



An Australian Government Initiative

**National Collaborative Research
Infrastructure Strategy**

**REVIEW OF NCRIS ROADMAP AND
FACILITATION PROCESSES**

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Contents

1. INTRODUCTION	4
Context: A new approach to resourcing research infrastructure	4
Evaluation Strategy	4
Scope of this Review	4
2. METHODOLOGY	5
Input sources	5
Analysis of responses	5
3. KEY ISSUES ARISING.....	6
Appropriateness	6
Effectiveness	6
Efficiency	7
4. CONCLUSION	9
5. REFERENCES	9
APPENDIX A: SUMMARY OF RESPONSES TO THE NCRIS ROADMAP	10
Appropriateness	10
Effectiveness	10
Efficiency	12
APPENDIX B: SUMMARY OF COMMENTS FROM NCRIS FACILITATORS.....	14
Appropriateness	14
Effectiveness	14
Efficiency	15
APPENDIX C: COVERING LETTER / QUESTIONS PUT TO KEY STAKEHOLDERS	17
APPENDIX D: SUMMARY OF RESPONSES FROM KEY STAKEHOLDERS	19
Appropriateness	19
Effectiveness	20
Efficiency	22

1. Introduction

Context: A new approach to resourcing research infrastructure

Announced by the Australian Government in May 2004 as part of *Backing Australia's Ability – Building our Future through Science and Innovation*, the National Collaborative Research Infrastructure Strategy (NCRIS) represents a departure from past methods of identifying and supporting research infrastructure in Australia, which often used a competitive approach to allocate Australian Government grant funds.

The NCRIS Programme addresses the problem that many high-priority, medium-scale research facilities or infrastructure investments are too large or complex to be supported by any single research institution and too important to the wider research community to be confined to individual interests or jurisdictions. It also seeks to avoid the waste of limited resources that would result from competitive or uncoordinated duplication of key research facilities. NCRIS embodies an alternative collaborative and cooperative approach to critical research infrastructure resourcing.

The objectives of NCRIS are to:

- Provide major research infrastructure that is national and strategic, collaborative, and world-class;
- Promote a sustained cultural shift towards investment attitudes that are national and strategic, and collaborative; and
- Foster research activity that is collaborative and world-class.

A roadmapping process was conducted in 2005 to identify priority capability areas for infrastructure investment, followed during 2006 by the use of a separate Facilitator to work collaboratively with the stakeholders in each of the first nine capability areas to document an Investment Plan for each area.

The Department of Education, Science and Training has taken this opportunity to seek initial feedback from key stakeholders, co-investors and the affected research communities, to assist in evaluating the success of the new NCRIS processes. The Department also sought to assess the associated strategic and cultural responses of the research communities that will use the infrastructure.

Evaluation Strategy

The *NCRIS Evaluation Strategy*, approved by the NCRIS Committee in December 2006, provides a framework for the evaluation over time of the NCRIS programme, in particular its effectiveness, efficiency and appropriateness. The Strategy draws on official statements about NCRIS to summarise the programme objectives (Appendix A to the Strategy) and identifies a series of top level indicators of success (Section 10 of the Strategy), that will inform the assessment of the effectiveness, efficiency and appropriateness of the NCRIS programme. Specific indicators relating to each NCRIS project will be developed, consistent with these top-level indicators.

A major review of the NCRIS programme is scheduled to take place in 2009. The terms of reference for the major review, consistent with the *NCRIS Evaluation Strategy* would be finalised in late 2008. The major review will draw upon information from this 2007 Review, the content of progress reports provided by NCRIS funding recipients and other information gathered specifically as part of the major review.

Scope of this Review

Despite the fact that the Investment Plans for the first nine NCRIS capability areas have not yet been implemented, it was considered important to obtain prompt feedback about the conduct of the NCRIS processes to date. This information can immediately be applied to the facilitation processes that are already in train for further capability areas. The results of this Review will also assist in the future updating of the Roadmap. Specifically, the two processes examined in this Review are:

- **The NCRIS Roadmapping process** (September 2005 – February 2006) through which the NCRIS Committee identified the national capabilities in which medium to large scale research infrastructure investments should be focused over the next 10 years. The NCRIS Committee will periodically review these capabilities in the light of changing priorities and emerging opportunities. The roadmapping process contributes to the first NCRIS objective by analysing and prioritising research capabilities for

investment in terms of their potential for national and strategic impact in providing collaborative and world-class infrastructure. The consultations of expert sub-committees during the roadmapping process also began to address the second NCRIS objective - promoting a sustained cultural shift towards investment attitudes that are national and strategic, and collaborative.

- **The NCRIS Facilitation process** (March – November 2006 for the first nine capability areas) brought together Facilitators, researchers, research managers and other stakeholders, to collaborate in the development of Investment Plans for the first nine NCRIS capabilities, thereby advancing the first and second NCRIS objectives.

2. Methodology

Input sources

In accordance with the designated scope of this Review and the NCRIS evaluation framework, the Department of Education Science and Training has drawn upon advice from the following sources:

- Stakeholders' public submissions, (November – December 2005), in response to the *NCRIS Roadmap – Exposure Draft* released in November 2005. Around 193 submissions were received at that time.
 - A summary of feedback received through this pathway is provided in **Appendix A**;
- The Final Reports of the Facilitators who developed the Investment Plans for the first nine NCRIS capabilities, which were approved for funding in November 2006;
 - A summary of Facilitator's views, as they relate to the evaluation framework, is provided in **Appendix B**;
- Responses solicited by the Department of Education, Science and Training from key NCRIS stakeholders who were surveyed in February – March 2007 to obtain their views of the roadmapping and facilitation processes. Those surveyed included Deputy Vice Chancellors (Research) at all of Australia's universities, the heads of major Australian Government research agencies, key state and territory government contacts with involvement in the NCRIS processes and NCRIS Committee members. The Department received 21 responses from the 61 questionnaires distributed.
 - The text of the letter and questionnaire sent to the stakeholders is provided in **Appendix C**;
 - A summary of Stakeholders' views, as they relate to the evaluation framework, is provided in **Appendix D**.

Analysis of responses

Evaluation of the responses has been structured around the NCRIS evaluation framework, that is:

Appropriateness

- The demonstrated necessity for the NCRIS programme, the alignment and consistency with government policies and priorities, and the suitability of the chosen collaborative and strategic investment approaches in addressing Australia's present and emerging research infrastructure needs.

Effectiveness

- Extent to which the NCRIS processes identify priority areas and investments for major research infrastructure that are national and strategic, collaborative, and world-class;
- Extent to which the NCRIS processes promote a sustained cultural shift towards investment attitudes that are national and strategic, and collaborative;
- Extent to which NCRIS has the potential to foster research activity that is collaborative and world-class;

Efficiency

- Cost-effectiveness of the NCRIS processes, i.e. appropriateness of the level of resources and effort devoted to developing the Roadmap and Investment Plans;
- The efficacy, transparency, fairness, clarity and shared understanding of processes adopted in managing the NCRIS processes.

The Facilitators, and those making public submissions to the Exposure Draft of the NCRIS Roadmap did not specifically structure their comments around the evaluation framework, but many of their comments can be related to the framework. By contrast, the questionnaire sent out to key stakeholders in 2007 was explicitly constructed around the evaluation framework. Appendixes A, B and D summarise and categorise the feedback received.

3. Key issues arising

Appropriateness

There is strong support from stakeholders for the NCRIS approach to allocating research infrastructure funds. There is wide agreement that taking a national, collaborative approach to infrastructure investment has the potential to realise economies of scale and that appropriate access and pricing regimes can result in effective use of the investment.

