SPARK Australia

Transforming ideas and research from bench to bedside and …why we need to do something now
Joint Select Committee on Trade and Investment Growth

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How the research and innovation sector can better assist in overcoming Australia’s geographic, economic and labour challenges, with a focus on commercialisation including how technology imports and exports could be further facilitated

The Need

“Increasing collaboration between businesses, universities and the research sector is absolutely critical for our businesses to remain competitive. To commercialise an idea, a great invention, a great innovation, a great piece of research and then grow it into new sources of revenue, new jobs, new opportunities and new industries”

Malcolm Turnbull Prime Minister of Australia

“Australia has world-class universities and research organisations but is ranked last in the OECD in research-business collaboration. Strengthening the relationship between our innovative businesses and our research organisations will be crucial to Australia’s economic success in the coming decades.”

Mr Ken O’Dowd, MP

The Solution for the MedTech and BioTech industry in Australia

The implementation of Stanford University’s SPARK program as SPARK Australia, links universities/research entities/clinicians across Australia with the MedTech/BioTech industries and healthcare services to drive innovations and collaboration to achieve the commercialisation of ideas and research.

Government plays a role in ensuring it has a supported start and is within the right environment.

What is SPARK?

The Program is called SPARK Stanford. SPARK is a partnership between university, healthcare services and industry dedicated to:

- Educating and mentoring faculty, fellows, graduate students and medical students on the discovery and development process for therapeutics, diagnostics and MedTech
- Advancing promising research discoveries to the clinic and commercial sector
- Innovating efficient and cost-effective approaches to drug discovery and development
- Providing access to specialised knowledge and technical expertise regarding drug and diagnostic development, dedicated core laboratory facilities, and sources of funding
- Supporting translational efforts to deliver products and services for unmet health needs and cultural change

Stanford University Professor Daria Mochly-Rosen and Professor Kevin Grimes initiated the SPARK program for improving the ability of their researchers to translate their research and benefit patients.

- SPARK has a 59% success rate (inventions are licenced or used in the clinic) within 12-24 months
Stanford University is the world leader in academic commercialisation of medical technologies.

- Stanford will support, mentor and continue to develop the Australian SPARK Team
- SPARK is already operating at University of Technology Sydney, the Kolling Institute in NSW and soon within Western Australia
- Seven Universities and research centres have indicated their interest in being part of the SPARK Australia program to become part of an Australian network commercialising medical technology ideas while learning, indeed, being part of an international network across more than 6 countries

Above all SPARK focusses on the translation of academic discoveries into drugs, diagnostics and medical devices that address real clinical needs.

**Why we need SPARK Australia**

SPARK addresses the desire of the Australian Government to:

- increase commercialisation including technology imports and exports eg medical and biomed technology, research and development, global collaboration and skill transfer
- Move the focus of Australian universities/researchers to include industry collaboration and need based research
- Enhance the commercialisation/entrepreneurial skills of academics and institutions
- Enhance and grow inter-institutional and inter-country learning relationships
- Maximise the return on investment in research
- Translate research to benefit patients

Medical devices, diagnostics and therapeutics treat disease and disability and save lives. SPARK brings together academics and researchers with clinicians, patients and industry to ensure that discoveries address real clinical needs.

The nationwide program cost of implementation for five years is $25.5 million and also includes University/research institution partner funding.

Medical Technology Association of Australia has acted as a conduit and facilitator of collaboration and change.

**SPARK Australia**

The objective of the SPARK Australia program is to create a network of translational programs from around the country. It will be the umbrella program that unites Australian institutions, clinicians and industry together under the banner of developing a culture of translational & entrepreneurial medical research for staff and students. It will develop the educational programs and mentoring required for the building of such a culture.

Without cultural change, Australia will not have the opportunity to learn from mistakes, develop new and innovative products and build solutions based partnerships with industry.

