Australian Government

Australian Research Council

Submission

to the

National Collaborative Research Infrastructure Strategy Advisory Committee

February 2005

Abbreviations

AIMS	Australian Institute of Marine Science
AMIRA	Australian Minerals Industry Research Association
ANSTO	Australian Nuclear Science and Technology Organisation
ARENAC	Australian Research and Education Network Advisory Committee
ARC	Australian Research Council
ARIIC	Australian Research Information Infrastructure Committee
BAA	Backing Australia's Ability
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEST	Department of Education, Science and Training
DSTO	Defence Science and Technology Organisation
EFTSU	Equivalent Full-time Student Unit
ELT	Extremely Large Telescope
GA	Geosciences Australia
ICT	Information and Communications Technology
IGS	Institutional Grants Scheme
IODP	International Ocean Drilling Program
IR	Infra-red
LIEF	Linkage Infrastructure Equipment and Facilities
MNRF	Major National Research Facilities
NCRIS	National Collaborative Research Infrastructure Strategy
NCRISAC	National Collaborative Research Infrastructure Strategy Advisory Committee
NHMRC	National Health and Medical Research Council
NSF	National Science Foundation (USA)
OECD	Organisation for Economic Cooperation and Development
PFRA	Publicly Funded Research Agency
RIBG	Research Infrastructure Block Grants
SII	Systemic Infrastructure Initiative
SKA	Square Kilometer Array

Executive Summary

Commonwealth funding for research infrastructure is complex. It involves several agencies, including DEST, the ARC and the NHMRC, and there are many schemes, including the *Institutional Grants Scheme* (IGS) and *Research Infrastructure Block Grants* (RIBG) administered by DEST, the *Linkage Infrastructure Equipment and Facilities* scheme (LIEF) administered by the ARC, and the Health and Medical Research overhead infrastructure support administered by the NHMRC. There are overlaps and gaps in coverage among the various research infrastructure funding schemes.

The ARC proposes that research infrastructure funding be closely aligned with and informed by the Government's wider investment in research. Funding needs to take account of the whole-of-life costs of research infrastructure. The assessment of funding proposals for expensive research infrastructure should be in concert with and informed by the funding of ongoing research generally.

The funding of research infrastructure should be based on fundamental general principles, including:

(i) Funding should support excellent research and target needs or opportunities that are of the highest priority.

(ii) Research infrastructure funding should be informed by and integrated with other Commonwealth research funding.

(iii) As with other research funding schemes, research infrastructure funding schemes should be available on an ongoing and, as far as possible, predictable basis.

(iv) Where it is the most cost-effective option, Australian researchers should access international facilities rather than expect funding for facilities in Australia.

(v) Research infrastructure funding should have regard to the full costs of the infrastructure, including capital and ongoing maintenance and operational costs.

(vi) Research infrastructure funding decisions should be informed by knowledge of what is currently available through a research infrastructure database.

Introduction

[Throughout this document, numbers in square brackets refer to numbered sections in the *National Collaborative Research Infrastructure Strategy Draft Implementation Framework (November 2004)*.]

A nation's innovation system is central to the process of future value creation and competitiveness in the 21st century. The national innovation system comprises all the institutions, people and processes that create, share and use new knowledge, as well as the collaborative linkages and interactions between them.

Under the National Competitive Grants Program (NCGP), the ARC administers a suite of competitive funding schemes that support research and research training. Through the NCGP, the ARC aims to:

(i) develop and maintain a broad foundation of high-quality world-class research across a wide range of disciplines and, in particular, in areas of national research priority;

(ii) encourage and extend cooperative approaches to research and improve research outcomes by strengthening links within Australia's national innovation system and with innovation systems internationally;

(iii) contribute to high-quality research training and foster career opportunities for Australia's best and brightest researchers; and

(iv) facilitate access for Australian researchers to state-of-the-art national and international facilities and equipment and provide incentives for the cooperative development of research infrastructure.

Current funding of research infrastructure in Australia

Adequate access to high-quality research infrastructure is essential to maintaining and enhancing the vitality of Australian research. The arrangements for funding research infrastructure in Australia can be improved – infrastructure funding could be better aligned with the needs of Australia's best researchers and complex funding streams could be disentangled and made more predictable. Notwithstanding that the objectives of some funding schemes overlap in some respects, there remain gaps in funding which could be addressed.