Stakeholders responded positively about the extent of consultation, the ability to apply NCRIS funds to operating costs, the engagement with States and Territories, the constructive participation by CSIRO and the overall progress achieved to date.

Various respondents specifically contrasted the collaborative NCRIS approach with the previous competitive approach to allocating infrastructure funding. All of these respondents strongly supported the NCRIS approach, while often noting that particular aspects of the NCRIS process need further development. The following comment reflected a balanced viewpoint that was common among stakeholders:

"The collaborative approach mostly worked well and certainly is a welcome departure from more competitive approaches."

Many stakeholders were excited about the potential benefits of the NCRIS approach and emphasised that there is a demonstrated need for a major programme of this sort, with significant infrastructure proposals having been omitted from Investment Plans due to funding constraints.

Effectiveness

To a large degree, stakeholders considered that the Roadmap and Investment Plans did identify the appropriate, high priority research infrastructure investments. It was noted, though, that the Roadmap reflected views at a particular point in time and that it will need updating in the future.

One significant issue that was raised by a number of stakeholders was the need, through both the roadmapping and facilitation stages, to ensure that the infrastructure requirements of emerging areas of strategic importance are adequately taken into account. While the current Roadmap and Investment Plans do address a number of emerging interests, it was pointed out that there can be a tendency for the discussion of infrastructure need to be dominated by major research institutions with established research programmes. It is important to ensure that the needs of smaller players working in strategically important areas are taken into account, while retaining the NCRIS emphasis on collaboration and the realisation of economies of scale wherever possible.

Stakeholders considered that the roadmapping and facilitation processes have both contributed to the gradual development of a more collaborative culture among institutions and researchers. It was noted however that, especially during the roadmapping phase, some players had not absorbed the change from a competitive to a collaborative approach, and therefore still tended to argue from a local rather than national perspective. While the development of a national, collaborative culture is still evolving, and the worth of such an approach is yet to be proven through the successful implementation of the initial NCRIS projects, respondents believed NCRIS was an effective catalyst for change.

Stakeholders noted that achieving research excellence depends on many factors other than access to research infrastructure. That is, good research infrastructure is a necessary but not sufficient condition for achieving good research outcomes. Nevertheless, respondents were of the view that the collaborative delivery of improved infrastructure combined with effective, merit based access schemes does have the potential to support excellent research outcomes. In this context, the availability of appropriate ICT

infrastructure under the Platforms for Collaboration capability was noted as important in achieving effective access and building a collaborative culture.

Efficiency

As an overall observation on the conduct of the NCRIS process to date, stakeholders highlighted that those sectors with a history of cooperation and collaboration were better placed to articulate their position during the roadmapping process and better placed to develop an Investment Plan in conjunction with a Facilitator. For other sectors, more work was needed to collate and distil their proposals and to consolidate them into a well developed plan.

Hence while the time allowed for the roadmap and facilitation phases was broadly seen to be tight but reasonable, the circumstances varied among capability areas. Similarly, some of the comments below may apply to a greater or lesser extent for different capabilities depending on their experience in working collaboratively.

Updating the Roadmap

Comment was made by stakeholders that the early part of the original roadmapping exercise took longer than was necessary and that any updating of the Roadmap should be done in a timely fashion. One suggestion was that greater use might be made of independent consultants to assist with updating the document.

It was further suggested that continued efforts should be made to promote an understanding among stakeholders of the intent and conduct of the programme, including the benefits for institutions in supporting national infrastructure, so that interested parties will be better placed to contribute to the updating of the Roadmap. This explanation of the programme should include those stakeholders working in emerging areas and the humanities and social sciences.

In communicating the intent of the programme to stakeholders, it is important to explain the scope of the NCRIS projects. NCRIS is intended to provide funding contributions in the range of \$5 million to \$60 million to support major research facilities that are too large to be addressed easily by individual institutions. In broad terms, smaller investments can be supported by programmes such as the ARC LIEF Scheme, and support for larger "landmark" investments would need separate case by case consideration by government.

Selecting the Facilitators

Many stakeholders emphasised strongly the need to select Facilitators who are independent of the facilities that stand to receive NCRIS funds.

While DEST and the NCRIS Committee were very conscious of this issue in selecting the initial group of Facilitators, it was in some cases difficult to identify people with suitable subject area expertise who were not associated with existing facilities. As a result, DEST required all Facilitators to declare their relevant interests and where necessary stand aside from positions. In several cases the Committee also appointed a reference group of experts to work with the Facilitator and ensure the Facilitator received a wide range of input.

Nevertheless, other avenues should be pursued in future to ensure the Facilitators are independent. It was suggested that the approach currently being used for the Terrestrial Ecosystem Research Network (TERN) is a mechanism that can help to ensure the independence of the Facilitator. In the case of TERN, an independent Facilitator is supported by a science adviser and reference group who ensure there is effective subject matter input.

Guidance for the Facilitators

Significant efforts were made with the initial nine Facilitators to provide them with guidance on the intent of the programme and the nature of their role as a Facilitator. This included the provision of relevant documentation, oral briefings of Facilitators, the appointment of an NCRIS Committee member to act as a mentor for each Facilitator and the holding of periodic meetings with the Facilitators as a group so that they could learn from each other's experiences.

Nevertheless, stakeholders have identified several areas where more specific guidance should be provided to Facilitators.

First, it is important that a Facilitator has a clear understanding of the scope of their project and communicates that understanding clearly and consistently to the stakeholders with whom they engage. Relevant issues include:

- that the description of the capability area in the Roadmap is a starting point for consideration of the infrastructure needs, but that it can be amended or augmented with agreement from DEST and the NCRIS Committee. If such changes occur, they need to be clearly communicated and explained to the stakeholders;
- that the Facilitator needs to consult thoroughly with universities, independent research institutions, government agencies and institutions and, where relevant, industry when identifying infrastructure needs;
- that, in the case of government agencies, the Facilitator needs to take care to explain that NCRIS funds can be applied to research requirements but are not intended to support operational requirements.

When consulting with universities, Facilitators need to consult both with relevant researchers and with university management. Formal endorsement by a university for involvement in a project is typically provided by the Deputy Vice Chancellor (Research) or equivalent.

In the case of the first nine capability areas, Facilitators were asked to discuss three funding scenarios with stakeholders including an “unconstrained” scenario that was intended to encourage thought about the longer term infrastructure needs. Several comments were received, however, indicating that the inclusion of this scenario raised unrealistic expectations among stakeholders which were subsequently difficult to manage.

The message that, while significant co-investment is expected, there is no specific “matching requirement” with regard to co-investment needs to be communicated consistently by Facilitators.

Some respondents noted that the NCRIS process should seek to attract significant co-investment so as to increase the scale and scope of the infrastructure provided. There was some concern, though, that the possibility of large funding contributions by institutions or state and territory governments can influence the investment that is proposed in an Investment Plan. Several stakeholders recommended that Facilitators should therefore be required first to consider the science case for infrastructure investment and, second, to consider the funding sources including the potential for co-investment by institutions and state and territory governments. The funding processes and timeframes associated with state and territory co-investment need to be considered when developing an Investment Plan and associated implementation strategy.

Stakeholders commented on the flexible approach taken in regard to governance structures with some commenting that the absence of a prescriptive requirement made the situation more complex. Overall, though, stakeholders supported a degree of flexibility in this area but considered that clearer guidance should in future be provided to Facilitators and stakeholders about the types of governance arrangements and corporate structures that are workable and acceptable to DEST and the NCRIS Committee.

