REALISING INNOVATION

THROUGH SCIENCE AND R&D

AN ANALYSIS OF THE ISSUES FACING THE SCIENCE AND R&D WORKFORCE AND RECOMMENDATIONS FOR GOVERNMENT AND INDUSTRY TO HELP ADDRESS BARRIERS TO INNOVATION

Professionals Australia

Professional Scientists Australia

Realising innovation through science and R&D: a framework for addressing barriers to innovation: a report by Professional Scientists Australia (a division of Professionals Australia), 2014.

ABOUT PROFESSIONAL SCIENTISTS AUSTRALIA

Professional Scientists Australia is a division of Professionals Australia (formerly the Association of Professional Engineers, Scientists and Managers, Australia). We represent several thousand Professional Scientists from a broad range of specialisations including health science, automotive design, biomedical science, ecology, veterinary science, neuroscience, mental health, genetics and genomics, astronomy, biochemistry, mineral processing, environmental science, defence research, synchrotron science, environmental science, immunology and water science.

Professionals Australia is an organisation registered under the *Fair Work Act 2009* representing over 25,000 Professional Engineers, Professional Scientists, Veterinarians, Architects, Pharmacists, Information Technology Professionals, Managers, Transport Industry Professionals and Translating and Interpreting Professionals throughout Australia. Professionals Australia is the only industrial association representing exclusively the industrial and professional interests of these groups.

Professional Scientists Australia promotes the views of their scientist members on a wide range of policy issues to government, industry and the community.

We have three objectives:

> to provide a strong voice for professional scientists. This includes considering the kind of support, policies and practices at the enterprise and structural levels that will be necessary to create a sustainable science workforce capable of realising optimal levels of innovation, productivity and competitiveness;

> to play a leading role in encouraging dialogue between industry, government and the higher education sector. This means advocating for investment and structural reforms, building the platforms for collaboration and change and initiating and leading projects to foster collaboration; and

> to promote public understanding of science and the key role professional scientists play in ensuring Australia's future. This involves influencing public policy and resource allocation decisions and promoting the value of science to decision-makers and the wider community. We seek to highlight the critical role science plays in enabling productivity and innovation, promoting economic prosperity, protecting the environment and improving human welfare and quality of life. In doing so, we raise the status of the profession and the professionals who work in it.

PURPOSE OF THIS DOCUMENT

This framework has been developed by Professional Scientists Australia based on the views of members set out in Still the Clever Country? The aims of the document are to identify key policy areas that would benefit from government support and intervention in a context of fiscal responsibility, and to recommend specific actions by stakeholders that will address some of the key barriers to building a science and research and development (R&D) workforce capable of driving innovation in the longer-term.

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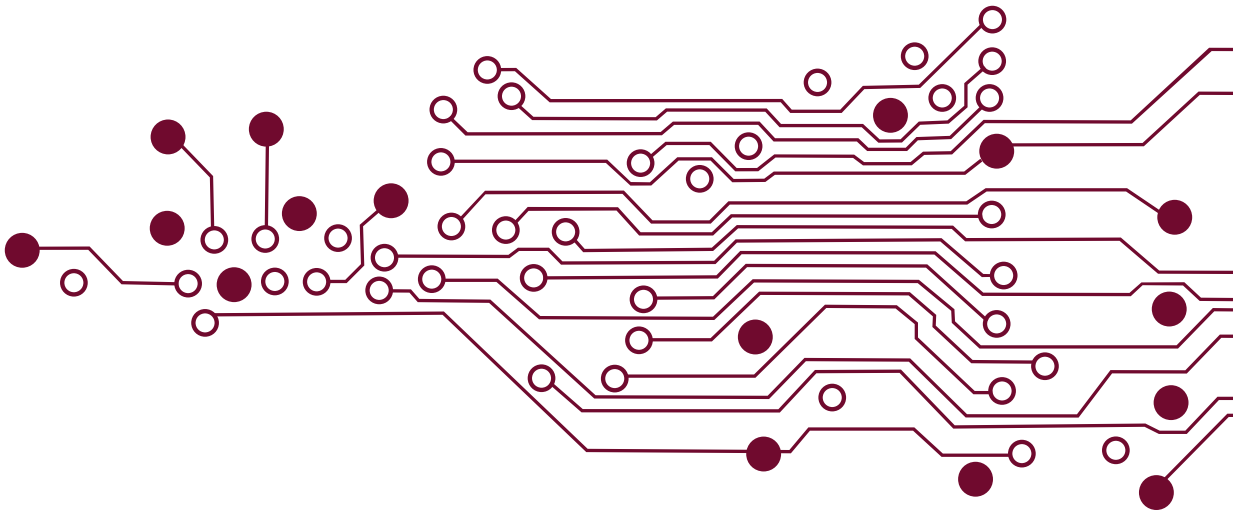

FOREWORD:

THE FUTURE OF AUSTRALIAN SCIENCE AND R&D

Australia currently faces myriad challenges. These include declining commodity prices and resource sector investment, infrastructure backlogs, a need to fund rising health care costs, an ageing population and shrinking tax base, the decline of the manufacturing and mining sectors, ongoing global financial instability, food and energy security, indigenous disadvantage and a slowing rate of growth.

