

Victorian Action Plan for Small Technologies

Bringing big benefits to industry and the community

April 2010



Victoria's small technologies promise to generate many benefits for our economy, environment and community.

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Over the last decade, the Victorian Government has invested around \$250 million in infrastructure and activities to support small technologies.

Message from the Minister for Innovation



Small technologies have the potential to change the way we do and see many things. As our knowledge of micro and nanotechnologies advances, new discoveries at the atomic and molecular level will create many new products – from sensors that detect diseases at much earlier stages to materials for stronger and lighter cars and aircraft, and many more.

Investment in small technologies is increasing dramatically and the global market for nanotechnology- and microtechnology-enabled products and services is expanding rapidly. Other countries are directing substantial funding towards research and development in these areas. With many exciting opportunities being generated by these technologies, Victoria cannot afford to be left behind.

Over the past decade, the Victorian Government has invested around \$250 million in infrastructure and activities to support small technologies.

Our challenge now is to convert more of our research and development activities into innovative solutions that meet the needs of industry and the community, attract higher levels of investment and jobs, improve productivity in our industries and enhance Victoria's global competitiveness. We must also make sure that young Victorians have the skills they need to take up the many new careers emerging because of these technologies.

The Victorian Government recognises that the development of new technologies must be undertaken responsibly. We are working with scientists, research organisations and business and industry leaders to devise frameworks that will ensure the safe development of small technologies for workers, consumers and the broader community.

In 2008, we released the *Victorian Nanotechnology Statement* – the first nanotechnology policy statement made by a state government in Australia. The statement sets out priorities for developing nanotechnology in Victoria.

The *Victorian Action Plan for Small Technologies* builds on and broadens this statement, investing \$10.5 million to deliver new initiatives that will increase the adoption of small technologies by businesses, improve skills and training, and increase awareness of small technologies. The plan features a new Small Technologies Industry Uptake Program to help businesses to apply small technologies to meet challenges, solve problems and improve productivity.

The Victorian Government is investing in the future of small technologies, research and industry, and is taking action to ensure Victorians will benefit from more effective and safer medicines, more environmentally friendly manufacturing processes, and more sustainable methods for managing our natural resources.

This plan will increase the development of innovative products and services in Victoria - reinforcing our leadership in supporting science, technology and innovation, and helping Victorians to capture the substantial health and environmental opportunities being created by advances in these technologies.

A handwritten signature in black ink, appearing to read 'Gavin Jennings'. The signature is stylized and written over a faint, light-colored background that looks like a piece of paper with some texture.

Gavin Jennings MLC
Minister for Innovation

Small technologies applications have the potential to be applied across various industries including climate change, health and ICT.

