5. Which Knowledge?

Defining the components of the question '*Which disciplinary and stakeholder knowledge is synthesised?*' draws on the ideas previously developed in interdisciplinarity, transdisciplinarity, integrated assessment and related approaches. Based on the thinking that underpins these innovative efforts, I suggest that there are six key, interrelated categories of concepts and methods: taking a systems view, scoping, boundary setting, framing, dealing with values, and harnessing or managing differences.[1]

Taking a Systems View

The challenge is to find an approach that puts the real-world problem centre-stage and that makes it feasible to examine a range of discipline-based and stakeholder perspectives in a coherent and systematic way. To do this, integrative applied research draws on the traditions of systems thinking, which provide ways of looking at the interrelationships between various aspects of the problem, as well as the broader issues the problem relates to and those interconnections. A systems view about heroin use, for example, involves examining the interactions between users, their families, treatment providers, police and the community at large, with different foci on crime, social functioning, health, and so on. It also means examining the broader context of the heroin supply system: the drug cartels, supply lines and international law-enforcement efforts.

It is important to note, however, that it is impossible to focus on the *whole* problem at once. Instead, different systems approaches emphasise different aspects of the whole. Systems approaches can include the following.

- Conceptual maps of key areas, as well as the relationships between them. The description of heroin use just provided is an example of a very rough conceptual map.
- Developing causal (loop) diagrams, which focus on feedback cycles, both positive feedback or reinforcing cycles (which cause vicious and virtuous cycles) and negative feedback or stabilising cycles.[2] For example, heroin users often pay for their drug through crime, which leads to shame that is dulled

1 The approaches drawn on do not all deal with each of these categories of concepts and methods, and, when they do, often handle them differently. The notion of harnessing and managing differences is not taken from these earlier developments, but is first described in Bammer (2008). The level of detail provided is uneven across the categories. This should not be seen as a reflection of their significance, but is an artefact of my understanding. It is also important to note that scoping and boundary setting are relevant not only to this question, but also to questions three (how?) and four (context?).

2 Badham (2010).

by the heroin use, leading to more use, more crime, more shame and so on in a vicious cycle. The initial cycle can be embellished with other cycles that bring in a wider array of factors. For example, committing crime can lead to a criminal record, which makes obtaining legal employment harder, leading to more crime—a further vicious cycle. On the other hand, treatment can help users deal with their shame and allow them to hold down a job leading to less drug use, in a stabilising cycle.

- Soft systems methodology, which concentrates on different world views.[3] This method might bring together psychologists who regard drug use to be a result of unresolved trauma, police who see it as disdain for the law, anthropologists who have identified the search for mind-altering experiences as part of every culture, sociologists for whom drug use is an expression of youthful rebellion, civil libertarians who argue it should be a personal freedom, and so on. The aim is to build up the richest possible picture of the situation in which there is perceived to be a problem and then to work through a structured set of processes to decide on a plan of action.
- Agent-based models, which explore how recognisable group patterns can result from simple individual behaviours. Such systems approaches also examine how those patterns are affected by differences in the individual behaviours.[4] For example, a research project I was involved in used an agent-based model to examine the relationship between psychostimulant[5] drug use and resulting harms. Good correlation with real-world prevalence of psychostimulant drug use was found when individual drug using behaviours were classified into five types (no use, occasional weekend use, regular moderate weekend use, regular weekend use with one–three-day 'benders' and daily use), with two primary rules to determine movement between categories—namely individuals increasing use when peers became more involved in drug use and reducing use when friends experienced adverse effects.[6]

There are also other modelling methods that can illuminate different aspects of systems.[7] At this stage the literature about systems approaches is limited in its value for I2S, because illustrative examples relevant to knowledge synthesis are scarce and there is also little analysis that compares different methods.

3 Checkland (1984). World views are also referred to as underlying assumptions.

4 Badham (2010).

5 Psychostimulants are drugs like cocaine, amphetamines and ecstasy, which make people feel more alert and energetic. This may be coupled with negative effects like insomnia, paranoia and aggression. For more information, see Australian Drug Information Network (<http://www.adin.com.au/>, accessed 13 December 2011).

6 Moore et al. (2009).

7 Badham (2010).

Tasks for the I2S Development Drive
Collect case examples illustrating how different systems approaches are useful for describing a complex problem and for bringing together discipline-based and stakeholder knowledge. Work with systems experts to produce a guide to the broad range of systems approaches to a complex problem, emphasising the different ways they bring together discipline-based and stakeholder knowledge.