Professional Scientists Australia understands that a fiscally responsible approach is required in developing policy responses to these challenges but notes that science and R&D are key drivers of sustained innovation and productivity growth in Australia across many of the areas in which these challenges exist.

It is critical that we take a strategic approach to science and R&D policy over the next decade to ensure we can best respond to these challenges. Governments, industry and the education sector are well-placed to develop policy initiatives that will remove barriers to productivity improvement, economic growth and global competitiveness.

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These barriers include declining investment in the science and R&D workforce, cuts to publicly-funded research organisations, deprofessionalisation, problems with developing and maintaining Australia's STEM (science, technology, engineering, mathematics) capability, limited investment in non-mining related business activities and research and a debate about workplace productivity which is a proxy for short-term cost-cutting and reducing wages and conditions.

The importance of developing a skilled and sustainable science and R&D workforce capable of supporting innovation in the longer-term cannot be overstated.

Professionals Scientists Australia considers it critical that we play an active and considered role in identifying and responding to the challenges facing us - challenges that can only be tackled effectively with the shared cooperation and commitment of major stakeholders including government, industry, the tertiary sector, professional associations, unions and professional scientists themselves.

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INTRODUCTION: HOW DO WE ADDRESS BARRIERS TO INNOVATION?

As a nation we are at an important crossroads. We need to ask ourselves the big questions about the direction we wish to head, and where we need to invest - responsibly and sustainably - in order to get there.

As we move toward 2020 and continue the process of transitioning from manufacturing and mining sector-driven growth and employment to a knowledge-based economy, improving Australia's science, engineering and technology capability will be critical to realising optimal levels of innovation and responding to the complex economic challenges we face.

Investment across the sciences and in the science infrastructure that supports research across industry will be imperative. More specifically, investment across areas including health, agriculture, the environment and defence will see significant returns in building our innovative capability.

We need to ask whether or not, in the following settings, we want these outcomes ...

MEDICAL/HEALTH

> clean blood supplies;
> reliable, cost-effective and timely pathology results for patient treatment;
> effective and reliable diagnosis of diseases;
> to safeguard against bioterrorist attack;
> to produce radio isotopes for cancer therapy;
> protection from the harmful effects of radiation;
> to combat mosquito-borne diseases such as dengue, HIV/AIDS, TB, malaria and bird flu epidemic;
> more effective vaccines and pharmaceuticals to prevent and treat previously untreatable diseases; and
> safe and effective genetically-based interventions and treatments for disease?

Good health outcomes are dependent on medical science. So to do these things, we need to develop and sustain a highly-skilled and experienced medical science workforce.

AGRICULTURE

> effective early detection of imported pests and plants that threaten Australia's livestock and agriculture;
> new disease and pest-resistant crop varieties;
> practical plans for food security whilst maintaining biodiversity and natural resources;
> to free unusable land for economically beneficial agricultural production;
> solutions for drought and insect plagues;
> independent advice on genetic modification;
> independent advice on consequences of deforestation and lack of biodiversity conservation; and
> sound advice on sustainable farming practices?

The safe and reliable production of food is dependent on agricultural science. Therefore we need a highly-skilled and experienced agricultural science workforce.

ENVIRONMENT

> to ensure free clean water supplies, appropriate management of water resources and effective waste water management;
> independent advice on consumer exposure/ pesticide residue and other environmental contaminants and repatriation of sites;
> independent monitoring of air quality and noise;
> to protect our marine environments;
> to manage land and fire risk and sound hazard modelling and disaster planning (in the case of floods, earthquakes and tsunamis for example);
> independent evidence-based advice on the likely effects of climate change;
> clean low emissions energy technology including solar and wind;
> maintenance of ecosystems and identifying organisms of potential economic or health value such as medicinal plants or potentially harmful organisms;
> fuel security;
> environmental protection and mitigation for offshore drilling;
> to understand the effects of fracking on groundwater contamination; and
> to look responsibly at potentially new minerals resource development and extraction?

Protecting and maintaining our environment is dependent on environmental science. So if we want these things, we need a highly-skilled and experienced environmental science workforce in place.

DEFENCE

> effective counter-terrorism technologies;
> protection against malicious cyber activities;
> informed and impartial advice to the Australian Defence Forces on major air, maritime and land acquisition;
> to develop our surveillance and communications capability;
> to maximise the survivability of our navy ships; and
> improved submarine-related technology?

Our ability to defend Australia and protect its national security interests are dependent on a highly-skilled and experienced science and R&D workforce.

To transition effectively to a knowledge-based economy and have a world-class innovative capability across the health/medical, agricultural, environmental, defence and multiple other fields, we need a diverse, vibrant and sustainable science and R&D workforce.

