ASSISTING TRANSITION

ASSISTIVE TECHNOLOGIES OPPORTUNITIES AND INDUSTRIAL TRANSFORMATION IN SOUTH AUSTRALIA

John Spoehr, Lance Worrall, Paul Sandercock, Jonquil Eyre and Simon Molloy

April 2014

A collaborative project between the Stretton Centre, WISeR, DMITRE and Fraunhofer Gessellschaft

The Stretton Centre is funded by the Australian Government Suburban Jobs Program

Australian Government
Department of the Environment

City of Playford

Government of South Australia
Department for Manufacturing, Innovation, Trade, Resources and Energy

Fraunhofer

The University of Adelaide
Australian Workplace Innovation and Social Research Centre

Assisting transition

Assistive technologies opportunities and industrial transformation in South Australia

Australian Workplace Innovation and Social Research Centre
The University of Adelaide
230 North Terrace
Adelaide
South Australia 5005

www.adelaide.edu.au/wiser

Published April 2014.

ISBN: 978-0-9923617-6-1

Suggested citation:

Spoehr J, Worrall L, Sandercock P, Eyre J, Molloy S. 2014. *Assisting transition: Assistive technologies opportunities and industrial transformation in South Australia.* Adelaide: Australian Workplace Innovation and Social Research Centre, The University of Adelaide.

The Australian Workplace Innovation and Social Research Centre (WISeR) *focuses on work and socio-economic change. WISeR is particularly interested in how organisational structure and practices, technology and economic systems, policy and institutions, environment and culture interact to influence the performance of workplaces and the wellbeing of individuals, households and communities.*

WISeR also specialises in socio-economic impact assessment including the distributional impacts and human dimensions of change on different population groups and localities. Our research plays a key role in informing policy and strategy development at a national, local and international level.

CONTENTS

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

This discussion paper has been developed by the Australian Workplace Innovation and Social Research Centre (WISeR) at the University of Adelaide in partnership with the Stretton Centre, the Department of Manufacturing, Innovation, Trade, Resources and Energy (DMITRE), and includes Fraunhofer Gesellschaft as a strategic adviser. It is part of larger response, including the SA Government's *Our Jobs Plan,* to the urgent need for rapid diversification of our existing manufacturing sector, particularly in light of the impending closure of GMH and the nation's entire automotive industry.

A key focus must be on retaining key engineering and manufacturing capabilities developed through automotive manufacturing, with accelerated transition of firms into new and growing manufacturing product and market opportunities.

- Changes in technology and international supply chains, together with innovative business organisation, have opened up new opportunities for internationally competitive manufacturing by SMEs; 'new manufacturing'. This transition is feasible.

Assistive technologies (AT) are devices that enable individuals to perform tasks they would otherwise not be able to because of age or disability, or technologies that increase the ease and safety with which tasks can be performed. AT range from relatively simple to highly complex technologies.

Population ageing and rising disability rates will underpin high demand for AT, in Australia and internationally. In 2009, two million Australians used aids and equipment because of various disabling conditions. By 2050 the number of Australians aged 65-85 years will have doubled, whilst the number over 85 years will have quadrupled. Ageing alone will have doubled the cost of healthcare.

Similar trends are evident across much of Europe, Asia and the US. Often, these countries not only emphasise the role of AT in improving an individual's quality of life and the productivity of service provision, but also focus on leveraging this demand to help open up opportunities for advanced manufacturing and domestic industry development. To date, in Australia, there has been less focus on AT as an opportunity for growing local industries.

AT includes product/market segments that are the 'new manufacturing' where SA must look to be competitive, characterised by, amongst other things:

- Less reliance on low costs and long production runs
- High levels of customisation produced in short production runs and exhibiting high variability and high value
- Use of new materials that are both light and strong, such as titanium, where the state can build competitive advantage.

At the same time, capabilities from the automotive sector can be applied to AT. These include high process engineering skills, materials science and technology expertise, computer controlled processes, etc. There is also opportunity to use public procurement and the purchasing power of private institutions to help stimulate local innovation, particularly where high customisation, rapidity to market or high through life support for AT is needed.

