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Making interdisciplinary research work

Evaluation Framework and
Report on *Assistive Health
Technologies for Independent
Living: A Pilot Study*



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Background

Making Interdisciplinary Research Work (LASP 2010 project LS1000004) commenced in 2010 as a multiphase, multiyear, project in order to address two outstanding problems: the application of interdisciplinary research to broad, problem-based research and how to use this understanding to find effective ways of approaching the array of challenges confronting Australia.

The earlier phases of the project are complete and published on the ACOLA website at <http://acola.org.au/index.php/projects/lasp>:

- *Strengthening interdisciplinary research: What it is, what it does, how it does it and how it is supported?* Professor Gabriele Bammer, February 2012.
- *The Character of Interdisciplinary Research: Examined through a sample of socio-environmental research projects.* Professor Michael Webber, January 2014.

The initial reports made a series of findings that has led to the development of the draft evaluation framework for successful interdisciplinary research. The final phase of the project was a test case for the findings and evaluation framework and marks the conclusion of the project. The final phase comprised two main elements:

- *Assistive Health Technologies for Independent Living* – a pilot research project to test the findings from *Making Interdisciplinary Research Work – Achieving a Sustainable Australia* (delivered by an expert working group supported by ATSE)
- *Making Interdisciplinary Research Work – Evaluation Framework and Report* (delivered by the ACOLA Secretariat)

Assistive Health Technologies for Independent Living: A Pilot Study

Assistive Health Technologies for Independent Living: A Pilot Study (AHT) was completed during 2013 – 2014. The primary research question was expressed as follows:

Can a patient-centred interdisciplinary network of experts in medical science, technology, social science, healthcare and economics enable healthy and fulfilling independent living for the aged and disabled through the adoption of assistive technologies for home-based healthcare?

The project was led by an expert working group (EWG) co-chaired by Dr Erol Harvey FTSE and Prof Greg Tegart AM FTSE. The work was reviewed by a Steering Committee chaired by Peter Laver AM FTSE. The project was managed by the Australian Academy of Technological Sciences and Engineering (ATSE) for ACOLA.

AHT constituted the final phase of the ACOLA ARC LASP project *Making interdisciplinary research work – achieving a sustainable Australia*. The final phase was intended to serve as a road test for an evaluation framework developed based on the findings made in the earlier phases of *Making interdisciplinary research work* with a view to testing the validity of the framework.

The evaluation process was designed as follows:

ACOLA Secretariat monitored the planning, initiation, progress and conclusion of AHT. Monitoring took the form of periodic attendance and observation at key meetings of the Steering Committee and the EWG; a summary of the initial group discussion about

interdisciplinary findings and framework held within the EWG; interviews with the two ATSE project managers; interviews with the two EWG co-chairs; and reference to recent publications regarding the process and theory of interdisciplinary research.

This evaluation report includes:

- the original ACOLA evaluation framework established earlier, developed from the findings made during the earlier phases of *Making interdisciplinary research work*
- a review of the application of the findings and evaluation framework in this project, as evidenced by the project participants themselves
- an evaluation of the appropriateness of a generic framework for interdisciplinary research, based on observations during the AHT project; reports from the project participants; a review of the earlier ACOLA reports; and a reading of the additional literature.
- a summary of the initial group discussion within the AHT project EWG, as well as the individual interviews conducted, are available on request.

ACOLA evaluation framework for interdisciplinary research guidelines

	Guide	Evaluation Question/s
1	Aims	Has the project defined what the interdisciplinary research is aiming to achieve? Can the aims be defined?
2	Combinations	Has the project stipulated which disciplines, practitioner-knowledge, end-user perspectives, epistemologies, languages and cultures will be combined? Are there internally conflicting objectives?
3	Context	Has the project described the context in which the interdisciplinary research will take place? Is the problem or goal a moving target?
4	Decisions	Has the decision-making process been agreed?
5	Methodology	Has the project stipulated an appropriate methodology to be applied? Could there be unforeseen consequences (the "observer effect")?
6	Impact/outcome	Has the anticipated impact or outcome been captured?
7	Leadership group	Has the project stipulated appropriate governance, research, management, communication and administrative structures? Have these been recruited as skill sets from suitably qualified/experienced individuals? Was this based on convenience, an authoritative/political approach or a collaborative approach?
8	Communications	Has the project considered the time, cost and technological means of communication? Are the appropriate information sharing sites/technologies in place? Is there a plan for publication, distribution, public engagement and media management?
9	Tangible planning	Has the project identified tangible tasks to be allocated to appropriate individuals, teams or sub-groups?
10	Stakeholder roles	Have the real stakeholders been identified and engaged? Is the project to be driven by supply (the leadership group) or demand (the end-users)? How will the project communicate continuously with stakeholders?
11	Commercialisation	Has intellectual property been assigned? What if any will be the role of commercialisation for the project? Are there plans in place to engage those stakeholders at appropriate points?
12	Documentation	Has the project planned for appropriate documentation? Have the necessary administrative resources been budgeted?
13	Timed contributions	Has the project considered the other responsibilities that team members have? Has this been taken into account in planning the timing of research contributions and the management of the project?
14	Ways of sharing	Has the project defined or developed spaces (real/virtual) for sharing ideas and data?
15	Succession planning	Has the project planned for succession by including early career researchers and allowing for mentoring and training?