A range of barriers currently threaten the viability of science and R&D in Australia and raise some serious questions about the kind of support, structures and practices needed to support innovation and productivity improvement through science and R&D as we move toward 2020.

> What level of investment in our science and R&D workforce will adequately and reliably support an improved science and innovation capability and maintain our reputation for scientific endeavour?
> How do we ensure science and R&D are appropriately valued by the community, government and industry?
> How do we attract, develop and support the next generation of science professionals?
> Can we hope to sustain the profession when deprofessionalisation and lack of recognition of the status of professional scientists are impacting quality of service and output?
> How can organisations provide rewarding and challenging careers with options for progression?
> In an environment which is characterised by rapidly changing standards and legislation, how can we ensure professionals are up-to-date and part of organisations' risk management strategies?
> How have globalisation and developments in technology affected the work of professional scientists?
> At the enterprise level, how can employers put in place employment practices that support staff engagement and innovation and, in turn, organisational competitiveness and growth?

These questions go to the heart of how we build a sustainable science and R&D workforce able to meet the range of economic challenges we face.

An agile and experienced science workforce undertaking research and development, utilising innovation and research undertaken elsewhere and adapting it to the Australian context – that is, continually seeking to innovate in the medical/health, agricultural, environmental, defence and other specialist fields – will be vital to productivity improvement in Australia over the next decade.

The lack of a highly-skilled, experienced and sustainable science and R&D workforce across these and other specialist areas would be a fundamental barrier to building our innovative capability.

So what then do we need to do to develop and maintain a highly-skilled and experienced science and R&D workforce?

INVEST IN SCIENCE AND R&D

WHY INVEST IN SCIENCE AND R&D?

Investing in science and R&D is critical because:

> Investing in the science and research workforce is about investing in national productivity. Governments are in a unique position to create a policy environment which encourages industry to invest more in research and makes Australia a go-to destination for international companies to undertake research.

> A sustainable and vibrant STEM workforce is essential to almost every aim we have as a nation.

> The social benefits generated by Australia's public funding support of science are significant and investment in science and R&D over time outweighs the cost.

> Long-term strategically-based investment by both government and business is essential if we are to compete globally and in our region. This includes a balance of investment and research in non-mining business activities as well as in natural resources.

> There is a shift to knowledge-based jobs with the decline of the manufacturing and mining sectors and a knowledge-based economy is largely built on the STEM skills of its workforce. The Australian Academy of Technological Sciences and Engineering (ATSE) suggests that 75 per cent of the fastest-growing occupations require well-developed STEM skills and knowledge.

> Investment in science infrastructure including initiatives like the Australian Synchrotron which supports research across a range of areas yields benefits beyond their actual cost.

> Evidence-based decision-making is fundamental to sound informed public policy development. Public policy development undertaken with scientific input should be central to informed and rational debate about the key challenges and issues which face Australia to 2020 and beyond. Science and R&D fundamentally underpin this approach.

WHAT ARE THE RISKS ATTACHED TO CUTBACKS?

Cutbacks can lead directly or indirectly to increased risk and exposure to liability for organisations, government and/or the community.

Whether it is:

> testing one in 10,000 compared to one in a hundred imported fish samples for traces of contaminants poisonous to humans;

> the virus detection error rate in blood donor samples spiralling out to one in 100 rather than one in 50,000 as a result of outdated laboratory infrastructure;

> an irregularity in a routine pathology test being missed as the number of tests undertaken by the laboratory doubles over a year with no increase in staffing levels;

> a family waiting four weeks for a child's serious medical diagnosis due to the reduced number of laboratories having the trained scientific staff and testing capabilities to do the required DNA test;

> the unnecessary exposure of nearby residents to toxic insecticide as site testing is delayed due to a staffing freeze on inspectors authorised to take samples; or

> delays in advising the public of an algal bloom in a region's water supply because of a lack of science expertise amongst the managers assessing the extent of public danger.

Each of these hypothetical scenarios present significant risk and potential exposure to liability.

Funding cutbacks made without a detailed understanding of an agency or organisation's specialist expertise and collaborative engagements can result in a lack of understanding about the extent of lost capabilities and whether or not remaining capabilities will be sufficient to continue the required work at the appropriate levels.

Governments have a responsibility to act in the interests of the wider public in terms of public safety, public health and the public interest and government budgeting needs to operate from a cost base which protects this position.

WHAT IS THE CURRENT FUNDING SITUATION?

Australia currently invests around 2.2 per cent of our GDP in research putting us middle of the OECD table. But the stop/start nature of funding in the recent past means we are sliding backwards and will continue to do so unless action is taken. Australia should rightly aspire to being in the top half of the OECD table.[2]

In terms of business R&D, the current situation is that Australia has one of the lowest levels of government support in the world. A recent report from the Melbourne Institute[1] shows that Australia's commitment to business R&D is lagging well behind other countries with the US government committing over 0.22 per cent of GDP to business R&D and the UK Government 0.14 per cent while the Australian commitment sits at just 0.09 per cent. According to author Professor Beth Webster, the report shows that we are slipping behind not just other high-income countries but increasingly middle-income countries including Malaysia, South Korea and the Czech Republic.