This discussion paper summarises preliminary research into how and on what bases local aged care providers decide to purchase particular AT products, and into the level of readiness of selected automotive component suppliers to diversify into AT, concluding each requires a clear and strong focus in future.

The discussion paper and the first Industry Workshop in April 2014 commences the

Assistive Technologies Mapping and Opportunities Project which, during 2014, will identify high value practical and actionable target opportunities for SA firms along the AT value chain. Over 2014 we will progressively pinpoint opportunities by:

- Analysing domestic and international demand by key product/market segments
- Working with local companies to analyse their existing capabilities, against the requirement to be competitive in particular parts of the AT value chain
- Targeting gaps in company capability and capacity to build on our strengths
- Through progressive iterations of these analyses of demand and local capability by product/market segment, producing a Supply/Demand/Capability matrix of high value credible opportunities for local industry development and foreign direct investment attraction
- Working with public and private disability and aged service providers, as well as suppliers, industry, researchers and others to build strong information loops, better understand needs and 'shape' industry capability and innovation to future demand.

There will be ongoing engagement with companies, government, research institutions and relevant industry associations, including at least one additional workshop or information session. In addition to the schedule of high value industry opportunities and Supply/Demand/Capability matrix, the project will deliver well-defined policy proposals to ensure we capture these opportunities through a strategy which may include an Assistive Technologies Industry Development Program and a possible Assistive Technologies Industry Innovation Centre.

1 PURPOSE OF THE PROJECT AND THIS DOCUMENT

The Assistive Technologies Mapping and Opportunities Project is a collaboration between the Department of Manufacturing, Innovation, Trade, Resources and Energy (DMITRE), the Australian Workplace Innovation and Social Research Centre at the University of Adelaide (WISeR), the Stretton Centre, and Fraunhofer Gesellschaft, Europe's largest application-oriented technology and business extension organisation, and strategic adviser to the project.

The purpose of the Project is to investigate the potential to respond to the urgent need to diversify South Australia's manufacturing base, particularly in light of the collapse of Australia's automotive manufacturing sector. Opportunities for transitioning manufacturing businesses and workers into new and growing product and service categories in the area of 'Assistive Technologies' (AT) is the central focus of the project.

This discussion paper provides the rationale for developing a strategy for industrial transformation for a selected set of existing or new manufacturing businesses from the automotive and other industries into AT. It also reports on initial research undertaken recently by WISeR that has included consultation with industry and other stakeholders, and on the approach to developing a transition strategy that could be the foundation for an Assistive Technologies Industry Development (ATID) program.

The discussion paper is for the information of, and use by, businesses in the manufacturing sector (including automotive), South Australian and Federal Government industry and economic development personnel, interested academics, key industry associations[1], and end-users and lead customers of AT in the aged care, disability care and health care sectors. The paper will inform the deliberations of the first Industry Workshop on defining AT opportunities for South Australian manufacturers, to be held April 2014.

The project is undertaking research and consultation designed to identify credible high value industry development opportunities through the development of a Demand/Supply/Capability matrix. Over 2014 the project will identify substantive growth opportunities matched to existing or potential new capacities and capabilities of South Australia manufacturers. This involves pinpointing where individual companies need to acquire new capabilities or improve processes to capture opportunities in the AT value chain.

The project is an industry development initiative, focusing squarely on identifying (during 2014), and then capturing, practical high value and actionable targets and opportunities in the high growth AT value chain.

1.1 WHY DO WE NEED AN INDUSTRIAL TRANSFORMATION STRATEGY?

Like Australia, South Australia urgently needs to diversify its industry base. To maintain skills and employment in South Australia it is necessary to respond to the impending loss of sophisticated manufacturing capabilities, such as automotive production, through diversification strategies. Otherwise key industrial capabilities will be lost permanently.