The Commonwealth provides funding for research infrastructure through a number of programs. A summary of some programs administered within the Education, Science and Training portfolio is provided below.

Institutional Grants Scheme

The Institutional Grants Scheme (IGS) supports universities' research and research training activities. IGS funding is distributed among universities according to a formula that is based on research income (60%) and publications (10%) using the two most recent years' data, and higher degree research student places (EFTSU) (30%) using the previous year's data.

Administered by:	The Department of Education, Science and Training
Amount:	$284.6 million in 2003-04
Frequency:	Annual
Use of funds:	Allocated by universities within broad guidelines.

Research Infrastructure Block Grants

The objective of the Research Infrastructure Block Grants (RIBG) scheme is to support high-quality research in universities by:

(i) meeting project-related research infrastructure costs associated with Australian competitive grants;

(ii) ensuring that areas of recognised research potential have access to the support necessary for their development;

(iii) enhancing support for areas of existing research strength; and

(iv) remedying deficiencies in research infrastructure.

The scheme allocates grants to universities according to an index which measures institutional success in obtaining competitively awarded research funding. RIBG allocations are made on the basis of data collected for the two most recent calendar years.

Administered by:	The Department of Education, Science and Training
Amount:	$160.3 million in 2003-04
Frequency:	Annual
Use of funds:	Allocated by universities within broad guidelines.

Systemic Infrastructure Initiative

The Systemic Infrastructure Initiative (SII) provides funding to upgrade the basic infrastructure of universities to support research and training. The objective of the SII is to provide funding for innovative approaches which link or expand access to shared facilities or high-priority investments that will bring sector-wide strategic benefits.

Administered by:	The Department of Education, Science and Training
Amount:	$246 million over five years from 2001-02
Frequency:	Targeted by committees on a call for proposals basis
Use of Funds:	The operation of facilities such as libraries, computing centres, animal houses, herbaria and experimental farms; the purchase, hire, installation and maintenance of equipment; telecommunications; and salaries and services for support staff.

Major National Research Facilities

New funding for research infrastructure has been awarded under the Major National Research Facilities (MNRF) program in 1996 and 2001.

The objectives of the MNRF scheme are to establish major research facilities that:

(i) improve Australia's capability in science, engineering and technology;

(ii) maintain and enhance Australia's international scientific and industrial competitiveness; and

(iii) support the rapid commercialisation of research results.

Administered by:	The Department of Education, Science and Training
Amount:	$155 million over five years from 2001-02
Frequency:	The most recent application round was in 2001
Use of funds:	Expensive, large equipment items or highly specialised laboratories that are vital for conducting leading-edge research in science, engineering and technology. Funding for the operating costs may be provided but not beyond the five-year time frame of the program.

Linkage Infrastructure Equipment and Facilities

The *Linkage Infrastructure Equipment and Facilities* (LIEF) scheme aims to:

(i) encourage organisations to develop collaborative arrangements among themselves, across the higher education sector and with organisations outside the sector, in order to develop research infrastructure;

(ii) support large-scale cooperative initiatives involving two or more organisations, thereby allowing expensive facilities to be shared;

(iii) enhance support for areas of research strength; and

(iv) ensure that researchers in fields of recognised research potential have access to the support necessary for development.

Administered by:	The Australian Research Council
Amount:	$26.6 million in 2003-04
Frequency:	Annual
Use of funds:	Items of equipment, research library infrastructure and international facility subscriptions to facilitate access by Australia-based researchers. Available to eligible higher education institutions, with other institutions such as publicly funded research agencies, industry and business, as partner institutions.

There is expenditure on research infrastructure by other organisations within the Education, Science and Training portfolio – CSIRO, ANSTO and AIMS – and within other portfolios, including $200 million that will be provided over seven years from the Health and Ageing portfolio for Health and Medical Research infrastructure support.

Likewise, State Governments also invest in research infrastructure. The range of infrastructure investments by the States is wide and can at times be very significant – as exemplified by Victoria's synchrotron initiative which will cost of the order of $200 million in total.

Few of the Commonwealth's research infrastructure funding schemes address investment on a business-like basis, having regard to expenses such as depreciation, maintenance and operations, or to concepts of efficiency and yield. Rather, the schemes contribute typically to the outgoings associated with the purchase of assets, leaving ongoing costs to be found from other sources (or not found, effectively reducing the assets' useful lives).