Implementing the Investment Plans

With the first nine capability areas, the role of the Facilitator ended when the Investment Plan was considered by the NCRIS Committee. The lead institution and other project participants were then responsible for negotiating the funding agreement with DEST and implementing the project. In those cases where the stakeholders were well coordinated, this arrangement worked well and the transition from facilitation to implementation appeared to work smoothly. In other cases, the project participants were not as well placed to progress the task.

It is important therefore to recognise that different approaches to implementation might be appropriate in different cases. For example, it might be helpful to engage the lead agency (or agencies) more closely while the Investment Plan is being finalised by the Facilitator, or it might be helpful to allow the Facilitator to assist the lead agency for a short time while implementation commences.

4. Conclusion

At this stage in the implementation of NCRIS, there is a widespread view among stakeholders that the national, collaborative approach to the allocation of infrastructure funding should be supported as it has the potential to provide wider access to better infrastructure.

At the same time, it is acknowledged that this is a new process and there is a need to learn quickly from the experience gained so as to improve the way that the programme is conducted.

DEST and the NCRIS Committee will therefore address the matters raised by stakeholders in the future conduct of the programme.

5. References

The Australian Government initiative, *Backing Australia's Ability – Building our Future through Science and Innovation* represents a commitment to pursue excellence in research, science and technology, through three key themes: the generation of new ideas (research and development); the commercial application of ideas; and developing and retaining skills. The home page for this initiative is at:

<http://backingaus.innovation.gov.au/>

Through the *National Collaborative Research Infrastructure Strategy* (NCRIS), the Australian Government is providing \$542 million over 2005-2011 to provide researchers with major research facilities, supporting infrastructure and networks necessary for world-class research. The NCRIS home page is at:

<http://www.ncris.dest.gov.au/>

The NCRIS objectives are contained in the *NCRIS Roadmap*, (released in February 2006 by the Minister for Education, Science and Training), which can be downloaded from:

http://www.ncris.dest.gov.au/key_documents.htm

The *NCRIS Investment Framework* describes how NCRIS uses facilitators to develop investment plans in consultation with the research community; how interested parties can participate in the development of investment plans; the role of the NCRIS Committee in ensuring the quality of investment plans; the role of the Minister in providing final approval of funding for Investment Plans; and administrative arrangements for implementing investment plans. The Investment Framework can be downloaded from:

http://www.ncris.dest.gov.au/key_documents.htm

The NCRIS Facilitators are listed at:

http://www.ncris.dest.gov.au/background.htm#Capability_Facilitators

The *NCRIS Roadmap – Exposure Draft* was released by the NCRIS Committee in November 2005, allowing stakeholders to comment on the proposed direction of NCRIS investment. This paper provided a focus for consultations that were undertaken prior to finalising the *NCRIS Roadmap* in February 2006, and is available, together with the public submissions, at:

http://www.ncris.dest.gov.au/ncris_strategy_development/exposure_draft.htm

The first nine NCRIS capabilities and the funding for each, as announced by the Minister for Education, Science and Training on 27 November 2006 are listed at:

<http://www.ncris.dest.gov.au/capabilities/default.htm>

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Appendix A: Summary of responses to the NCRIS Roadmap

This appendix highlights feedback relevant to the current evaluation raised in the submissions to the exposure draft of the NCRIS Roadmap received in December 2005. It should be noted that submissions were sought regarding the Exposure Draft Roadmap in the context of an investment strategy for major research infrastructure. Specifically, respondents were invited to:

- comment on the scope of the prioritised capabilities and to provide any views or information that might help to further prioritise those capabilities;
- provide any comments that that would assist the Committee in further articulating the strategic infrastructure and support requirements, together with any associated issues, relating to the capabilities identified in the exposure draft; and
- respond to any issues/questions posed in the "Conclusions/issues" section for each capability.

The submissions to the exposure draft of the NCRIS Roadmap are available on the NCRIS website at http://www.ncris.dest.gov.au/ncris_strategy_development/exposure_draft.htm

Appropriateness

"A comprehensive, consultative approach to setting priorities for large investments in national research infrastructure has long been overdue, and the Australian Government and the NCRIS committee are to be commended for initiating such an approach."

It was generally acknowledged that a strategic, national and consultative approach to identifying, and investing in, research infrastructure was important to minimise duplication and maximise the impact of investments. The majority of submissions provided positive responses in their expectation or anticipation of NCRIS facilitating research infrastructure needs.

Support was also strongly expressed for the NCRIS principles, including strategic investments that minimise duplication; ensuring infrastructure is accessible nationally; and a focus on areas where Australia had the potential to be an international leader. The inclusion of funding to support the operation and maintenance of infrastructure was welcomed by all. The need to collaborate and maximise investment impact was also seen as being important in achieving world-class research and being able to participate on the international stage.

Effectiveness

Extent to which the NCRIS processes identify priority areas and investments for major research infrastructure that are national and strategic, collaborative, and world-class

"NCRIS is a refreshing and exciting concept in that it has identified and will address national research priorities. The scope of identified capabilities appears to take account of emerging technologies and issues that are vital for the wellbeing and advancement of Australians and Australia."

As requested, the majority of respondents provided feedback on the description of the specific capability or capabilities relevant to their research. The majority of submissions expressed enthusiasm for the Roadmap and optimism that NCRIS would address identified research infrastructure needs. There were some concerns raised about the lack of recognition of issues or the low prioritisation accorded to some capabilities or specific research areas. Some submissions indicated support for the development of research infrastructure capabilities which were accorded low prioritisation/or no support under NCRIS.

However, many of the responses also endorsed the Strategic Roadmap as a useful statement of the nation's major infrastructure priorities overall. Numerous submissions noted that the Roadmap identified a broad range of capabilities and would facilitate priority research including research consistent with the National Research Priorities.

The exposure draft also engendered positive response from the state governments and demonstrated their willingness to engage with the NCRIS process and work with the Commonwealth to develop a collaborative research infrastructure. Implicit in this commitment was an acknowledgement that

investment in major research infrastructure needs to be co-ordinated nationally with insufficient resources available to support duplication between States. As one state government noted:

"[the State Government] is supportive of the proposed approach and its focus on capability development at a national level rather than in the duplication of research infrastructure across a number of jurisdictions"

While almost all of the respondents expressed broad support for the Roadmap, some concern was expressed regarding the scope of NCRIS, particularly with regard to a number of perceived infrastructure needs that were not considered to be adequately addressed in the Roadmap. Broadly these infrastructure needs were landmark facilities, the humanities and social sciences and specific scientific research areas not highlighted in the roadmap.

The lack of a clear process for identifying and funding landmark infrastructure was raised by a number of respondents. While acknowledging that this could not be addressed by NCRIS due to funding limitations, the need for a process to address this need was emphasised.

Submissions received from the humanities and social sciences, while broadly supportive of the NCRIS approach, indicated that they felt that these areas had been overlooked and that the NCRIS consultation process did not appear to have engaged well with researchers in the humanities and social sciences.

It was also noted that representation of humanities researchers and social scientists on the four expert sub-committees had been minimal.

Feedback from stakeholders involved in specific fields expressed disappointment that their area was not included in the Roadmap. While some disappointment was inevitable (due to the need for prioritisation), these comments also highlight that the highly consultative, national focus of NCRIS, with a mandate to maximise the utility of infrastructure across the nation, is likely to favour infrastructure investments that enable research in well established areas with a large user base.

Some institutions felt that the consultation process had not acknowledge the key role that institutions play in supporting the maintenance and operation of infrastructure and that engagement at an institutional level had been insufficient.