The report notes that in 2012, the OECD ranked Australia 20th out of 26 countries on its patent quality index and the United Nations (UN) ranked Australia 23rd behind almost all other OCED countries on its Global Innovation Index. The report also indicated that the UN ranked Australia 13th on the calibre of its innovation inputs (institutions, infrastructure, and knowledge workers) and our innovation output was considered so low that our innovation efficiency was ranked 107th in the world. While noting that business R&D is only one part of total innovation spending, Professor Webster suggests that it represents one of the more consistent indicators of innovation activities.

KEY RECOMMENDATIONS

The general scientific community is committed to increasing scientific research funding to 2.4 per cent of GDP in line with the OECD total.

There is broadbased concern about an increasingly short-term funding focus meaning professional scientists spend a great deal of time completing grant applications to secure future funding rather than concentrating on their research work.

There is also a general concern that if funding as a percentage of GDP continues to slide competition for grants will become more intense making the grants process even more competitive and time-consuming, and ultimately leading to disaffection and a loss of talented scientists from the profession.

Professional Scientists Australia therefore recommends:

- **increasing scientific research funding to 2.4 per cent of GDP and maintaining a position in the top half of the OECD table;**
- **adopting a longer-term planning focus for funding (including a mix of long and short to medium-term grants to ensure early career scientists are not disadvantaged by funding being locked in for longer periods); and**
- **placing a hold on cutbacks or funding freezes alongside a commitment to consultation with scientific research organisations and key stakeholders about the threats to organisational capabilities and risks to industry and community arising out of funding cutbacks.**

DEAL WITH DEPROFESSIONALISATION

WHAT IS A PROFESSIONAL AND HOW ARE PROFESSIONAL STANDARDS MAINTAINED?

A position is regarded as professional if it is governed by the technical and ethical standards of a profession which the Macquarie Dictionary defines as "a vocation requiring knowledge of some department of learning or science."

The establishment of recognised science degrees in conjunction with the creation of professional science associations with codes of ethics and continuing professional development requirements are the mechanisms by which high standards of professional practice and the relevance and currency of the qualification and experience are maintained in science. Scientists are committed to the development of professional standards, and have built a culture of integrity and independent enquiry around the profession.

WHAT IS DEPROFESSIONALISATION?

Deprofessionalisation is the systematic deskilling of professional positions. It is a process which occurs in a workplace or industry when non-qualified or less-qualified individuals are used to perform work which is more properly performed by appropriately qualified individuals.

Instances of practices which can lead to deprofessionalisation include:

> the devaluing of professional work by replacing the requirement for professional qualifications with generic classifications not requiring specific qualifications;

> replacing professional scientists with non-degree qualified technical officers; and

> practices such as not including post-nominals on business cards which can undermine the importance of ensuring scientific work is undertaken by degree-qualified professional scientists.

WHAT IS THE CONTEXT FOR DEPROFESSIONALISATION?

The application of commercially-driven business models to the conduct of scientific inquiry and areas of scientific application such as the health sector, as well as managers without a background in science making decisions about the recruitment and development of their science workforce are trends that have marked the last decade in science.

It is also true that, however valuable science may have been regarded in the past, the attitude of many toward the role of scientists has grown increasingly hostile in recent times - most notably with the scepticism around climate change research. This has threatened the status and integrity of the work professional scientists do.

The technological advancement in equipment used in scientific enquiry is another factor contributing to deprofessionalisation in science – along with mechanisation and automation can come the uninformed view that a professionally-trained scientist is no longer required to undertake the work.

WHY DOES DEPROFESSIONALISATION MATTER?

The effects of deprofessionalisation can be profound. In the short-term, the impacts include the compromise of scientific independence, the diminution of ethical standards and significant exposure to risk and liability.

In the longer-term, the devaluing of professional work including replacing the requirement for professional qualifications with generic classifications not requiring specific qualifications can lead to what are effectively pay cuts in the longer term, a lack of career progression built into the career structure for science and R&D professionals and ultimately disaffection and lack of job satisfaction. This in turn can result in scientists leaving the profession and problems attracting new graduates which affects the long-term viability and sustainability of the science and R&D workforce and its capacity to support innovation.

KEY RECOMMENDATIONS

A commitment to ethical scientific practice and appropriately-funded scientific inquiry in line with the relevant professional standards and codes of conduct maintained by the profession is fundamental to maintaining quality and critical to risk management across industry and the community.

Without respect for the basic mechanisms by which high standards of professional practice are maintained – the most fundamental being the engagement of professionally qualified and appropriately experienced individuals to undertake science and R&D work – Australia's research and development capability and reputation for high-quality scientific endeavour will be irrevocably undermined.

Professional Scientists Australia recommends that organisations engaging professional scientists must demonstrate a commitment to maintaining sufficient levels of appropriately qualified and experienced staff and offering career path structures which will underpin rewarding and fulfilling careers.

