

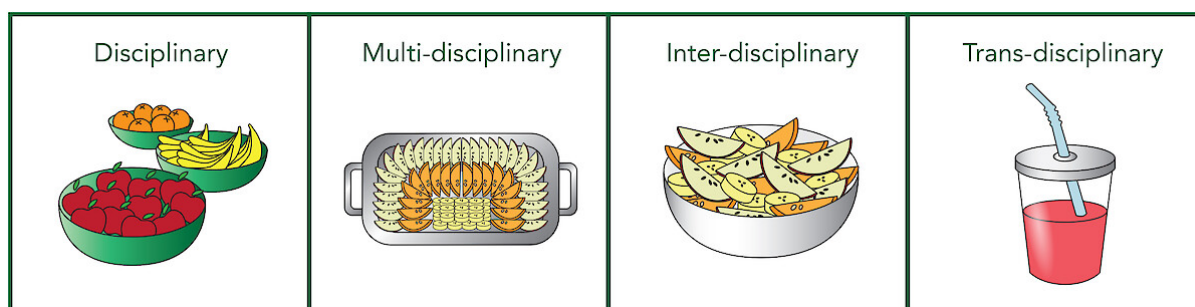
Increasing impactful interdisciplinary research through a more balanced research funding and evaluation process

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<https://ian.umces.edu/blog/got-complex-problems-have-a-transdisciplinary-smoothie/>

Summary

Solving local, national, and global challenges will demand more from universities and research organizations. This challenge-driven research requires interdisciplinary research that includes a powerful combination of perspectives and insights from different academic disciplines. Despite the urgent need for impactful interdisciplinary research, it is clear that current research funding criteria, researcher incentives structures, capacity building and research impact assessment do not fully support the development of high calibre interdisciplinary research. While interdisciplinarity has achieved a status of recognition, it has not reached its full potential due to the persistence of significant obstacles at many levels of the creation of knowledge.¹ Such lack of supportive framework makes it challenging to develop and utilize the full potential of interdisciplinary research.

National funding agencies should launch a **Balanced Research Funding and Evaluation Initiative** to create and implement national standards for interdisciplinary research development, management, promotion, funding and evidence-based evaluation. The aim is to support more impactful research on global challenges, and other topics that greatly benefit from interdisciplinary research. This requires, Better Recognition of Interdisciplinary Research, Facilitating Cross-disciplinary Collaboration, Reducing Institutional Bias Against IDR, Streamlined and Interoperable Funding Application Process across Funding Agencies, Dedicated Funding Mechanisms for Interdisciplinary Research, Capacity Building and Training, Evaluation and Impact Assessment development.

¹ LERU,

<https://www.leru.org/files/Interdisciplinarity-and-the-21st-Century-Research-Intensive-University-Full-paper.pdf>

Challenge And Opportunity

Need for skills development on interdisciplinary research

Today scientific research is increasingly expected to address societal challenges. This places new demands for the universities, research performers and individual researchers. While the societal impacts are required, it is evident that the outcomes of impactful research needs to be acceptable for the wider population that is bearing the consequences. As a result, researchers' skill requirements are broadening from capability to perform disciplinary research tasks, to team skills and positive interaction with the wider society.

Funding agencies and institutions are creating initiatives such as the UN Sustainable Development Goals and EU Horizon 2020 to encourage interdisciplinary research² that can be more easily translated into global, national and community initiatives to enhance health and wellbeing. Therefore, the current research environment calls for interdisciplinary education and skills to carry out impactful research and to create sustained partnerships with community institutions. However, formalized opportunities in these areas are limited for students embarking on research careers (Gill, et al., 2015)

Our current information society, populated by increasingly well-informed and critical stakeholders, presents a challenge to both the policy and science arenas. The introduction of the UN Sustainable Development Goals (SDGs) offers a unique opportunity to direct joint activities towards these goals. SDGs have a societal focus and in the future much of the related scientific research can only be successful if stakeholders are part of the research effort in transdisciplinary projects, based on the principle of time-consuming "joint learning". However, in many fields internal organization of the discipline is not yet well tuned to the needs of inter- and transdisciplinary approaches (Bouma, J. and Montanarella, 2016).