Another issue raised by respondents was concern about lack of recognition for the role of industry in the research sector and that linkages with some industry sectors could have been more developed.

Extent to which the NCRIS processes promote a sustained cultural shift towards investment attitudes that are national and strategic, and collaborative

"We welcome the development of a plan to provide collaborative research infrastructure in a strategic manner, rather than an unguided competitive approach"

Feedback welcomed the impetus that NCRIS had provided for a cultural shift in attitudes of the research community as well as the state and territory governments. It was widely perceived that the shift in focus from local needs towards Australian research infrastructure needs was highly constructive and long overdue. The NCRIS process initiated and encouraged an innovative and collaborative approach in identifying research infrastructure needs to maximise the investment of funds for innovative quality research facilities and activities.

The shift from a competitive approach was widely welcomed. That NCRIS enabled all stakeholders to participate in the planning and implementation of the infrastructure was reported by one respondent as a very positive contribution to the ongoing development of Australia's research capacity

One respondent highlighted that the strategic approach not only minimised duplication in the provision of research infrastructure but also provided the potential to benefit from the economies of scale associated with the effective operation of the infrastructure including the provision of support staff. Another respondent highlighted that the shift in funding of infrastructure would also require a new way of working together noting that:

"Funding efficiency will be maximised by encouraging varied and non-traditional links between researchers "

Even at this early stage, a number of respondents indicated that the NCRIS process had resulted in improved communication and collaboration both between research institutions, and between institutions and governments.

However, an exclusively collaborative approach to infrastructure investment was not universally supported. One respondent suggested that maintaining an element of contestability in the provision of infrastructure to ensure excellence and attract additional resources.

Extent to which NCRIS has the potential to foster research activity that is collaborative and world-class

“NCRIS provides an opportunity to set up world-class science infrastructure accessible to all scientists and technologists in Australia.”

The responses to the exposure draft convey a sense of anticipation and expectation that NCRIS investment will strengthen Australian research and enable the Australian research community to engage more actively and collaboratively to conduct research at the international level and participate in cutting edge research. A number of submissions highlighted the importance that world-class infrastructure plays in enabling world-class research. As one respondent noted:

“An efficient and effective national shared infrastructure is a prerequisite for world-class research work conducted in this country”

Respondents were optimistic that the strategic investment approach would enable more investment in world class infrastructure that combined with wide accessibility, would enable researchers to pursue world leading research. A key component of this optimism was the expectation that facilitating the development of a critical mass of researchers (brought together through utilisation of the infrastructure) would enable research of sufficient quality to make an international impact. Respondents also expressed anticipation that NCRIS would enable a more systematic approach to funding access to international infrastructure for Australian researchers.

Efficiency

“In general we believe that the NCRIS consultation process has been well constructed and implemented and has generated a well defined set of capability areas that covers a very wide range of high profile research activities in Australia.”

While not the focus of the consultation round, some commentary was provided regarding the efficacy of the Roadmap consultation process and the proposed implementation arrangements for NCRIS.

While overall, feedback regarding the Roadmap consultation process was positive, individual respondents expressed concern that the consultation processes had failed to effectively engage specific groups of stakeholders including institutions, some sectors of industry and specialist research areas.

The submissions reflected a tension within the community regarding the degree to which NCRIS investment should build on existing capability and the danger of concentrating all capability in a few resource rich organisations to the detriment of smaller organisations. A number of regional institutions expressed concern that the strategic approach supported by NCRIS would result in a concentration of infrastructure in major centres, further disadvantaging researchers based at regional institutions. While there was universal agreement regarding the principle of concentrating investment, the need to develop linkages between major facilities and smaller specialist facilities to optimise accessibility and maintain diversity was expressed by a number of respondents. In order to achieve this it was suggested that NCRIS could play a key role in supporting smaller units at various institutions to develop appropriate structures for formal interaction, coordination or collaboration. Similarly, it was recommended that consideration be given to the development of distributed infrastructure networks as much as possible to avoid undue concentration of capacity in centrally located, well established organisations.

The need for a parallel training strategy was emphasised and ensuring that NCRIS infrastructure was accessible to students was identified as an important issue by a number of respondents. Centralisation of infrastructure was seen as a potential barrier for students not co-located with the facilities and the need to ensure appropriate access was seen as critical to the maintenance of appropriate expertise through time. One respondent emphasised the need for:

“a coordinated effort in education and training which now takes place independently at numerous facilities, at sometimes unnecessary cost”.

A number of respondents also noted that the move to centralised facilities needed to be accompanied by a strategy to fund access to these facilities with respect to both travel costs and access charges. As one respondent noted:

“A mechanism for funding the travel or researchers to use national facilities at distant nodes needs to be devised. This may be directly as part of the infrastructure support through NCRIS or as effectively coordinated relevant funding through an agency such as ARC.”

Some respondents suggested that it would be beneficial if there had been a larger role for international review and input in the Roadmap development process. It was perceived that to a large extent Australia was ‘going it alone’ and that this isolation may result in sub-optimal outcomes.

One respondent suggested that a review of the issues in relation to the MNRFs would be useful and provide the opportunity to identify lessons learnt including the need for secure funding of associated operating costs and ensure that researchers were able to secure funding to access major facilities.

In general there was support for the 5-year funding commitment although respondents expressed a desire for a lapsing rather than terminating programme to increase certainty in the community and encourage the development of a long-term view. Concern was raised by a number of respondents that the funding to be provided under NCRIS was insufficient to implement the Roadmap and that further prioritisation would need to occur.

A number of respondents also emphasised the need to maintain the Roadmap as a living document able to incorporate changes in priority as research developed. These respondents suggested that processes be put in place to review and update the Roadmap as appropriate to continue to effectively guide infrastructure investments.

While not explored in detail, a number of respondents noted the key role that governance would play in ensuring national access to the infrastructure, particularly for distributed networks, and emphasised the need to ensure that best practice governance models were promoted and implemented as part of the NCRIS investment process.

Those respondents that commented on the use of Facilitators to develop investment plans were supportive of the concept, noting that the stakeholders involved in many of the capabilities did not have a history of working together and that support would be required to develop inclusive and collaborative plans. It was also noted that the facilitation model proposed relied heavily on the knowledge, skills and credibility of the Facilitator, making these appointments (and the process for identifying them) critical to the successful implementation of the NCRIS strategy. It was also noted that some of the capabilities were extremely broad, presenting a substantial challenge for the Facilitators to develop collaborative proposals.

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Appendix B: Summary of Comments from NCRIS Facilitators

Appropriateness

The Facilitators generally saw the NCRIS programme as appropriate. One Facilitator noted that funding infrastructure that provides access to all eligible researchers is far more attractive than infrastructure grants awarded to a modest proportion of competing applicants, providing limited access to researchers. Another Facilitator pointed out that low cost access to facilities, along with support for maintenance and staffing is a concept popular with researchers. The next challenge is to ensure establishment of the facilities and their service-oriented operation.

Some stakeholders reported to their Facilitator that they see the ongoing viability of the project beyond the NCRIS funding period as uncertain, and were concerned about control over the directions and roles for the facility beyond 2011.

One Facilitator remarked that when dealing with the establishment of a new research capability, particularly a large and complex capability with many stakeholders, it would be prudent for the NCRIS Committee to engage in a scoping study to determine the size, complexity, issues and priorities for funding of the proposed capability before deciding on a level of funding for it.