This will ensure high-quality service standards, independent and rigorous scientific inquiry, appropriate reward, respect and recognition and a sustainable science and R&D workforce. Operating from a cost base which protects these fundamentals is critical to countering deprofessionalisation which is a key threat to a viable science and R&D workforce and therefore to Australia's innovative capability.

ENHANCE AUSTRALIA'S STEM CAPABILITY

WHY IS AUSTRALIA'S STEM CAPABILITY IMPORTANT?

Australia's STEM capability is fundamental not only to driving innovation but supporting productivity improvement, maintaining global competitiveness, safeguarding standards across the Australian community, protecting the environment and improving human welfare and quality of life.

While at first glance it doesn't get much more straightforward than doing what's needed to ensure a more prosperous, fairer, healthier, safer and greener world, the truth is that addressing the failures in quality and reach of STEM education is complex and requires long-term planning and commitment.

WHAT IS HAPPENING WITH STEM-BASED EMPLOYMENT?

Estimates by the Australian Academy of Technological Sciences and Engineering (ATSE) suggest that 75 per cent of the fastest-growing occupations require well-developed STEM skills and knowledge – and STEM skills are critical not only for core-STEM occupations or those who ACOLA describe as the "high-skill group capable in research commercialisable innovation and effective response to technological change"[3] but also for ensuring tertiary graduates are able to meet the demands of increasingly technology-intensive roles across industry and for lifting scientific literacy generally.

ATSE projections also show that STEM-based employment will grow at almost twice the pace of other occupations, and that currently 26 per cent of employers have difficulty recruiting STEM-skilled professionals and managers.[4] As the manufacturing and mining sectors decline and we move across to a knowledge-based economy, these figures should signal the need for an urgent look at whether or not Australia is well-positioned to maintain and grow our STEM capability.

As noted by Michael West[5], roughly half of all professional occupations with identified skills shortages in Australia are in core-STEM areas. At the same time, the number of students studying STEM subjects at secondary and tertiary level is declining.[6] As former Queensland Chief Scientist Professor Peter Andrews points out, while China and India build bigger and better knowledge-intensive economies based on increasing numbers of STEM graduates, the proportion of Australian students going into Year 12 physics, chemistry and biology has halved over the last 30 years – and the proportion of Australians graduating from universities in mathematics and statistics is less than half the OECD average.[7]

KEY RECOMMENDATIONS

So how do we ensure we are able to meet the demand for STEM graduates across academia and industry in the face of these figures? It's clearly of great concern when science and technology education in Australia is compared with that offered elsewhere and other countries are growing the sector more quickly than we are.

STEM education is fundamental to Australia's future. A committed, coordinated and strategic approach to investing in our science, engineering and technology capability and our STEM workforce is clearly a defining issue for Australia as we look to our future as a modern knowledge-based economy.

Professional Scientists Australia calls on key stakeholders to work towards the development of a range of education/industry STEM skills initiatives.

More specifically, we recommend initiatives that will:

- enhance the attractiveness of science careers;
- support early career scientists;
- support retention of mature-aged scientists as the ageing of the science workforce reflects ageing of the general workforce;
- expand the pool from which tertiary students and graduates are drawn, provide incentives and remove impediments to attracting and retaining high-quality professionals in/to science;
- ensure that while skilled migration plays an important role in meeting Australia's science skills needs in the face of modest or declining university enrolments and completions that firstly, there are mechanisms in place to ensure migrant workers are subject to protections in the workplace, secondly, that importing skills is not a means for driving down market rates and conditions of employment, and thirdly, that skilled and temporary migration in science occurs in the context of interventions which assist with reducing attrition rates from tertiary science courses, adequate professional development for Australian-based science professionals and enterprise-based strategies to ensure optimal retention of scientists in the profession;
- adopt a long-term focus to build capacity in key areas, especially in newly-emerging disciplines noting the long lead time needed to produce high-quality well-trained work-ready scientists in emerging areas; and
- deal with the underrepresentation of women in science and R&D and work with key stakeholders on initiatives to address barriers to the attraction, development and retention of women in science courses, academia, workplaces and the profession generally. The number of girls studying STEM subjects in secondary school, differential university enrolments and completions, the limited number of women going beyond post-doctoral phase at tertiary level, differential earnings for women in full-time science and R&D roles, differential participation in part-time work and disproportionate concentration in non-senior and non-executive level roles are each important and complex policy areas requiring action. Enterprise-based practices likely to assist with the attraction and retention of women in STEM-related careers include the following:
  - appropriate equal opportunity policies;
  - workplace culture which provides for work/life balance;
  - career progression which takes account of career breaks;
  - appropriate mentoring and career support;
  - maintaining skills and knowledge to keep up-to-date;
  - ensuring women's skills are valued by using gender inclusive job evaluation and assessment;
  - ensuring women have access to discretionary payments and bonuses;
  - addressing occupation or role segregation for women;
  - ensuring that women do not experience differential access to training;
  - ensuring representation at the senior management level and in professional leadership and board positions;
  - providing flexibility aligned with business/organisational objectives; and
  - training in diversity management for managers.