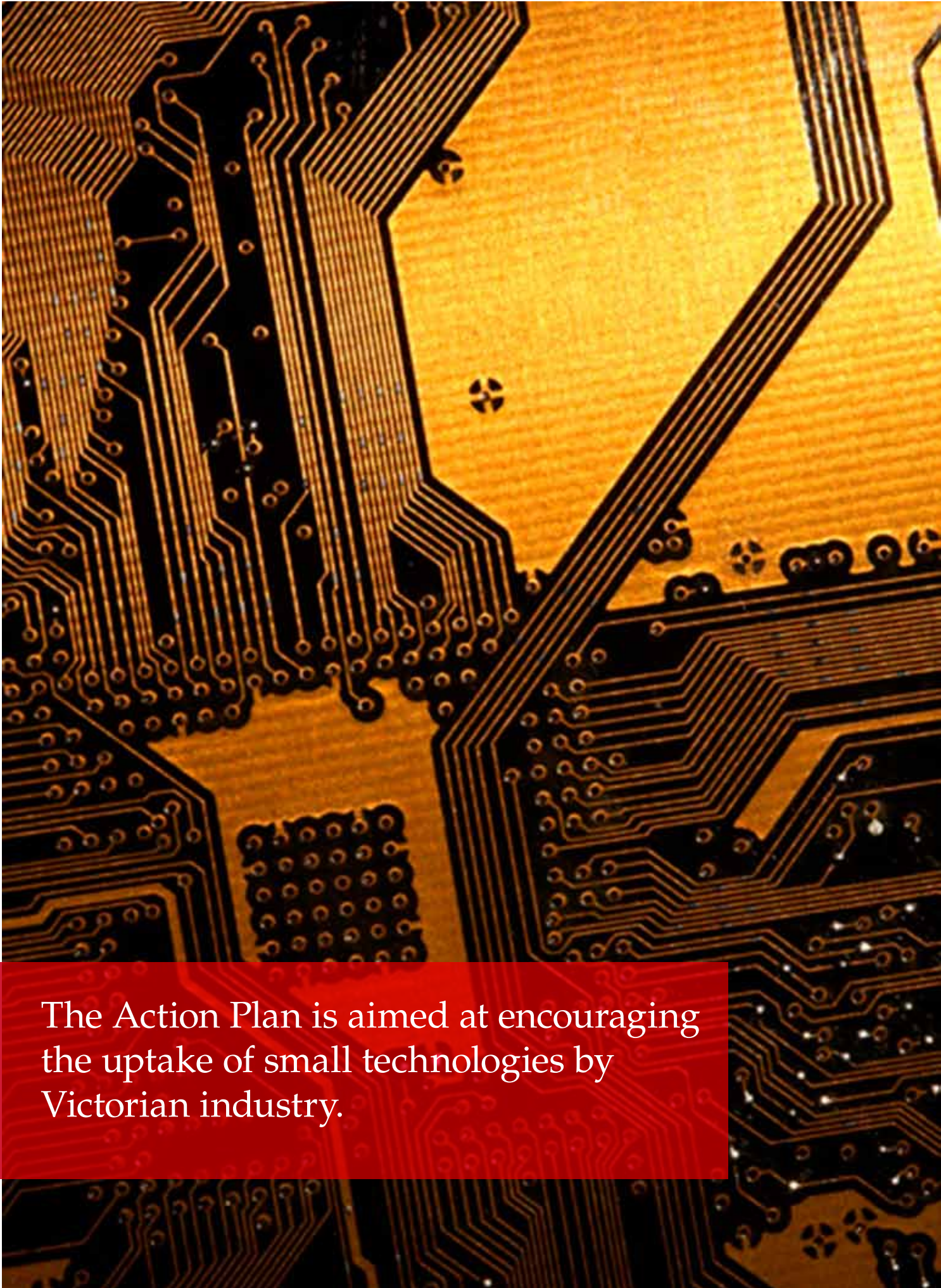


Victorian Action Plan for Small Technologies

The Action Plan builds on the *Victorian Nanotechnology Statement 2008*, investing \$10.5 million to deliver new initiatives that will increase the adoption of small technologies by businesses, improve skills and training, and increase awareness of small technologies.

The *Victorian Action Plan for Small Technologies* includes a range of new actions to meet three key objectives, with a particular focus on facilitating access to and take-up of small technologies products, techniques and processes by Victorian businesses.

ACTION ONE	Industry uptake of small technologies	Outcomes
<p>Increase the adoption of small technologies – based solutions by Victorian businesses</p>	<p>Small Technologies Industry Uptake Program</p> <p>Small Technologies Roadshow</p> <p>Small Technologies Industry Uptake Awards</p>	<p>Increased private sector investment in and development of small technologies-enabled products and processes</p> <p>Increased private sector adoption of small technologies-enabled manufacturing processes</p> <p>Increased exports of small technologies-enabled products and services</p>
ACTION TWO	Skills for small technologies	Outcomes
<p>Develop skills and training in small technologies</p>	<p>Developing a skilled workforce</p>	<p>A Victorian workforce with the skills needed to support long-term growth in small technologies.</p> <p>Increased number of jobs involving small technologies.</p> <p>More successful and sustainable small technologies businesses.</p>
ACTION THREE	Awareness of small technologies	Outcomes
<p>Increase public and business awareness of small technologies</p>	<p>Promoting Victorian small technologies</p>	<p>Greater community-wide awareness of the applications and benefits of small technologies.</p> <p>Work with the Commonwealth Government to improve understanding of the responsible and safe use of small technologies.</p> <p>More international partnerships involving Victorian businesses and researchers.</p>



The Action Plan is aimed at encouraging the uptake of small technologies by Victorian industry.

What are ‘small technologies’?

The term ‘small technologies’ refers to the convergence of microtechnology, nanotechnology, biotechnology, information and communication technology (ICT) and advanced engineering technologies. The integration of these technologies is already driving transformation and innovation in products, services and industrial processes and is likely to have a major impact across the Victorian economy and community.

Microtechnology is engineering on the scale of one millionth of a metre. Microtechnology is applied to miniaturising electrical devices (such as wires, transistors and sensors) and mechanical devices (such as electric motors, pumps, gears and levers). Advances in microelectronics have led to the ‘information revolution’, while micromechanical devices are expected to become more and more prevalent as new ways are found to reduce the size, cost and weight of mechanical devices.

Nanotechnology is engineering on the scale of one billionth of a metre or at the scale of an atom. Objects at this scale have unique physical and chemical properties, such as greater flexibility or strength, exceptional electrical conduction or resistance, or a high capacity for storing or transferring heat. These properties are enabling the manufacture of products that are lighter, expected to lead to new metals, plastics, composite materials, coatings, fluids and fibres that will have a profound impact on our lives.

Microtechnology and nanotechnology are enabling technologies. Their integration with different fields of science and industry sectors – particularly biotechnology and ICT – has the potential to generate a broad spectrum of new products, techniques and processes, as shown in the table below.

Industry	Potential small technologies applications
Health	Improved medical diagnostics; better targeted drug delivery; biocompatible materials for prostheses and implants; tissue growth; more precise medical instrumentation and surgical tools; more treatment options
Environment	Better environmental remediation and waste management techniques and processes; sensors; better water and soil quality; monitoring and prevention of pollution; clean-up technologies
Climate change	Better outputs from renewable energy technologies; next generation batteries and fuel cells; more efficient hydrogen powered vehicles; energy-efficient materials and coatings; heat-resistant materials; clean, green manufacturing processes
Water	Improved water quality and monitoring; high-efficiency filtration; better waste treatment; improved recycling technologies
Building and construction	Stronger, lighter construction materials; CO ₂ -free concrete; improved insulation materials; heat and energy producing coatings; UV-reflective and self-cleaning glass
Food and agriculture	Bio-degradable and sensory packaging; supply-chain tracking; high-value food and dairy derivatives; sensors and filters
Chemicals	Safer, environmentally-friendly substitutes for toxic chemicals; new solvents; better sunscreens and cosmetics
Automotive and aerospace	Lighter, stronger materials; sensors; scratch-proof, dirt-repellent coatings and fabrics; improved battery and energy storage technology; performance enhancing and cleaner fuel additives
Energy	Lower cost solar photovoltaics; improved battery and storage technology; stronger, lighter materials; better insulation; more energy-efficient lighting systems and coatings
Textiles	Stronger fibres; anti-microbial textiles for clothing and wound treatment; dirt repellent and wrinkle-proof clothing; fire-resistant fabrics; active textiles
ICT	High-capacity storage; flexible, lightweight displays; improved processors; quantum cryptography and computing; clothing electronics
Mining	Less invasive mining processes; environmentally-friendly core processing techniques; waste reduction
Leisure and sports	Stronger lightweight materials; breathable clothing; improved playing surfaces; interactive entertainment; cheap computers