Review of the application of the ACOLA evaluation framework to this project

Guide	Evaluation Question/s	Notes
1.1 Aims	has the project defined what the interdisciplinary research is aiming to achieve?	General concurrence that time invested upfront in this is well worth it. 'Spend a lot of time at the beginning getting the questions right' (Webber)
1.2	Can the aims be defined?	A high priority. There is agreement that clearly defined aims are essential, no matter how difficult. EWG members described this as 'one of the most important guidelines'.
2.1 Combinations	has the project stipulated which disciplines, practitioner-knowledge, end-user perspectives, epistemologies, languages and cultures will be combined?	Where the composition of the leadership group is driven by skills and experience identified as essential, this will occur. Where the composition is determined by authoritarian or political considerations, this may be down-played or ignored. May also be confused with the need to involve different stakeholder groups, which is not the same end.
2.2	Are there internally conflicting objectives?	'All projects have these. It is the management of conflicts that counts' (EWG member comment)
3.1 Context	has the project described the context in which the interdisciplinary research will take place?	Webber referred to the socio-economic, political and bio-physical context in which research is undertaken, in order to identify pressures or constraints that require recognition. This was not always understood and the guideline probably needs to be clarified.
3.2	Is the problem or goal a moving target?	Careful consideration might always identify some fluidity. Interdisciplinary research tends to be applied to 'wicked' problems which are <i>sui generis</i> fluid.
4.1 Decisions	has the decision-making process been agreed?	Particularly important in cases where the research group has varying levels of experience in collaboration.
5.1 Methodology	has the project stipulated an appropriate methodology to be applied?	The interaction, competition and resolution of differences in epistemologies and hence methodologies is emphasised in other sources, not in ACOLA guidelines.
5.2	Could there be unforeseen consequences (the "observer effect")?	The question may be highly appropriate to certain types of data-gathering but not at all to others.
6.1 Impact/outcome	has the anticipated impact or outcome been captured?	This may serve as a good test of the aims definition described in 1.2 above.
7.1 Leadership group	has the project stipulated appropriate governance, research, management, communication and administrative structures?	The 'governance' role of the Steering Committee and/or peer reviewers (as distinct from those conducting the research) needs to be more clearly defined and communicated.
7.2	Have these been recruited as skill sets from suitably qualified/experienced individuals?	The same challenges as set out in 2.1 above may apply here. Webber also calls attention to the need for professional non-discipline skills (e.g. project management, communications, facilitation, stakeholder management, data analysis and statistics)
7.3	Was this based on convenience, an authoritative/political approach or a collaborative approach?	Interdisciplinary projects may stand on fall on this issue alone.