Effectiveness

Extent to which the NCRIS processes identify priority areas and investments for major research infrastructure that are national and strategic, collaborative, and world-class

The Facilitators all regarded the NCRIS processes as being effective at engaging the research community and uniting disparate geographical efforts to address large research infrastructure needs, and to transform "for the good" the way infrastructure investments are conducted in Australia. It was pointed out that the success of the facilitation process depends critically on identifying a comprehensive list of key stakeholders, potential co-investors and relevant 'interested parties', which can be challenging in diverse research capabilities. For those capabilities supporting disciplines already characterised by strong collaborative organisations and links, such as the astronomy community with its Astronomy Decadal Plan already in place, the prioritisation of infrastructure investments was seen as relatively straightforward (assisted by the Roadmap and NCRIS Committee feedback) compared to capabilities bringing diverse research groups together for the first time.

The level of resources provided for the facilitation process was seen as helpful in identifying people who were developing genuine national proposals, and critically important in enabling embryonic proposals to come forward early and focus their proposals with respect to goal, purpose, outcomes and activities.

One Facilitator argued for a more flexible approach in priority-setting for future funding rounds, pointing out that the Strategic Roadmap provided a sound base for developing the Investment Plan, but constrained the outcomes to a significant extent by defining the main areas for inclusion. Another commented that more NCRIS funds could have been directed towards areas that were strongly supported by state and territory governments, to stimulate additional state funding for research infrastructure.

Extent to which the NCRIS processes promote a sustained cultural shift towards investment attitudes that are national and strategic, and collaborative

The Facilitators mostly agreed that the facilitation processes had brought communities together, on a scale not previously attempted, which was seen as critically important in the management of large expenditure on research infrastructure. It was observed that many groups working in particular research areas had met and learned about each other for the first time – a very valuable step forward. Facilitators cited measures of success indicating the value and impact of this cultural shift, such as the willingness of researchers and managers to spend substantial time in collaborative discussions, lack of inter-institutional rivalry, willingness to contribute capital equipment to common good, significant cash co-investments raised in a very short time to run NCRIS facilities, enthusiastic uptake by state governments interested in encouraging high-tech industry growth and significant engagement by CSIRO and industry. One Facilitator identified the need to be pro-active in promoting the positive outcomes and achievements of

NCRIS, to date, so that the momentum and enthusiasm and buy-in is maintained, and the merit is not lost or buried among other subsequent or concurrent research funding programs.

Some Facilitators recognised that the future potential for cultural changes include a strengthening of cross-sectoral and cross-jurisdictional engagement, with clear prospects for deep engagement between state jurisdictions and the higher education / research sector. State government agencies were seen to be very useful in helping Facilitators engage with key stakeholders in the states, but this was found to be variable. In parts of the process, some Facilitators noted that universities and industry held back from full engagement, through unfamiliarity with the collaborative process, or risk aversion and a desire to evaluate expected returns before becoming fully involved. In some capabilities, industry aims for pre-competitive research and science are seen to be well aligned with the NCRIS investment objectives, so greater engagement is expected as the capabilities evolve.

Some Facilitators found that the radical shift from competitive to collaborative processes was not always fully understood by stakeholders, with early confusion turning to general support once the NCRIS procedures were explained. Others noticed a residual competitiveness and dissent in regard to prioritisation, and recommended the need to minimise state based approaches and educate the community about the benefits of strategic, national investment.

Decisions have to be reached during the facilitation process that are not the preferred outcome for some parties, and there is pressure for investment decisions to coordinate the available NCRIS funding with potential co-investments by states and institutions to achieve an optimal outcome overall – these factors unavoidably introduce a competitive element and necessitate compromise decisions at times. There is therefore a need for clear explanation to stakeholders of the reasons behind these decisions, and a concomitant need to ensure that research funding processes do not discriminate against meritorious researchers who are not connected to organisations hosting NCRIS infrastructure.

Extent to which NCRIS has the potential to foster research activity that is collaborative and world-class

While the Facilitators' Final Reports provided specific assessments of infrastructure issues arising within particular capabilities and the generally positive implications for research activity in those capabilities, there were relatively few comments specifically on this topic.

Efficiency

The Facilitators seemed largely of the opinion that the timeframe to develop Investment Plans was short but appropriate and should not be extended too far. It was pointed out, however, that for some of the more complex capabilities, additional facilitation funds would have been appropriate.

The initial investment plan framework provided to Facilitators was considered helpful, as was guidance from the NCRIS Committee and secretariat, with rapid turnaround on questions and good availability for consultation. One Facilitator noted that it was difficult to estimate a budget for the facilitation process at the beginning, as the NCRIS process was evolving in response to developments within the capabilities. It was suggested that better communication and guidance from the outset, in regard to the preferred governance requirements for the NCRIS capability, would have mitigated against extra effort and unexpected expenditure in later stages of the facilitation process.

Managing expectations

Some Facilitators raised the need for additional clarity of purpose for NCRIS funding, citing experiences with stakeholders who appeared to regard NCRIS as a programme to fund infrastructure for 'operational' rather than 'research' purposes. Some Facilitators pointed out that seeking 'unconstrained' investment scenarios of up to \$60 million per capability may have created stakeholder expectations that were subsequently difficult to manage.

Coordination across capabilities

Cross-capability coordination concerned some Facilitators, in particular the unpredictability in demands placed on one capability through NCRIS investments in other capabilities, and the ability of the facilitation processes to ensure adequate synergies between related capabilities. Some Facilitators identified the need for better clarity and communications in defining the respective ICT responsibilities of their own capabilities, and those to be provided through the Platforms for Collaboration capability.

Independence of the Facilitator and Reference Group

Several Facilitators noted that the perceived independence and lack of conflicts of interest of the Facilitator and advisory bodies or reference groups was highly valued by stakeholders. One Facilitator recommended that a Reference Group should have members with organisational management experience.

Certainty in co-investments

Several Facilitators were concerned about the uncertainty in the extent of state government co-investment forthcoming, for example due to impending elections, budget processes or state concerns that co-investments may not remain within that state. There is also a significant risk of major modifications being required in investment plans if state funding fails to eventuate and a question as to who would fill the funding gap.

Lines of communication

Clear and functional lines of communication between all parties were regarded by Facilitators as critical. Responses from several Facilitators underlined the critical importance of keeping key stakeholders informed about important processes and developments early on, to avoid misunderstandings, especially executive staff of universities (Deputy Vice Chancellors – Research), industry representatives, state and territory government representatives, and senior officers of research institutions. One Facilitator pointed out that establishing and maintaining a dedicated Facilitator's web site is a useful method to keep up-to-date communications lines open with stakeholders within a particular capability area. Other communications issues arising at various points in the process included an apparent unawareness by some stakeholders of the development or existence of the NCRIS Roadmap and a need for Facilitators to receive more detailed and up-to-date briefings about high level interactions between DEST, the NCRIS Committee and state and territory governments.

Clarity of processes

The provision of clear guidelines, specifications and intent were also seen as critically important to various aspects of the process. This was seen to be especially important in regard to the provision of contractual templates, guidelines or model solutions for common problems or issues likely to be encountered by all of the capabilities, e.g. governance, risk management, access to infrastructure, taxation issues (for holding companies set up to receive NCRIS funds). More generally, it was pointed out that the facilitation process benefits from a well-defined strategic framework, process and timetable, and continuing communication with key stakeholders at all stages in the process to maintain a sense of ownership.

One Facilitator pointed out that governance needs to be considered early in the process, especially in regard to identifying the lead institution. Some Facilitators would have appreciated additional and earlier clarity in the NCRIS Committee's position, in the establishment of appropriate governance models (e.g. the establishment of a company limited by guarantee, *versus* the nomination of an institution acting as a lead agency to receive NCRIS monies), and guidance from the Committee in establishing the relationship between the capability governance model and the governance models already in existence within the participating organisations.