Creating an interdisciplinary research proposal and doing the actual research demand different competencies and greater coordination (and resources) compared with disciplinary research. Granting agencies and research institutions should realize this greater management and provide needed support.

Need to develop evaluation and research assessment practices for interdisciplinary research - DORA Declaration 2012

As science evolves, so too do its evaluation practices. This notion was formulated in the San Francisco Declaration on Research Assessment (DORA Declaration (2012)). Now, 10 years on 2023 the DORA declaration has been signed by 23,350 individuals and organizations in 161 countries who state:

‘There is a pressing need to improve the ways in which the output of scientific research is evaluated by funding agencies, academic institutions, and other parties.

² Interdisciplinary research is “a mode of research by teams or individuals that integrates information, data, techniques, tools, perspectives, concepts, and/or theories from two or more disciplines or bodies of specialized knowledge to advance fundamental understanding or to solve problems whose solutions are beyond the scope of a single discipline or area of research practice” National Academy of Sciences, National Academy of Engineering, and Institute of Medicine. 2005. *Facilitating Interdisciplinary Research*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/11153>.

The outputs from scientific research are many and varied, including: research articles reporting new knowledge, data, reagents, and software; intellectual property; and highly trained young scientists. Funding agencies, institutions that employ scientists, and scientists themselves, all have a desire, and need, to assess the quality and impact of scientific outputs. It is thus imperative that scientific output is measured accurately and evaluated wisely.’

Three themes run through these recommendations:

- the need to eliminate the use of journal-based metrics, such as Journal Impact Factors, in funding, appointment, and promotion considerations;
- the need to assess research on its own merits rather than on the basis of the journal in which the research is published; and
- the need to capitalize on the opportunities provided by online publication (such as relaxing unnecessary limits on the number of words, figures, and references in articles, and exploring new indicators of significance and impact).

Need to reform research assessment - COARA coalition 2020

The Coalition for Advancing Research Assessment (COARA, 2020) represents another initiative in research evaluation renewal. Initiated in January 2022, more than 350 organisations from over 40 countries have participated. Organisations involved included public and private research funders, universities, research centres, institutes and infrastructures, associations and alliances thereof, national and regional authorities, accreditation and evaluation agencies, learned societies and associations of researchers, and other relevant organisations, representing a broad diversity of views and perspectives, who argue:

The Agreement on Reforming Research Assessment sets a shared direction for changes in assessment practices for research, researchers and research performing organisations, with the overarching goal to maximise the quality and impact of research. The Agreement includes the principles, commitments and timeframe for reforms and lays out the principles for a Coalition of organisations willing to work together in implementing the changes. Signatories commit to a common vision, which is that the assessment of research, researchers and research organisations recognises the diverse outputs, practices and activities that maximise the quality and impact of research. This requires basing assessment primarily on qualitative judgement, for which peer-review is central, supported by responsible use of quantitative indicators’ (The Agreement on Reforming Research Assessment, 2020).

Reports by the League of European Research Universities (LERU) and other European organizations over the last two decades have concluded that compared with traditional research, interdisciplinary research requires

- more effort to manage
- dedicated training in teamwork and communication to enable successful taskwork
- sustained efforts to overcome governance, administrative, funding, publication, promotional, and evaluative bias that hinder IDR (European Union Research Advisory Board 2004; LERU, 2016, 2023; EASSH 2019)

Precedents

Dedicated funding to foster interdisciplinary research can come from funding bodies at different levels, such as national funding agencies, and universities. National funding agencies may consider adding an interdisciplinary component to the funding scheme so disciplinary-based evaluations do not penalize interdisciplinary projects. For example, many research funders around the world have attempted to develop strategies to encourage interdisciplinary research:

- **UK Research and Innovation (UKRI)**, as the national funding agency investing in science and research in the UK, has developed a Cross-Council Funding Agreement to set out the principles and processes for the assessment of interdisciplinary research proposals that cross two or more council remit domains. This Agreement helps to encourage interdisciplinary proposals, ensure that peer review is fair and appropriate, and provide equal opportunities for funding whether single or multiple disciplines.
- **Global Research Council (GRC)**, a federation of more than 50 national research funders, has selected interdisciplinarity as one of its two annual themes for an in-depth report, debate, and statement between now and mid-2016, which attempts to create a robust and supportive environment, develop new research infrastructure and establish effective processes for the review and evaluation for the interdisciplinary research.
- **The Natural Science Foundation of China (NSFC)** has officially established the Department of Interdisciplinary Sciences (DIS) in 2020, with a clear mission and responsibility of promoting interdisciplinary scientific research in China. DIS has experienced a process of pioneering explorations in a series of aspects to create the culture for accelerating interdisciplinary cooperation, such as initiating “top-down” design of projects, summarization of scientific issues, selection of outstanding projects, and training of potential talent, etc.

Universities may also take autonomous actions by themselves to create university-wide initiatives to solicit interdisciplinary projects and encourage cross-department collaborations to address research problems that are in line with the universities’ research agenda and the societal demand. Many research-intensive universities launched funding programs at the university level to foster interdisciplinary research specifically and encourage cross-department collaboration.

- At **Leiden University** (The Netherlands), eight university-wide interdisciplinary programs that tackle important global agendas such as sustainable development goals are set up by the University’s board of directors. The selected programs will receive funding for four years.
- Similarly, at **KU Leuven** (Belgium), interdisciplinary research, especially those with “high risk and high societal impact”, could be solicited and funded by their internal funding scheme for Interdisciplinary Networks (ID-N). Each year, an annual budget of €5 million will be provided for 5-8 projects.
- Some universities choose to fund excellent Interdisciplinary research for a longer period. For instance, the **University of Zurich** (Switzerland), through its University Research Priority

Programs, selects projects with high societal impact and provides funding for a 12-year period.

- In addition to funding projects from career researchers, **Trinity College Dublin** (Ireland) announced funding calls to encourage teams of cross-faculty PIs to co-supervise Ph.D. students in challenge-based interdisciplinary research projects.

Point of action

This policy proposal aims to improve the effectiveness of funding interdisciplinary research projects to address global challenges. By recognizing the unique value and potential impact of interdisciplinary research, facilitating cross-disciplinary collaboration, streamlining the funding application process, and establishing dedicated funding mechanisms, this proposal seeks to better cater to the needs of interdisciplinary research in tackling complex contemporary challenges.

Recommendation 1. Recognition of Interdisciplinary Research

- Emphasize the significance of interdisciplinary research in addressing complex global challenges by highlighting its potential for innovative solutions, broader perspectives, and holistic approaches.
- Encourage funding agencies to develop specific policies and guidelines that promote and prioritize interdisciplinary research as a strategic priority.

Recommendation 2. Facilitating Cross-disciplinary Collaboration:

- Establish platforms and mechanisms that facilitate networking and collaboration among researchers from different disciplines, encouraging the formation of interdisciplinary research teams.
- Encourage research institutions and funding agencies to organize interdisciplinary workshops, seminars, and conferences to foster interaction and collaboration among researchers working on global challenges.

Recommendation 3. Streamlining the Funding Application Process

- Develop a simplified and flexible funding application process that accommodates the unique characteristics of interdisciplinary research.
- Provide clear guidelines for applicants on how to effectively present interdisciplinary research proposals, including appropriate language and frameworks for articulating the integration of multiple disciplines.
- Establish interdisciplinary review panels or committees that consist of experts from diverse fields to evaluate interdisciplinary research proposals.