ENCOURAGE EFFECTIVE REWARD AND RECOGNITION STRATEGIES

WHAT REMUNERATION, EMPLOYMENT CONDITIONS AND MANAGEMENT PRACTICES SHOULD UNDERPIN THE SCIENCE AND R&D WORKFORCE?

A highly-skilled motivated and engaged workforce is central to organisational performance and a key driver of workplace productivity.

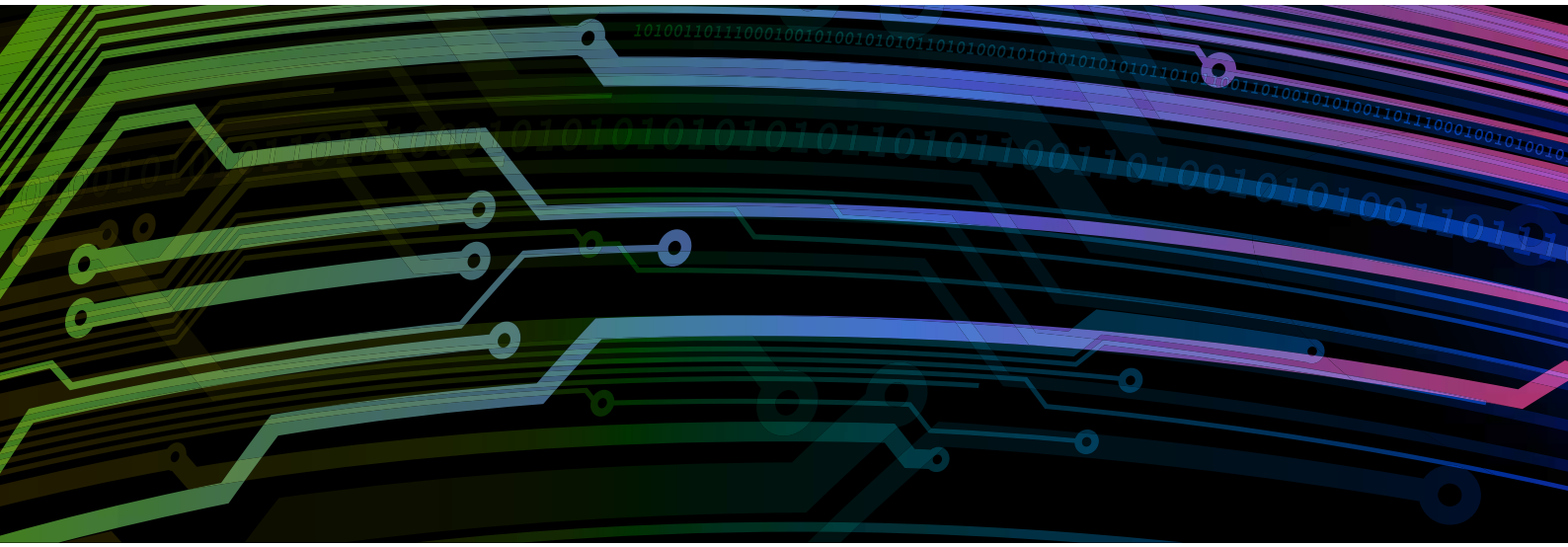
Employment practices at the enterprise level that support staff engagement and innovation and, in turn, competitiveness and growth will underpin productivity improvement in successful science and R&D organisations into the future.

Things like:

> career path options;
> skills development aligned with organisational objectives;
> effective reward and remuneration strategies;
> maintaining a culture work/life balance;
> offering professional development as part of a commitment to ensuring challenging and fulfilling careers;
> building an innovation culture;
> broadening the talent pool from which the pipeline for the professional science workforce is drawn;
> effective and consultative change management;
> collaborative and flexible workplace practices; and
> staff involved in strategic planning

are just some of the areas that can make a difference to staff engagement, workplace productivity and the bottom line.

Equally, practices which do not support staff engagement in each of these areas can potentially act as barriers to maximising the contribution of the science and R&D workforce and are therefore critical issues going forward.



KEY RECOMMENDATIONS

Professional Scientists Australia recommends that employers adopt workplace initiatives which address professionals' career aspirations and provide flexibility in employment conditions in line with their organisation's strategic objectives.

This means fundamentally sound workplace practices such as:

> offering salaries which keep pace with the market;
> regular and well-conducted performance management and staff feedback;
> security of employment;
> payment of penalty rates or adequate compensation for additional hours worked in lieu of overtime;
> payment of on-call allowances where appropriate;
> appropriate standards of office accommodation;
> access to study leave;
> work/life balance policies and practices;
> the availability of part-time work;
> professional development opportunities;
> working hours flexibility; and
> opportunities for phased retirement where desired.

