

# 41. Building I2S into an Academic Program

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A century after Kipling's 'The Sons of Martha' and a half-century after Snow's *The Two Cultures and the Scientific Revolution*, vast publics remain unaware of the scale of their reliance on knowledge-based technical practice.<sup>2</sup> That Kipling and Snow caricatured their unaware publics as élites added piquancy to the situation. Snow's position was particularly clear: '(literary) intellectuals are natural Luddites', he wrote. The passing of the half-century since *The Two Cultures* has seen technology-based practice address many of society's seemingly intractable challenges. Nonetheless, many publics (élite and otherwise) have become less aware of, and increasingly hostile towards, their reliance on science and knowledge-based technology.

A different but related cultural dichotomy motivates Gabriele's book. In one corner stand academic researchers, with knowledge and informed practices—always hard-won and often highly qualified. In the opposite corner stand officials and activists, with problems—always hard and often highly complex. The Integration and Implementation Sciences (I2S) stand between them, not to referee but rather to broker marriages. This commentary examines this positioning of I2S from the perspective of a university research manager.

## Why Integration and Implementation Sciences?

The following observations are, I believe, the foundational propositions set out in Gabriele's monograph.

- 1a. There are people with responsibilities and/or strivings to change aspects of human affairs. Call these people the primary participants.
- 1b. Primary participants often characterise their agendas as addressing or solving important problems of human society.

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<sup>1</sup> Lawrence Cram was invited as a university leader 'who has a longstanding interest in "integration" to tackle complex real-world problems. Your observations on whether the ideas in the book are workable in a university such as the ANU will be very pertinent.'

<sup>2</sup> Kipling (1907); Snow (1959).

- 2a. There is an activity known as academic research that has something to offer primary participants, but the primary participants do not know enough about it.
- 2b. Academic research is organised into disciplines, and more than one discipline has something to offer.
- 3a. Assembling disciplinary-based academic research so that it offers what is optimally useful to primary participants is an activity known as Integration and Implementation Sciences (I2S). I2S connects academic research to people aiming to change human affairs.
- 3b. I2S has not yet been reduced to a mature and systematic practice. An initial systematic practice is being assembled from available knowledge and methods in I2S, and practitioners are being educated in that practice.
- 3c. The initial practice could be enriched and improved by further systematic academic research in I2S, stimulated by deliberate and large-scale seed funding.

The significance of I2S is evident from the importance and richness of these propositions. The problematic features of I2S also begin to emerge.

Propositions (1a) and (1b) invite questions about the motivation and legitimacy of primary participants and their agendas. Mass media attention, political action, commercial interests, righteous indignation and wrong but honest beliefs all play out for people having an interest in creating the perception of a 'problem to be solved'. In practice, the problem may be fictitious or of lesser priority, or one where the solution is evident but unpalatable, or where doing nothing should be the preferred option. How might an I2S specialist prevent wasteful engagement between primary participants and academic researchers on wrongly stated and prioritised problems or on unworthy causes? Conversely, how does the I2S specialist coopt academic researchers for worthy causes? How does the I2S specialist exercise the evident responsibilities for gatekeeping and filtering?

Propositions (2a) and (2b) could be read as an indictment of the academic enterprise for its inability to communicate directly with broader audiences, reinforcing the stereotype of scholarly experts as intense and inaccessible specialists; however, this reading would underestimate the challenges that primary participants face in *integrating* academic knowledge, even when individual academic actors communicate clearly (which is not always the case). The propositions also hint at the risk of cynical exploitation of the academy. It is recognised that academic expert witnesses can be found on either side of most important issues. Academics accept this tentative uncertainty as an essential feature of the discovery, construction and reframing of knowledge. Primary

participants, however, may not wish to grapple with uncertainty or recognise alternative perspectives, but instead coopt selected academic perspectives to their causes.

Propositions (3a)–(3c) invite the question ‘Why is the need for I2S emerging only now?’. Perhaps a plausible explanation is found in (hotly contested) Cultural Theory. According to Cultural Theory, adherents to the putative high-group/low-grid<sup>3</sup> way will attach urgent importance to taking action on emerging crises. Since the power to take such action is perceived to be greater now than in the past (and may well be greater in some cases), these adherents have greater opportunities. A persistent and heightened sense of increasing complexity and ongoing crisis stimulate an increasing number and breadth of primary participants. A new profession arises to capture the efficiencies that arise through the division of labour, as academic researchers are unable to serve the growing need. A new discipline, I2S, arises to support the new profession.

The opportunities and needs for I2S will only intensify in the future. Once authors such as Gabriele point out what to look for as I2S, it can be seen in action in many parts of society. Scholarly work *on* I2S (theory building, codifying practice, and so on) will then be inevitable, and is bound to arise in many different disciplinary contexts until the character of I2S becomes better understood and refined.

## I2S, Human Sciences and the Sciences of the Artificial

The history of ideas provides an account of the development of three categories of systematic knowledge and theory building: natural sciences, human sciences and the sciences of the artificial.<sup>4</sup> Distinctive epistemologies related to deep differences in the nature of theories and the objects of research arise among these sciences or understandings.