Guide	Evaluation Question/s	Notes
8.1 Communications	has the project considered the time, cost and technological means of communication?	Internal means of communication become more important as project size increases.
8.2	Are the appropriate information sharing sites/technologies in place?	The take-up of any pre-existing project management software or database may be a challenge.
8.3	Is there a plan for publication, distribution, public engagement and media management?	The plan, the necessary resources and the responsibility for implementation should be clearly established and communicated, particularly where this is separate from the responsibilities of the EWG and/or SC.
9.1 Tangible planning	has the project identified tangible tasks to be allocated to appropriate individuals, teams or sub-groups?	Webber emphasises the value of <i>plan[ning] the project around tasks with tangible products</i>
10.1 Stakeholder roles	have the real stakeholders been identified and engaged?	There is consensus on the value of this
10.2	Is the project to be driven by supply (the leadership group) or demand (the end-users)?	This might be expected to fall out in line with academic/curiosity-driven projects (leadership group) and policy sector or industry/problem-solving projects (end-users)
10.3	How will the project communicate continuously with stakeholders?	Ongoing consultation with external stakeholders, as envisaged by Webber, is not common practice in ACOLA projects.
11.1 Commercialisation	has intellectual property been assigned?	There is consensus on the importance of resolving this in advance, where appropriate.
11.2	What if any will be the role of commercialisation for the project?	The question may be highly appropriate to certain types of projects but not at all to others.
11.3	Are there plans in place to engage those stakeholders at appropriate points?	As above
12.1 Documentation	has the project planned for appropriate documentation?	Projects that enjoy professional project management should see this happen as a matter of course.
12.2	Have the necessary administrative resources been budgeted?	As above
13.1 Timed contributions	has the project considered the other responsibilities that team members have?	The guideline tended to stimulate discussion about realistic/unrealistic expectations upon team members.
13.2	Has this been taken into account in planning the timing of research contributions and the management of the project?	Webber's injunction to <i>'plan for staggered outcomes'</i> is relevant here.
14.1 Ways of sharing	has the project defined or developed spaces (real/virtual) for sharing ideas and data?	This was uniformly understood to mean virtual spaces only. Webber also envisaged real spaces.
15.1 Succession planning	has the project planned for succession by including early career researchers and allowing for mentoring and training?	This question was deemed largely irrelevant, while Webber envisages an active program of involving and mentoring 'junior' researchers.
16 Anything else to add?		One interviewee raised the important difference between an 'agile' research (i.e. exploration, discovery) approach AND a risk based (invention, problem solving) development approach. This characterises the difference between academia and industry but also between academia and the policy-making sector.

The appropriateness of a generic framework for interdisciplinary research

However desirable it may be to identify universal practices as guidelines in the relatively new academic field of interdisciplinary research, the appropriateness of such guidelines to any particular project will still depend upon the nature of that project itself. The colloquial use of the term 'multi-disciplinary' and the real differences between multi-disciplinary research work (i.e. separate contributions by more than one discipline) and interdisciplinary research projects (involving an integrated insight across the disciplines) are complicating factors. Furthermore, the National Research Council uses the term 'convergence' to describe "*an expanded form of interdisciplinarity in which bodies of specialized knowledge comprise 'macro' domains of research activity that together create a unified whole*". A deeper understanding of this spectrum will influence the prioritisation of guidelines. Referring to the evaluation questions in the Appendix, the significance of issues such as 'combinations of disciplines' (2.1) and 'appropriate methodologies' (5.1) for example, will vary between multi-disciplinary and interdisciplinary projects. These will doubtless require further review in the case of convergent and transdisciplinary projects.

A second broad consideration that will influence the appropriateness of guidelines is the difference between 'iterative' (and particularly 'agile') research projects and risk-driven development processes.

The former may be characterised as an exploration of the field of possibilities (possibly simply curiosity-driven), while the latter is typically the problem-solving approach that characterises public policy development. Research projects, for example, may hardly be concerned with intellectual property and commercialisation issues, while development projects almost certainly will.

'Convergence' is a useful term in this context too because it captures not only the multiple skill sets required to address complex problems, but also the "*web of partnerships involved in supporting such scientific investigations and enabling the resulting advances to be translated into new forms of innovation and new products*".

Bammer (2012) refers to the need for "*an agreed parsimonious classification which distinguishes the major kinds of interdisciplinary research*". We do not yet have such a classification. Webber, whose report was based on a sample of socio-environmental research projects, points out that "*a body of knowledge as to how to practice interdisciplinary research (within the field of sustainability) is still lacking*". It may be that guidelines appropriate to interdisciplinary research projects in the field of sustainability are not necessarily transferable to other (interdisciplinary) fields.

The literature on the management of 'wicked' problems (included in the bibliography of the Bammer (2012) report but not referred to further in either Bammer (2012) or Webber (2013)) will also doubtless bear further investigation in the development of a broad set of guidelines for interdisciplinary research of various kinds. The ACOLA LASP project has shown that there is more work to be done. Meanwhile the APS report cited below encourages us to:

"work on fostering a culture that encourages collaboration and engagement, including developing a shared understanding of contentious issues among relevant stakeholders and organisations."

That seems good advice in a landscape that is still evolving.

Steering Committee

Peter Laver AM FTSE (Chair)

Professor Leon Mann FASSA

Professor Karen Reynolds FTSE

Professor Rod Tucker FAA

Professor Alison Bashford FAHA

Evaluation Report by

Dr Jacques de Vos Malan

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