

Knowledge integration and digital infrastructures: some fantasies and complications

Dr Zoë Sofoulis

Institute for Culture and Society,
University of Western Sydney

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[H]ow can the digital humanities help the humanities and higher education serve larger society so as to show the distinct value of the humanities? (Liu, 2012, 30)

This paper speaks to a variant of Alan Liu's question: how to enhance the contributions of qualitative social and cultural research to urban water management, and more generally to national innovation, sustainability and climate change adaptation agendas. Here I offer observations from my recent research on the links between urban water managers and HASS [humanities, arts and social sciences] researchers (Sofoulis 2011b), in conjunction with issues of HASS involvement in the 'Strategic Roadmap for Australian Research Infrastructure' (DIISR, 2008, 2011), a government-led process of scoping and reviewing the high end computational and networking capacities that support collaborative research in areas of national research priority.

Population growth, increasingly unpredictable rainfall patterns, and the demands of communities and environmental advocates for a greater say in water planning are among the factors prompting Australian water resource managers to recognise the limits of engineering solutions to acknowledge the important roles that people can play in achieving sustainable water management (Sofoulis and Strengers 2011), and thus to recognise the need for social research. Despite this acknowledgment, the water sector's restricted understandings of 'social research' and methodologies prevent the most effective mobilisation of HASS knowledge.

Although the water sector employs professionals and researchers from Science, Technology, Engineering and Mathematics (STEM) backgrounds, it outsources its social research to consultancies (usually with psychology, marketing or social science backgrounds) and occasionally to university researchers. This means the research questions are posed, research commissioned, and reports received by people and organisations lacking expertise in HASS or qualitative research.

Problems faced by HASS researchers on water reflect general features of the Australian research landscape, as was evident in the recent review of the 'Strategic Roadmap'. Expert Working Groups of high-ranking academics and government officials were convened to review needs in the four national research priority areas,¹ plus an information technology strategy group. But since there are still no national research priorities for HASS, a special HASS Expert Working Group was convened, in belated recognition that HASS research needs "were not reflected or articulated to any significant extent in the existing Roadmap" (2008, p.21):

To date, the Humanities, Arts and Social Sciences – represented by more than half of the nation's researchers – have had a limited role in the current NCRIS [National Collaborative Research Infrastructure Strategy] process. The Group notes that NCRIS's current conceptualisation of what constitutes infrastructure has been a chief difficulty. In the scoping of the initial Roadmap, certain requirements articulated by the HASS were considered outside the purview of the NCRIS program both in terms of scale and definition of infrastructure. (DIISR 2008, p.21).

Even relatively large digital humanities projects mostly require just a fraction of the 'terabytes and petaflops' (Liu, 2012, p 20) chewed up in STEM projects (Manovich 2011, p.2). The Roadmap was so preoccupied with high-end scientific computing that lower-level infrastructure needs for HASS research fell below its scope. Several problems related to the lack of a "dedicated service provider for the HASS" (p.21) in the national research infrastructure . The HASS Group did not call for new projects, "but rather for an

¹ : Promoting and Maintaining Good Health, Frontier Technologies, Environmentally Sustainable Australia, and Safeguarding Australia.

infrastructure to connect researchers to the research data, resources, capabilities and expertise that currently exists” (p.23), and it demanded “a major reconsideration of the means through which the HASS sector is included in any future NCRIS process” (p.28).

From this vignette I would like to tease out three themes:

- The Elephant in the Room (real disparities versus the fantasy of disciplinary symmetry).
- Science as the master discourse (epistemological monism vs pluralism)
- The Fantasy of Knowledge Integration.

The Elephant in the Room

The unmentionable elephant appears in a recent report on collaborative innovation as a metaphor of disparities in values attached to STEM and HASS knowledges (Spoehr et al. 2010). Although researchers



from both sectors were keen to collaborate, ‘few acknowledge that HASS disciplines do not enjoy the high status afforded to STEM disciplines in the innovation debate’ (Spoehr et al. 2010, 13).

Over fifty percent of Australian researchers are in HASS fields, yet receive only 5% of government research funds (compared to 14% in Europe), with the rest going to STEM (ABS 2010). This chart compares funding for the biggest fields in STEM and HASS (Engineering, Studies in Human Society), and for my ‘home’ field (Language, Communication and Culture), as well as Information Technology.