Scoping

Scoping is a process to look at all the possibilities for gaining a fuller appreciation of a problem, so that the most significant can be identified. It is a critical step in deciding which systems approach to take, as well as which disciplines and stakeholders to involve, by determining the full range of those who have something relevant to contribute. Scoping moves those planning the investigation beyond focusing only on what they know (based on their own interests and expertise) to considering the problem more broadly.

If scoping does not occur, critical issues may be ignored. If we consider the 1940s project of building the atomic bomb, for example, the domination of physical scientists, engineers and the military meant that significant environmental, social and health aspects were not considered, leading to ongoing difficulties in those areas.

In major research tackling significant real-world problems, there will generally be opportunities to build the research team, so the role of scoping is to identify the full range of people who could contribute to the investigation, as well as the breadth of what they could bring to addressing the problem. It aims to help those planning the investigation identify potential collaborators outside their usual circle of partners. This provides the first step in deciding the final composition of the team.

Scoping therefore has two components. One involves setting out all the relevant systems approaches. The other entails identifying—within each systems view—all the pertinent disciplines and stakeholders, what they can potentially contribute to addressing the problem and the various ways in which those contributions could be made.

For disciplines the task is to ascertain the array of topics each relevant discipline could look into and the methods that could be used. For example, in the research program I led on the feasibility of diamorphine prescription to treat heroin dependence, demographers could have made several contributions, such as examining the age and ethnic composition of the heroin-using population or estimating the number of users. There are various ways in which each of these research tasks could have been undertaken. For estimating the number of users,

these included network analysis starting with known users, asking experts for estimates using a Delphi technique or interrogating existing data sets. The point here is to think through important issues for the problem, as well as which types of disciplinary experts to include in the research team.[8]

Scoping the potential contributions of stakeholders—those groups who have a practical understanding of the problem—involves different considerations. It is rare for stakeholders to be full members of research teams. They often have little or no research training and are generally employed in other occupations, so are limited in the time they can contribute to any investigation. Those affected by the problem are often large heterogeneous groups whose members have diverse views about the issue. For example, in the research on the feasibility of diamorphine prescription, 31 per cent of police supported a trial, whereas 63 per cent opposed it. For those who provided services to illicit drug users, the comparable figures were 71 per cent and 19 per cent.[9] Those in a position to take action on the problem are often smaller in number, but may also have an array of perspectives. Informal discussions revealed that this was the case, for example, for the government officials who were responsible for illicit drugs policy.

The scoping challenge includes figuring out not only which stakeholders and perspectives to involve, but also a range of possible ways to access their expertise in the research process. This could include, for example: surveys; focus groups; workshops; hiring stakeholders as co-researchers, research assistants or research associates; and working with representatives on advisory committees or more informally. Interactions can range from one-off to intense and sustained.[10] Appropriate recognition of the contributions made is required.[11]

Tasks for the I2S Development Drive
Gather together literature and undocumented practical experience providing concepts for scoping knowledge, methods for undertaking it and illustrative case examples. Produce a guide to all the potential contributions of different disciplines and stakeholders, focusing on generic issues rather than specifics. Development of the guide requires collaboration with experts who have a broad understanding of each discipline and the various stakeholder groups.

8 This process differs from 'business as usual' in at least two ways. It is not only explicit rather than implicit, but also involves thinking about the disciplinary skills needed, rather than just using an expert who is conveniently available and letting them do what they are best at, regardless of how central it is to the problem being examined.

9 The remainder was undecided (Bammer et al. 1996).

10 All of the methods listed were used in the feasibility of diamorphine prescription research and the length and intensity of interactions were also very variable.

11 Depending on the level of involvement, this can be as simple as an acknowledgment in publications or can involve payment. Recognition can also be in-kind, such as teaching the stakeholders particular research skills or providing them with a reference when they are seeking employment. All of these occurred in the feasibility of diamorphine prescription research.

Boundary Setting

The point of scoping is to illuminate a range of options. Practicalities, however, dictate that everything cannot be included in the investigation, so boundaries must be set. This requires systematic thinking about what can best be done with the available time, money and person power. Boundaries define not only what is included and excluded, but also which issues are more central and which are marginal.[12] Both inclusion/exclusion and centrality are relevant to which disciplines and stakeholders are involved in the knowledge synthesis, what they are invited to contribute and how. This translates into allocation of resources, with the lion's share going to the disciplines and stakeholders deemed to be most central.