Demand for research infrastructure

There is a high demand for research infrastructure in the higher education sector, far exceeding the amount of funds available.

In the 2004 application round of the LIEF scheme, there were 159 applications requesting $81.272 million. The funding requests ranged between $133,000 and $4.157 million for one year of funding only. The ARC funded 70 applications amounting to $28.303 million, a success rate of 44% but only accounting for 35% of requested funds. The average grant size of $400,000 indicates that LIEF funding, on its own, cannot support large-scale infrastructure (unless shared).

There were two funded applications in that round of the LIEF scheme in which Australian researchers requested access to international facilities. These were:

(i) access to the neutron beam facility at the Rutherford Appleton Laboratory in the UK, beamlines in the Photon Factory at Tsukuba in Japan, and beamlines at the Advanced Photon Source Facilities at the Argonne National Laboratories in the US (requesting $400,000 in total); and

(ii) access to the 8-meter Gemini optical/IR telescopes located in Hawaii and Chile (requesting $2.092 million).

It is critical that the NCRIS fund is not seen as a "magic pudding" – requests for research infrastructure funding far exceed the capacity of the fund, particularly if it is to be used in part to continue the IT infrastructure work commenced under the SII. Requests for infrastructure funding might include:

(i) The Gemini optical/IR telescope – Australia is a partner in this international facility which has two 8-meter telescopes located in Hawaii and Chile. Two decisions made at the recent Gemini Board meeting included an increase of the annual subscriptions by consortium members by 2.5% per annum (the Australian share will be USD1.782 million in 2006 to USD1.967 million in 2010), and an initial engagement in building a set of instruments costing a total of USD100 million (the total Australian share will be approximately USD6.1 million).

(ii) Extremely Large Telescopes (ELT) such as the proposed 21.5-meter Giant Magellan Telescope – a next-generation international optical/IR telescope project. The design and construction cost is estimated to be USD500 million, and USD20 million annually for operation over an expected life of 30-50 years. Australia could aspire to be a 20% partner.

(iii) Antarctic Telescope – a proposal to build a remotely controlled 2-meter optical/IR telescope in the Australian Antarctic Territories at an initial cost of $25 million, including instruments and operating costs over five years. Based on the results of initial work funded by the ARC, the telescope's sensitivity would be many times higher than that of similar ground-based telescopes located elsewhere and would be comparable to the sensitivities typically exhibited by space-borne telescopes such as the Hubble Space Telescope.

(iv) The Anglo-Australian Observatory – a joint project between Australia and Britain operating a highly productive 4-meter optical/IR telescope and some smaller facilities in Australia. Australia's ongoing costs are funded through annual appropriations to the Department of Education, Science and Training (DEST), except for an exchange scientist funded under an ARC international fellowship.

(v) The Pierre Auger Observatory – an observatory in Argentina which allows the study of showers of particles produced when cosmic rays hit molecules in the upper atmosphere. Australian researchers' participation is funded under ARC *Discovery Project* grants which have a funding ceiling of $500,000 per annum.

(vi) The Square Kilometer Array – an international consortium is aiming to build the next generation radio telescope estimated to cost approximately €1 billion to design and construct. Australia is the most suitable scientific site for hosting this facility. The final site will be selected in 2006-07, with a pathfinder project to be built by 2011-12 and the facility completed

in 2020. The pathfinder project is expected to cost approximately €100 million. The initial siting and pilot studies are funded under DEST's MNRF program.

(vii) The Laser Interferometry Gravitational Wave Observatory – an international consortium including the US, the UK, Italy, Germany and Australia is aiming to build the next-generation gravitational wave detection facility. The total cost is estimated to be USD210 million. Australia's share to this stage is $7 million which will be used to build an early prototype to understand the sensitivity of instruments using the laser interferometry concepts. Funding for this and related gravitational wave projects has been provided under a number of ARC grants.

(viii) The Integrated Ocean Drilling Program (IODP) – Australia was involved in a predecessor to this program with annual subscription of USD2 million. The predecessor program ended in 2003 and a new international collaborative Integrated Ocean Drilling Program has been initiated, with a proposed Australian subscription of USD4 million per year. Australia did not raise the funds required and is not part of the IODP consortium.

