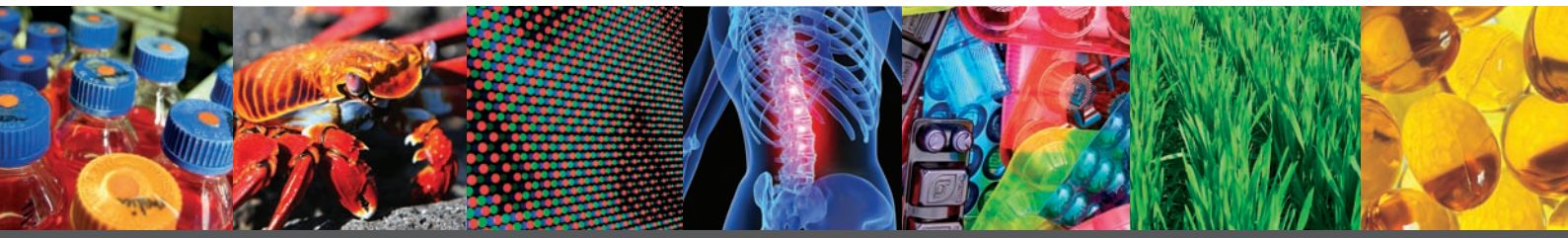
Australian Government

Department of Innovation, Industry, Science and Research

NATIONAL ENABLING TECHNOLOGIES STRATEGY



innovation.gov.au

INTRODUCTION

The Australian Government considers that enabling technologies have the potential to provide significant long term social and economic benefits for Australia. Enabling technologies have the potential to underpin an increasing number of breakthrough innovations in products, services and processes and to offer effective solutions to help address major global and national challenges, such as medical treatments, energy generation and environmental remediation. They may also pose new health, safety and environmental risks and have ethical and social impacts. A balance needs to be found that manages the risks and impacts while ensuring that the benefits can be obtained.

Powering Ideas: An Innovation Agenda for the 21st Century sets out the Commonwealth Government's ten-year reform agenda for Australia's innovation future. A number of programs were announced in the 2009-10 Budget to support the Powering Ideas agenda and assist the development, commercialisation and adoption of enabling technologies in Australia[1]; support the indirect costs of research in universities; increase research capacity; and support collaborative work with industry. The Australian Government has established the National Enabling Technologies Strategy (the Strategy), within the Super Science – Future Industries Initiative which is investing in cutting edge biotechnology, nanotechnology and communications technology research infrastructure.

The Innovation Agenda also aims to increase the level of collaboration between Australian businesses, universities, and publicly-funded research organisations by building on new and existing programs like Enterprise Connect, Cooperative Research Centres, Industry Innovation Councils and the Australian Research Council.

The Strategy, with funding of $38.2 million over four years, provides a framework to support the responsible development of enabling technologies. Its aim is to improve the management and regulation of biotechnology and nanotechnology in order to maximise community confidence and community benefits from the use of new technology. It will help Australian industries capitalise on growth opportunities and ensure Australia can benefit from enabling technologies while ensuring processes are in place to identify, monitor and mitigate any associated risks.

For the purposes of the Strategy, "enabling technologies" are defined as new technologies or new uses for existing technologies that enable new products or services or more efficient processes. The Strategy will focus primarily on nanotechnology and biotechnology and will also undertake strategic assessment of the development of new enabling technologies and the convergence of new and existing technologies. The Strategy will deal with ICT to the extent that it is an enabler for and/or converges with nanotechnology, biotechnology or other new enabling technologies.

The Strategy will build on the work of the National Biotechnology Strategy (2000 to 2008) and the National Nanotechnology Strategy (2007 to 2009), in particular, the Australian Government's Objectives for the Responsible Management of Nanotechnology.

Issues related to the development of enabling technologies straddle jurisdictional and portfolio boundaries, requiring national coordination. The Strategy provides a central point for policy coordination and community engagement, as well as providing a range of specific measures designed to facilitate the development and uptake of these technologies. This includes addressing the need for information on a range of different levels: providing industry and the community with balanced and factual information, undertaking activities that contribute to social inclusion in the development and benefits of enabling technologies, supporting the metrology necessary to underpin effective regulation, and ensuring regulation supports the responsible and safe use of innovative services and products.

1 In particular, the new Research and Development Tax Credit and Commercialisation Australia.

The metrology aspects of the Strategy have funding of $18.2 million, the public awareness and engagement program approximately $9.4 million and the remaining $10.6 million is for policy coordination, industry uptake, international engagement, and strategic research related to these activities.

