Toolkits for transdisciplinary research

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By Gabriele Bammer

Gabriele Bammer (biography)

If you want to undertake transdisciplinary research, where can you find relevant concepts and methods? Are there compilations or toolkits that are helpful?

I've identified eight relevant toolkits, which are described briefly below and in more detail in the journal GAIA's Toolkits for Transdisciplinarity series.

One toolkit provides concepts and methods relevant to the full range of transdisciplinary research, while the others cover four key aspects: (i) collaboration, (ii) synthesis of knowledge from relevant disciplines and stakeholders, (iii) thinking systemically, and (iv) making change happen.

Full range of transdisciplinary research
1. Research integration and implementation

Collaboration
2. Collaboration

Synthesis of knowledge from relevant disciplines and stakeholders

3. Co-producing knowledge
4. Dialogue methods for knowledge synthesis
5. Integration methods

Thinking systemically

6. (Dynamic) systems thinking

Making change happen

7. Engaging and influencing policy
8. Change

Of the eight toolkits, two – on knowledge co-production and on integration – were developed by transdisciplinary researchers. The others were developed in different contexts but still include many methods that transdisciplinarians will find useful.

1. Research integration and implementation

The Integration and Implementation Sciences (I2S) website provides more than 100 tools, approaches and cases relevant to research integration and implementation. They deal with:

i. synthesis of knowledge from different disciplines and stakeholders
ii. understanding and managing unknowns
iii. providing integrated research support for policy and practice change.

Reference: http://i2s.anu.edu.au/resources

2. Collaboration

Practical guidance is provided on collaboration in research teams, including those which strive for high levels of integration. The toolkit is divided into nine sections:

i. preparing to collaborate
ii. building a research team
iii. fostering trust

iv. developing a shared vision
v. communicating about science
vi. sharing recognition and credit
vii. handling conflict
viii. strengthening team dynamics
ix. navigating and leveraging networks and systems.

Reference: Bennett, L. M., Gadlin, H. and Levine-Finley, S. (2010). *Collaboration and team science: A field guide*. National Institutes of Health Publication, 10-7660. National Institutes of Health: Bethesda, United States of America. Online (open access): http://teamscience.nih.gov

3. Co-producing knowledge

The td-net toolbox for co-producing knowledge provides 14 methods for bringing together different perspectives on a problem, recognising that both individuals and social groups have different ways of thinking about issues. The methods deal with ways of:

i. tailoring research questions
ii. identifying relevant 'actors'
iii. constructing groups
iv. sharing and consolidating expert and/or non-expert knowledge and perspectives
v. constructing a timeline of significant events
vi. planning possible futures
vii. challenging suggested solutions
viii. identifying impacts.

Reference: https://naturalsciences.ch/topics/co-producing_knowledge

4. Dialogue methods for knowledge synthesis

Fourteen dialogue methods to bring together disciplinary experts and/or stakeholders are described, along with case studies of applications in four research areas: environment, population health, security and technological innovation. The methods deal with ways of understanding and combining:

i. judgements
ii. visions
iii. assumptions
iv. interests
v. values.

Reference: McDonald, D., Bammer, G. and Deane. P. (2009). *Research integration using dialogue methods*. ANU Press: Canberra, Australia. Online (open access): http://press.anu.edu.au/?p=60381

5. Integration methods

Integration is essential in transdisciplinary research, with seven groups of integration methods:

i. Integration through conceptual clarification and theoretical framing
ii. Integration through research questions and hypothesis formulation
iii. Screening, using, refining, and further developing effective integrative scientific methods
iv. Integrative assessment procedures
v. Integration through development and application of models
vi. Integration through artifacts, services and products as boundary objects
vii. Integrative procedures and instruments of research organisation

Reference: Bergmann, M., Jahn, T., Knobloch, T., Krohn, W., Pohl, C. and Schramm, E. (2012). *Methods for transdisciplinary research: A primer for practice*. Campus Verlag: Frankfurt am Main // German version: *Methoden transdisziplinärer Forschung:*
Ein Überblick mit Anwendungsbeispielen. Published in 2010. See also Matthias Bergmann's blog post.