A close-up photograph of a scientist in a white lab coat and blue gloves looking through a white microscope. The scientist is positioned on the right side of the frame, with their face in profile. The microscope is the central focus, with its eyepiece and objective lenses clearly visible. The background is a blurred laboratory setting with various pieces of equipment. A red semi-transparent box is overlaid on the top left of the image, containing white text.

Victoria is home to around half of Australia's small technology companies.

Small technologies in Victoria – a strong foundation for growth

Victoria has a longstanding record of world-class medical research, globally recognised strengths in biotechnology and a growing international reputation for innovation in nanotechnology and microtechnology. Victoria's high levels of investment in science-related infrastructure support the convergence of these technologies to generate opportunities for developing new commercial products, services and processes.

The state's investment in science infrastructure, such as the Australian Synchrotron, the Small Technologies Cluster and the Melbourne Centre for Nanofabrication (MCN), has positioned the state at the leading edge of microtechnology and nanotechnology research.

Victorian universities, public research institutes and cooperative research centres are leaders in microtechnology, nanotechnology and biotechnology research. These developments have boosted the state's knowledge, skills and infrastructure base in small technologies, enabling Victorian businesses to develop new practical and commercial applications.

Victoria is home to around half of Australia's small technology companies. In addition, a significant number of multinational companies and foreign government agencies are investing in the development and commercialisation of small technologies in Victoria.

Successes have been in the application of materials and devices in health and hygiene, advanced bulk materials, coatings and environmental monitoring. A number of Victorian companies have achieved international success and recognition:

- Dulux Group – coatings and paints
- Starpharma – cancer and HIV treatments
- Recaldent – a nanostructure extracted from milk
- Micronisers – nanoparticles for UV-reflective coatings
- MiniFAB – partner in an award-winning diagnosis system for eye disease.

Victoria has invested in facilities and services to help researchers and companies turn discoveries into commercial outcomes. These include commercialisation programs and infrastructure, business and technical support services, and capacity in prototyping and manufacturing.

Skills development, training and education in small technologies are now available; including nanotechnology-related degrees at a number of universities, practical courses in nanotechnology manufacturing at TAFE institutes, and vocational education and training (VET) courses in secondary schools.

High levels of Victorian Government investment – alongside Commonwealth Government support for nanotechnology research and development – have contributed to this strong foundation in small technologies. The OECD estimates that the impact of microtechnologies and nanotechnologies will be greater than US\$3 trillion by 2015. Ongoing investment in infrastructure and skills will be needed to ensure that Victoria shares in the strong and rapid global growth in this area.

Government support for small technologies

Over the past decade, the Victorian Government has invested around \$250 million to provide infrastructure, facilities and services to support small technologies activities, including:

- Australian Synchrotron
- Melbourne Centre for Nanofabrication
- Small Technologies Cluster
- The Victorian Centre for Advanced Materials Manufacturing

Victorian businesses are also benefiting from the Commonwealth Government's investment in small technologies, including around \$108 million per annum on nanotechnology-related research projects and the \$100 million Australian National Fabrication Facility, which is providing laboratories and support for micro- and nano-fabrication research.

CSIRO Future Manufacturing Flagship

As part of the Victorian Organic Solar Cell Consortium research program, researchers based at CSIRO Clayton have developed printed polymer based photovoltaics that have the potential to provide a low cost energy source alternative to currently available technologies. The Industry Uptake Program through the voucher scheme will enable industry to gain access to researchers and facilities such as those at CSIRO.

CSIRO Future Manufacturing Flagship's Dr Scott Watkins holds a sample of printed plastic solar cells (Photo courtesy of CSIRO)



Melbourne Centre for Nanofabrication

The new Melbourne Centre for Nanofabrication (MCN) will provide Australia's leading scientists and engineers with the tools to build miniature devices, opening up opportunities to dramatically change the face of health care and environmental management.

The Victorian node and headquarters of the Australian National Fabrication Facility, the MCN is a purpose-built centre that draws on the knowledge of six Victorian universities and CSIRO. MCN combines state-of-the-art instrumentation for micro- and nano-scale fabrication with special laboratories for making smaller devices. The MCN will support and produce research and prototypes in areas such as environmental sensors, medical diagnostics, micro- and nano-actuators, novel energy sources (such as solar cells) and novel bio-nanotechnology products (such as drug delivery devices).

MCN aims to fill a gap in Australia for open access, multi-scale fabrication infrastructure and will host a set of state-of-the-art tools, including:

- an electron beam lithography (EBL) system for generating patterned structures and features on a nanoscale
- a dual-beam focused ion beam electron microscope (FIB-SEM) for etching nanoscale patterns
- systems for nanoimprinting and plasma etching.