The Strategy has the following themes and objectives:

1. *A national approach* – the Strategy will work with Federal, State and Territory governments and agencies and a wide range of stakeholders, to encourage collaborative efforts and joint activities consistent with the aims of the Strategy.

2. *Balancing risk and reward* – the Strategy will support the appropriate coverage of enabling technologies in policy and regulatory frameworks, and support Government agencies to ensure that Government policy is informed by an understanding of health, safety, environmental, social and economic considerations.

3. *Developing measurement capabilities* – the National Measurement Institute (NMI) will develop measurement infrastructure, expertise and standards for nanotechnology and biotechnology (nanometrology and biometrology).

4. *Engaging with the public* – the Strategy will increase public understanding of enabling technologies and issues surrounding them. It will also increase understanding of public concerns and aspirations about enabling technologies by technology developers and those responsible for policy formulation.

5. *Using technology for a better future* – the Strategy will increase government, industry and the community's understanding of the ways in which applications of enabling technologies may help to address major global and national challenges and increase industry productivity, and will encourage the responsible development and uptake of these technologies.

6. *Planning for the Future* – The Strategy will assist government, researchers, industry and other stakeholders to prepare for the advent of new technologies by undertaking foresighting activities and supporting the development of policy and regulatory frameworks.

CONSULTATION FOR THE NATIONAL ENABLING TECHNOLOGIES STRATEGY

As part of the development of the Strategy, the Department of Innovation, Industry, Science and Research (DIISR) consulted a range of stakeholders including industry, governments, non-government organisations, research organisations and universities. Several themes and ideas about what the Strategy should aim to achieve emerged from the consultations such as the need for a national approach; efficient, robust and flexible regulation; community engagement which feeds into policy development; the provision of balanced information on enabling technologies both for industry and the community more broadly; addressing funding gaps in technology research, development and commercialisation; encouraging international engagement and increasing linkages amongst and between researchers and industry.

The National Enabling Technologies Strategy will not be able to address all these issues – many will be addressed by other Government initiatives, including those addressed in *Powering Ideas*. However, the Strategy will work alongside other Government measures and components of Australia's innovation system and, where appropriate, engage with them to further the aims of the Strategy.

1: A NATIONAL APPROACH

The Strategy will work with relevant Federal, State and Territory governments and agencies and a wide range of stakeholders to encourage collaborative efforts and joint activities.

Coordination of Commonwealth, State and Territory activities

The Strategy will provide a focal point for coordination on policy development and other activities related to enabling technologies across the Commonwealth Government and with the States and Territories. Key activities will include:

- facilitation of a whole of government approach on health, safety and environment (HSE) issues through an Enabling Technologies HSE Working Group;
- actively engaging with a network of Commonwealth agencies, including the Coordination Committee for Innovation, to address broader policy issues, keeping them informed of emerging issues, linking into other measures and activities that could further the aims of the Strategy e.g. trade and investment activities, and obtaining advice from key advisory bodies; and
- establishing a joint Commonwealth/State Working Group as a forum for information sharing and collaboration, to identify issues that may require a national response, or to monitor the progress of issues being addressed in other forums such as Ministerial Councils and Safe Work Australia.

Continued collaboration with industry and researchers

The Strategy will work with industry associations, researchers, research infrastructure organisations and government to support development and maintenance of networks and to identify and facilitate opportunities for collaboration, with the aim of building critical mass and enhancing research and industry capacity in enabling technologies. This could involve funding or supporting workshops, forums and similar activities, as well as collaborative projects that emerge from such networking opportunities.

Stakeholder Advisory Council

The Strategy will establish a Stakeholder Advisory Council to meet twice per year to consider important issues that may arise in the development or use of enabling technologies and provide advice to Government on the ways in which the Strategy could address those issues, including recommending and/or undertaking specific projects. This could include assisting in identifying work to address the gaps in understanding about the potential risks and benefits of enabling technologies and communicating the latest knowledge about enabling technologies to industry, government and other stakeholders. Membership is expected to include representatives from industry, universities, research organisations, unions, non-government organisations, consumers, ethicists and social scientists.

2: BALANCING RISK AND REWARD

The Strategy will contribute to the development of policy and regulatory frameworks that appropriately cover enabling technologies and inform government policy of health, safety, environmental, social and economic considerations of enabling technologies.

