FAQ: What are the main topics covered by i2S?

To date, there have been two ways of describing the main topics covered by Integration and Implementation Sciences (i2S). One is a list of 14 topics, the other consists of three domains and 5 questions. Even though they do not fit together neatly, these are two compatible framings. Both aim to provide a way of identifying and conveying the expertise required to undertake research on complex societal and environmental problems. This expertise needs to be recognised as high level, separate from, but equivalent to, other disciplinary expertise.

Fourteen main topics

Fourteen main topics were developed in 2019 as an index for Integration and Implementation Insights (i2Insights; http://i2Insights.org) which is a blog and repository "providing research resources for understanding and acting on complex real-world problems." With some minor modifications they have withstood the test of time and each blog posts is catalogued using one or more of these topics. The current list of topics is:

- change
- communication
- context
- decision making
- diversity
- education
- evaluation
- institutionalisation
- integration
- research implementation
- stakeholder engagement
- systems
- teamwork
- unknowns.

The following narrative has been developed to describe how these fit together:
Research dealing with any complex societal or environmental problem has three overlapping dimensions:

1. developing a more comprehensive understanding of the problem, both what is known and what is not known
2. generating ideas about addressing the problem, including what may and may not work
3. supporting improved policy and practice responses to the problem by government, business and civil society.

Such research involves **integration** of multiple and varied perspectives about the problem and insights into acting on it, all the while not losing sight of **unknowns** and outliers that do not fit neatly into a synthesized package, especially as these can be the sources of adverse unintended consequences and nasty surprises. It also involves **research implementation** and the best-possible **decision making** to underpin policy and practice **change**.

Research integration and implementation require a **systems** perspective, incorporating **context** and seeking out **diversity** in participants, ideas, mental models, epistemologies, values and more. It requires **teamwork** by researchers from different disciplines, along with **stakeholder engagement**, with those affected by the problem and those in a position to do something about it.

Communication and dialogue about the research problem, the research process and the findings underpin effective research and action.

Research integration and implementation requires **evaluation** to improve effectiveness, **education** to develop expertise in research integration and implementation, and **institutionalisation** to ensure that the expertise is recognised, widely adopted and rewarded.

Three domains and five questions

i2S is also conceived as covering three domains and 5 questions, which formed the basis of the major description of i2S published in 2013 (Bammer, 2013). In this description research tackling complex societal and environmental problems was referred to as "integrative applied research."

The three domains are:

1. Synthesising disciplinary and stakeholder knowledge, which involves bringing together knowledge from relevant disciplines, as well as stakeholders, who are those affected by a problem under investigation, and those in a position to act on it.
2. Understanding and managing diverse unknowns, especially those that cannot be eliminated, in order to minimize adverse unintended consequences and unpleasant surprises.
3. Providing integrated research support for policy and practice change. This recognises that a) the role of researchers is primarily to support decision makers, rather than taking action themselves; b) research support (often referred to as 'the evidence') should take into account both what is known and what is not known; and c) decision makers can be involved in setting policy and/or changing practice in government, business and/or civil society.

The three domains are fleshed out using five questions which highlight the expertise required and operationalize the domains in a way that aims to be both systematic and comprehensive. The questions (which can be used in any order and which require iteration) are designed to be used by projects tackling complex societal or environmental problems to ensure that all the important issues are covered.

Question 1— What is the integrative applied research aiming to achieve and who is intended to benefit? (For what and for whom?)

This question recognizes that there are several ways of approaching the problem and that these need to be considered in the process of determining what the research will aim to do and who the research is seeking to serve.

Question 2— What knowledge is synthesized, unknowns considered, and aspects of policy and practice targeted in the integrative applied research? (Which knowledge, unknowns and aspects of policy and practice?)

This question involves:

- Taking a systems approach to consider a) possible interconnections, for example among interrelated problems, causes, and areas for action as well as b) perspectives.
- Scoping all the knowledge and unknowns that different disciplines and stakeholders can offer, as well as all the potential areas where the research could support action
- Setting boundaries, based on the scoping, to determine what will be included and excluded in the research, as well as which decision makers will be offered support.

- Framing both the problem and research findings to aid communication and action.
- Identifying the values at play, along with managing any value conflicts that arise during research or implementation of findings.
- Harnessing and managing differences, which is the essence of collaboration for both research and action. The aim is to harness the differences which provide the rationale for the collaboration and to manage those which are sources of irritation and impede collaboration.

Question 3— How is the integrative applied research undertaken (the knowledge synthesized, diverse unknowns understood and managed, and integrated research support provided), by whom and when? (How?)

This question deals with methods, processes and concepts for knowledge synthesis, understanding and managing unknowns, and providing integrated research support for policy and practice change.

Methods for knowledge synthesis can be grouped into three classes:

- Dialogue, which can be formal or informal.
- Building a product, which can be a model, artefact or shared vision.
- Common metrics, which are single measures that elements of the problem can be converted to; the most widely used of which is dollar value.

The most common *methods for dealing with unknowns* are reduction—converting the unknown into knowledge—and banishment—ruling the unknown out of scope. For complex problems, other methods must also be brought to bear, particularly acceptance that the unknown exists, cannot be reduced, and should not be banished (Smithson, 1989). Methods for accepting unknowns include adaptive management, employing the precautionary principle, developing scenarios, diversification and hedging.

Finally, three common *methods to provide integrated research support for policy and practice change* are:

- Informing policy makers and practitioners about research findings through various forms of communication.
- Advocating for particular types of change based on research findings.
- Engaging with policy makers and practitioners to develop shared understanding of a problem and a joint strategy for action.

Question 4— What circumstances might influence the integrative applied research? (Context?)

This question examines the circumstances in which integrative applied research occurs, especially those that can affect understandings and action. Context can be usefully considered to have three key elements:

- Overall context, which refers to the big picture such as the history of the problem and action taken on it, influences from geography and culture, and political possibilities for intervening in a problem.
- Authorization, which considers the sources of legitimacy for research and action (and any associated restrictions).
- Organizational facilitators and barriers, which refers to the structure and culture of the organizations involved in the research; these facilitate some aspects of integrative applied research and provide barriers to others.

Question 5— What is the result of the integrative applied research? (Outcomes?)

This question uses the other four questions as the basis for evaluating integrative applied research, asking for example:

- Were aims and beneficiaries clearly articulated for each of the three domains?
- Was an effective systems analysis used as part of knowledge synthesis?
- Were effective methods used for managing unknowns?
- Were lessons from previous attempts to offer research support for policy action on the problem understood and taken into account?

References:

Information about the index for i2Inisghts and definitions of the 14 main topics can be found at https://i2insights.org/index/

Bammer, G. (2013). *Disciplining interdisciplinarity: Integration and implementation sciences for researching complex real-world problems*. ANU Press: Canberra. https://dx.doi.org/10.22459/DI.01.2013

Smithson, M. (1989). *Ignorance and uncertainty: Emerging paradigms*. Springer Verlag: New York.

Origin:

This is one of four FAQ resources produced by Gabriele Bammer in 2022 for the Integration and Implementation Sciences (i2S) website. The information on that website has been transferred and is now available at https://i2insights.org/i2s/. The FAQ are listed under "Historical notes" on https://i2insights.org/i2s/i2s-publications/, which provides more information about them.