The STEM sector’s wealth allows it support substantial research infrastructures as well as big research projects. Water professionals enjoy overlapping industry, professional and accreditation networks, research centres with expensive equipment, cooperative networks, shared databases, high profile annual conferences, and a number of dedicated journals, newsletters and membership organisations. HASS water researchers have one volunteer-

run Household Water Use Researchers network, and a Water Governance Research network whose three-years funding has expired. That's it. Many Australian water corporations classify social research reports and data as 'commercial in confidence' to even prevent HASS researchers from sharing and reviewing each others' work.

The Strategic Roadmap simply took for granted the pre-existing STEM networks and databases that serve as infrastructures to support collaborations using high-end digital research infrastructures. The building of comparable 'infra-infrastructures' for HASS is "outside the purview" of the Roadmap or other funding schemes.

For example, my project produced *Tributaries: A directory of social and cultural research on urban water* (Humphry et al.) as a networking tool. But a proposal for an internal UWS grant to turn it into an editable and expandable on-line database was turned down, mainly because it "read like an excellent infrastructure proposal – not a project grant that would be developed to secure ARC Discovery or Linkage funding". However, like the Roadmap, the ARC's infrastructure grant scheme (LIEF - Linkage Infrastructure, Equipment and Facilities) seems designed to meet the capital-intensive needs of already organised fields and projects, not to help research communities develop the organisational infrastructures to support higher level digital networks for collaboration.

Science as Master Discourse

The HASS Expert Working Group's experience of belated and limited inclusion in the Roadmap process is familiar to social and cultural researchers on water:

[S]o the hard scientists decide what they want, and they get going and they get their whole project up and running and funded and "This is how we're going to do it!" and then they say, 'Now, of course we need a bit of social science', so then the social science just becomes a service provider, does not have any intellectual input into it at all, hasn't been part of defining the problem, so the problem is only half-defined anyway, because it doesn't have the people side of it.. – Senior social researcher

Almost all STEM statements on 'integrated' or 'interdisciplinary' knowledge assume that Science is the meta discourse into which 'lesser' discourses can be incorporated or translated, entitled to define the terms of engagement, methodology and rules of evidence even for HASS research. In the water sector, the full scope of HASS research methods and knowledge of history, culture, society and politics is largely ignored in favour of collecting statistically representable 'surface data' (Manovich 2011) generated by demographers, market researchers and behavioural psychologists. The large scale opinions survey is about the only social research method acceptable to the water industry, whose history is deeply entangled with the rise of statistics as a tool of governance, and the associated fantasy that gathering data on populations will enable them to be predicted and controlled. Thus, despite claiming interest in 'behaviour change', the water industry is generally unwilling to fund qualitative and ethnographic studies of actual domestic practices, which involve sub-statistical sample sizes and produce 'rich' or 'deep data' that cannot be integrated into predictive models.

Whereas epistemological pluralism is fundamental in the humanities, much Australian discourse on science is characterised by a fundamentalist positivism. Few STEM undergraduates are exposed to history and philosophy of science, and naïvely assume that anything not scientifically objective is merely 'subjective'. This epistemological monism stifles contributions of HASS researchers in supposedly interdisciplinary contexts:

'I feel like I am self-censoring in daily work where it [insistence on scientific rationalism] still nags away at a daily context'.

It is a long term process to dent scientific fundamentalism to the point of genuine 'integration' knowledge: meaningful conversations across epistemological differences are difficult when interlocutors recognise only one valid knowledge framework. Meanwhile HASS researchers need to translate our knowledge into forms STEM experts can handle. The digital humanities could be important for improving communications across the HASS-STEM divide. Data visualisations and sociocultural mapping techniques, such as Tony has shown us, could lure water managers away from the bell curve and

their quasi-engineering models of human behaviour, and towards more 'culturally intelligent' (Ang 2011) understandings of social complexity.

Even pre-digital visualization tools can help bridge different knowledge frameworks:

... because engineers are used to reading scientific stuff written a certain way, and it's not written as a storybook, it's in charts and tables and (laughs) and everything, because they're very visual! So [...] somehow we came up with a table.