SPARK Australia program will embody the following characteristics:

- It will be the umbrella organisation to help support all industry (including the healthcare industry) and researchers participating in SPARK programs established now or in the future at Universities and Institutions from around Australia.
  - The goal is to reach, within 1-2 years, all states with 2 or more participating Universities from each State
- It will raise and manage funds to ensure the development and sustainability of the
SPARK Australia program.
  • This will include institutional, industrial, government and philanthropic support.
  • It will carefully select projects for funding which have the likelihood of being commercialised after receiving a shortlist of proposed projects from partner institutions.
  • The funds will be used to support the SPARK programs of the participating institutions through mentoring and an educational program in translational medical research.
  • It will convene an Annual Conference for SPARK Australia participating institutions and industry and other stakeholders, rotating the location among member institutions.
  • It will provide support and advice for running as a network at least 1 collaborative SPARK project per annum from any of the participating institutions. The projects and participating Universities/Institutions will be selected by the Organising Committee.
  • SPARK Australia participants will meet biannually to discuss funded projects and collaborative projects.
  • It will act to help develop, provide advice and mentoring for existing and new SPARK programs from around Australia through annual visits to participating Universities and institutions.
  • In the future, the aim is to establish a pipeline using the participating SPARK programs and institutions from around Australia to cover all aspects of medical product development (drugs, vaccines, diagnostics, medical and assistive devices) from the ideation phase to clinical trials.
  • It will ensure products developed are linked with entities/industry or programmes which take it to the next stage of commercialisation.
  • The SPARK program (both National and Global) will actively support the progression of the generated pipelines from Australia and all other participating countries maximizing translational volume and realising commercial potential.
    • This will be done for the benefit of the Australian healthcare system. A proportion of the profit generated from such activities will be reinvested in support of the participating SPARK programs.

The Universities/research facilities involved in developing SPARK Australia all have partner hospitals and medical (and or dental) centres attached to them which facilitates access to healthcare professionals - a crucial element in the development of new technologies.

Producing entrepreneurs is now seen as an economic priority, and teaching high impact entrepreneurship has become an important role for universities. SPARK focusses on the cultural change needed to turn an idea into commercialisation.

New South Wales
In 2014/15, the University of Technology Sydney (UTS), University of Sydney and the Kolling Institute piloted the Stanford SPARK program. Four academics and researchers were selected from UTS and the Kolling Institute to participate in the program. Thus far the results of the program have been extremely encouraging and within a period of only 1 year the researchers have made great progress in achieving their milestones in each of their areas of research through a mentoring and educational program.

The feedback of the researchers themselves has been extremely positive and there is no doubt that this program has great importance in enabling a change in the way individuals think and work on translational medical research in Australia. There is more to do however.
Western Australia
After returning to Australia from three years on faculty at Stanford University, A/ Professor Santa Maria began assembling a team to launch a SPARK Program in Western Australia. Both the University of Western Australia, Curtin University and the major local research institutes are involved and the team is part way through a capital raise to support the development. Like NSW they require Government support to spread the program across Australia.

Other
Currently Flinders University and Monash University are looking to develop a local SPARK team with the aim of launching the programs soon.

Flinders University recognise the value and potential of SPARK to complement their existing industry engagement program, the Medical Device Partnering Program (MDPP), and is working on logistics in cross University involvement.

The Monash Institute of Medical Engineering (MIME) at Monash University has already funded a pipeline of new, multidisciplinary medical technology projects, which are now underway (35 in total). These are clinician-initiated collaborations involving engineering and IT researchers. The teams are working on solutions to address unmet clinical need with the aim of driving translational outcomes across a broad range of medical fields in Monash partner hospitals, Monash and Alfred Health. This effort will be enhanced and focussed on commercialisation as a result of partnership with an Australian SPARK program.

Medical Technology Association of Australia (MTAA)
The Medical Technology Association of Australia (MTAA) is the national association representing companies in the medical technology industry. MTAA aims to ensure the benefits of modern, innovative and reliable medical technology are delivered effectively to provide better health outcomes to the Australian community.

The member companies cover the spectrum of the industry in Australia, from subsidiaries of major multinational medical technology companies to independent distributors and small and medium sized Australian innovative companies.

MTAA has also been communicating with the Australian Dental Industry Association, IVDA, Ausbiotech and others.
TERMS OF REFERENCE

What are Australia’s geographic challenges? – how SPARK can overcome these

1) **Challenge** - Distance to traditional markets US and Europe which impacts on cost of freight, delivery time for example and time zone differences which impact on the ability to communicate in a timely manner

2) **Challenge** – Australia has a small multicultural population and due to state and federal jurisdictions, there is limited collaboration between state and federal government.

