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Summary and contextual comments

Australia has the capability to become a leading nation in terms of excellence in research and innovation and, through this capacity, create a more resilient economy with a broader base of products and services that are attractive to the world market. To achieve this we must continue to strengthen our publicly funded research and, importantly, lift the investment that industry makes to research and development (R&D) to a level that is comparable to that of leading nations with strong export economies. This will not only require increasing the investment in research funding and infrastructure, but also augmenting the workforce with more PhD graduates and better preparing them for industry employment. This would help to deliver excellence in discovery, translation and application.

Universities Australia strongly supports the development of the National Research Investment Plan (NRIP) and considers it a critical first step in addressing the existing short-term and fragmented approach to strategic investment that currently characterises Australia’s national research system.

Universities Australia broadly supports the development of a framework along the lines presented by the Australian Research Committee (ARCom), noting that the NRIP has undergone further refinement in response to feedback provided by university representatives as part of the recent national consultation process. Whereas we agree that the NRIP is broadly about building Australia’s capacity for innovation across a breadth of research providers, our submission focuses on those aspects that directly relate to Australia’s universities and the crucial part they will play in successfully executing a new NRIP.

Universities Australia particularly supports the following aspects of the proposed NRIP:

- The ‘National Research Fabric’, noting that it:
  a) Highlights the key domains and inherent interdependencies of a robust research environment;
  b) Recognises and promotes the multidisciplinary nature of research; and
  c) Will facilitate a longer-term, strategic approach to capability development, asset utilisation and return on investment.

- The emphasis on the critical elements of a strong research system, that is, strategic and sustainable public investment; quality research infrastructure; attraction, training and retention of a skilled research workforce; promotion of domestic and international collaboration; and the development of strong industry and business research partnerships;

- The implementation of a decision-making and funding framework that is clear; sufficiently flexible to support complexity and facilitate innovation, and encourages cohesion across the various Australian Government departments and funding schemes. It is important that the NRIP supports and cross-references other relevant contemporary policy and strategic developments in the sector, including the Strategic Review of Health and Medical Research (the McKeon Review); the Australia Government’s Strategic Roadmap for Australian Research Infrastructure; and the Australian Workplace and Productivity Agency’s discussion paper, Australia’s Skills and Workforce Development Needs.
Reform of Australia’s research support system is necessary to increase our national research capability and global reputation. To position Australia at the forefront of innovation, priority must be given to the development of a sustainable investment model to support strategic research, research infrastructure and a skilled research workforce. As the guiding framework for such reform, the NRIP must be clear, accessible and apply broadly.

The Discussion Paper poses seven questions, which are addressed in the next section of this submission. Comments on related issues, relevant to the NRIP, are outlined below.

**Investment, optimising impact and efficiency**

Australian university-based research has been highly successful. On the key measures provided by the 2010 Excellence in Research for Australia (ERA) exercise, much of our research was rated as above world standard. While there is scope for improvement in key areas, our relatively strong position reflects well on the almost universal peer review process that has been adopted in our competitive grant process. This has resulted in the best research programs being funded, no matter where they are conducted. Piecemeal funding arrangements deliver piecemeal results, even when resourcing is substantial. To continue to achieve quality research outcomes, effort and investment must be coordinated strategically, supported through a nationally competitive process, and balanced across the key foundational elements: people, infrastructure, ongoing technical support and major capital. Support arrangements must also reflect the timeframes needed to conduct and deliver substantive research results. These timeframes typically do not align neatly with annual budget cycles.

The NRIP process provides the opportunity to address existing inefficiencies in the allocation of grants. Growth in the productive value of research afforded by increased funding over the past decade has been constrained by the proportionately larger growth in grant submissions over the same period, and especially among ultimately unsuccessful (but ‘fundable’) applications. This situation represents lost opportunity and involves high administrative overheads. These are generally recognised in commercial and other competitive tendering environments as a cost and either passed on to funding bodies or result in reduced productivity, quality and/or viability/profitability. Our resource prioritisation and allocation system needs to re-balance resources from the overhead costs associated with making an application to the conduct of research. Universities Australia strongly recommends that consideration be given to extending funding periods and reducing application complexity. This should not be achieved, however, by replacing, or diminishing in any way, the peer review, evaluation process. Internationally, there are models for increasing the efficiency of national competitive grants processes while avoiding the problem of reducing peer review competition, such as longer-term funding for centres and established researchers.