It should also include the basics at the broader level such as:

> maintaining adequate staffing levels;
> ensuring appropriate numbers of experienced degree-qualified scientists are engaged and retained;
> classification definitions for professional scientists which include the requirement for relevant qualifications and experience;
> ensuring early career scientists are mentored and supported and recognising the work of senior staff undertaking these mentoring roles;
> seeing that senior scientists are included in management decision-making around the organisation's science and R&D workforce;
> ensuring that scientists have career path options as technical specialists as well as in management roles; and
> generally challenging and fulfilling careers.

We also see encouraging flexible and consultative management practices as critical because of their potential to operate as barriers to workplace productivity.

ADDRESS WORKFORCE DEVELOPMENT ISSUES

ARE SKILLS SHORTAGES AN ISSUE?

The question of skills gaps and shortages in science and R&D is a vexed one. While some argue there's an oversupply, others argue that while there are no current shortages we need to build capacity and/or preparedness because of the long lead time required to train highly-skilled specialist professionals.

It is widely understood that importing scientists is a solution to skills gaps only to the extent that it sits alongside proper efforts to employ and train the Australian workforce. Australian universities need to ensure they attract quality students to STEM subjects and then government and industry need to ensure they offer fulfilling and secure career options for both domestic and migrant scientists.

What is clear is that we need to build capacity into the workforce to avoid future shortages in light of the projected demand for STEM-qualified graduates.

WHAT IS NEEDED TO MAKE INFORMED POLICY DECISIONS ABOUT LABOUR MARKET SUPPLY AND DEMAND?

With a possible disconnect between industry demand and supply, there is a need for an agreed evidence-base on which to make informed policy decisions about how best to satisfy labour market demand. There appears to be scope for this kind of research to be undertaken in partnership with industry and for stakeholders to then collaborate on a workforce development plan to take science and R&D into the next decade.

Australian universities need to ensure they attract quality students to STEM subjects and then government and industry need to ensure they offer fulfilling and secure career options for both domestic and migrant scientists.

KEY RECOMMENDATION

Professional Scientists Australia would welcome the involvement of a wide range of stakeholders in developing a workforce development plan to take the science and R&D workforce into the next decade.

Such a plan would include:

> ensuring an effective science and R&D skills pipeline from schools;

> strategies to enhance quality and fit of STEM skills supply from universities ;

> effective communication and structuring of career pathways into and within the science and R&D workforce;

> broadening the mix of workers in the science and R&D workforce by improving participation and diversity; and

> supporting and enabling continuing skills development across careers.

IN SUMMARY

Now more than ever, addressing the barriers to realising innovation through science and R&D is critical.

Professional Scientists Australia looks forward to working toward the development of policy initiatives with government and industry to help build our science and R&D capability, and workforce strategies at both the structural and enterprise levels to foster a skilled and responsive science workforce that can best support innovation and in turn productivity improvement, competitiveness and economic growth.

In transitioning to a knowledge-based economy, valuing the work of professional scientists will be fundamental to attracting top quality talent to science and maintaining a sustainable, vibrant and committed science and R&D workforce.

Recognition of the value added by science and R&D to the economy and the value attached to the work of professional scientists by government, employers and the community will determine whether we maintain our reputation for scientific endeavour, whether science and innovation will be central to the move towards a knowledge-based Australian economy and whether science and R&D will play the key roles they should in maximising our innovative capability as we move toward 2020.

It is critical that we take a strategic approach to science and R&D policy over the next decade to ensure we can best respond to these challenges.

KEY RECOMMENDATIONS

INVEST IN THE SCIENCE AND R&D WORKFORCE

> Increase scientific research funding to 2.4 per cent of GDP and maintain a position in the top half of the OECD table;

> adopt a longer-term planning focus for funding (including a mix of long and short to medium term grants to ensure researchers spend more time on research and less time on grant applications, but also that early career scientists are not disadvantaged by locking in funding for longer terms); and

> place a hold on cutbacks or funding freezes in conjunction with a commitment to consultation with scientific research organisations and key stakeholders about the threats to organisational capabilities and risks to industry and community arising out of funding cutbacks.

DEAL WITH DEPROFESSIONALISATION

Professional Scientists Australia recommends that organisations that engage professional scientists must demonstrate a commitment to maintaining sufficient levels of appropriately qualified and experienced staff and offering career path structures which will underpin rewarding and fulfilling careers. This will ensure high-quality service standards, independent and rigorous scientific inquiry, appropriate reward, respect and recognition and a sustainable science and R&D workforce. Operating from a cost base which protects this position is critical to countering deprofessionalisation which is a fundamental threat to a viable science and R&D workforce and therefore to Australia's innovative capability.

ENHANCE AUSTRALIA'S STEM CAPABILITY

Professional Scientists Australia calls on key stakeholders to work towards the development of a range of education/industry STEM skills initiatives.