* * *

Appendix C: Covering Letter / Questions put to Key Stakeholders



Australian Government

Department of Education, Science and Training

Our Ref: ES07/03445

<Key Stakeholder>
<Job Title>
<Institution>
<Address 1 >
<Address 2 State Pcode>

Dear <Key Stakeholder> ,

REVIEW OF NCRIS PROCESSES

I am writing to ask for your input to a small review we are conducting of the two key stages of the National Collaborative Research Infrastructure Strategy (NCRIS) that have been progressed to date. These two stages are:

1. the development of the NCRIS Roadmap; and
2. the preparation of the Investment Plans for the first nine priority capabilities identified in the Roadmap.

You will be aware that the NCRIS processes being reviewed represent a departure from past methods of identifying and supporting research infrastructure in Australia, which often used a competitive approach to allocate funds. Consequently, the Department of Education, Science and Training is interested in obtaining brief comments from key stakeholders on the efficiency and effectiveness of the NCRIS processes to this point.

Should you wish to comment, I invite you to include a few dot points on the attached form and return it to the Department by 9 March 2007.

Background information on the programme is available at www.ncris.dest.gov.au . If you have any queries, please direct them to Greg Piko, Director Research Infrastructure, (telephone 02 6229 4161, e-mail greg.piko@dest.gov.au).

Yours sincerely

Evan Arthur
Group Manager
Innovation and Research Systems Group

16 February 2007

REVIEW OF NCRIS PROCESSES

Name:

Organisation:

Please return this form by 9 March 2007 to:

Email: ncris@dest.gov.au or

Fax: 02 6123 7383

NCRIS aims to meet national priority research infrastructure needs.

- Do you consider that the NCRIS Roadmap effectively identified the priority areas for investment in research infrastructure?
- Do you consider that the nine Investment Plans developed to date have identified appropriate infrastructure investments? You are welcome to make general comments on the nine plans as a whole, or specific comments on individual Investment Plans.

Comments

NCRIS aims to change the infrastructure investment culture to a more collaborative, strategic and nationally-focussed approach, with facilities being accessible to researchers from around Australia.

- Do you consider that the Australian Government's collaborative approach to meeting national needs for accessible infrastructure is a positive development? Why/why not?
- Do you believe that other organisations support this approach? You are welcome to provide examples in your comments.

Comments

NCRIS aims to foster research that is collaborative and world-class.

- Do you think that NCRIS funded infrastructure and/or collaborative relationships will contribute to this outcome? You are invited to support your response with examples.

Comments

NCRIS aims to implement infrastructure investment as efficiently as possible.

- Do you think the NCRIS Roadmap and Investment Plan processes were appropriate?
- Are there specific improvements that could be made to these NCRIS processes? If yes, please describe the improvements.

Comments

Please provide advice of any significant successes you believe NCRIS has facilitated, or any other comments you might wish to make.

Comments

* * *

Appendix D: Summary of Responses from Key Stakeholders

Appropriateness

Benefits of the collaborative approach:

Many respondents to the DEST questionnaire saw the NCRIS approach as providing the opportunity to create more linkages and provide more access by researchers to facilities than was previously available through competitive funding schemes. The identification of the capability areas in the NCRIS Roadmap coupled with Commonwealth and state and territory investment has spread the benefit to a broader research community.

Various respondents recognised that developing a single negotiated outcome for each capability in the national interest has broad support, and remarked that the NCRIS roadmap and facilitation processes were appropriate as they forced interest groups to focus on national infrastructure issues.

Perceived need for the NCRIS programme

Many respondents remarked that there was a clear, unarguable case for maximising the use of national facilities, and that NCRIS is a very positive development, bringing about the more efficient use of infrastructure, encouraging links and enabling small groups to access larger networks. They also noted that the capability "Platforms for Collaboration" has the capacity to pull the entire suite of NCRIS capabilities together coherently.

Several respondents echoed the underlying and pressing need for this kind of funding, commenting on the requirement for ongoing sustained support for NCRIS beyond the first round of funding, (in some cases, remarking that priority areas had been inadequately funded to date). Some expressed the opinion that the NCRIS programme currently does not have clear direction and planning beyond the first funding period, and that there is a need to maintain momentum and support emerging areas with additional Australian Government funding. Another remarked that the apparently generous funding for NCRIS turned out to be inadequate for the visions inspired by the process.

Contrast with competitive approaches

Respondents considered the national collaborative approach was commendable and a valuable departure from competitive approaches. One respondent remarked that the NCRIS collaborative approach is entirely the appropriate process for this kind of nationally important infrastructure for Australia to remain competitive, that we cannot afford duplication, and that this approach is vastly superior to previous 'beauty contest' infrastructure funding schemes with major winners and losers.

Some felt that NCRIS has led to wider appreciation that research infrastructure is more than just a physical activity. NCRIS has changed the culture of research agencies and funding agencies, stimulated discussions and planning around future infrastructure needs, but by the same token, needs further opportunities and funding in the near future to support worthy initiatives in capability areas that were bypassed due to funding limitations.

Potential to realise economies of scale

Some stakeholders noted that the cost of research nowadays, especially research requiring major facilities, requires an NCRIS-type programme. While one respondent suggested that the mid-level scale of current NCRIS investments is not appropriate for a national infrastructure program, and that NCRIS should have focused on more 'landmark' size facilities, on the scale of the Square Kilometre Array or the Australian Synchrotron, for example, most other respondents were of the view that the NCRIS investment targets were at the appropriate scale.

Others noted that there were already good news stories emerging from the collaborative process, of capabilities bringing together groups that had not previously had any real interactions into more coherent groups, and provided a focus on their collaborative areas. In some areas, this has allowed Australia to become competitive with world leading facilities in the US, UK, Europe and Japan.

Engagement with states and territories and CSIRO

The involvement of CSIRO and the state and territory governments was generally very well received. It was noted, for example, that the Nanofabrication Centre in Melbourne appears to be a significant success in encouraging CSIRO to partner with others and provide a substantial cash contribution.

Some noted that this generic collaborative approach may be informed by, or indeed, may form the basis of strategic and long-term planning for specific capabilities within the Australian innovation landscape, in the manner of the Astronomy Decadal Plan, for example.

Others remarked that the NCRIS programme needs to do more to address the impact of state government commitments, especially in relation to access by smaller states and regional universities.

Effectiveness

Extent to which the NCRIS processes identify priority areas and investments for major research infrastructure that are national and strategic, collaborative, and world-class

The majority of respondents felt that the NCRIS Roadmap provided a positive, realistic framework for informed discussion on a broad range of infrastructure needs. Respondents also considered that the consultative Roadmapping process was well-conceived, given its groundbreaking nature internationally, and given its aim of identifying research infrastructure investments that are truly in the national interest.

There was general agreement that appropriate priorities had been identified, but some respondents noted that the list of identified priorities was not definitive or absolute. An argument was made that the priority areas identified for investment reflected somewhat the makeup of the expert sub-Committees assisting the NCRIS Committee, and that a different membership may have identified other priorities, suggesting a need for longer timeframes to allow wider consultation. Some felt that there was not a full consideration of new ideas in some capabilities, for example, the focus on temperate agriculture in Plant Phenomics may have precluded due consideration of tropical agriculture. In a similar vein, it was pointed out that while the priorities identified were arguably critical in 2004-05, in hindsight, priorities selected for 2006 may have included Terrestrial Ecosystems, which would have provided a two-year head start to collect critical data. This also raises the question about what mechanisms are available to update the NCRIS Roadmap, and how often this can be expected to occur.