Businesses, publicly funded researchers and students will have access to the centre's facilities, either for their own use (following induction training) or by having their project carried out by MCN staff.

The MCN will actively encourage multidisciplinary and multi-institutional collaborations between the research sector and industry with the aim of assisting businesses and researchers to achieve global competitiveness in nanotechnologies for medical and environmental applications.

The Victorian Government has provided \$15 million funding for the MCN, along with \$15 million from the Commonwealth Government through the *National Collaborative Research Infrastructure Strategy* (NCRIS) and \$15 million from the MCN's collaborating partners.

Small technologies – big benefits

Integrating Victoria's emerging capabilities in microtechnology and nanotechnology with our strengths in biotechnology, materials science, advanced manufacturing and ICT has the potential to deliver substantial economic, social and environmental benefits to Victorians.

Economic benefits

Victoria is well-placed to capture some of the lucrative opportunities small technologies are generating.

A global market worth billions of dollars has already emerged, based largely on the capacity of microtechnology and nanotechnology to revolutionise virtually all aspects of manufacturing.

In 2007, manufactured nano-enabled products had a global value of US\$146 billion, with the OECD forecasting this value will exceed US\$3 trillion by 2015. A 2005 Commonwealth Government review predicted that nanotechnology could be worth up to AU\$50 billion to the Australian economy in new products and processes by 2015.

Environmental benefits

Small technologies are now regarded as pivotal enablers in environmental protection and management, and are expected to play a key role in the global response to climate change.

Nanotechnology will assist in energy savings and CO₂ reductions through various applications related to energy efficiency, improved water and land management, and better water and air quality.

According to the *UK Nanotechnologies Strategy* (March 2010), wide-scale adoption of nanotechnology could cut greenhouse gas emissions by up to two per cent in the near term and up to 20 per cent by 2050, with similar savings being realised in air pollution. Developments in small technologies are also likely to cut the costs of solar energy, lead to more effective fuel cells and batteries, enhance the viability of renewable energy sources and improve carbon sequestration.

Small technologies are also likely to play an increasingly important part in ensuring a safe and reliable water supply through their contribution to improvements in membrane technology, more efficient desalination processes and more accurate sensors. Small technologies may also be applied to remove heavy metals and other damaging substances (such as oil spills) from the environment and help in the reduction and recycling of waste.

Business and industry benefits

Across almost all industry sectors, small technologies will lead to new products and processes – opening up new markets, reducing costs, driving higher levels of innovation and productivity, and improving the competitiveness of Victorian businesses and industries. These technologies will also improve existing products, increasing their international competitiveness. For example, the Dulux Group is already using these emerging technologies to improve their paints, while Universal Biosensors is incorporating microtechnologies and nanotechnologies into their hand-held blood glucose sensor.

Victoria's manufacturing and agricultural sectors can benefit from small technologies through more efficient processes that are lower in cost, generate less waste and use less energy.

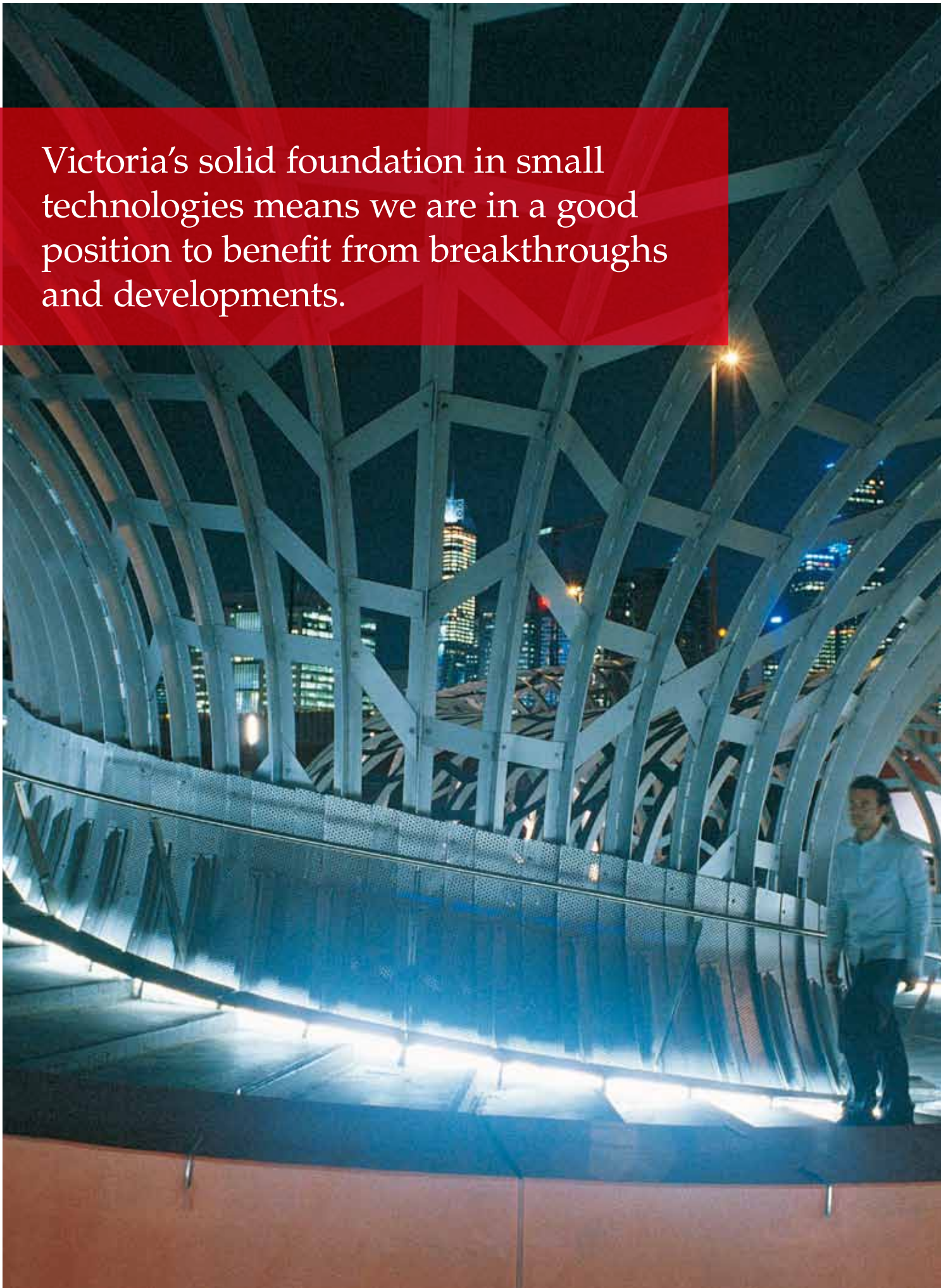
Small technologies-enabled products designed and manufactured in Victoria will create new jobs and businesses, and help to attract new investors.