(x) CERN (ATLAS) – as a member of an international consortium, Australia is participating in the building of a detector on the next-generation accelerator at the European Organisation for Nuclear Research (CERN). This facility will be operational in 2007. Access to CERN and the cost of building instruments is funded partly under a LIEF grant and ARC *Discovery Projects* grants.

(xi) KEK (Belle) – Australia is a partner in an international consortium at the High Energy Accelerator Research Organization (KEK) in Tsukuba, Japan. The current set of experiments is due for completion in 2008. In addition to assisting in designing and constructing the detector for the accelerator, Australian researchers are involved in processing a large amount of data through a grid facility. Access and the building of the detector is funded partly under a LIEF grant and *Discovery Projects* grants.

(xii) The Synchrotron – the synchrotron being constructed in Victoria will, once fully functioning, have 13 beam lines. It is estimated that the total cost of construction is of the order of $200 million, with the beam lines costing approximately $50 million and the annual operating costs ranging between $15 million and $20 million.

(xiii) The European Molecular Biology Laboratories – this is a series of research laboratories in a number of locations in Europe performing world-class research in molecular biology. The annual subscription rate for international partners is €0.7 million.

An example of the complexity of current arrangements for research infrastructure funding in Australia is the funding that supports access for Australian researchers to the Gemini facilities. The initial Gemini project was funded under an ARC grant for the capital portion of costs. The annual 4.76% subscription to the facility, together with maintenance of an Australian Gemini Office as mandated by the partnership agreement, has been funded in response to an annual application to the LIEF scheme, together with matching funding from a large number of universities. In 2002, Chile decided to relinquish its 5% share in the Gemini partnership. Through an MNRF grant, the Australian Gemini consortium acquired an additional 1.43% share in the Gemini partnership. The MNRF grant pays for both the capital amount for the Australian share of the Chilean portion and the additional annual subscription. The MNRF grant will come to an end in 2006 but the Australian participation in and obligations to the Gemini partnership continue until 2011.

Furthermore, as indicated above, at a recent meeting the International Gemini Board approved a ramp on the annual subscription rate of Gemini from 2005 onwards, and a commitment to building some expensive instruments. There is no guaranteed stream of funding to support Australian participation in this, even though Australia is a signatory to an agreement committing its support for the Gemini partnership until 2011. Such complex funding arrangements are typical of Australia's participation in international facilities.

General Principles [5.2]

There are a number of general principles that should underpin a national strategy for research infrastructure:

(i) Investment in research infrastructure should be on the basis of research excellence and should target needs or opportunities aligned with the National Research Priorities. The Commonwealth should aim to identify and invest in the highest-quality Australian research, since it is this research which has the potential to deliver the greatest economic, social and environmental benefits to the community.

(ii) Research infrastructure investment should be informed by and integrated with other Commonwealth-funded research schemes.

(iii) As with other research funding schemes, research infrastructure funding schemes should be available on an ongoing and, as far as possible, predictable basis.

(iv) Access to international research facilities should enable Australian researchers to perform world-class research at world-class facilities, leading to collaboration with some of the best researchers in the world and setting benchmarks for best international practice.

(v) In addition to capital costs, research infrastructure funding should meet ongoing maintenance and operational costs. Capital costs constitute only a portion of the total cost of installing and operating a research facility and often the ongoing maintenance and operating costs are major expenditure items for a research facility.

(vi) Decisions on funding for research infrastructure need to be informed by what is currently available nationally and/or internationally through a research infrastructure database. Such information is essential for evidence-based decision-making.

In the ARC's view, the most effective way to reform the funding system would be for Commonwealth funding to be allocated so that it is ongoing; integrated with the research activities that it is designed to support; contestable; accessible by universities, publicly funded research agencies and other research institutions; and allows and encourages the involvement of business and industry interests. Where expenditure on infrastructure is incurred by business, it is essential that there are clear and stable guidelines in relation to taxation issues.

So that price signals can operate and provide incentives to focus on the highest institutional priorities for research infrastructure, the Commonwealth's financial contribution to individual infrastructure items should not necessarily meet all of the costs associated with those items. On the other hand, the Commonwealth contribution should meet all of the costs that it has committed itself to funding.