Some respondents observed uncertainties and misunderstandings in the early stages of the Roadmapping process, with some preliminary applications appearing to take the form of 'bids', but it was also recognised that subsequent definitions of capabilities by the NCRIS Committee and subcommittees clarified matters greatly, and more importantly, generated broad support. A few respondents were concerned that the Committee views on what constituted 'infrastructure' were not clear to stakeholders, with considerable discussion regarding the relative merits of 'hard' versus 'soft' infrastructure. Some felt that the Roadmapping process would have benefited through additional industry consultation, for those capabilities connected to industry (e.g. Biotechnology Products).

Respondents felt that the capabilities identified for funding in the Investment Plans were well articulated, appropriate and addressed nationally significant issues, but that the real merit of the investment plans would be evident in about five years. One observed that, while the broad directions provided by the Roadmap were good and established by a clear process, the interpretation of the Roadmap implementation depended heavily on direction provided by the Facilitator - criteria for establishing this direction were not clear. The community would need key performance indicators to instil confidence that the process produced optimal outcomes.

Funding level and balance

Not all respondents were of the view that the relative allocation of funds between capabilities was appropriate. In particular, some of the larger and more complex capabilities were regarded as having been too complex for a single Facilitator to manage, and may have been relatively under-funded, although the investments made therein were seen to represent good value for money. Others felt that the apparently generous NCRIS funding is inadequate for the visions inspired by the process. It was also pointed out that some fine-tuning or re-balance in infrastructure investment was available through the ARC Large Equipment Infrastructure Fund (LEIF) scheme.

One respondent considered that the excellent capability areas from the Roadmap that required further scoping, and which were not funded in this round, will now have to depend on future Australian Government funding allocations that may or may not eventuate.

Infrastructure spanning multiple capabilities

Some respondents commented that additional focus was needed on certain enabling infrastructure requirements that didn't fit neatly into a single capability as defined, notably major infrastructure for platform technologies that span or support multiple capabilities (for example, nuclear magnetic resonance spectroscopy). Similarly, it was suggested that the NCRIS programme would benefit from inclusion of a mechanism to recognise, incorporate and make widely accessible certain generic "regional" infrastructure facilities (situated within universities) that support research across several capabilities. One respondent expressed concern that the limited funding available for Platforms for Collaboration may fail to meet the needs of remote researchers.

Extent to which the NCRIS processes promote a sustained cultural shift towards investment attitudes that are national and strategic, and collaborative

The majority of respondents signalled strong support, at least in principle, for the notion of a collaborative approach to identifying and funding nationally significant research infrastructure, as it provides for efficient use of the infrastructure, encourages science linkages and appreciation of related science, and enables small groups to take advantage of larger support networks. Many pointed out that this was an imperative to create the best science outcome for the nation, and that the necessary cultural changes were indeed already underway, catalysed by the collaborative NCRIS Roadmapping and Facilitation processes to date.

Evidence for this was seen in the way the Facilitation process initiated interchange and galvanised sometimes disparate research communities and different funding sources to discuss and cooperate on broader national scale infrastructure needs, even resulting in constructive infrastructure initiatives that were additional to those envisaged in the NCRIS Roadmap. Respondents commended the way that initial open discussions and processes led to groups of scientists around the country realising it was in their best interests to work together, noting that this has probably made lasting difference to the collaborations between scientific teams of Australia and is one of the most important outcomes. Healthy co-contributions from institutions and industry were viewed by some respondents as further indicators of support for this collaborative approach.

It was also accepted by some that this is only the start of a lengthy journey towards the desired goal, and that funding policy will necessitate and drive collaborative behaviours, gradually changing deeply embedded competitive and parochial cultures. One commented that this process and its emphasis on future outcomes, collaboration and merit-based access would need to be sustained for around ten years to witness the real cultural shift that will justify the NCRIS vision.

An important comment from the stakeholders surveyed was that while the collaborative concept was laudable, especially in regard to funding large research facilities, a truly national vision was not always exemplified in the negotiation processes. Some respondents felt that the wealthier institutions, larger jurisdictions and more established research fields tended to dominate the decision making process, while smaller institutions undertaking excellent research or emerging research areas of national importance were not adequately taken into account. It was also felt by some that competition between state and territory governments led to distortions in the suggested national investment and that a number of smaller universities struggled to be part of NCRIS because of scarcity of resources to allocate to expensive infrastructure.

On the other hand, others pointed out that NCRIS round 1 raised the profile of new scientific infrastructure, with the support of state and territory governments, and that the collaborative approach to funding accessible infrastructure with state co-investments was an excellent way to attract and retain world class researchers in national institutions and to obtain economies of scale from limited infrastructure funds. It was also recognised that researchers generally were pleased to be involved in bringing together state institutions to present a state vision in each area.

Some respondents argued that there is still a place for competitive approaches in national infrastructure funding, and that these should not be precluded. One pointed out that while collaborative infrastructure funding may benefit 'public-good' research areas and assist Australia in achieving critical mass in

interactions with international researchers, a competitive model may also have value, in 'private-good' research areas for example. Another felt that in some ways, a traditional competitive process better encourages members of a community to come together to create a worthwhile proposal, whereas the NCRIS process may have effectively 'forced' collaboration onto communities, sometimes after the formulation of a research infrastructure proposal.

Extent to which NCRIS has the potential to foster research activity that is collaborative and world-class

A number of respondents drew a direct connection between the NCRIS investment in world-class infrastructure, the genuine collaboration already engendered by the Roadmapping and Facilitation processes to date, and the likelihood that world class research outcomes would result. One straightforward argument advanced was that Australian research cannot be world-class unless high quality infrastructure is established and maintained. Another respondent noted the real potential for research outcomes of NCRIS Round 1 infrastructure investments to benefit local state-based industries. The continuing challenge is to encourage state and territory governments to take a medium-term view of returns on research infrastructure investments. This would be facilitated by consultations between the NCRIS Committee and state treasury officials, science directorates, executives and ministerial staff.

Other stakeholders made the point that, while there is a strong potential for this infrastructure to facilitate world-class research (where it is not already happening), it is too soon to tell if the desired research quality will eventuate, and that the provision of these infrastructure resources and facilities is a necessary but insufficient condition for research excellence and collaboration.

Some identified the need to ensure several additional factors, most notably effective and impartial merit-based access schemes, the use and management of the infrastructure by high quality researchers and research managers, adequate research funding for high quality projects, the implementation of effective operational procedures for the facilities, the provision of high quality IT tools and systems for remote access and collaboration and the endurance of collaborative relationships established between stakeholders during the NCRIS processes. Some pointed out that there is a risk here, as collaboration may not have been adequately addressed in some investment plans, with only marginal funding for access plans, and insufficient collaboration structures across capabilities.

Several respondents pointed out that the true level of success could only be measured, by means of a review process, in the medium term once staff and facilities are in place and operating. One suggested that an appropriate review against key performance indicators (e.g. calibre of researchers using the facilities, extent of national and international collaboration) should be conducted of the various NCRIS consortia after 1 to 2 years of operation to measure this outcome.

Efficiency

Variability in investment of effort in NCRIS processes

The investment of time and energy in the roadmapping, facilitation and discussion process was judged by respondents to be commendable and desirable to ensure appropriate outcomes from a very significant Commonwealth investment. Respondents felt that the buy-in from state and territory governments was very high and very valuable, but the overall cost to the sector of participating in the NCRIS processes to date is difficult to evaluate at this stage. Some perceived that the collaborative negotiations involved substantial hidden costs for participants, including the time of many people. Others remarked that it will be important to document the compliance and transaction costs of the new capabilities when evaluating the scheme as a whole.

