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# INTEGRATION INSIGHTS

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THE CASE FOR A NEW DISCIPLINE OF INTEGRATION AND  
IMPLEMENTATION SCIENCES (I2S)

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## THE CASE FOR A NEW DISCIPLINE OF INTEGRATION AND IMPLEMENTATION SCIENCES (I2S)

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*How can the contribution of university research and education to tackling complex social, environmental and technological problems be boosted? Effectively tackling real-world problems requires a new type of researcher, who can enhance collaboration between discipline and practice experts. Such researchers need a solid foundation in a set of conceptual and methods skills, called Integration and Implementation Sciences (I2S).*

*I2S covers four domains, namely concepts and methods to enhance:*

- 1. fresh thinking on intractable problems;*
- 2. integration of disciplinary and stakeholder knowledge;*
- 3. understanding and management of ignorance and uncertainty; and*
- 4. the provision of research support for decision making and practice change.*

*I2S provides (a) the hub around which research institutions can organise teams to investigate real world problems, (b) a baseline level of quality for such work, (c) an avenue for transmitting new theory and methods between groups focusing on different real-world problems, and (d) a home for methodologies addressing recurrent concerns in tackling complex problems that are not the province of any discipline or practice area.*

*Integration Insights is a series of digests of concepts, techniques or real-world examples of integration in research.*

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### RATIONALE FOR DEVELOPING I2S

In addition to research that advances understanding through a single discipline, there is growing appreciation of the importance of cross-disciplinary research that focuses on real-world problems. There are three challenges in conducting such research that are not yet resolved:

1. No well-established institutional structures within which to undertake research on real-world problems;
2. No core methodological underpinning to cross-disciplinary problem-based research; and
3. Recurrent concerns in tackling real-world problems that are not within the domain of any discipline or practice area.

Integration and Implementation Sciences (I2S) provides a solution to all three challenges.

### *Institutional Structures for Research on Real-World Problems*

In terms of institutional structures, I2S shifts the focus away from the content of the real-world problems to the methods for addressing them. In other words, rather than trying to find agreed ways to institutionalize approaches to specific problems, such as multitudes of centres covering biosecurity, climate change, obesity, tobacco control etc., approaches to cross-disciplinary problem-based research are institutionalized through a discipline of Integration and Implementation Sciences, which is accommodated as a standard academic department. I2S researchers then provide the lynchpin for investigations into real-world problems, providing a concrete hub around which diverse discipline and practice perspectives can be drawn on in a flexible manner. The discipline and practice experts involved in investigating the real-world problem can change as the requirements of the investigation change.

In terms of how I2S is organised, some useful analogies can be drawn with statistics. Like statistics, I2S is a cross-cutting discipline which works on three levels: (i) a core of

people, the disciplinary specialists, who focus on the development of integration and implementation theory and methods; (ii) a substantially larger group of people, the equivalent of applied statisticians, who focus on integration and implementation in relation to specific problem areas, for example in biosecurity, climate change, population ageing and so on. They not only apply what is known to the problem area, but also use their work on the problem to develop new integration and implementation theory and methods; and (iii) just as most researchers have at least a basic appreciation of statistics, its uses and where to find advanced expertise when they need it, most researchers will also have a similar appreciation of Integration and Implementation Sciences.

*Core  
Methodological  
Underpinning*

A disciplinary hub focusing on integration and implementation theory and methods also addresses two fundamental weaknesses that cross-disciplinary problem-based research suffers from as it is currently conducted.

The first is that, unlike discipline-based research, there is no core methodological underpinning to cross-disciplinary problem-based research. As a consequence, the quality of such research is not guaranteed and is hard to assess. Furthermore, the outcomes are likely to be much more hit-or-miss than in discipline-based research.