**Time zones**

Historically Australia may have had a distance disadvantage but it has a time zone advantage with the majority of the world’s population (the Asia Pacific region) lying within its time zones.

The Strategic Review of Health and Medical Research states that:

*Australia should look to leverage its strong ties with Asia to increase collaboration with the world’s fastest growing science innovation region. Asia accounts for a growing share of global science and innovation activity, driven by China, India, South Korea and Japan. As noted in the Australian Government’s Australia in the Asian Century White Paper (2012), Australia’s collaborative links with Asia have strengthened over the last decade, augmenting strong economic and political ties. As international focus is increasingly shifted to Asia, Australia will face more competition to collaborate with the region’s leading researchers. Investment in Health and Medical Research (HMR) will ensure that Australia continues to be an attractive partner in HMR*.¹

**Small population**

SPARK increases MedTech and BioTech networks locally and internationally. Australia’s medical innovation community is relatively small and will benefit from becoming part of a global network. In their submission to the Strategic Review of Health and Medical Research, Research Australia states that:

*International collaboration is important to Australia because our size prevents us from undertaking research in every possible field in health and medical research. International collaboration enables local expertise in particular areas to combine with other, complementary areas of expertise that exist internationally to undertake research that cannot be undertaken solely in Australia. Furthermore, promoting collaboration between institutions both nationally and internationally is an important means of raising the quality of Australian health and medical research*.²

SPARK builds international market immersion into the thinking of innovators. SPARK allows for a global network between industry, research and university sectors for R&D, mentoring, learning, innovation transfer and cultural change.

Stanford currently has programs running in similar time zones such as Singapore, India, Taiwan and Japan. Stanford networks provide a gateway for Australian MedTech and BioTech researchers and industry into credible Asian hubs. Built into the budget is a heavy networking schedule for the team to build and maintain these networks.

¹ Strategic Review of Health and Medical Research Final Report February 2013, p 15
² Ibid P 15
Participation in the SPARK Australia program will assist Australia’s MedTech and BioTech community become more mature which can then foster the next generation of researchers.

SPARK increases MedTech and BioTech focus on international markets
Compared to US counterparts, Australian start-ups rate of growth are much less in:
- start up valuations
- and the growth in exit valuations over time

Part of this is the need to focus on local markets to gain early traction which then causes them to lose focus with foreign customers. By affiliating and establishing within the global network, Australian researchers can become aware of foreign markets much earlier in the process.

Another component is the lack of linkages and involvement with industry. SPARK provides the mechanism to enhance collaboration with industry.

Australia leads the world as a location to hold clinical trials
There are a number of benefits of development in Australia to take advantage of
- Low average costs (much cheaper than US and EU) for early phases
- Large amount of trial sites
- High completion rate within allocated time
- Benefits for early phase / proof of concept studies (less requirements than the FDA and EMA, but still recognized)
- Do not have to submit an IND (Investigational New Drug) or IDE (Investigational Device Exemption) approval prior to a trial (unlike with the FDA)
- High quality infrastructure
- Ethnically diverse

Australia has many advantages as a place to conduct clinical trials. This is because Australia is home to some of the world’s best researchers and health professionals and boasts a world-class research infrastructure, a stable socio-political environment, and high standards that ensure confidence in the scientific conclusions reached by clinical trials conducted in Australia.

Australia has a robust intellectual property system and a simple and efficient regulatory regime. These are all factors that have contributed to the strong growth of investment in clinical trials in Australia by global biopharmaceutical and MedTech companies over the past three decades.

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3 Clinical Trials Capability Report Austrade 2015
What are Australia’s economic challenges? – how SPARK can overcome these

1) **Challenge** – Australian pharmaceutical industry is falling
Australia’s pharmaceutical export industry is now worth about $2.5 billion a year, a significant drop from 2012 when it was worth more than $4 billion. The number of new clinical trials has been declining by an average of 13% per year (2008-2011) due to increasing competition from India, China, Brazil and emerging markets in Eastern Europe, which are high growth markets for pharmaceuticals.