**Achieving the right investment balance in people, project and research infrastructure**

The right balance needs to be struck in funding the three essential components of a research system - a skilled research workforce, high-quality basic and applied research, and world-class research infrastructure. This is a weakness in the existing system as evidenced by the short life of NCRIS and the need for a Synchrotron rescue package. The research operating environment is extremely dynamic. To compete effectively, Australia needs a clear and workable priority assessment and

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planning mechanism. This will help to ensure the most efficient use of finite resources, which may need to be committed over substantial periods, possibly decades. The NRIP represents a significant opportunity to build a principles-informed system that enjoys strong support across the research community.

The success of the NRIP will ultimately be measured by the outcomes of our national research effort, the extent to which it overcomes existing structural impediments to achieving world class results, enables drivers to innovation and future capability, results in the translation of our research effort into productivity and the degree to which the value of research and ensuing innovation is enjoyed and recognised by the broader community. For the NRIP to achieve these aspirations, the plan will need to create a framework that is robust and consistent, reflects Australia’s innovation priorities and objectives, and underpins research funding programs and initiatives across government. Universities Australia recommends that advice provided by ARCom to Government includes:

- Identifying the overarching objectives for the NRIP;
- Identifying key drivers for change;
- Establishing principles to inform the development of a core set of assessment criteria to guide funding allocation; and
- Identifying the key areas of policy focus such as the contribution that research makes to national productivity, prosperity and wellbeing, increasing the efficiency of grant awards processes, addressing research workforce shortfalls, and the need to strengthen Australia’s performance and commitment to research by both government and the business sector.

Universities Australia recognises the political and economic imperative of fiscal discipline. The challenge in this tight fiscal environment is to optimise the results of research investment and build the case for further investment, so that when key decision-makers are confronted with having to make budget choices, funding for research is seen as a long-term investment in Australia’s future well-being and economic prosperity. There is clear evidence that investing in quality research investment delivers substantial direct and indirect economic benefits. For example, the Access Economics report, *Exceptional Returns II 2008*, estimated that the return on investment (ROI) in Australian health research and development is 117 per cent and has a benefit/cost ratio of 2.17:1.

The NRIP needs to be the enabler of robust decision-making and prioritisation in a highly competitive environment. Decision-making risk can be mitigated through the inclusion in the NRIP of criteria that closely reflects the objectives and priorities established under the NRIP, to assist in funding decision-making. Examples are:

a) Supports growth in research capacity;

b) Ensures sustainability and builds on Australia’s comparative strengths;

c) Delivers value to the community; and

d) Builds support for research investment beyond the research community itself.

**Research Infrastructure**

As noted during consultations, investment in research infrastructure must increase our national capability, be utilised to optimal effect, be sustainable over time, be managed to facilitate and support access and results. Splintered systems make poor use of available resources and expertise. A
sustainable funding model for the long term, including for technical support and expert management, is urgently required. A national management structure for national assets could be established and it may be feasible for ARCom to take on this role, subject to appropriate representation.

Infrastructure funding is also necessary for individual institutions to engage in the proposed capacity building anticipated by the NRIP. Short-term schemes can deliver positive outcomes, however they have proven unsustainable and insufficient for meeting the nation’s longer-term research needs. Short-term, strategic schemes can complement, but not replace, core, longer-term infrastructure and capability commitments. In order to build and sustain research capability and achieve outcomes, it is important to maintain the momentum and continued engagement of our top researchers. This requires funding regimes and processes that ensure researchers and institutions receive timely advice to enable them to plan future work programs and investments.

The National Research Infrastructure Council (NRIC) developed and published sound principles to guide investment in research infrastructure – the Strategic Framework for Research Infrastructure Investment. ARCom could draw on these in providing advice to Government.
Response to the Discussion Paper Questions

Q1. Views are sought on this representation of the national research fabric and the notion of focusing on the development of enabling capabilities (domains) in the NRIP.

Universities have a clear and important role to play in Australia’s research capability, embodied in legislation, and the NRIP is a significant initiative supporting their charter.

The National Research Fabric presented in the discussion paper provides a valuable framework to assist the Australian Government identify and analyse opportunities to invest in national research excellence and its translation into tangible societal benefits. In our view, the National Research Fabric places appropriate emphasis on:

- The need for a high-level, coherent and strategic view of our research system that enables a robust assessment of Australia’s current capacity, assets and strengths as well as gaps, weaknesses and risks;
- Promoting multidisciplinary research collaboration to optimise use, sharing and access to key infrastructure, assets and information; and
- The need for long-term research infrastructure; a skilled research workforce; promotion of domestic and international collaboration, and strong industry and business research partnerships.

It is noteworthy that “ongoing support for national scale research infrastructure” has been identified as a gap for most capability areas. Universities Australia strongly supports the need to address this as a priority and encourages ARCom to undertake a central leadership role in this area.