Recommendation 4. Dedicated Funding Mechanisms for Interdisciplinary Research

- Allocate a portion of funding agency budgets explicitly earmarked for interdisciplinary research on global challenges.
- Designate specific grant programs or funding streams that are exclusively focused on supporting interdisciplinary research projects.
- Create interdisciplinary research centers or institutes that serve as hubs for collaboration and provide long-term funding and support for interdisciplinary research initiatives.

Recommendation 5. Capacity Building and Training

- Develop training programs and workshops to enhance researchers' skills in interdisciplinary research methodologies, communication, and collaboration across disciplines.
- Encourage educational institutions to incorporate interdisciplinary research training and education into their curriculum to prepare future researchers for global challenges.

Recommendation 6. Evaluation and Impact Assessment

- Establish evaluation criteria that consider the unique challenges and potential impact of interdisciplinary research on global challenges.
- Encourage the development of appropriate metrics and indicators to assess the outcomes and societal impact of interdisciplinary research projects.
- Conduct periodic reviews and evaluations of funded interdisciplinary research projects to learn from successes and failures and refine future funding strategies.

Conclusion

This policy proposal advocates for a comprehensive approach to enhancing the funding of interdisciplinary research projects aimed at addressing global challenges. By recognizing the importance of interdisciplinary research, facilitating collaboration, streamlining the application process, establishing dedicated funding mechanisms, promoting capacity building, and implementing robust evaluation and impact assessment, research funding agencies can effectively support interdisciplinary research endeavors and foster innovative solutions to the complex global challenges we face.

Literature

Bouma, J. and Montanarella, L.: Facing policy challenges with inter- and transdisciplinary soil research focused on the UN Sustainable Development Goals, *SOIL*, 2, 135–145, <https://doi.org/10.5194/soil-2-135-2016>, 2016

Bromham, Lindell, Russell Dinnage, and Xia Hua. "Interdisciplinary research has consistently lower funding success." *Nature* 534.7609 (2016): 684-687.

Brown R, Werbeloff L, Raven R. Interdisciplinary Research and Impact. *Glob Chall*. 2019 Apr 5;3(4):1900020. doi: 10.1002/gch2.201900020. PMID: 31565373; PMCID: PMC6450447. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6450447/>

Coalition for advancing research assessment - COARA, (2020) <https://coara.eu/agreement/the-agreement-full-text/> The Agreement on Reforming Research Assessment, (2020).

https://coara.eu/app/uploads/2022/09/2022_07_19_rra_agreement_final.pdf

Gill, S.V., Vessali, M., Pratt, J.A., Watts, S., Pratt, J.S., Raghavan, P. and DeSilva, J.M. (2015), The Importance of Interdisciplinary Research Training and Community Dissemination. *Clinical And Translational Science*, 8: 611-614. <https://doi.org/10.1111/cts.12330>)

European Alliance for Sciences and Humanities, Interdisciplinary perspectives for Horizon Europe: Lessons from the 4th SSH Integration Monitor Report April 2019 <https://eassh.eu/Position-Papers/easshsshintegration4threportfnl.pdf>

European Union Research Advisory Board 2004
LERU, 2016, 2023;

Rylance, R. "Global funders to focus on interdisciplinarity." *Nature* 525.7569 (2015): 313-315.

San Francisco Declaration on Research Assessment (2012)
<https://sfdora.org/read/>

Van Noorden, Richard. "Interdisciplinary research by the numbers." *Nature* 525.7569 (2015): 306-307.

Additional bits and pieces and odd clips for future use

AI will be part of future R&D - let's think about IDR now

Kusters R, Misevic D, Berry H, Cully A, Le Cunff Y, Dandoy L, Díaz-Rodríguez N, Ficher M, Grizou J, Othmani A, Palpanas T, Komorowski M, Loiseau P, Moulin Frier C, Nanini S, Quercia D, Sebag M, Soulié Fogelman F, Taleb S, Tupikina L, V, Vie J-J and Wehbi F (2020) Interdisciplinary Research in Artificial Intelligence: Challenges and Opportunities. *Front. Big Data* 3:577974. doi: 10.3389/fdata.2020.577974

Increasing our understanding of how to effectively design and deliver interdisciplinary research is crucial to realizing the SDG agenda.