These countries are now attracting a larger share of global clinical trial investment because they have much larger patient populations (enabling fast patient recruitment), significant cost advantages, skilled labour and increasingly sophisticated healthcare systems to produce quality trial data.

2) **Challenge** - Economic diversification
Car manufacturing downturn in South Australia and Victoria plus the end of the mining boom in Western Australia provide immediate urgency for diversification in the economy.

3) **Challenge** – improved support for the industries of the future
40% of Australia’s current jobs are likely to be displaced by automation and computerisation in the next 10-20 years. 60% of current university students are training for jobs that won’t exist in the future.

4) **Challenge** - Funding gap at early stage of medical research development
While basic discovery research is funded primarily by government and by philanthropic organisations, late-stage development is funded mainly by pharmaceutical, MedTech companies or venture capitalists. The period between discovery and proof of concept, however, is considered extremely risky and therefore has been difficult to fund. The funding gap that often occurs in this period has been referred to as the “valley of death.”

5) **Challenge** – Reducing healthcare burden
Australia’s ageing population is challenging the ability of health services to maintain health and wellbeing, and provide support for the frail and disabled, while chronic diseases, such as diabetes pose a significant and growing burden of mortality, morbidity and health care costs. Recent statistics have shown that half of all Australians have at least one chronic disease, while one-in-five have at least two of the eight most common chronic diseases, including diabetes, cardiovascular disease (CVD) and mental health conditions.⁴

**Growing the MedTech/pharma and BioTech Industries**
The Australian MedTech industry⁵:
- turnover of approximately $10.2 billion in 2012-13 (revenue is ~$11.8 billion if in vitro diagnostic (IVD) and dental products are included)
- employed more than 19,000 people
- mainly located in NSW (55%) followed by Victoria (24%) and Queensland (12%)
- imported goods to the value of $4.4 billion and exported goods to the value of $1.9 billion in 2013.

Globally the MedTech market is expected to grow at a compound annual growth rate of 4.5%, and achieve sales of US$455 billion by 2018.

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Australia is the leading location of BioTechnology companies in the Asia-Pacific region with around 450 BioTechnology companies. Australia invests over $1 billion in pharmaceutical R&D.

In the recently released report “The Importance of Biological Sciences to the Australian Economy” it is estimated that if advances in the biological sciences over the past 30 years had not occurred:

- our economy would be 4.2% to 5.9% smaller (including the direct effect of lost productivity and the flow-on consequences of this)
- the burden of disease in Australia would be 18% to 34% higher.

In the Strategic Review of Health and Medical Research it was noted that “… Australia should aspire to build the world’s best health system which can more efficiently ensure a healthy population and can leverage medical innovation and industry to create wealth, high-value jobs and increase economic productivity. In doing so, Australia will also enhance its standing as a leader in healthcare and research globally, and be well positioned to engage with its partners in the region.”

Bridging the gap between bench and bedside is a challenging endeavour. There is an inherent risk that early-stage programs will fail during development, no matter how promising the science. As stated on the Stanford SPARK website:

Such nascent programs are unlikely to attract interest from industry until they have reached significant milestones, and very little funding is available from the NIH (US National Institutes of Health), foundations, or private enterprise for this critical transition.

The SPARK program teams industry mentors with their own track records with university researcher increasing the quality of the opportunities. This mentorship manages researcher expectations, manages industry relations, provides researchers with the language to communicate to those providing capital and acts as a vetting service when presenting an opportunity.

SPARK educates participants in all areas of commercialisation of medical research from learning how to understand the need, disease process, stakeholders, brainstorming, prototyping, clinical studies, regulatory strategy, reimbursement pathways, IP/legal, market, appraisal, business strategy, pitching to investors and launching a start-up.

The SPARK program has a 59% success rate (licensed or in clinic). This creates a culture of success and will instil translational efforts as second nature within Australia. From the Stanford experience, patents produced within this system have a higher likelihood of being granted due to the careful mentoring through the IP process. The personal and close mentoring system keeps the researcher on track for commercial milestones.

As a consequence, researchers become aware and involved in the business side of their research which often feeds back into the decision making process of their research. Having the networks of people who have “been there and done that” provides leadership in the start-up phase. The networks identify and help remove stumbling blocks to translation. This process de-risks the research for further development.