Regard should be had to the full whole-of-life facility costs, including capital and ongoing operating and maintenance costs associated with the facility. Part of the Commonwealth's funding for the salary component of research personnel and other overheads associated with research infrastructure should be provided through competitive programs such as those administered by the ARC and the NHMRC. This would help to ensure that the highest quality researchers have preferential access to facilities. To a large extent, the costs associated with facility personnel should be recovered from users of the facility via an access fee that could be funded from research grants or, in some cases, by the host institutions. It needs to be recognised that, in some cases, facilities will require ongoing upgrade to their technology platforms (for example in the rapidly evolving area of biotechnology). Such upgrades could require significant expenditure on research and development.

Implementation Principles [8]

Setting Priorities [8.1]

The size of its economy precludes Australia from aspiring to be a world-leader in all fields of research. The Government's National Research Priorities provide a focus for investment in high-quality research in areas identified as having the potential to deliver the greatest benefits to the community.

At a lower level, however, there are differences of opinion about priorities within and across particular research disciplines, which can make reaching a consensus difficult. The following may assist in overcoming some of the difficulties associated with setting priorities at this level:

(i) Representative bodies or interest groups associated with particular disciplines could be consulted in the preparation of decadal plans which take account of the forecast direction of developments in those disciplines in Australia – an example of such a plan is the decadal plan for astronomy prepared in 1995 which is currently being updated to address the coming decade. Where it is not possible to identify a representative body, for example in emerging inter-disciplinary areas, interested researchers could cooperate to formulate such plans. In these plans, the disciplines would need to indicate research infrastructure requirements, together with an estimated cost, for the ongoing development of research in the discipline. Each group would need to provide a priority list of proposals for infrastructure funding.

(ii) Existing major facilities and funding schemes could be monitored – with a focus on facilities' usefulness and expected productive lifetimes.

A committee, together with appropriate funding agencies, augmented by national and international experts, could assess the combined priority lists from the different disciplines and provide a roadmap for future discussions about investment in research infrastructure. Similar consultation and priority-setting processes are in operation in the USA and the UK, and the European Union is currently attempting to create a Europe-wide research infrastructure investment program.

A priority list would inform decision-makers and research communities about possible directions for the development of Australia's research infrastructure – but there could be no guarantees that facilities or equipment would be funded strictly in order of priority. The list would be subjected to reviews so that changes in research infrastructure requirements in response to changes in circumstances or the emergence of new fields of research inquiry could be considered. NCRIS may be an appropriate source of seed funding for decadal reviews.

Funding for existing facilities [8.5]

The portfolio of investments in research infrastructure should mirror the needs of the portfolio of ongoing research activities, as exemplified by funding through, for example, the National Competitive Grants Program, the CRCs and IR&D Board funding schemes. This would necessarily mean that investment must be made in existing and new facilities.

There is thus a strong argument that funding proposals associated with existing facilities should be considered on an equal footing with proposals to fund new facilities.

Management plans [8.3]

For funding proposals associated with new or existing facilities, a committee should consider, as appropriate:

(i) a strategic plan, covering how the facility is to achieve the enhancement of Australian research capabilities.

(ii) a business plan, with details on how the strategic plan could be implemented, including estimated financial statements (in accordance with generally accepted accounting principles) relating to installing and operating the facility over its useful lifetime;

(iii) an annual operational plan with statistics concerning usage and outcome from the past year, and what achievements are expected in the forthcoming three years; and

(iv) risk assessment and management plans.

Self-sustaining facilities

It is very challenging and in many cases not possible to make research infrastructure self-sustaining, unless there are specific and appropriate provisions in research grant allocations to cover realistic and commercially sound access fees.

Implications for other research funding programs

To avoid unintended consequences, for example in relation to access to other research funding programs, the administrative arrangements for funding national collaborative research infrastructure should be circulated widely for comment at the proposal stage to allow any interactions with other funding programs to be identified and addressed, as appropriate.

The remainder of this document addresses specific questions raised in the Draft Implementation Proposal.

Developing the Roadmap [6.1]

The draft Implementation Framework sought responses to the Strategic Roadmap, including conceptual and structural issues, and suggestions for developing and improving.

The 'Initial Outline of Strategic Roadmap' constitutes a start to what clearly needs to be developed into a more detailed and well-argued map. Many of the specific proposals could well be fitted with a National Research Priority Goal other than that shown. For example, *Maintain and upgrade infrastructure supporting genomics, proteomics and phenomics* is listed under the priority of *Promoting and Maintaining Good Health* but is equally applicable to the priority area of *Frontier Technologies for Building and Transforming Australian Industries*.