6. (Dynamic) systems thinking

Transdisciplinary research often requires systems thinking, especially understanding how the inter-related elements of a problem form a complex and unified whole, and how those interdependencies influence the actions that can be taken. Seven how-to guides provide an introduction to systems

thinking tools, especially for understanding dynamic systems. Several focus on systems archetypes, which are distinctive combinations of reinforcing and balancing processes found in many kinds of organisations, under many circumstances, and at many levels and scales. They are:

i. Introduction to systems thinking
ii. Systems thinking tools: a user's reference guide
iii. System archetypes basics: from story to structure
iv. Systems archetypes I: diagnosing systemic issues and designing interventions
v. Systems archetypes II: using systems archetypes to take effective action
vi. Systems archetypes III: understanding patterns of behaviour and delay
vii. Applying systems archetypes

Reference: https://thesystemsthinker.com/category/how-to-guides

7. Engaging and influencing policy

This guide provides a general approach and specific methods addressing how researchers can effectively interact with policy makers. It is based on the extensive experience of the Research in Policy and Development (RAPID) programme of the UK Overseas Development Institute. The toolkit provides guidance in three areas:

i. Diagnosing the problem: understanding root causes rather than symptoms, understanding why the problem persists, diagnosing complexity and uncertainty, and identifying stakeholders.
ii. Developing an engagement strategy to influence policy: identifying realistic outcomes, identifying who or what is to be influenced, developing a theory of change, developing and implementing a communications strategy, and assessing the available capacity and resources.
iii. Developing a monitoring and learning plan: defining information requirements, collecting and managing data, and making sense of data to improve decision-making.

Reference: Young, J., Shaxson, L., Jones, H., Hearn, S., Datta, A. and Cassidy, C. (2014). *Rapid Outcome Mapping Approach: A Guide to Policy Engagement and*

Influence. Overseas Development Institute (ODI): London, UK. Online (PDF and workbook): http://www.roma.odi.org

8. Change

More than 120 techniques aimed at achieving change are presented, many of which can be adapted for transdisciplinary research. There are three major sections covering change at the following levels:

i. Personal, in two groups: goals and creativity, and personal growth
ii. Team, in two groups: different perceptions of reality (maps) and team learning
iii. Larger systems, in six groups: organisational analysis; vision, values and goals; planning and project management; understanding clients and stakeholders; systems thinking, and large systems change.

Reference: Nauheimer, H. (1997). *The change management toolbook. A collection of tools, methods and strategies*. Online (open access PDF and online version with additional more recent tools): http://www.change-management-toolbook.com/.

Do you have useful tools or toolkits to share?

To find out more, see Toolkits for transdisciplinarity:
Toolkit #1 – Co-producing knowledge. *GAIA*, 24, 3: 149. Online (DOI): 10.14512/gaia.24.3.2
Toolkit #2 – Engaging and influencing policy. *GAIA*, 24, 4: 221. Online (DOI): 10.14512/gaia.24.4.2
Toolkit #3 – Dialogue methods for knowledge synthesis. *GAIA*, 25, 1: 7. Online (DOI): 10.14512/gaia.25.1.3
Toolkit #4 – Collaboration. *GAIA*, 25, 2: 77. Online (DOI): 10.14512/gaia.25.2.2
Toolkit #5 – Change. *GAIA*, 25, 3: 149. Online (DOI): 10.14512/gaia.25.3.2
Toolkit #6 – Research integration and implementation. *GAIA*, 25, 4: 229. Online (DOI): 10.14512/gaia.25.4.2
Toolkit #7 – (Dynamic) systems thinking. *GAIA*, 26, 1: 7. Online (DOI): 10.14512/gaia.26.1.3
Toolkit #8 – Integration Methods. *GAIA*, 26, 2: 79. Online (DOI): 10.14512/gaia.26.2.3

To see all blog posts from the partnership with the journal GAIA: https://i2insights.org/tag/partner-gaia-journal/

Biography: *Gabriele Bammer PhD is a professor at The Australian National University in the Research School of Population Health's National Centre for Epidemiology and Population Health. She is developing the new discipline of Integration and Implementation Sciences (I2S) to improve research strengths for tackling complex real-world problems through synthesis of disciplinary and stakeholder knowledge, understanding and managing diverse unknowns and providing integrated research support for policy and practice change. She leads the theme "Building Resources for Complex, Action-Oriented Team Science" at the US National Socio-environmental Synthesis Center.*

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Change, Integration, Methods, Participation, Research implementation, Systems, Toolkits

Co-production, Collaboration, Dialogue, Integration and implementation sciences (i2S), Knowledge synthesis, Partner - GAIA journal, Policymaking, System dynamics approach, Systems archetypes, Systems thinking, Transdisciplinarity (general relevance)

Gabriele Bammer

7 thoughts on "Toolkits for transdisciplinary research"