Respondents noted that individual capability areas naturally have different timelines and processes. Several respondents remarked that research communities with a history of established collaborative arrangements or cultures were better placed to make the most of the NCRIS processes compared to research areas being brought together for the first time. One respondent summed this up as follows:

"It was clearly evident that those capability areas that had already developed a collaborative plan (e.g. IMOS and Optical and Radio Astronomy) were well placed to maximise the benefits of the NCRIS process. Capability areas that were 'starting from scratch' benefited significantly from the collaborative approach but found the negotiation around details more challenging. With the

benefit of this first round, subsequent NCRIS rounds will maximise the benefit as well as allowing a more streamlined process."

For capabilities just starting to collaborate, the timing and process may have been too inflexible, and they may have benefited from a longer timeframe to develop their Investment Plan. One respondent remarked that tight timelines for the facilitation process and short notice of meetings and workshops may have limited input to a subset of potential stakeholders rather than the full spectrum of each capability - for example, it was not clear to what extent the business community was engaged in the process.

Timeframes for developing and updating the NCRIS Roadmap

Some respondents commented that the consultation processes had taken too long in the early stages of NCRIS, to develop the Roadmap, leaving too little time for the development of Investment Plans. These respondents suggested that the imperative to shorten lead times to investing in new infrastructure implies a need, in future years, to streamline the initial 'consultative' stages in the process for reviewing / updating the Roadmap.

Respondents commented that the NCRIS Investment Plan processes were conducted under a tight timeframe, made significant achievements and delivered a comprehensive package of infrastructure developments. Greater time efficiency at the earlier stages could have enabled a longer period for investment plan development and consideration. Hope was also expressed that future NCRIS rounds would address a need for large scale infrastructure support for developments emerging in the humanities and social sciences.

Facilitator independence

The Facilitation process was seen to be challenging and the role of Facilitator was regarded as critical, but inconsistencies were perceived by some respondents. Improvements suggested developing clearer and more transparent Facilitator selection processes, balancing experience against potential conflict of interest, and having an eye to credibility with the broad research community, including professional societies and the Academies. On the other hand, some suggested that Facilitators should be chosen on the basis of a demonstrated track record of facilitation outside their narrow field of interest.

It was suggested by some that with the later stages of the facilitation process relying so much on trust in a single Facilitator, the process was vulnerable to the risk that local interests may be seen to have overridden national strategic needs in some instances - parties or sectors missing out may consequently express lack of confidence in the process. Some respondents recommended a more formal and structured transition process at the end of the Facilitation process, for example, that the Facilitator role would continue through to completion of the final Funding Agreement to implement the Investment plan, to avoid complications with lead agencies.

Guidance to Facilitators

Some suggested the need for DEST and the NCRIS Committee to provide more detailed guidelines to Facilitators, to ensure consistency and fairer processes to incorporate and engage a broader range of stakeholders when identifying priority areas for investment.

Communications with stakeholder organisations

Negotiations with universities, research institutions and industries were not always conducted with the appropriate stakeholders in those organisations. It was pointed out that Facilitators and NCRIS officers needed to negotiate with staff members who understand the particular legislative and governance requirements to be followed in taking part in joint ventures and incorporated entities. It was also recommended that all organisations named as contributors to Committee-approved plans should have been formally advised by the NCRIS Secretariat of steps, timelines and decisions expected to plan for the next phase.

Some institutional respondents commented that their universities were not clear on the status of discussions between Commonwealth and State jurisdictions, making it difficult to coordinate investment decisions. At the same time, some felt that the development of business plans and funding agreements at institutional level may not have reflected the good collaborative arrangements made between the scientists.

It was also noted that Facilitators needed to be aware of the need to be negotiating at the correct level with institutions, to involve senior executive levels such as Deputy Vice Chancellors (Research) from the outset, and not just the key researchers. Failure to adhere to such protocols left universities feeling 'out of the loop', hampering planning, internal communication, coordination and investment decisions. One senior university executive commented that despite having reasonable knowledge of institutional infrastructure needs and key contacts, he was only informed about his institution's involvement in certain NCRIS capabilities at time of a formal request for institutional support. In addition, not all Facilitators seemed to be aware that university sign-off with legal and financial implications must occur at the executive level, rather than at the researcher level.

Clarity in co-investment requirements

Some respondents commented that their institutions were unclear from the outset as to how differential co-investment by institutions could be reconciled with the notion of equitable or meritorious access to researchers from non contributing institutions around Australia. These institutions were not clear as to what benefit the contributing institutions could derive from the process. The influence of co-investment upon decision making was unclear to some universities who felt they were not expected to co-invest - subsequently it emerged that co-investment was important in determining outcomes. Co-investment appeared to emerge as a competitive tool within some capabilities, by which some partners appeared to leverage a larger share.

Some respondents remarked that suggesting three different funding scenarios for each investment plan, including an unconstrained scenario, raised expectations among potential funding recipients and consortia, and may consequently have limited funding to critical NCRIS round 2 areas.

Balance in co-investment priorities

Several respondents commented that the involvement by state and territory governments and the desire by NCRIS to leverage state and other co-investments may have diverted the NCRIS process, ahead of the necessary scientific considerations. One suggestion in this context was that infrastructure recommendations could have been accomplished by means of a two-stage process, starting with identifying a necessary facility on a 'site-independent' basis, followed by a competitive selection process for site selection.

Several respondents summed up these issues by recognising that, in making infrastructure investment decisions, a balance will always be needed between the 'sectional interests' of established institutions and jurisdictions with a greater potential to co-invest and thereby increase the aggregate infrastructure support available to particular capabilities, and the interests that might be better served by investing in strategically significant research strengths located in smaller institutions or less populous regions.

Coordination with states and territories

Some stakeholders commented that regular meetings between the state and territory government representatives and DEST were useful in sharing common concerns and maintaining communications. They also remarked on an apparent lack of consistency in early engagement between Facilitators and state governments to manage state institutional expectations across all capabilities and to clarify the level of co-investment required in order to secure reasonable share of NCRIS funds. A theme that was repeated from several stakeholders was that the doubt over some state government co-investments had thrown uncertainty over entire capabilities, and this was seen as a significant drawback in the process. In connection with this, a state government stakeholder suggested that there needs to be better coordination between NCRIS and state government processes, particularly Budget cycles, state priority-setting processes and co-investment expectations. The states appreciated the flexibility in the timing of their contributions, given the administrative difficulties in dealing with carry-over funding.

Governance issues

While most respondents accepted the need for strong, independent and unifying governance arrangements in each capability, some respondents suggested that clearer guidelines on governance issues would have been helpful throughout the process.

There was a sense from several respondents that there was too much variation between different capabilities in areas such as governance structures and risk management, and that greater simplicity was needed, focusing on managing infrastructure. Some felt that the governance and corporate structures

(e.g. platform companies) for receiving NCRIS payments have, in practice, proven time consuming and cumbersome to set up. They felt that many problems, such as establishing the taxable status of these companies, might have been avoided if there had been better planning for this governance process from the outset. It was recognised that lessons were learned by this, and that governance processes may not be so problematic in subsequent funding rounds.

Several respondents commented on the need to establish and promulgate to all stakeholders, from the outset, more complete frameworks, models, templates and solutions for shared problems, such as corporate structure, performance monitoring, tax exemption of holding companies, access regimes and reporting. Another identified the need for better control over investment plan development: bringing detailed business planning up to the standard required for funding agreements, and implementing strict version control so states and commonwealth are working from the same plan.

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