Her co-researcher described playing along with the scientists who insisted on using social and psychological research data to build predictive models:

I mean, I'm not convinced for a moment that the modellers will be able to do anything like – they want to be able to model human behaviour in their models. It's never going to happen! But you know what? There's no point in standing there today saying, and saying for years, "It's never going to happen!" You've just got to play with them over time, and eventually we all get to a point that we're feeling comfortable with, and they're feeling comfortable that OK, it's not going to happen, "But here's where it does fit." So I guess you can't just afford to – social scientists can't afford to be arrogant.

Here, a series of failed models holds the scientists' attention until they are ready to accept another knowledge framework.

Rather than try and mimic STEM, the HASS would do better to push for a shift in emphasis from the 'science base' of policy—and the positivist quantitative emphasis that implies—to a more HASS-inclusive notion of the 'research base' needed for service-based economies (British Academy 2004, especially 9, 72).

The Fantasy of Knowledge Integration

The HASS Expert Working Group reported that three other working groups had “indicated their concern at the lack of a systemic connection between their research capabilities and those of the HASS sector”. This is a flattering description of what is often a crassly instrumental view of HASS contributions to ‘integrated’ knowledge. For example, the Environmental Group identifies a priority need for ‘inter-disciplinary integration across natural and social sciences, economics and the humanities’ (DIISR 2011 p.11). But the humanities soon disappears as attention turns to:

... linkages between the observing and analysis systems across biophysical, social and economic domains so that industries, the public and public policy makers can draw on the products of excellent collaborative science (p.11)

Here, as in many STEM-centred discussions of knowledge integration, social researchers are mere ‘handmaidens’ to Master Science, providing ‘data inputs’ for science models:

Similarly, where social and economic drivers are key elements of the system, more attention is required on the collection of and/or access to key social and economic data that are sensitive to change in environmental condition or function. (p.14)

Aspects of human knowledge that can’t be reduced to digestible pellets of ‘social data’ and fed to pet modelling software are simply ignored.

A personal anecdote illustrates this instrumental approach. A group of science and engineering researchers were planning a water research program for which they sought “social science” input and collaboration. To kick off this exercise they presented interested HASS colleagues with an A3 paper covered by a grid of about 20 x 20 categories and subcategories of research questions, a few of which had been left blank. The HASS researchers were expected to undertake research to literally fill in the blanks.

Whereas the Environment Group’s fantasy of knowledge integration is of assimilating social data into its own models, the HASS fantasy resembles Herman Hesse’s *Glass Bead Game*, whose players can synthesise and translate knowledges and forms of expression across all

arts and sciences—here, via digitization.

Data in this sector exists in a plethora of formats, many of which are currently very difficult to align for the purpose of meaningful analysis. Bringing together nationally important data collections and resources would ensure that relevant data is (a) more accessible, visible and useable across data sets and repositories; (b) more consistent, uniform and accurate; (c) captured and managed to international standards; (d) generated, deposited and accessed efficiently; and (e) made available in appropriate formats for advance analysis. (p.47)

These points are obviously relevant for functional questions about digitally storing and displaying materials. But a datum is ‘what is given’: a fundamentally positivist construct. A challenge for the digital humanities is maintaining space for the ‘negativity’ essential to critical thinking and analysis—registering absences, silences, erasures, unspoken messages, unperformed actions—and not losing sight of higher order referential and ethical systems that enable these to be perceived amidst seas of data.

It is not fancy data architecture that will lead to greater cross-disciplinary understanding, but the capacity to listen and learn without assuming that everyone else’s knowledge has to fit into one’s own preferred frameworks.

The utopian hope in both the STEM and HASS fantasies of knowledge integration is that somehow massive computing capability and mega-databases will of themselves permit knowledges from different sources to be integrated. The Strategic Roadmap overlooks the human labour needed for exchanging knowledge amongst groups of people who don’t necessarily share the same knowledge frameworks. Real institutions and people, with real jobs, in real time, are needed to bring researchers from different disciplines or sectors together, and to be knowledge brokers and translators of ideas between domains, in order to achieve a greater collective capacity for making wise decisions in a no longer predictable environment.

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