It is necessary that all major research infrastructure is well planned and integrated into the nation’s research effort and that infrastructure funding is provided to cover the essential operational components of research infrastructure. The availability of highly skilled operational and technical staff is critical if we are to optimise Australia’s return on investment in flagship facilities and ensure they are utilised to full capacity. The Australian researcher workforce is distributed widely, and appropriate mechanisms are required to facilitate access to national facilities. To make the most of the research opportunity, onsite support is critical. The funding of major national facilities should be sufficient to support the use of the facilities by visiting researchers (via a competitive process) so that a visiting researcher to the Synchrotron or the Square Kilometre Array would receive the support (accommodation, technical support, etc.) similar to that available to researchers visiting an Antarctic research facility.

In the absence of clarity about the intended deployment of the National Research Fabric, there is some confusion within the university sector about the utility of the concept of domains and capabilities. With regard to domains, the NRIP would be strengthened if a rationale was included to explain the chosen domains (the threads) more clearly and within a defined context. This would help address varying concerns that the description of domains may need to be more abstract (to accommodate all disciplines) or, alternatively, more detailed to comprehensively capture all disciplines within the scope of the relevant domain. Some researchers have expressed concern that the choice of domain names appears to exclude disciplines.
Further, the fabric needs to include an identifiable place for curiosity-driven research, recognising it is central to the long-term health of our research system and thereby acknowledging the value of investigation that identifies emerging national and global challenges.

The suggested approach should support established centres of excellence, while also enabling young universities to progress their research endeavours in a strategic fashion. Such universities are often well placed to promote research in specific areas or across a select range of disciplines. Through their links to particular communities or regions can make unique contributions to the national strategy (see Q6). The NRIP matrix itself is sufficiently comprehensive to allow research capacity to be further established across the country.

**Q2. Is the scope of each of the domains appropriate and are they sufficient to cover Australia’s needs into the future?**

Overall, reaction to the NRIP amongst University Australia members has been positive. In the main the broad scope of the NRIP was acknowledged and the multidisciplinary focus commended. However, it will be important for all research disciplines to see their future described within the domains concept, noting that some areas of research endeavour are difficult to align. (These issues are discussed under Q1.)

Health and medical research is an area of significant national research strength and we recommend that it be added as a sixth domain, separate from the ‘human’ domain. If we are to grow our impact and international reputation for excellence in the health and medical sciences, then our national research fabric should reflect its priority. Including health and medical research as a domain within the fabric usefully avoids a separate consideration of these fields, outside of ARCom and the NRIP.

For those areas that do not have an obvious domain, it needs to be made clear, in supporting statements, how they will be treated under the National Research Fabric. For example, many disciplines, including mathematics and statistics, law and physical sciences, are represented as facilitative to the listed domains. This creates a perception, by the domains being synonymous with disciplines, of these disciplines being selectively undervalued.

Further, we suggest ARCom consider the addition of a sixth vertical thread element focusing on ‘engagement’. For this purpose, engagement encompasses not only communication and interaction with the sectors directly affected by Australia’s research investment choices, but also general public awareness, understanding and support. This dimension is especially important in the context of national investment, where government takes account of the imperatives articulated by those they represent in making decisions about public finding priorities.

**Q3. What other gaps are there in the current and future capability and what mechanism would be best to address them?**

If the NRIP is to provide a sound, well understood and accepted basis for future policy and funding decisions, it will be important that the fabric be comprehensive and firmly established before advisers and policy makers contemplate how to further identify and address capability gaps. This means that clearer definitions of domain capabilities, guided by feedback from the research community and other key stakeholders, need to be provided.
Once the necessary groundwork has been laid, we would envisage a process to identify, assess and plan remedial action in relation to gaps, prioritised to reflect the advice which ARCom expects to provide to Government. Some of those issues might include:

- The overall quantum of investment in research;
- The potential for funding schemes that enable universities to up-skill research staff in priority areas quickly and/or to support more recent entrants into the research market to access support and infrastructure on a sustainable basis and to train a highly effective research workforce for industry transformation; and
- The extent to which research investment strikes the appropriate balance between supporting basic research and its application.

**Q4. What will be the impact on the national research fabric and Australia’s capacity to increase national wellbeing if the gaps are not addressed?**

The ARCom and the NRIP are fundamental to the transformation of the Australian innovation system and economy. It is important that in addition to identifying gaps in the current research fabric, the NRIP process also recognise other risks that reduce the capacity of the research sector to operate at optimal capacity (within an appropriate regulatory framework). Such risks may include overly prescriptive or burdensome regulatory requirements, or fragmentation of the system. Above all else, the biggest risk is that research will not be seen as an obligation across all sectors and that the business sector in particular does not take advantage of the public investment in research and research training to help transform its own business models, product offerings and competitiveness.