Research in the natural sciences is a quest for law-based explanations.<sup>5</sup> Encompassing astronomy and the earth sciences, physics, the materials sciences, and biology, it is characterised by systematic observation, critical

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3 From Douglas (1970): a ‘high-group’ way of life is about a high degree of collective control, whereas a ‘low-group’ one emphasises individual self-sufficiency. A ‘high-grid’ way of life has conspicuous and durable forms of stratification in roles and authority, whereas ‘low-grid’ has a more egalitarian ordering.

4 Gregor (2009) and references therein.

5 Kuhn (1996).

experimentation, hypothesis formation and falsification. Research settings and problems in the natural sciences are reproducible, and progress is made through puzzle solving that confronts well-characterised anomalies.

Research in the human sciences is the quest for ‘understanding of human and historical life’.<sup>6</sup> Encompassing the social sciences and the humanities, human sciences research entails an array of theories and methods that are more diverse and contested than in natural sciences research. This fluidity springs from the internalised, first-person capacity of humans for deliberated or unbidden stances and actions, fundamentally distinct from the reproducibility found in the natural sciences. Research in the human sciences is characterised by new and deeper hermeneutic reinterpretation, often arising from shifts in research settings and problems due to changes in social and political systems.

Research in the sciences of the artificial—the design sciences—is concerned ‘not with how things are, but with how they might be’.<sup>7</sup> Research in the science of the artificial encompasses artefacts that may be symbols, material objects, activities and organised services, and complex environments for living and learning.<sup>8</sup> Research methods differ from those of research in the natural or human sciences in a number of ways, owing to the ‘malignant’ or ‘wicked’ nature of design science problems and puzzles. The account of ‘Dilemmas in a general theory of planning’ by Rittel and Webbers<sup>9</sup> identifies the following characteristics

1. problem understanding and problem resolution are concomitant
2. work on a problem terminates when time, money or patience is exhausted
3. there are no true or false answers
4. there is no way to trace all the waves through all the lives affected by a solution
5. every implemented solution has consequences that cannot be undone
6. judgment determines which solution should be pursued and implemented
7. part of the art is not knowing too early which solution to apply
8. every problem is a symptom of another problem
9. explanations are logically arbitrary and hypotheses not subject to crucial tests
10. practitioners are personally liable for the consequences of their actions.

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6 Dilthey (1988).

7 Simon (1996).

8 Buchanan (1992).

9 Rittel and Webbers (1973).

Given these characteristics, and the nature of I2S as described by Gabriele, the ‘science’ in I2S is not natural science. Rather, it lies at the intersection of human science and design science. I2S is a human science since it entails interpersonal and inter-group interactions, and a science of the artificial since it leads to the creation of symbols, objects, services and environments by and for humans. The appearance of ‘design’ as part of the toolkit for I2S practitioners will draw on knowledge and understandings that oftentimes will be unfamiliar to the natural science and human science researchers who are coopted or ‘called upon’ into their projects. Indeed, not only coopted researchers but also the primary participants—the people with responsibilities or strivings for change—may be unfamiliar with a design science perspective on their activities.

Just as the natural and human sciences resolve into disciplinary specialisations, so too do the design sciences resolve in to specialisations—such as graphic design relating to symbols and industrial design relating to material objects. Design science specialisations relating to systems and environments also exist (engineering and urban planning, for example) and appear to be ripe for enrichment—a situation directly important for I2S as a field of academic inquiry. Of particular interest to I2S are refractions such as political science (normally viewed as a human science) contributing to the design of public policy, and environmental and economic sciences (normally viewed as natural and human sciences, respectively) contributing to development programs.

The course of sociology as a discipline over the past few decades offers insights into pathways for I2S. Burawoy’s<sup>10</sup> description of public, policy, professional and critical sociologies raises many topics of direct interest to academic (that is, critical) consideration of I2S. Traditional and organic public sociologies entail relationships between publics and academics, which are reminiscent of the relationships that are the primary focus of I2S—the difference being that I2S is not in itself a longstanding discipline like sociology. The value of distinguishing between public and policy sociologies is evident, and perhaps a useful distinction that is not yet a part of I2S. It is axiomatic that I2S practice with a client group (that is, policy work) and with a public could have quite different complexions.

The normal pathway for an emergent discipline in the modern university is to acquire initial formal recognition through formation as a ‘centre’ or ‘institute’ or ‘network’ either within or between existing academic disciplinary units. If the centre prospers in an academic sense, through growth in educational and/or research attention, the university will likely find ways to support growing independence. Colonisation of affiliated disciplines can occur and will support rapid growth; legitimacy in an academic sense requires emergence of similar

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<sup>10</sup> Burawoy (2005).

disciplinary foci in several universities. I2S exhibits many of these features, and we may be witnessing the appearance of a new discipline: I2S as described by Gabriele, or something quite like it.

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## Brief Biography

Professor Lawrence Cram is Deputy Vice-Chancellor (Research) at The Australian National University (ANU). His career spans research and teaching in engineering, mathematics, astronomy, physics and computing. He has extensive

experience in public sector research management and public policy. He worked for three years as Executive Director in the Australian Research Council and has been involved in the successful commercialisation of research at CSIRO, the University of Sydney and ANU. He has long been interested in higher education, particularly in relation to the identification and enhancement of the affordances that arise between universities and their scholarly communities. He is a Fellow of Engineers Australia, the Australian Institute of Physics and the Royal Astronomical Society.

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