Health and social benefits

Small technologies are likely to lead to a major leap forward in our ability to detect and treat diseases, heal injuries and repair damaged tissues and organs. In particular, small technologies will contribute to the development of new sensory devices that can detect diseases at very early stages, improvements in the delivery of drugs, new biological and pharmacological treatments, more precise medical and surgical instruments, and improved products such as artificial skin, implants and aids for people with disabilities.

Our quality of life has the potential to improve through small technologies. From households, through products such as self-cleaning windows, better insulation and furnishings that repel dirt, to our personal appearance, with clothes that stay cleaner or generate their own heat, and new cosmetics. Small technologies can also be used in recreational activities, through more flexible, interactive and portable entertainment products, better equipment and protective gear for playing sports and new ways of accessing and exchanging information.

Victoria's solid foundation in small technologies means we are in a good position to benefit from breakthroughs and developments.



A challenging future

Victoria's small technologies promise to generate many benefits for our economy, environment and community.

The Victorian Government is focused on establishing an environment that allows for the successful uptake of small technologies by a wide range of industries.

Victoria's solid foundation in small technologies means we are in a good position to benefit from breakthroughs and developments occurring in Australia and around the world.

In order to take full advantage of these developments, Victorian industry will need to understand and take up the opportunities small technologies present in order to improve products and processes, attract investment, reduce costs and increase productivity.

The ability of our businesses to absorb these technologies and turn them into effective solutions will become increasingly important to their future sustainability and competitiveness.

While businesses in Victoria are increasingly aware of the potential of small technologies, many are uncertain of their practical application. To fully realise the benefits of small technologies, Victoria will need to:

- increase the awareness of small technologies in business and industry
- accelerate the commercialisation of small technologies knowledge and discoveries
- develop a more entrepreneurial culture around small technologies
- improve business and industry access to the research, advice and support needed to create practical solutions.

This approach recognises that small technologies can be enablers for a wide range of industry sectors and that action will be needed by industry and government to convert developments in small technologies into commercial and social outcomes.

The Victorian Government is taking a leading role in encouraging the development of emerging technologies from research to business solutions. The *Victorian Nanotechnology Statement 2008* has a strong focus on stimulating business uptake of small technologies.

In 2008 the Victorian Government also launched a major innovation statement, *Innovation: Victoria's Future*, delivering \$300 million in programs and investment to ensure Victoria's future as a healthy, sustainable and productive state. A core initiative is the \$145 million *Victoria's Science Agenda*, which delivers a suite of strategic investments designed to build on Victoria's robust science and technology base, strengthen and diversify our broader industry base and improve our competitiveness in emerging global markets. The *Victorian Action Plan for Small Technologies* is one of these strategic investments.

This Action Plan provides \$10.5 million for targeted activities that will promote the uptake of small technologies by industry, ensure that our workforce has the right mix of skills to support growth in small technologies, and improve awareness and understanding of the benefits and risks of small technologies.

The plan has a strong focus on enabling existing and developing small technologies to be integrated into commercial applications, products and process that will support the competitiveness of a broad range of Victorian businesses.

Through the Action Plan, the government aims to ensure that Victorian businesses recognise and embrace the potential of small technologies, so that Victorians reap the many benefits.

New fabrics, coatings and surfaces

From clothes that change colour, to paints that can generate or store energy, to coatings that are scratch-free and fabrics that clean themselves - these are just a few of the possibilities being generated by applying small technologies to the development of new materials.