It is the ARC's view that a structured approach to setting research infrastructure priorities should be developed following very broad stakeholder analysis. Such analyses should necessarily take into account the needs of Australia's technology-dependent industries. With reference to the *Decadal Review of Astronomy*, we argue that, ideally, a roadmap should be informed by such strategic planning exercises of relevant discipline (including interdisciplinary) areas and also be informed by the quantity and quality of research supported by relevant funding bodies such as the ARC and the

NHMRC. The issue of proposed timelines and expenditure relative to available funds must also be considered to optimise the usefulness of a roadmap.

This submission has argued above that the investment in infrastructure must be aligned with and indeed driven by the nature of ongoing and prospective excellent research conducted in Australia. Whilst we note that the proposed establishment of RIAC was foreshadowed by the National Research Infrastructure Taskforce, we also note that the report *Review of Closer Collaboration Between Universities and Major Publicly Funded Research Agencies* (DEST , March 2004) recommended that "*The Australian Government establish a Strategic Research Council to enhance collaboration and coordination across the research system."* The report further went on to state *"The National Research Infrastructure Council (NRIC) proposed by the National Research Infrastructure Taskforce could be a group within the SRC with specific responsibility to advise on the area of national research infrastructure"*. This would be consistent with the ARC's view that, in order to maximise national benefit, allocation of funding for infrastructure should be intimately informed by the broader research agenda and ongoing funding of excellent research.

Implementation proposals for consultation

National process for identifying research infrastructure investments [8.1]

The draft Implementation Framework sought views on proposals and options for a national process.

The process as set out is fairly fluid. It could well work but it depends to a large extent on the membership of RIAC.

It is the ARC's view that key national funding bodies, particularly those with expertise in the funding of infrastructure and research, must be represented on RIAC and must be consulted. It is also the view of the ARC that one or more representatives from the key user communities must be represented on such a committee or a sub-committee thereof.

As pointed out previously, it would also be desirable for key discipline areas to be asked to prioritise their needs for infrastructure through a Decadal Review/Outlook process. Likewise, key industry groupings should be given the opportunity to conduct similar processes.

An underlying principle should be that an argument for a particular piece of infrastructure must be founded on a clear articulation of what research outcomes are dependent on such a piece of infrastructure and what alternatives are available here and overseas.

Investment priority recommendations [8.2]

The draft Implementation Framework sought views on the proposed scope of investment priority recommendations.

The ARC believes that a multi-stage process is desirable but we are not yet certain at what time it is optimal to seek the Minister's approval – at both the first and second stages or only at the second stage?

Without detail about what elements the prioritisation process entails, the ARC believes that a competitive process should be conducted in several stages.

The first stage would comprise a call for Expressions of Interest and shortlisting would be dependent on the degree to which a compelling argument is made. Such arguments must include the degree to which the business case can be made and could be based on a discipline/sector Decadal Review/Outlook. The Minister could be consulted at this stage.

Based on the first stage applications (and potentially the Minister's input), a preliminary priority list could be put in place. Selected consortia would be asked to submit a second stage application. In some cases such a second stage application could be crafted from the amalgamation of several first stage applications as a result of some active brokering by the RIAC.

Following receipt and evaluation of second stage applications, recommendations for funding could be made to the Minister.

There are differing views on the merits of a multistage process. The ARC employed a two-stage process in its recently established Research Networks scheme. In the first stage, interested consortia could apply for grants of up to $50,000 to develop second stage applications. This ensured that there was an initial screening and that second stage applications were of a good enough quality for the Selection Advisory Committee to make informed recommendations.

The draft Implementation Framework sought views on the role RIAC should play in encouraging collaboration between key players in the development of investment proposals.

It is the ARC's view that it would be useful for RIAC to play a brokering role. It would not be appropriate in all cases but the opportunity to do so should be maintained. Sponsoring the development of Decadal Plans/Outlooks would be another way of brokering that could serve to inform not only infrastructure investments but also other research investments. The ARC has previously sponsored the development of the Astronomy Decadal Plan.

Funding allocation processes [8.3]

The draft Implementation Framework invited comment on the circumstances under which the Commonwealth could enter into direct negotiations with key organisations to develop an investment proposal.