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6 The Importance of Advanced Biological Sciences to the Australian Economy – Office of the Chief Scientist Jan 2016
7 Strategic Review of Health and Medical Research, Final Report February 2013 P7
Silicon Valley has a huge economic impact to borrow from.

<table>
<thead>
<tr>
<th>University</th>
<th>New companies created by alumni</th>
<th>Annual revenues of companies created by alumni</th>
<th>Employees in companies created by alumni</th>
</tr>
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<tbody>
<tr>
<td>Stanford University</td>
<td>39,900</td>
<td>$2.7 trillion</td>
<td>5.4 million</td>
</tr>
<tr>
<td>MIT</td>
<td>25,800</td>
<td>$2 trillion</td>
<td>3.3 million</td>
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If the economic output of these two universities were combined it would have the fifth largest GDP of any country

**Economic diversification**
The South Australian and Victorian governments are already acting to encourage diversification. South Australia has created a medical device manufacturing precinct and programs designed to attract manufacturing to the area.

Victoria will release shortly a ‘health and medical research strategy’ along with a ‘MedTech and Pharma Strategy’ which will frame the research priorities and how Victoria will grow their MedTech and pharma industry.

NSW is currently providing support to late stage commercialisation MedTech projects through the Medical Device Fund. The NSW Medical Technology Knowledge Hub, launched in March 2015, is a collaborative network between academia, industry and government to improve the business environment for all facets of the medical technology industry. The Knowledge Hub focuses on accelerating the translation of Australia and NSW's research investments into commercial products by addressing local challenges that prevent commercialisation opportunities and raising the global standing of the local industry.

SPARK will complement, support and enhance these State Government initiatives by providing researchers and academics with commercialisation and entrepreneurial skills.

**Needs of future industries**
The nature of the MedTech/BioTech and pharma industries means that the workforce is required to be highly skilled, educated and flexible. In a soon to be released workforce and skills report for the MedTech industry, commissioned by the MTAA on behalf of the NSW Medical Technologies Knowledge Hub, it is noted that

*Companies highlighted difficulties in finding high quality workers to fill open positions in R&D, with concerns about attracting ‘top talent’ or people with experience in medical devices. It was noted that engineering graduates looking to work in R&D tended to be technically capable, but lacking in business skills.*

The report goes on to add that:

*An ongoing theme that emerged throughout the consultations conducted for this study was that there is a disconnect between the skills that are demanded by industry and the skills being supplied out of universities, with a key driver of this being too few linkages between the MedTech industry and universities across Australia.*

SPARK Australia will provide academics and researchers with the business, commercialisation and entrepreneurial skills that industry requires.
Skill requirements will be discussed in more detail in the Labour Challenges section

**Funding gaps**

The Australian Government agencies charged with supporting health and medical research and innovation are:

- the Department of Health and Ageing (DoHA), which incorporates the National Health and Medical Research Council (NHMRC)
  - NHMRC, the major national vehicle for Australian Government funding for health and medical research, has experienced a five-fold increase since 1995
  - The quality of research proposals has steadily increased over the past decade, but increasing numbers of research projects are failing to be funded.
- the Department of Innovation, Industry, Science and Research (DIISR), which includes the Australian Research Council (ARC), Cooperative Research Centres (CRCs), and the Commonwealth Scientific and Industrial Research Organisation (CSIRO).

SPARK will value add to and ‘game change’ for federal/state government funding programs. The Federal Government has a number of commercialisation programs, such as “Accelerating Commercialisation” which provides matched funding for Australian based startups. To date often these programs are not filled due to lack of quality of input. Co-funding the SPARK program at the start of this innovative approach by the government, will allow for the right environment to occur.

NSW Government offers the Medical Device Fund to support early stage commercialisation companies as well as a program to assist researchers commercialise their research. Other States have or are considering similar programs.

SPARK provides support to researchers at the ideas stage. The funding gap in early development leads to slow growth and low exit value of Australian start-ups. The SPARK program provides:

- seed funding for two years, building more value in the process to the idea and institutions capacity
- mentoring to support commercialisation and business understanding

SPARK will teach the local investment community how to identify opportunity in life sciences. The SPARK program creates networks with high net worth individuals and local Angels to share their experiences and educate researchers with how they see the opportunity in these areas. Involving the local investment community with the projects brings a more personal connection to the research. The close mentoring performs a large amount of due diligence for the investors.