Developments underway in Victoria include:

- Researchers at RMIT's School of Fashion and Textiles are using a natural bio-polymer found in crab shells to create odour-repellent fabrics for use in the automotive industry. By combining this biopolymer with a fragrant oil, a durable finish can be applied to fabrics used by the industry that has excellent antimicrobial properties and may be able to resist odours and stay cleaner for longer.
- Researchers from Deakin University's Centre for Material and Fibre Innovation are working on a project with the Australian Nuclear Science and Technology Organisation and Tufts University in the United States, investigating ways of converting natural fibres such as wool and silk into ultra-fine powders – with the potential to lead to new products such as artificial skins, medical bandages and materials that can absorb pollutants.
- Melbourne company Micronisers has developed a nano-sized zinc oxide powder and a zinc oxide in acrylic polymer that are transparent, enabling them to be used in clear varnishes that provide long-lasting protection against the effects of ultraviolet sunlight.
- Using liquid crystal polymer technology, Melbourne-based company iGlass has developed glass that becomes opaque at the flick of a switch. As well as being used in buildings (to increase privacy, eliminate glare and reduce energy costs), iGlass can also be used as a projection screen, opening up new possibilities for products such as see-through appliances, museum showcases, advertising screens, display windows and partitions in shops, businesses and homes.



Small technologies are used in everyday life such as in the paints and coatings above.
Photo courtesy of Dulux Group.

Action One – Industry uptake of small technologies

Under the Action Plan, the Victorian Government will help Victorian businesses apply small technologies in new commercial products and services solving problems, increasing exports, and boosting business productivity and competitiveness.

The government will invest in three new initiatives to accelerate the adoption of small technologies by Victorian businesses. These initiatives aim to increase national and international competitiveness of Victorian companies by:

- improving manufacturing techniques and processes
- creating new products or enhancing existing products
- opening up new export opportunities.

These initiatives will stimulate business access to small technologies research, infrastructure and expertise, and encourage businesses to explore and adopt small technologies ideas and solutions. The initiatives also focus on creating and expanding industry clusters around small technologies in areas where Victoria has existing strengths and can build critical mass and achieve global leadership.

Small Technologies Industry Uptake Program

The Small Technologies Industry Uptake Program will provide support to Victorian businesses through a voucher system. Vouchers can be exchanged for access to small technologies facilities, services, advice or expertise provided by participating service providers. This new approach to technology uptake will give businesses a broad range of options to scope how small technologies can help their businesses or undertake activities to develop products and processes using small technologies.

The program will focus on:

- increasing business knowledge of small technologies applications in Victoria
- encouraging businesses to explore the use of small technologies to solve problems, enhance existing products or increase their competitiveness
- improving access by businesses to small technologies capabilities (people and facilities) within publicly funded institutions and service providers

- building stronger links around small technologies between Victoria's publicly funded research and development organisations and the private sector
- attracting private investment and leveraging public programs such as the Victorian Government's *Victoria's Science Agenda* and *Boosting Highly Innovative SMEs* programs, and the Commonwealth Government *Commercialisation Australia* program
- helping businesses to move more rapidly from concepts and ideas to commercial products and services.

The three-year Small Technologies Industry Uptake Program will commence in mid 2010.

Small Technologies Roadshow

To help businesses access the Small Technologies Industry Uptake Program, a Small Technologies Roadshow will take place in Victoria.

The roadshow will include industry events to raise awareness of the potential of small technologies applications for industry, provide information about Victoria's capabilities in small technologies and showcase examples of where businesses have applied small technologies successfully.

Recognising success and excellence in applying small technologies is important in encouraging other businesses to consider small technologies solutions, and to promote interest and awareness within the wider Victorian community.

Small Technologies Industry Uptake Awards

The Small Technologies Industry Uptake Awards will highlight innovation, best practice and export or market success by Victorian businesses in applying or producing small technologies. The awards will be presented each year by the Minister for Innovation.

Microtechnology- and nanotechnology-enabled products are on the cutting-edge of science and engineering, and generating excitement about these products will encourage more young Victorians to consider careers in small technologies.



The Victorian Government will help businesses apply small technologies in new commercial products and services solving problems, increasing exports, and boosting business productivity and competitiveness.

Evaluation measures

Action One will be evaluated by the following measures:

Within 12 months:

- number of Small Technologies Feasibility (STFeas), Small Technologies Technical (STTech) and Small Technologies Trial (STTrial) vouchers provided
- increase in industry demand for small technology infrastructure (such as MCN, Australian Synchrotron, MiniFAB)

- number of participants in industry awareness programs and roadshows
- amount and breadth of media coverage of awards.

Within three years:

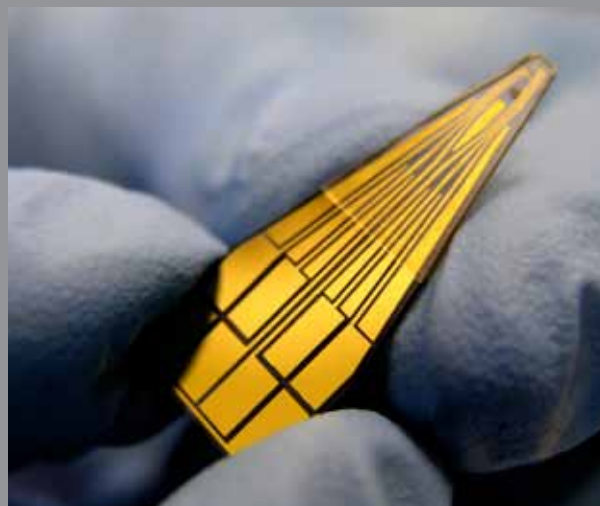
- number of new or improved products and processes as a result of provision of vouchers
- amount of new investment into small technologies as a result of provision of vouchers.