Aspects of this have been touched on above. The ARC understands that it is envisaged that infrastructure proposals can be progressed one by one. While there are some arguments for such an approach, care would need to be taken not to expend funds before a very clear picture of the total infrastructure landscape and opportunities for co-investment across the board have been defined. Without a strong understanding in this area, the Commonwealth could be in danger of either under- or over-investing in projects that happen to be considered early on by RIAC.

For these reasons the ARC agrees that the default position should be to engage in a competitive process for allocating funding and that, as much as practically possible, this occur simultaneously across a range of different infrastructure types. This would not mean that funding should start flowing to all projects simultaneously (which might lead to cash-flow problems).

Circumstances under which the Commonwealth could enter into direct negotiations are varied and include situations in which:

- only a single provider and/or provider group exists – for example in relation to ultra-large overseas infrastructure;
- no obvious provider exists to take charge of an infrastructure initiative that has been deemed to be important to Australia; and

- assessment of applications as part of a competitive process clearly reveals that combining elements from two or more competitive bids would lead to a superior outcome.

The draft Implementation Framework invited comment on the proposed requirements for business planning.

There should be a strong requirement for business planning.

Detailed operational plans of the proposed or existing facility should be submitted to and approved by RIAC. These should include, as appropriate:

(i) a strategic plan, covering how the facility is to enhance Australian research capabilities;

(ii) a business plan, detailing how the strategic plan could be implemented, including estimated financial statements (in accordance with generally accepted accounting principles) relating to installing and operating the facility over its useful lifetime;

(iii) an annual operational plan with statistics concerning usage and outcomes from the past year, and achievements that are expected in the forthcoming three years; and

(iv) risk assessment and management plans.

The elements outlined in the draft Implementation Framework appear to be relevant. In framing the requirements and the resources needed to monitor compliance, it would be beneficial to ascertain how well the business planning requirements introduced in the MNRF round conducted in 2001 have served both the Commonwealth and the MNRF grant recipients.

In many instances, for example under the MNRF program, there has been a requirement that applicants contribute significant cash resources in order to mount a competitive application. While the ability to contribute significant cash resources can be taken as an indicator of commitment, the overriding criteria should always be the excellence of the proposal and the degree to which it will address needs or opportunities that are of the highest priority. In this way, it should be possible to avoid a situation in which, for example, a moderately needed facility is funded at the expense of a much needed facility.

Eligibility for funding [8.4]

The draft Implementation Framework invited comment on whether indicative limits should be set, the proposed criteria for them and what the appropriate limits would be.

The draft Implementation Framework invited comment on the principle that very large facilities should not be within the scope of NCRIS, including views on the threshold for very large facilities.

It is practical to have funding limits. The lower limit should be informed by the availability of funding from other schemes. For agencies that have access to ARC funds, the lower limit for NCRIS funding could well be close to the upper limit for the LIEF scheme, at approximately $2 million per project per annum. The ARC is only funding one project of such magnitude on a repeated basis (access to the Gemini telescopes). The average payment for LIEF projects is a $400,000 once-off allocation.

Many interested parties (for example CSIRO and private research institutes) are not eligible to apply for ARC LIEF funding. It is therefore essential that lower limits for the NCRIS funds are set only once a clear picture of most infrastructure funding schemes and the eligibility criteria that apply to those have been established.

The upper limit for the scheme can certainly not be greater than the funds allocated to the scheme. The ARC considers that an upper limit of $100 million per project could be appropriate, although this will depend on the number of high-priority projects that are identified for funding and their associated costs. More expensive landmark projects (eg SKA, ELT) should be considered by Cabinet outside the NCRIS processes.

The draft Implementation Framework invited comment on whether NCRIS funds should be available for demonstration projects.

The ARC considers that some NCRIS funds could be made available to demonstration projects. It would be appropriate to set a limit on the total funds available for such projects.

Funding conditions [8.5]

The draft Implementation Framework invited comment on the proposals regarding costs covered by NCRIS grants.

In the ARC's view, the most effective way to reform the funding system would be for Commonwealth funding to be allocated so that it is ongoing; integrated with the research activities that it is designed to support; contestable; accessible by higher education institutions, publicly funded research agencies and other research institutions; and allows and encourages the involvement of business and industry interests.