The second weakness is that while many cross-disciplinary problem-based teams develop new concepts and techniques, there is no recognized systematic way for communicating such insights between problem-based teams. For example, researchers working on a problem of environmental management are unlikely to be aware of relevant innovations in, say, dialogue-based methods for integration developed in public health or security. This has slowed progress and led to considerable 'reinvention of the wheel'.

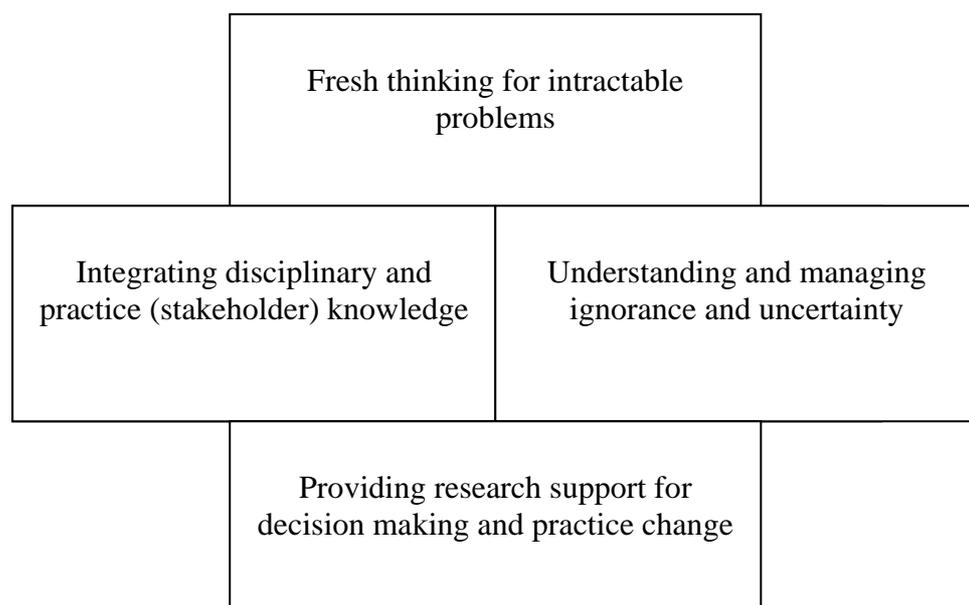
I2S overcomes this problem by providing cross-disciplinary problem-based researchers with a foundation of agreed core concepts and methods for undertaking their work, as well as an institutional mechanism for building the discipline and for communicating new developments.

*Orphan  
Domains*

I2S covers domains which are not the territory of any established research discipline or practice area and which are therefore academic 'orphans'. The foundation of I2S is compiling concepts and methods developed in disciplines or practice areas which individually address only part of the domain. A recent book bringing together a range of disciplinary and practice perspectives on uncertainty (Bammer and Smithson, 2008) is an example.

In other words, I2S covers integration and implementation concepts and methods that none of the established disciplines or practice areas has the mandate to pull together.

**THE FOUR  
CORNER-  
STONES OF I2S**



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## *Fresh Thinking for Intractable Problems*

There are four domains that I2S covers. Real world problems not only require the integration of insights from diverse discipline and practice perspectives, but also need new thinking to determine ways forward, require effective management of knowledge gaps and uncertainties, and need effective uptake of research findings into policy and practice change.

Many of the real-world problems that societies face are intractable, so that sparking innovative thinking about them is essential. For example, how do we balance the rights of individuals, but prevent abuse of legal safeguards by criminals; how do we motivate young people to become engaged productive citizens; how do we encourage independence in medical research but restrict the development of potentially dangerous viruses? I2S develops concepts and methods which can catalyze innovative ways forward in thinking about such problems, leading to more effective policy and practice approaches.

## *Integrating Disciplinary and Stakeholder Knowledge*

Integrating disciplinary and practice (stakeholder) knowledge has three elements: useful concepts, a range of effective methods and a standardised way of describing such integration.