TearLab™ – using nanofluidics to treat eye diseases

Melbourne micro- and nano-fabrication company MiniFAB has made a major contribution to the development of the award winning TearLab™ Osmolarity System, which will assist in the diagnosis and treatment of patients with dry eye disease.

The TearLab™ system (a product of US-based TearLab™ Corporation) will enable eye care practitioners to measure the osmolarity (solute concentration) of tears in clinical settings. This will enable practitioners to make a quick diagnosis of dry eye disease without the need to use expensive conventional systems that require large sample volumes.

The TearLab™ system consists of a desktop instrument and a disposable nanofluidic sensor, the Osmolarity Test Card – a device that can collect 50 nanolitres of tear fluid without the use of pumps or valves. Tears are collected direct from the eye and then moved via embedded nanofluidic channels to electrodes that measure the sample. Sampling time is reduced to less than a second and the results of the test are available in less than two minutes. The system was awarded the prestigious Medical Design Excellence Award in 2009.



TearLab™ photo courtesy of MiniFAB™

MiniFAB managed the development of the Osmolarity Test Card and delivered technical expertise in micro- and nano- fluidics and technology. MiniFAB is now the sole global manufacturer of the Osmolarity Test Card.

As well as being a key partner in the development of the TearLab™ system, MiniFAB is using its microtechnology and nanotechnology expertise to develop numerous devices and components, including micro-chemical reactors, biosensor cartridges, bio-fluidic handling systems and connectors, and integrated active components such as valves and pumps.

Action Two – Skills for small technologies

New workforce initiatives will be needed to build on Victoria's existing strengths in small technologies. This will ensure that our workforce has the skills and expertise required to drive greater business uptake of small technologies and underpin future growth.

The Victorian Government delivers a range of programs to develop a skilled workforce for the state, working closely with industry to ensure that education and training programs match current and future skills needs. These programs are being used by companies working in small technologies to improve the skills of their existing workforces and to influence the skills composition of Victoria's future workforce.

A skilled workforce is critical for businesses to be able to solve problems by adopting and integrating small technologies that are not necessarily exclusive to a specific industry. Particular skills will need to be available in small technologies firms and across a broad range of businesses and industry sectors. For example, small technologies may lead to improvements in polymers that lead to the development of new coatings, which in turn may have applications in sectors such as biotechnology, building and construction, automotive and advanced manufacturing. Different skills will be needed to take these improvements from the concept stage through to their commercial application and marketing.

The government will support new initiatives designed to improve the available skills mix and range within the Victorian workforce to support small technologies

and their uptake by business and industry. These initiatives will consolidate Victorian expertise in key areas of microtechnology and nanotechnology, and maintain Victoria's longer term skills requirements for small technologies, address skills gaps and support entrepreneurship in business and education. All initiatives will encourage much greater engagement of industry with education and training activities.

Developing a skilled workforce

To determine the most appropriate direction for new skills initiatives, and to identify where government and industry efforts should be directed, the Victorian Government will commission a small technologies skills and workforce review. The review will be completed by early 2011 and will make recommendations to the government on the best ways to ensure that Victoria continues to have a supply of highly skilled workers to support the uptake and integration of small technologies.

Evaluation measures

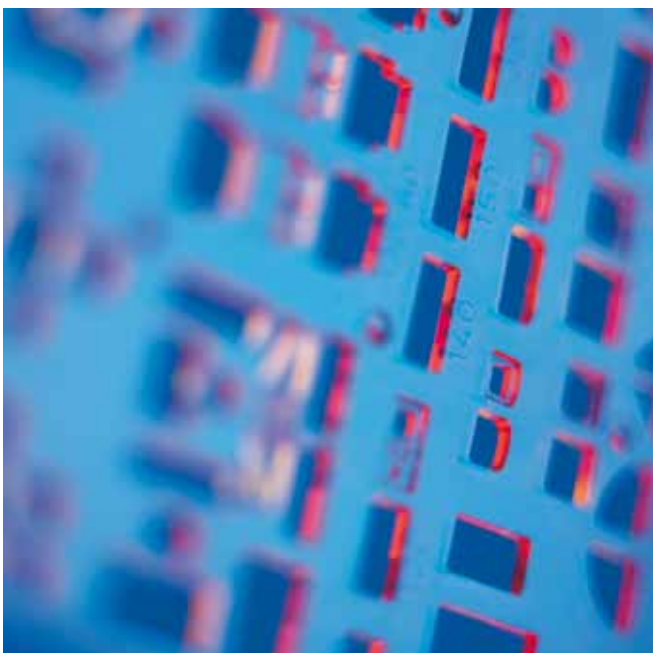
Action Two will be evaluated by the following measures:

Within 12 months:

- completion of skills audit.

Within three years:

- number of projects implemented to improve skills for small technologies in Victoria.



Action Three – Promotion of small technologies

Community support for small technologies is vital for the future growth, success and international competitiveness of industry in Victoria. Initiatives undertaken through the Action Plan will create new opportunities to promote Victoria's strengths in small technologies, inform Victorians about breakthroughs and stimulate public discussion about the many benefits being generated by small technologies.

Public understanding of small technologies is important as industry, governments and research organisations increase their efforts to promote awareness of microtechnology and nanotechnology. Potential benefits created by the convergence of these technologies with other scientific fields and industry sectors will also be promoted.