**Reducing healthcare burden**

The government is now under increasing pressure to ensure that the investment of public funds is well targeted and cost-effective, and the Australian health system remains in the long-term financially sustainable.

Governments are facing significant challenges in healthcare delivery with the costs of an ageing population, the increase in chronic diseases, coupled with the community’s demand for improved health care access. The MedTech/BioTech and Pharma industries (including researchers and clinicians) are well placed to be part of the solution to this, indeed, a partner in holistic planning and integration.

For many elderly patients, ageing safely at home is a significant challenge, and as a result, many end up moving to long-term aged-care facilities. A significant proportion of older
patients have limited mobility, and together with a lack of social support, this impacts on their ability to attend medical appointments.

While home-based care models can address this problem, they do reduce the number of patients that can receive care, and are costly in terms of travelling time for health care professionals. With the availability of sensors and broadband in the home, there are now many remote monitoring and telehealth technologies that facilitate healthy and safe ageing at home.

The demand for these types of products and services is likely to grow dramatically with the ageing of the baby boomer generation. For caregivers, telehealth and remote monitoring technologies have the potential to relieve them from stress and worry about the safety and wellbeing of elderly family members, as well as reduce the time spent transporting family members to and from doctors’ offices, or emergency rooms.

In response to these challenges, Australia needs to find smarter, more cost-effective ways of delivering healthcare services outside of the hospital and aged care sectors. The rapid adoption of existing medical technologies and healthcare delivery systems, as well as the development of new technologies, are part of the solution. Unfortunately, Australia is in danger of being left behind other advanced economies which have developed policies and systems to integrate medical technologies in a structured and innovative way in the home and community settings, in order to prevent expensive tertiary interventions.

SPARK as a collaboration between industry, healthcare professionals and healthcare systems and researchers has the potential to develop the technologies and therapeutics that ensure that the Australian health system remains financially sustainable in the long-term.
What are Australia’s labour challenges?
1) **Challenge - the brain drain**

2) **Challenge – job ready skills**

**The “brain drain” needs to be reduced**
As federal grant funding for university based basic science continues to fall, without a strong industry focus or commercial stream and interaction for medical research, this talent is being lost overseas, or it doesn’t even consider the health and medical industry as a career option.

Silicon Valley is one of the preferred destinations for medical based and tech start-ups. Bringing the areas’ most successful medical commercialisation would improve the Australian culture and ecosystem for developing them internationally but keeping them local.

![Figure 8: Startup founders by university](#)

**Job Ready Skills**
Demand for skilled workers in the MedTech industry is expected to increase significantly over the next five years. The current skills gap of around 3% could increase to a potential gap of around 26% if employment levels remain at current levels. Skills gaps in the MedTech industry could represent a barrier that prevents companies from achieving their full growth potential.

Collaboration across industry, education providers and government will be required to ensure that measures implemented to address skills gaps are effective and have a lasting impact across the MedTech industry. Adopting Australia wide the SPARK program is one way to provide academics and researchers with the skills needed by industry. SPARK educates participants in all areas of commercialisation of medical research from learning how to understand the need, disease process, stakeholders, brainstorming, prototyping, clinical studies, regulatory strategy, reimbursement pathways, IP/legal, market, appraisal, business strategy, pitching to investors and launching a start-up.
How can technology imports and exports be further facilitated

Globally the challenges of healthcare delivery vary widely, yet health systems around the world have similar objectives: to deliver the highest quality care to the most people possible at the lowest possible cost. Healthcare spending continues to rise. Total health spending in Australia accounted for 9.1% of GDP in 2011-2012 (slightly lower than the OECD average 9.3%)⁹. This equated to an increase of over 5% in real terms compared to a 1% increase on average across OECD¹⁰.