**Q5. What other structural or policy issues could be addressed to further strengthen the research system?**

The recent experience of NCRIS and the Synchrotron are examples where the lack of forward planning places current activity at serious risk and makes past investment in significant research infrastructure ineffective or, worse, detrimental to our overall research effort, especially if the opportunity cost associated with the investment to date is taken into account. There is general acknowledgement that the life-cycles of discovery and innovation are long-term, yet the research system is frequently subject to episodes of significant disruption. There needs to be a fundamental shift in policy, with a move and commitment to long-term investment. Rolling investment plans (of 10 years duration) with regular review periods (every 3-4 years) offer potential benefits and could be considered. Additionally, there would be value in facilitating participation of State governments in the setting of priorities and partnering in the provision of resources.

**Q6. What mechanisms would be best to address the structural or policy issues?**

Structural and key policy issues will only be addressed effectively through genuine engagement with and the broad support of key stakeholders groups. Consultation with key stakeholders will help to facilitate ‘buy in’ and a broad community understanding of the value of the research system.

A system where a percentage of research funding is quarantined and contingent upon partnering may promote national capacity building, without compromising the expectation and delivery of excellence. A clear basis for continued encouragement of investment in research from industry in the form of tax
or other incentives is needed to increase the amount of industry investment and collaboration R&D. Recent increases in tax incentives to support research investment have been welcomed, and it is critical that this is not reversed as part of the current Business Tax Working Group process.

Q7. What will be the impact on the national research fabric and Australia’s capacity to increase national wellbeing if the structural or policy issues are not addressed?

In short, Australia will not be a master of its own destiny. This in turn will put at risk our prosperity and status in the world. The potential for wealth generation from R&D is unparalleled and failure to implement a structural and policy framework that enables a highly competitive Australian R&D environment has a huge, although unquantifiable, opportunity cost. Technological developments have driven, and will continue to drive, most economic and social change. A strong R&D sector would broaden our economic base and safeguard Australia against future economic shocks, increasing our capacity to buffer against and pull out of future crises. As a nation we have not fully exploited the opportunities our research has provided in the past and we cannot assume we will have or continue to enjoy a proportionate share of wealth-creating opportunities in the future.

Without sustained, long-term investment in the research system, the national research fabric will be compromised, impacting Australia’s ability to sustain or increase national wellbeing. While Australia has considerable mineral wealth and other assets, we cannot rely on those or positive terms as sufficient to underpin our future prosperity. This would be akin to the emerging economic giants of the twenty first century relying predominantly on cheap labour from among their increasingly skilled and technologically empowered populations to achieve sustained growth.

We need to address the lack of business investment in Australian R&D – which is very low, and applies to both domestic and international investment.

As well as long-term investment, we must adopt a systems approach to understanding the research enterprise. A more holistic view will help mitigate the risk of Australia making investments that fail to translate into tangible outcomes, restricting our capacity to instigate or respond to diverse and emerging opportunities. For example, the system is already failing when we produce far fewer PhDs than other nations of similar size and present those who graduate with ever diminishing career opportunities. Our ability to retain high calibre researchers is hampered by the uncertainty generated by short-term funding rounds. This contributes to difficulties in attracting international researchers of esteem. Similarly, it contributes to difficulties in ‘growing our own’. There will be no better way to ensure young Australians develop crucial skills, such as in maths and science, than to build an environment that offers the prospect of an exciting and rewarding future.

Ideally, other parts of our economy, particularly business, will employ an increasing number of highly trained researchers and view this as a valuable and enabling investment, as it is generally viewed overseas. For instance, in highly competitive economies such as Finland the proportion of PhD educated personnel working in business is more than four times that of Australia: in Sweden and Canada it is three and 2.5 times respectively. The rapidly developing economies by comparison, are also well supported by government investment and incentives to invest in research. Australia needs to keep pace with these developments. As an example of the shifting dynamics shaping the research environment, Malaysia intends to graduate 60,000 PhD students for placement in industry over the
next decade. This is equivalent to two-thirds of the total number of PhDs ever to graduate in Australia. In Europe major investments in research continue to be made, despite their severe economic challenges, in part because they recognise R&D as being a means of regenerating productive and economic capacity. In comparison with other OECD countries, Australia has a similar proportion of researchers in the total workforce but far fewer in business R&D.

The NRIP provides the opportunity to link the continuum of research and innovation in a virtuous circle – with basic research leading to discovery, to applied research, to development, innovation, commercialisation and investment. The NRIP is an opportunity for the Australian Government, the university sector, industry and enterprise to work together to place Australia on a stronger footing for the future.

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2 The MyPhD programme is part of the Malaysian Government’s “Malaysia as a Centre for Knowledge and Innovation Development” agenda. (See - www.mohe.gov.my)