The government is providing support to promote Victoria's strengths in small technologies, and to improve understanding and awareness of these technologies within the Victorian community, businesses and industry.

In addition, the Victorian Government is working closely with the Commonwealth Government's *National Enabling Technologies Strategy Community Awareness and Engagement Group* to ensure consistent programs are being run and that public attitudes and concerns are addressed.

Promoting Victorian small technologies

Victoria has considerable strengths in areas of microtechnology and nanotechnology and must continue to promote these to keep up with the rapid changes, attract investment and establish new markets. New efforts to promote small technologies will focus on three key areas.

Promoting Victoria's strengths internationally

Promoting Victoria's strengths in microtechnology and nanotechnology at the international level is an important element in increasing the competitiveness of Victorian businesses. To achieve this, the government will:

- adopt a stronger focus on using the Victorian Government's international presence (including overseas Victorian Government Business Offices) and trade programs to facilitate investment and partnership opportunities for Victorian small technologies businesses
- develop a strategy to improve access to international supply chains for businesses
- facilitate partnership arrangements in small technologies with overseas research organisations, industry associations and government bodies.

Promoting Victoria's strengths locally

The government will develop a new program with a specific focus on promoting Victorian nanotechnology and microtechnology to local industry sectors. While the Small Technologies Industry Uptake Program will help to improve local awareness about Victoria's strengths in small technologies, further action will be needed to promote these strengths more broadly across industry. In particular, the government will encourage businesses that may have never considered small technologies as relevant to their operations to take a look at the possibilities these technologies can offer.

Supporting conferences and events

Having access to international expertise, corporations and markets, and keeping up with the latest scientific and industry developments, is essential for Victorian businesses to successfully apply small technologies and secure new markets. However, making these connections can be difficult for smaller businesses.

The government will support the expansion and internationalisation of Victorian businesses involved with small technologies by providing grants to assist eligible businesses to attend recognised domestic and overseas conferences and trade events. The grants program will commence in 2010 and will be evaluated after 12 months.

The government will also continue to promote Victorian businesses at international events and on trade missions.

To improve awareness and understanding of small technologies, stimulate public discussion and promote the achievements of Victorian microtechnology and nanotechnology, the government will support the hosting of small technologies events and conferences in Victoria, and work with industry to attract these events.

Evaluation measures

Action Three will be evaluated by the following measures:

Within 12 months:

- number of recipients of Small Technology Industry Partnering Program (STIPP) grants.

Within three years:

- number and awareness of small technology events sponsored by the Victorian Government
- number of industry delegations.

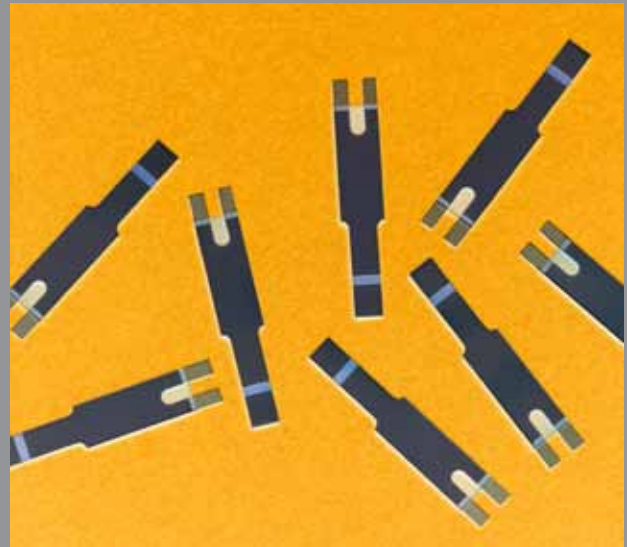
Universal Biosensors – changing the future of blood glucose monitoring

Victorian company Universal Biosensors is at the forefront of blood glucose testing, and is on track to change the future of self-testing for diabetics. New developments utilising small technologies will enable point of care testing, community based medicine and patient self-management.

Over the past decade leading scientists and engineers at Universal Biosensors, through small technology applications, have developed sophisticated electrochemical cell technology to be used as a platform for creating point of care blood tests for patients.

The company's first product was launched by LifeScan (a division of Johnson & Johnson) in January 2010. The technology is protected by 45 patent families and more than 500 patents and patent applications. The company is listed on the Australian Stock Exchange (ASX:UBI), and operates from R&D and manufacturing facilities in the Melbourne area.

The product marketed by LifeScan is the OneTouch® Verio® blood glucose monitor for home use, and Universal Biosensors is now developing a Point-of-Care System capable of measuring other important analytes for the doctor's office, clinics, aged care facilities and hospitals. All products being developed on the platform are based on Universal Biosensors multi-layer strip with opposing electrodes which allows for direct application of finger stick whole blood. Varying the



Examples of Universal Biosensors test strips

reagents within this strip results in the ability to conduct many different types of assays on the same platform.

Universal Biosensors certified manufacturing facilities in Australia offer flexible, reproducible and cost-effective manufacturing processes that have been validated and are being used for the OneTouch® Verio®. The present capacity allows for hundreds of millions of strips per year, and after implementation of near-term expansion plans, including scaled manufacturing for the immunoassay platform, the capacity will approach two billion strips per year.

Exporting their entire product range, Universal Biosensors continues to develop its platform and has now embarked on feasibility studies to detect DNA and RNA.

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