Increasingly healthcare delivery organisations worldwide are rethinking the services they offer as funding and payment models evolve, focusing on wellness and outcomes rather than volumes of services consumed. To achieve this objective, various changes in structure and organisation are required. In both of these aspects, innovation can help to increase value and efficiency. Innovation may include, but is not limited to technological advances as well as new strategies, organisation structures, facilities, research, education processes and partnerships¹¹. These strategies will give rise to a more patient-centric care model through better monitoring and management of wellness and chronic disease and enable cost containment while improving overall delivery system health.¹²

Not only does the MedTech, BioTech and Pharma industry offer solutions to current healthcare needs but it is continually researching and developing solutions to the many health issues that Australia and the world face as people live longer lives. The industry looks not only at the health costs incurred “in the medical system” but looks to develop solutions to help keep potential patients out of expensive healthcare facilities.

Global research suggests that 5% of these patients utilise 50% of your healthcare spend. There is a recognised inability to cost-effectively deliver care to high-cost, complex patients due to the fragmentation of services in our current health and social services system. These patients tend to have multiple co-morbidity with psychosocial complications meaning disease specific programs fail to address the core issues. In addition intervention to address social determinants of health is a key success factor in addressing the cost and outcomes of this sub population.

The Australian MedTech and BioTech process from R&D to commercialisation can learn and benefit considerably by being part of a global innovation network which includes MedTech and BioTech companies and researchers. Through SPARK, Australia has the opportunity to join a global program with a track record for medical commercialisation - the most successful BioTech commercialisation program in Silicon Valley.

SPARK has been (or is in the process of being) adopted in the following countries:

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<td>Taiwan</td>
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<td>Singapore</td>
<td>South Korea</td>
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<td>Norway</td>
<td>Australia</td>
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<td>Brazil</td>
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<td>Germany</td>
<td>Netherlands</td>
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<td>Poland</td>
<td>Zimbabwe</td>
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Recently, a number of SPARK directors from different institutions around the world came together in Taiwan and formed a Global SPARK community. The members of this

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⁹ OECD Health Statistics 2014, How does Australia compare
¹⁰ ibid
¹² The Digital hospital evolution IBM Global Business Services accessed 18/02/2015
community all emulate the SPARK program founded at Stanford and follow the concepts described on SPARK Stanford’s.

**Increasing university medical based research with commercial outcomes**

MTAA has worked with industry and various Universities/research facilities across Australia to develop the SPARK program in Australia. Without it there is concern that real change will not occur in Australia unless we have buy in from Government to support this change. It needs to be in the area of how we fund research, the support for new approaches to be set up to allow and endorse cultural change and for industry and research to work together. Current funding models do not do this proactively. It is more about “I have an idea, who will fund it?”.

Strengthening Australia’s international standing generates intangible benefits for the nation and also attracts overseas research grant funding into the country. Over the last five years, National Health and Medical Research Council (NHMRC) project grants and programs leveraged over $800m of international funding, largely due to the increased quality of research being delivered through competitive granting schemes\(^1\)3.

The following information from the Australian Research Council (ARC), outlines the level of international collaboration in recent years. Since the inception of the National Competitive Grants Programme (NCGP), the ARC has actively supported international collaboration through its various schemes. The information below provides insight into the ARC’s previous international collaborations, including overall statistics from the commencement of the NCGP, and more recent examples of scheme-specific collaboration.

This includes all research and not just medical research.

**Figure 1 – Percentages of collaboration with countries on ARC grants from 2011 to 2015**

\(^{13}\text{ibid}\)
In addition to ARC funded projects the Australian Government also has a number of bilateral research funds:

1. The Australia-China Science and Research Fund (ACSRF) supports strategic science, technology and innovation collaboration of mutual benefit to Australia and China. The ACSRF builds critical mass in areas of strategic priority and supports enduring partnerships between Australian and Chinese researchers. The ACSRF also facilitate activities that encourage the application and commercialisation of research outcomes to the mutual benefit of both countries and provide early career researchers the opportunity to gain relevant Australia-China research experience.

2. Australia-India Strategic Research Fund (AISRF). The Australia-India Strategic Research Fund (AISRF) helps Australian researchers from public and private sectors to participate with Indian scientists in leading-edge scientific research projects and workshops. The AISRF is Australia’s largest fund dedicated to bilateral research with any country and one of India’s largest sources of support for international science.