The point of linking scoping and boundary setting is that it allows the most critical issues to be identified and addressed. It reduces the possibility that the knowledge synthesis effort will miss the mark by focusing on side issues or inadvertently ignoring critical issues. Even when a possibility is ultimately excluded, there is an important difference between ruling something out in the boundary-setting process and not having considered it at all.

Let me illustrate boundary setting by returning to the contributions of the discipline of demography in the feasibility of diamorphine prescription case example mentioned earlier under scoping. We decided that developing an estimate of the number of heroin users was essential to figuring out what the demand for the new treatment might be, so that this was deemed to be the most important contribution the demographers could make. We used existing data sets rather than collecting new data for three reasons: our funding was limited, sampling drug users has many problems and, most significantly, we already had access to a unique data set that was considerably better than any we could have collected.[13]

Elements of scoping and boundary setting occur in all research, usually intuitively. This framework offers two advances, which are important for enhancing the ability of integrative applied research to contribute to tackling complex real-world problems. First, as already described, is to ensure that the problem is central in the considerations. Second is to make the decision process explicit. This allows it to be evaluated and improved in future.

An important aspect of reporting on boundary setting is the systematic documentation of the final decisions about which systems approach was taken, as well as which disciplines and stakeholders were invited to contribute and

12 Midgley (2000).
13 Larson (1992); Larson and Bammer (1996).

how those contributions were made. Such accounts are usually missing from descriptions of integrative applied research. But this alone does not allow others to evaluate and learn about the process of boundary setting. Information is also required on how and why decisions were made. There will often be disagreement about the final choices. Unless the boundary-setting process is well described, learning from it to improve future practice is difficult. It is important therefore to document both the concepts and the methods used, as well as to keep a record of the background to and rationale for decisions.

Tasks for the I2S Development Drive
Collate published and unpublished concepts and methods for boundary setting, along with case examples that emphasise how and why decisions were made.

Framing

The frame is the way the problem is presented. The language used to describe the problem is powerful.[14] For example, people who inject illicit drugs can be referred to as 'dirty junkies', 'cool nonconformists' or 'sons and daughters who have lost their way'. Each has specific connotations, which lead to different issues being investigated: perhaps antisocial behaviour for the first framing, creativity for the second and peer pressure for the third. Similarly, research on drug prevention could be defined or framed as 'an examination of individual factors involved in initiating illicit drug use' or alternatively as 'an examination of popular culture and its influence on illicit drug use'. Both are about understanding why young people use illicit drugs as a first step towards more effective prevention, but one approach frames it as a problem of individuals, whereas the other treats it as a societal problem, especially how social norms are communicated through television, music, the Internet and so on.[15]

Critically, the problem will be framed by the way it is described regardless of whether conscious attention is paid to this process. The idea here is to raise awareness of the importance of framing so that the research team can accurately convey what it is setting out to do. This requires more than thinking up a catchy title; it must also be congruent with the knowledge synthesis approach being taken.

14 Much of the work on framing has been conducted in the context of selling a political message (see, for example, Lakoff 2004) or advocacy to change policy and/or practice (see, for example, Chapman 2007). These insights need reworking to make them more directly applicable to integrative applied research.

15 Furthermore, in the first framing, psychology would be a key discipline to involve in the investigation, whereas in the second it would be anthropology or culture studies.

Tasks for the I2S Development Drive
Draw together useful concepts and practical methods for framing, along with case examples of when it has worked well and when it has failed.

Dealing with Values

The values brought to the research will both determine and reflect the systems approach used, the way the problem is scoped and the boundaries set, as well as how the problem is framed. In addition, there are likely to be several sets of values in play at the same time: values about the problem, about research and even about the approach that should be taken to values.[16]

In this domain, the task for I2S is to help integrative applied research teams consider the interaction between their values and the knowledge synthesis. For example, are the team's values generating important blind spots about incorporating some kinds of knowledge or leading to disproportionate emphasis on the perspectives of some stakeholders at the expense of others? It is common for research on controversial issues to be affected by values—for example, research on forestry issues may often look only at one side of the debate, concentrating on the views of either loggers or conservationists.

Tasks for the I2S Development Drive
Compile case examples that illustrate different experiences in bringing values into play and their consequences for the knowledge synthesis. Work with applied philosophers and other experts to produce a guide to concepts and methods for understanding and responding to the various dimensions of values.