Why interdisciplinary research matters. *Nature* 525, 305 (2015).
<https://doi.org/10.1038/525305a>

overview of challenges and solutions

Name: "InterConnect: Empowering Interdisciplinary Research Policy Program"

Explanation: "InterConnect" captures the essence of the program's objective, which is to establish connections and foster collaboration between diverse disciplines. The term "Inter" signifies the interaction and integration of different fields, while "Connect" emphasizes the program's aim to create meaningful connections and networks among researchers and policymakers.

The name "Empowering Interdisciplinary Research Policy Program" highlights the program's goal of empowering researchers and policymakers to engage in interdisciplinary research. It conveys the notion of providing support, resources, and opportunities for interdisciplinary collaboration in the policy realm.

Overall, the name "InterConnect: Empowering Interdisciplinary Research Policy Program" conveys the program's mission to facilitate interdisciplinary research by enabling connections, collaboration, and empowerment among researchers and policymakers.

Name: "InnovateSolve: Advancing Interdisciplinary Solutions Policy Program"

Explanation: "InnovateSolve" combines the concepts of innovation and problem-solving, highlighting the program's emphasis on finding creative and effective solutions to complex problems. The term "Innovate" represents the program's drive for innovation, while "Solve" emphasizes its goal of addressing and resolving challenging issues.

The name "Advancing Interdisciplinary Solutions Policy Program" clearly communicates the program's objective of advancing interdisciplinary research that leads to practical and impactful

solutions. It underscores the program's focus on generating interdisciplinary approaches to address complex problems within the policy realm.

Overall, the name "InnovateSolve: Advancing Interdisciplinary Solutions Policy Program" encompasses the program's commitment to fostering interdisciplinary collaboration, innovation, and problem-solving in order to tackle complex challenges through policy-oriented research.

Name: "ImpactLink: Advancing High-Quality Interdisciplinary Research"

Researching for Reality: Improving Interdisciplinary Research (IDR)

Explanation: "ImpactLink" signifies the program's mission to connect and link high-quality interdisciplinary work with tangible impact. The term "Impact" emphasizes the program's focus on generating meaningful and measurable outcomes, while "Link" highlights its aim to bridge different disciplines and stakeholders for collaborative, impactful policy solutions.

The name "Advancing High-Quality Interdisciplinary Policy" clearly articulates the program's objective of advancing rigorous and impactful interdisciplinary research within the policy domain. It underscores the program's commitment to promoting excellence, quality, and relevance in interdisciplinary work.

Overall, the name "ImpactLink: Advancing High-Quality Interdisciplinary Policy" conveys the program's dedication to driving interdisciplinary research that produces significant policy outcomes. It emphasizes the program's focus on linking rigorous interdisciplinary approaches with real-world impact, thereby fostering effective policy solutions and promoting positive societal change.

Comment: Current structures did not serve interdisciplinary research well, and that it was significantly more difficult to gain funding for this than for mainstream activity.

- Rylance, R. "Global funders to focus on interdisciplinarity." *Nature* 525.7569 (2015): 313-315.

Comment: There is increasing interest in research that breaks free of traditional discipline boundaries, but the growing concern that interdisciplinary research is not adequately supported under current funding structures, where it has been shown that interdisciplinary proposals have lower funding success rates.

- Bromham, Lindell, Russell Dinnage, and Xia Hua. "Interdisciplinary research has consistently lower funding success." *Nature* 534.7609 (2016): 684-687.

Interdisciplinary research is on the rise, and takes time to have an impact—achieve lower impact in the short-run, but higher impact in the long-term.

- Van Noorden, Richard. "Interdisciplinary research by the numbers." *Nature* 525.7569 (2015): 306-307.

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