Addressing the health, safety and environmental implications of enabling technologies

The Strategy will continue to address the health, safety and environmental (HSE) impacts of enabling technologies, particularly nanotechnology, through:

- developing whole-of-government approaches to issues, including working with State and Territory Governments through appropriate forums, such as the Commonwealth/State Working Group, to assist with the review of their regulatory frameworks;
- supporting the activities of the key regulatory agencies to continually review their regulatory frameworks, processes and capabilities where necessary to provide efficient, robust and adaptable regulation of enabling technologies;
- developing strategies to focus and encourage Australian efforts to scope and answer some of the key questions that are needed to underpin regulation and responsible development of these technologies, in particular where there is a need for research relevant to Australian conditions; and
- supporting engagement between Australian policy and regulatory agencies and their overseas counterparts and contributing to the development of global policy and regulatory standards in line with Australia's priorities and circumstances.

Through these activities, the Strategy will provide a foundation for continuous improvement of regulatory approaches to enabling technologies and existing and new developments in biotechnology and nanotechnology.

Social, economic and ethical impacts of enabling technologies

The application of technologies such as biotechnology and nanotechnology can raise social, economic and ethical issues. The Strategy will commission and conduct research on the social, economic and ethical impacts of enabling technologies, and provide forums for stakeholders and the broader community to consider and debate the issues raised. This work will be an important contribution to the evidence base required for effective policy development and sound cost/benefit analysis in regulatory processes.

3: DEVELOPING MEASUREMENT CAPABILITIES

Under the Strategy, the National Measurement Institute (NMI) will develop measurement infrastructure, expertise and standards for nanotechnology and biotechnology (nanometrology and biometrology). This work includes:

- development and maintenance of primary measurement standards;
- development of new measurement capabilities, and means for their dissemination;
- provision of calibration and measurement services to customers;
- participation in international metrology activities; and
- leadership in the national measurement system.

National and international collaborations with individual research laboratories and international organisations and consortia will be an important activity for the development of measurement standards. Dissemination of these standards will be achieved through the provision of transferable standards, reference materials and reference methods for use by calibration laboratories and individuals making measurements across Australia. Workshops for industry, researchers and regulators will also be run by NMI.

Nanometrology

NMI's nanometrology work involves measuring the size distributions of nanoparticles, and also characterising their physico-chemical properties. This work is particularly important to underpin other organisations' work in areas such as toxicological and environmental testing, food applications and occupational health and safety applications. NMI's existing nanoscale dimensional measurement standards work program will be expanded through the commissioning of a metrological Atomic Force Microscope. The capabilities of the nanometrology laboratory will also be expanded to meet the demands of the nanotechnology community (industry, regulators and researchers).

Biometrology

NMI's existing biometrology expertise will be expanded to develop and maintain the accuracy, reliability and comparability of biological measurements appropriate to the needs of regulators and industry. NMI will develop high accuracy reference methods and standards which can be used in applications such as the detection of genetically modified organisms or materials; cancer diagnostics and prognostics; pre-natal diagnostics; the detection of gene doping in sport and the emerging applications of gene therapy and pharmacogenomics. NMI's work will support growth in new biotechnology applications and will assist Australian industry and researchers to translate biotechnologies from prototype to production. Regulators' biometrology needs in agriculture, health and the environment will also be supported.

4: ENGAGING WITH THE PUBLIC

The Strategy's public awareness and community engagement program will increase public understanding of enabling technologies and issues surrounding them, and increase understanding of public concerns and aspirations by technology developers and in policy formulation. The main elements of the program will be:

- Community engagement – multiple channels will be utilised to provide opportunities for diverse members of the public to engage in discussions on enabling technologies, including proposed policy approaches designed to improve the technologies' management and regulation.
- Public attitude research – qualitative and quantitative research will be used to underpin activities and evaluate the success of the program.
- Education – school resources will continue to be developed, supported by teacher professional development and demonstrations, in both metropolitan and regional areas.
- Information exchange – to understand the information needs of different groups, provide balanced and factual information in appropriate formats, and seek feedback for improved information provision.

This program will also link to relevant initiatives such as those that may be put in place under the National Science Communications Strategy, and will work co-operatively with international bodies also undertaking similar public awareness and engagement activities, such as the OECD.

5: USING TECHNOLOGY FOR A BETTER FUTURE

The Strategy will increase understanding and awareness of the ways in which application of enabling technologies may help address major global and national challenges and increase industry productivity.