Harnessing and Managing Differences

Finally, bringing together different disciplinary and stakeholder perspectives is about more than combining different relevant 'facts'. Among those involved, there will also be differences in, for example, visions for addressing the problem, world views about the problem, epistemological approaches to research, working habits, career goals, and so on.[17] The challenge is to identify and deal separately with two types of differences

16 For example, Neuman (2003) compared the way values are dealt with in positivist, 'interpretive' and critical social science. In brief, positivists aim to be value-free and objective; interpretive social scientists favour making values explicit and aim to treat all values equally; whereas critical social scientists have an activist orientation and argue for researcher commitment to a value position.

17 There will also be differences in values. But the importance of values means it warrants its own category.

1. those relevant to developing a rich appreciation of the problem, which need to be harnessed as part of the knowledge synthesis
2. those which may get in the way, which need to be managed so that they do not impact negatively on the knowledge synthesis.[18]

For example, imagine a research program on the future of education to which a demographer, computer scientist and economist are contributing. In figuring out a solid basis for a policy of government provision of computers in schools, they would each have different facts to contribute: the demographer on population distribution and trends, the computer scientist on available hardware and software, and the economist on costs and funding structures. They may well have somewhat different visions about the government policy, so that the demographer might be focused on the geographical distribution of students and how that will change over time, the computer scientist on accommodating differences in intellectual ability and the economist on differential support based on family income. These are all examples of the kinds of information and perspectives that, if harnessed, would effectively contribute to a rich appreciation of the problem.

On the other hand, the demographer and computer scientist may have personality differences that provoke them to dislike each other. In addition, there might be considerable debate about where the results of the knowledge synthesis should be published. Each may want to claim the publication for their discipline and to present the results in a particular way. Multiple publication of the same results is, however, considered bad practice, and even if it could be accommodated, each of the researchers may want to publish first. These differences in personality and personal professional interests are examples of the kinds of differences that need to be managed so that they do not get in the way of the knowledge synthesis.[19]

Tasks for the I2S Development Drive
Gather together concepts and methods for understanding differences, as well as for harnessing and managing them, along with illustrative case examples.

18 Differences can be managed in various ways and a taste of these is provided in Box 26.1 in Chapter 26.

19 The intellectual differences are not always the ones that are harnessed and the personal the ones that are managed. Sometimes the valuable differences are personal. Research on a 24-hour time cycle can make good use of preferences for morning, afternoon and evening work, for example. And sometimes intellectual differences need to be managed, as in the case when researchers have diverse epistemologies.

Dealing with the Six Categories

While it is possible to present the implementation of the six categories of concepts and methods as linear steps—as I have done above—in practice they cannot be dealt with in this way. Instead they need to be considered together and iteratively, as each influences the others.[20] For example, let us return to the imaginary case of government policy on providing computers in schools. Rather than beginning with a systems view, the starting point might be a problem framing focused on the poorest schools and values about supporting the needy. But the economist might want to bring in different values about 'willingness to pay'. This in turn might lead to the identification of the usefulness of causal loops as a systems approach, especially exploring a vicious cycle between low willingness of parents to pay, schools with few resources and poor scholastic performance.

The point is that research is messy and it is difficult to have clear definitions, aims and processes up front. Research that is nailed down too soon leaves little room for creativity and real discovery; instead it is likely to be a mechanical filling in of small gaps. The integrative applied research process can be described by the now common aphorism 'ready, fire, aim'—in other words, find a starting point, initiate some investigations and modify, clarify and tighten up, as the research progresses.

This discussion about iteration, and especially untidiness, may appear to contradict everything that has been presented earlier. The point is not that anything goes. Rather it is that the first tentative steps in the investigation are aimed at choosing a systems approach, furthering the scoping, clarifying the values, and so on. It is likely that at various points throughout the research further adjustments are made. For example, the framing may be recognised as inadequate and require updating, a key disciplinary perspective may be added and a method for engaging a stakeholder group may be dropped. The six categories provide a focus for the iteration and messiness, so that by the end of the research there should be a clear—if complex—story to tell.

Task for the I2S Development Drive
Compile case examples of how iterative processes between the six categories of concepts and methods played out.

20 Iteration is not only important in considering the six elements in this question. Iteration between the questions is also necessary. For example, context and scoping are closely intertwined, as I discuss in more detail in Chapter 7. Further, the domains also influence each other. For instance, considerations about the eventual implementation of the research can be crucial in deciding how the knowledge synthesis is approached. It is not possible to describe I2S in a coherent fashion without stripping out many of these complexities, but the practice of I2S needs to allow for iterative and untidier processes.

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