So that price signals can operate and provide incentives to focus on the highest institutional priorities for infrastructure, the Commonwealth's financial contribution to individual infrastructure items should not necessarily meet all of the costs associated with those items. On the other hand, the Commonwealth contribution should meet all of the costs that it has committed itself to funding – and we do believe it to be important that funding be made available for some recurrent costs, specifically those activities required to provide core services such as technical support and maintenance. This support is acutely needed in the start-up phase of a new facility.

Regard should be had to the full whole-of-life facility costs, including the capital and ongoing operating and maintenance costs, of the facility. Part of the Commonwealth funding for the salary component of research project personnel and other overheads associated with research infrastructure would be driven through competitive programs such as those of the ARC and the NHMRC. Such an arrangement would help ensure that the highest-quality researchers – those receiving grants and/or other support from their employing institutions based on a quality assessment – have preferential access to facilities. The funding of facility personnel should, to a certain extent, be funded through a cost recovery process from the users in the form of an access fee that could be covered through research grants or, in some cases, through the host institutions. We hasten to say, however, that such a system would break down immediately if granting systems did not recognise the need to fund the access costs to major infrastructure facilities appropriately.

Notwithstanding our view that price signals are important and will ensure that good researchers get preferential access to research facilities, it would be difficult to state with a high degree of confidence that 'one size fits all'. The idea that funding bodies should include access funds in their grants to researchers may not work in all cases. While this may be an appropriate mechanism for some classes of facility, it may also present problems in other cases. In particular, where a facility has very large operational costs (such as a major research vessel), the marginal cost of utilisation by researchers for their proposed project may easily exceed maximum funding levels available in existing competitive project funding schemes. Even where it does not, the mechanisms for competitive funding are such that budget cutting and smaller grants are the norm, and many

assessors will be reluctant to recommend very large grants in such cases – a cultural change may well be required. In such cases, the net effect in a regime of full (or near full) cost recovery from researchers who are expected to be supported by grant funds is likely to be under-utilisation of the facility and difficulty with its ongoing financial viability.

Access to international facilities through NCRIS funding should certainly be available where this is deemed to be a high priority for the strengthening and further development of Australia's research effort. Indeed in some cases, such as high energy physics, access to shared international facilities is the only possible avenue. It is illustrative that the detector for the ATLAS project at CERN in Switzerland, in which Australia participates, costs in excess of $800 million.

We are not convinced that the access price for private institutions should be very different from those in public institutions.

The draft Implementation Framework asked: How should NCRIS treat funding for existing facilities?

There is a strong argument that existing facilities should be considered together with proposals for future facilities on an equal footing. When considering existing facilities (for example MNRFs) for funding and/or supplementation, their past performance in respect of utility, usage and financial management must be taken into account.

The draft Implementation Framework invited comment on access and charging policy

This issue has been covered to a certain extent above. We do believe strongly in some price signals being put in place. However, we agree that this would require a change in practices by most research funding bodies to ensure that funding to cover access charges is awarded during the normal granting process. In the absence of such a development, we agree that it becomes impossible to include depreciation costs in the pricing structure for publicly funded researchers.

If granting bodies do not change their approach – and it would require some transitional funding for this to occur – then charging for depreciation costs would lead to under-utilisation of facilities. On the other hand, if depreciation costs did not form part of charges for access, then the balance sheet of the facility would deteriorate quickly and it would become imperative that the Commonwealth put in place an ongoing granting program to fund replacement and upkeep of infrastructure.

Timing of priority setting and project funding processes [8.6]

The draft Implementation Framework invited comment on the proposed timetable for priority setting and project funding processes.

We have addressed the issue of priority setting above. The process suggested is not entirely clear to us. We repeat that it can be dangerous to progress implementation of single priorities one by one since, in such a process, comparative merit would be hard to establish and, hence, one would run the risk of either over- or under-investing in a given priority.

For very large projects in excess of, for example, $40 million, it would probably not be essential to run frequent reviews but this could be important for smaller facilities. Once funding is approved for a facility, it would be essential that the funding stream did not become back-loaded. For infrastructure funding, there is a need to bring the funding on fairly quickly.

National stocktake and directory project [8.7]

The draft Implementation Framework invited comment on the proposal for a national stocktake and directory project.

There are many good arguments for this as detailed in submissions to the NRIT review. The ARC fully supports this initiative.