Addressing global problems

The Strategy will support research and engagement in international activities that will help increase Government, industry and community understanding of the potential for enabling technologies to address major global and national problems, and to understand and help resolve potential impediments to their uptake.

Industry uptake

Increasing the level of industry's understanding of enabling technologies and their applications will strongly contribute to the increased use of these technologies, and the benefits to Australia that may come from their adoption. The Strategy will work with industry, researchers and State and Territory governments to:

- identify and facilitate projects that demonstrate applications of enabling technologies and develop information and activities to assist industry sectors to understand the potential benefits and risks of the technologies;
- provide information to facilitate the development of technologies and their applications, including providing information about regulatory frameworks, funding programs and research infrastructure;
- facilitate links and collaboration amongst and between researchers and industry in Australia and overseas and promote Australian capability internationally;
- identify current and future skills needs, capability and infrastructure gaps with a view to developing informed strategies which will address these issues; and
- contribute to establishing a policy and regulatory environment that supports businesses to undertake R&D and commercialisation and build capacity for the productive application of enabling technologies.

This work will also use existing Commonwealth programs and initiatives such as the Industry Innovation Councils and Enterprise Connect to engage industry leaders and champions and to inform them of the potential of these technologies for Australian industry.

6: PLANNING FOR THE FUTURE

The Strategy will assist Government, researchers, industry and other stakeholders to prepare for the advent of new technologies by undertaking foresighting activities and supporting the development of policy and regulatory frameworks.

Foresighting

The Strategy will establish an Expert Forum for Enabling Technologies to provide advice and guidance to support foresighting to identify new and converging technologies that may have implications for policy makers, regulators, researchers, industry and the broader community. The Expert Forum will meet twice a year to advise policy makers and regulators on both Australian and international research developments and suggest areas of further study. Its work will also feed into the deliberations of the Stakeholder Advisory Council.

In undertaking its foresighting role, the Strategy will take close account of other work being done in this area, including by the Prime Minister's Science, Engineering and Innovation Council, organisations such as the Commonwealth Scientific and Industrial Research Organisation, national and international technology and foresighting thinktanks and regulators.

Legacy framework

Over the course of the Strategy, relevant agencies will review their policy and regulatory frameworks to ensure they are well placed to address the emergence of enabling technologies. Advice from the Expert Forum, supported by appropriate research studies, will inform the work of agencies, and international links established under the Strategy will help identify best practice in policy and regulation.

IMPLEMENTATION ISSUES

Working with others

DIISR will work with a range of stakeholders to undertake the various activities outlined in this document and developed over the course of the Strategy. Following advice from the Stakeholder Advisory Council on issues it considers should be addressed and proposed activities to be undertaken, DIISR, in collaboration with other Government agencies, will develop a work program for the coming financial year, along with an indication of activities open to collaborative delivery mechanisms. These will be published on the Strategy website. Organisations that wish to be involved in the delivery of these activities will be welcome to put forward proposals.

Expected outcomes from NETS

The expected outcomes from the NETS, are:

- Timely and accurate information that informs policy makers' decisions on impacts, opportunities and challenges of enabling technologies, with a particular focus on whole of government responses;
- Increased competitiveness through uptake of nanotechnology based products, processes and services;
- Effective regulatory frameworks that manage the impacts of enabling technologies on public health, safety and the environment but do not unreasonably inhibit or prohibit uptake of technologies;
- Effective regulation and improved industry use of enabling technologies, through world-class biometrology and nanometrology capability; and
- Public confidence in enabling technology products and services through better understanding their risks and benefits, and how these are managed; and
- An understanding amongst government, researchers and industry of public interests with regard to enabling technologies .

DIISR will develop a detailed set of KPIs for the Strategy by early 2010, together with the mechanisms for measuring them. These will be published on the Strategy website and will be the basis for an independent evaluation in 2011–12.

Industry and research data

The collection of industry and research data will be important both for measuring and monitoring Australia's performance and providing advice to government on industry and research activity with regard to enabling technologies. DIISR will continue to publish the Biotech Business Indicators and will consider whether a similar publication should be developed in relation to nanotechnology. DIISR will work with the Australian Bureau of Statistics to build on previous work and develop mechanisms for collecting data on the use and awareness by industry of biotechnology, nanotechnology and, potentially, other technologies.

Annual Reports

DIISR will provide annual reports to the government on the implementation of the Strategy and enabling technology development in Australia more generally.

MORE INFORMATION

For more information on the National Enabling Technologies Strategy, please visit the Strategy's website at **www.innovation.gov.au/nets.**