More specifically, we recommend initiatives which will:

> enhance the attractiveness of science careers;

> support early career scientists;

> support retention of mature-aged scientists as the ageing of the science workforce reflects ageing of the general workforce;

> expand the pool from which tertiary students and graduates are drawn, provide incentives and remove impediments to attract and retain high-quality professionals in/to science;

> ensure that while skilled migration plays an important role in meeting Australia's science skills needs in the face of modest or declining university enrolments and completions that firstly, there are mechanisms in place to ensure migrant workers are subject to protections in the workplace, secondly, that importing skills is not a means for driving down market rates and conditions of employment, and thirdly, that skilled and temporary migration in science occurs in the context of interventions which assist with reducing attrition rates from tertiary science courses, adequate professional development for Australian-based science professionals and enterprise-based strategies to ensure optimal retention of scientists in the profession;

> adopt a long-term focus to build capacity in key areas, especially in newly-emerging disciplines noting the long lead time to produce high-quality well-trained work-ready scientists in emerging areas; and

> deal with the underrepresentation of women in science and R&D and work with key stakeholders on initiatives to address barriers to the attraction, development and retention of women in science courses, academia, workplaces and the profession generally.

ENCOURAGE EFFECTIVE REWARD AND RECOGNITION STRATEGIES

Professional Scientists Australia recommends that employers adopt workplace initiatives which address professionals' career aspirations and flexibility in employment conditions in line with their organisation's strategic objectives.

This will mean a range of things depending on the workplace but fundamentally sound workplace practices such as offering salaries which keep pace with the market, regular and well-conducted performance management and staff feedback, security of employment, payment of penalty rates or adequate compensation for additional hours worked in lieu of overtime, payment of on-call allowances where appropriate, appropriate standards of office accommodation, access to study leave, availability of part-time work, professional development opportunities, working hours flexibility and opportunities for phased retirement where desired.

It should also include maintaining adequate staffing levels, maintaining a culture of work/life balance, ensuring appropriate numbers of experienced degree-qualified scientists are engaged and retained, ensuring early career scientists are mentored and supported and recognising the work of senior staff undertaking these mentoring roles, seeing that senior scientists are included in management decision-making around the organisation's science and R&D workforce, ensuring that scientists have career path options as technical specialists as well as in management roles and generally challenging and fulfilling careers.

We also see encouraging flexible and consultative management practices as critical because of their potential to operate as barriers to workplace productivity.

ADDRESS WORKFORCE DEVELOPMENT ISSUES

Professional Scientists Australia would welcome the involvement of a wide range of stakeholders in developing a workforce development plan to take the science and R&D workforce into the next decade.

Such a plan would include:

> ensuring an effective science and R&D skills pipeline from schools;

> strategies to enhance quality and fit of STEM skills supply from universities ;

> effective communication and structuring of career pathways into and within the science and R&D workforce;

> broadening the mix of workers in the science and R&D workforce by improving participation and diversity; and

> supporting and enabling continuing skills development across careers.

CONTACT US

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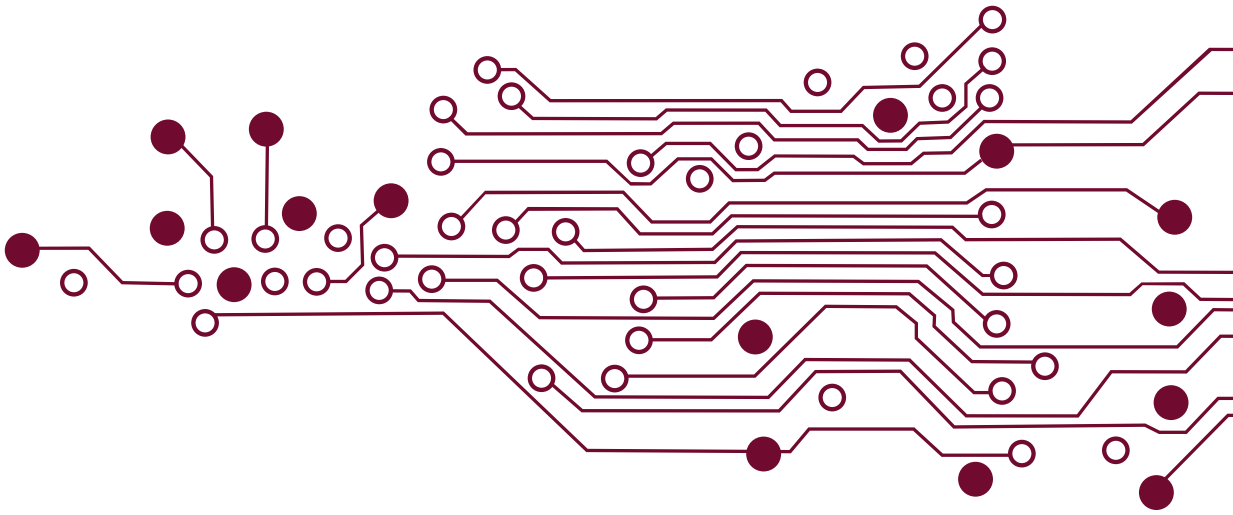

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