Co-Design with Stakeholders

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Co-design is a collaborative and participatory research tool that aims to improve the impact of research efforts. It is both a method and a process. It is used in research, community development, policy, and other settings. Co-design is most often applied in complex problem settings where technical, social, political, cultural and economic considerations all have relevance to finding a solution or triggering innovation. Co-design methods seek to integrate knowledge held by diverse knowledge holders to improve the quality and utility of research outcomes. That is, co-design is the process that leads to the *co-production* of new knowledge.

The theory underpinning co-design makes three common assumptions. First, is that knowledge systems are diverse and the integration of different knowledges creates multiple values. Second, scientists, with specialised scientific knowledge, are only one valuable partner in solving complex problems. Third, planning for the co-production of knowledge must consider benefits beyond the sole pursuit of intellectual scholarship.

There are myriad benefits to pursuing co-design approaches, both practical and ethical. These include:

- enhancing the utility of research outcomes by involving the intended beneficiaries of research in problem framing, ideas generation and solution options;
- creating shared ownership and responsibility for solution generation;
- acknowledging the value of diverse knowledge holders to problem solving;
- re-balancing power across diverse knowledge holders; and
- building critical partnerships for catalysing innovation.

Considerations Important to Co-Design

There are important distinctions to be mindful of when planning a co-design project. Whether the project should adopt a multidisciplinary, interdisciplinary or transdisciplinary approach to design is one important consideration. Multidisciplinary

research approaches do not tend to integrate knowledge deeply across disciplinary boundaries. Instead, multidisciplinary approaches tend to obtain value from collating multiple viewpoints on a pre-determined topic. Multidisciplinary research projects are not typically considered to require co-design approaches.

The co-design method is almost always applied to inter- and transdisciplinary research projects because of the need to bring together multiple perspectives, values and experiences to a complex problem. In interdisciplinary research, scientists are aiming to step beyond their own disciplinary boundary to blend and extend knowledge into new knowledge spaces. This differs from transdisciplinary projects where scientists and researchers share the tasks of problem framing, research design, and research evaluation with knowledge holders from other sectors other than science. These sectors might include policy makers, business and government representatives, local communities, First Nations peoples, and industry. Co-design processes help to manage power imbalances between co-design partners.

Co-design processes need to be fit-for-purpose and require careful planning. Co-design initiatives work best when they are well-considered, facilitated inclusively, and overseen by (co)leaders who can build trust and co-operation. They need to be well-resourced. The risks associated with poorly planned co-design processes are considerable and can lead to project failure. Erosion of trust among collaborating partners and the fracturing long-standing stakeholder relationships are examples of these risks.

Co-design approaches are relevant for students and researchers working on complex problems that require collaboration across disciplines, sectors, industries, civil society groups or governments. Co-design approaches are often used when the problem to be solved is multi-faceted. Co-design is both a method and a process and requires careful planning, coordination and resourcing. There are many research projects where co-design approaches will not be suited.

Why is it relevant?

Some problems that scientists try to solve require inputs from others who hold different knowledge types, values and experiences. For example, innovation in science requires technical knowledge to be linked with social, regulatory, institutional, and place-based (local) knowledge. Science domains like advanced engineering biology, biosecurity, agrifood systems, and sustainability transitions, require scientists and researchers to work alongside each other, and with others, to enhance research impact.

Practical Steps

1. Co-design projects can be small, but they need to be well-planned. A first important step is to understand how your research problem fits in a bigger social/political/economic system. A rapid literature scan to better understand your application context will provide you with hints about the types of knowledge that may be useful for collaboration.
2. Identify the types of knowledge holders important to your research problem.
3. Map your knowledge holders according to their perceived role in your research problem. You can use labels such as 'policy maker with knowledge in *x*'; 'data scientist with skills in *y*'.
4. Invite your chosen collaborators to attend an initial discussion with you. In this meeting you might introduce yourself, your research project and what you hope others can bring to the collaboration.
5. Appoint a leader(s) to coordinate meetings and facilitate group discussions. This is a critical role in well-functioning co-design processes.
6. Work collaboratively to reach agreement for each project stage, including research design, data collection, analysis and interpretation, and communication. A co-designed project shares responsibility, ownership, risks and benefits across its collaborators. Agreement on these aspects of the project in early stages is important.
7. Remember to build in shared and regular evaluation on how the research and collaboration is going, creating an open, trusted environment where collaborators can voice concerns or issues.

Case Study

Integrating Artificial Intelligence with Humanities and Social Sciences – Creating a Community of Practice to improve disciplinary integration [1]

Context: As artificial intelligence (AI) increasingly shapes decision-making across society, there have been growing calls to involve disciplines beyond computer science to address ethical, social, and environmental risks. However, little practical guidance exists on how such interdisciplinary collaboration should be implemented.

The Initiative: A group of Australian AI researchers and scholars from the humanities, social sciences, and economics (HSES) undertook an 18-month interdisciplinary integration initiative. The project applied a co-design approach intended to build shared

understanding, support collaboration, and create a foundation for longer-term interdisciplinary outcomes rather than immediate technical outputs.

Approach: The team adopted a collaborative inquiry approach to co-design, allowing participants to reflect on their experiences while actively engaging in cross-disciplinary work. Activities focused on dialogue, joint problem framing, and exploring how different disciplinary perspectives could inform AI development.

Challenges: Participants encountered significant barriers, including differences in disciplinary language, research methods, evidence standards, and expectations of impact. These mismatches often slowed progress and highlighted that integration does not occur automatically through collaboration alone.

Outcomes and Lessons: The initiative demonstrated that meaningful integration between AI and HSES disciplines requires deliberate design, time, and institutional support. Key enablers included dedicated resourcing, space for experimentation, long-term commitment, and acknowledgement that interdisciplinary integration is an ongoing process rather than a one-off success.

Key Insight: Responsible and socially aligned AI development depends not only on technical innovation, but on sustained, well-supported interdisciplinary collaboration that values diverse forms of expertise.

References

1. Carter, L., Stone-Jovicich, S., Bohensky, E., *et al.* (2025). Lessons from the Edges of Interdisciplinarity - Integrating Artificial Intelligence with the Humanities, Social and Economic Sciences. *Applied Artificial Intelligence*, *39*(1). https://doi.org/10.1080/08839514.2025.2584380

2. O'Donnell M, Collier M, Pineda-Pinto M, Cooper C, Nulty F., *et al.* (2025) Re-defining co-design for social-ecological research and practice: A systematic literature review. *Environmental Science and Policy*, 164: 103998. https://doi.org/10.1016/j.envsci.2025.103998

3. Hamilton S, Merritt W, Carter L, Palo AS, Piñon CD, and Cosijn M. (2025) *The Process and Toolkit from the Inclusive Value Chains project in the Philippines 2020-2025*. https://doi.org/10.25919/mqak-vy16

4. Bammer, G., O'Rourke, M., O'Connell, D. *et al.* (2020). Expertise in research integration and implementation for tackling complex problems: when is it needed, where can it be found and how can it be strengthened? *Humanities and Social*

Sciences Communications, 6(5):1-16. https://doi.org/10.1057/s41599-019-0380-0