3. In September 2011, Agency for Science, Technology and Research, Biomedical Research Council (A*STAR) and National Health and Medical Research Council (NHMRC) signed a Memorandum of Understanding (MoU) of general cooperation to promote and encourage research and development activities amongst researchers from Singapore and Australia. Under this agreement, such collaborations will be facilitated through the joint organisation of symposia and a joint grant call for research.

According to the Strategic Review of Health and Medical Research, Australia should also look to leverage ties with global leaders in HMR to build on research advances and foster cross-border communication of ideas and innovation. Increased collaboration with researchers producing innovative research will not only bring Australia to the forefront of global HMR, it will also enhance the skill-set of Australian researchers. Collaborating with Asian countries to solve common healthcare challenges and issues specific to the region will create a source of soft power and augment Australia’s influence in the region.

However while the level of collaboration at the research level is relatively high, this has not resulted in an increase in commercialisation including how technology imports and exports could be further facilitated.

Expert value added advice from a network of experienced MedTech and Biotech industry mentors
The SPARK program teams industry mentors with their own track records, with university and clinician researchers increasing the research opportunities, the quality of the output and the commercialisation of the research. This mentorship manages researcher expectations, manages industry relations, provides researchers with the language to communicate to those providing capital and acts as a vetting service when presenting an opportunity.

Australian mentors are mentored themselves by experts from Stanford SPARK
The Stanford SPARK team will train and support the leadership team and mentors in how they perform their duties. They are then available for further help from a distance and there is a yearly meet up for the leadership team with the global SPARK network.

Catalysing quality deal flow
By involving investor stakeholders early in the process their needs become aligned with the innovators. The SPARK program educates researchers on how to engage with industry and investors at various stages of idea to commercialisation.

14 Ibid p16
Catalysing capital formation
The program’s budget includes seed funding for the “valley of death” in medical research. Any successes from the programs return a small amount of capital back into the programs that can be used to leverage further funding. By providing seed capital in this area it provides the first investment to access the matched funding from the Federal government’s Accelerating Commercialization program.

The team already has Stanford relationships
The team has the willingness, expertise, relationships and knowledge to collaborate with Stanford University in bringing the SPARK program to Australia. Professor Wallach maintains his relationship through directing the NSW SPARK program and A/Professor Santa Maria returned from Stanford University in 2015. The MTAA’s Chief Executive Susi Tegen and Policy Manager Roslyn Mitchelson have built relationship with Stanford and facilitated the transfer and involvement of industry and research sector.

Stanford is willing
Stanford SPARK have openly expressed their willingness to affiliate through the relationships and trust established. This opportunity is not available without these. Stanford is a world leader, Australia can be also.

Stanford is the leading university from the leading area of the leading country for development of medical devices and biopharma. California accounts for 20% of all of America’s University-held patents involving medical devices, the greatest numbers being held by the University of California and Stanford University.

California, and especially Silicon Valley, is where the largest amount of venture capital is invested in the medical devices field (Figure 3-5). Many of the major firms recently acquired by leading medical device makers are to be found in Silicon Valley (Figure 3-6). Johnson & Johnson and other industry leaders have established their own venture capital branches there (venture arms and corporate venture capital) and actively gather information on promising venture businesses. Stanford University produces the most founders who join start ups.

Stanford Spark and Biodesign are the leading programs
These are successful models based on global best practice with Stanford SPARK generating a success (licensed or in clinic) rate of 59%.
Contacts

Professor Michael Wallach
Inaugural Director of the Institute for the BioTechnology of Infectious Diseases (IBID) at the University of Technology, Sydney
Visiting Professor, Technion-Israel Institute of Technology
Inaugural Director of the SPARK Sydney program

A/Professor Peter Santa Maria (Clinician scientist)
https://www.linkedin.com/pub/peter-santa-maria/75/962/583
ENT Surgeon Scientist MD / PhD
3 years Stanford Faculty
SPARK graduate
Founder / CMO Medical device startup
Founder / Chief of SAB of Pharma startup

Susi Tegen
Chief Executive
Medical Technology Association of Australia
MBA (Melb), BA (Adel), Post Grad Dip Ed (UNE), GCCM (AGSM), FARLF and FAICD
Telstra Nokia Business award, RIRDC SA Business Woman award