The concept at the core of this domain is systems-based thinking. Systems thinking plays an important role in identifying interconnectedness. We need better approaches to understanding and managing connectedness to complement strong reductionist research methods.

Effective systems-based thinking plays out through ideas and, especially, methods to:

1. improve scoping, problem framing and boundary setting, which define how a real-world problem will be approached and which perspectives will be included.
2. integrate effectively, for example at the end of a multidisciplinary process or throughout a transdisciplinary process. There are five classes of methods – dialogue-based, model-based, product-based, vision-based and common-metric-based (Bammer, 2006).
3. identify and manage synergies and conflicts between, for example, different values, interests, and epistemologies.

An agreed standard way for describing and analyzing integration is based on a simple framework comprising six questions (Bammer and Land & Water Australia Integration Symposium Participants, 2005):

1. What is the integration aiming to achieve and who is intended to benefit?
2. What is being integrated?
3. Who is doing the integration?
4. How is the integration being undertaken?
5. What is the context for the integration?
6. What is the outcome of the integration?

## *Understanding and Managing Ignorance and Uncertainty*

Real world problems also have many different types and aspects of ignorance and uncertainty embedded within them and there is currently no systematic way of recognising and dealing with all these attributes.

Managing unknowns is just as important as making maximum use of what is known. This involves concentrated attention to the nature of ignorance and uncertainty, including the irreducibility of some uncertainties. It also involves understanding how people think about and respond to uncertainty, for example through exploration of the metaphors they use, their motivations and even their moral orientations.

Further it involves examining different ways of coping and managing under uncertainty, especially in relation to meeting the adaptive challenges posed by uncertainty. The possibilities range from outright denial or banishment to acceptance and even exploitation of uncertainty. Each kind of response can be shown to have strengths and weaknesses that indicate when it is likely to be adaptive.

## Research Support for Decision Making and Practice Change

While different disciplines and practice areas have established ways of dealing with ignorance and uncertainty – for example, statisticians focus on probability-based approaches, intelligence analysts focus on distortion, historians take taboo into account and psychologists think about norms – no discipline or practice area has the role of bringing all of these different approaches together (Bammer and Smithson, 2008).

In terms of providing research support for decision making, over the last decade or so, there has been growing interest in the lack of impact much research has on policy making and how this can be remedied. This is a subset of a larger problem, namely how to increase consideration of research knowledge in decision making more generally, not only by policy makers, but also by business leaders, community activists, nongovernment organisations and professional groups.

Such considerations have five elements: a) understanding decision making processes, for example, government policy making or business commercial decision making; b) appreciating the attributes of influential research; c) delineating different types of researcher-decision maker engagement – ranging from one-way communication to the co-production of knowledge – and their strengths and weaknesses; d) understanding how institutions can influence which research is taken up by decision makers and e) developing more effective ways to evaluate research support for decision making.

Furthermore, improving decision making may not necessarily lead to on-the-ground change. Understandings about how change occurs are widely dispersed in areas such as diffusion of innovation, advertising, agricultural extension, health promotion, social entrepreneurship, community organising, organisational change and counselling. Again, no discipline or practice area has the mandate to bring all these perspectives together so that more can be learnt from the synergies and points of difference. Consequently this is a key task for I2S.

## CONCLUSION

Although the necessity for cross-disciplinary research on complex real world problems has long been recognised, it has been difficult for such research to gain traction in universities. This has limited the contribution of university-based research to tackling important social challenges. It is also crucial that cross-disciplinary research is not a poor cousin to discipline-based research in terms of quality, so that mechanisms are required to enhance excellence. Four key conceptual and methodological areas central to research integration and implementation are currently academic 'orphans', with no established area having the mandate to develop them. They are the cornerstones of I2S:

1. fresh thinking on intractable problems;
2. integration of disciplinary and stakeholder knowledge;
3. understanding and management of ignorance and uncertainty; and
4. the provision of research support for decision making and practice change.

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