The current shake out of Australian manufacturing has several sources. But today, Australia manufacturing business cannot be competitive where the primary basis of competition is scale and unit cost. Given its cost structures, Australia needs to focus on knowledge-intensive, complex high margin products and services that provide opportunities for internationally competitive manufacturing based on short production runs, medium to high complexity, high variability of output and high levels of

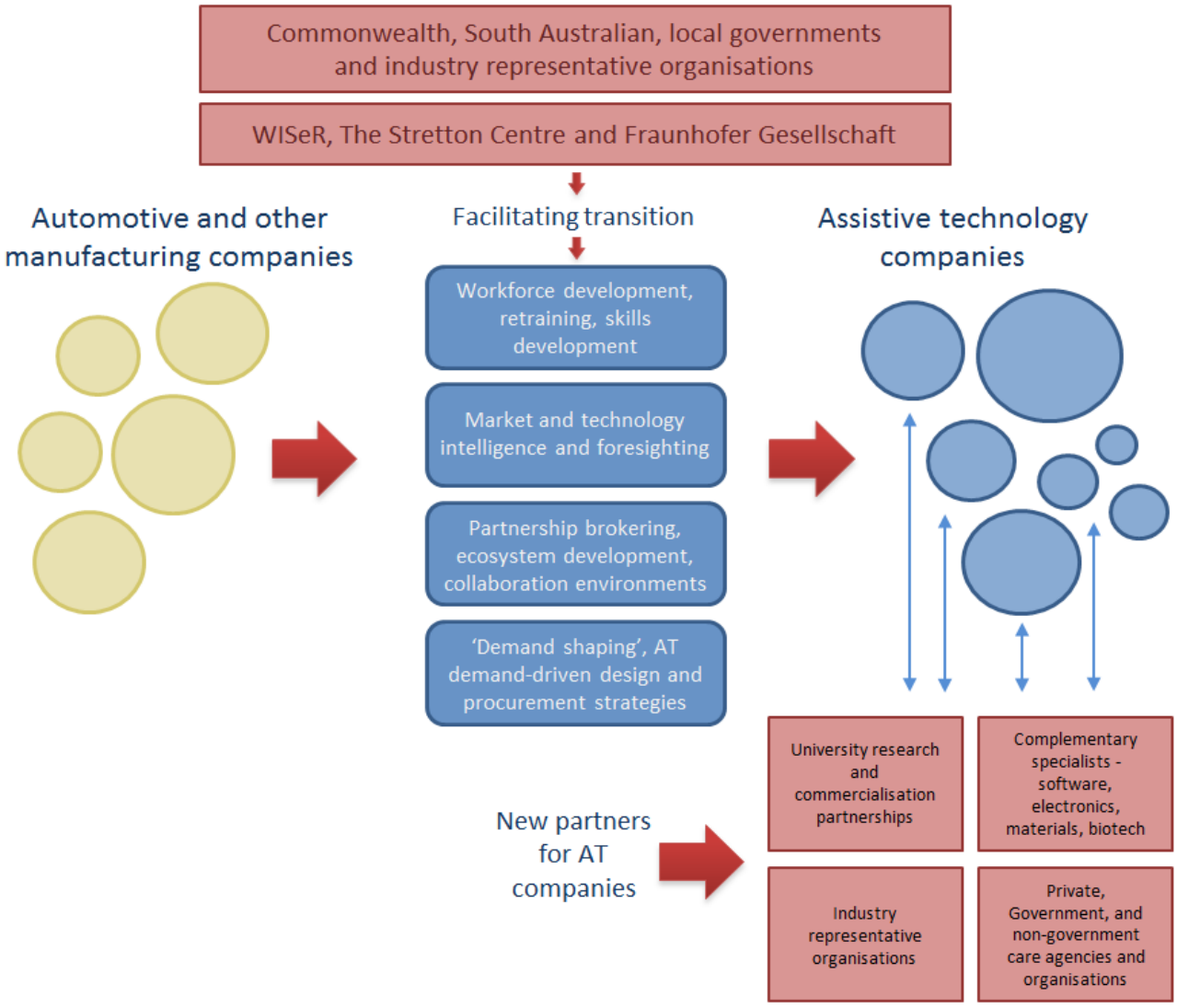
[1] For example, the Australian Industry Group, the Assistive Technologies Suppliers Association, the Medical Technology Association of Australia, the Australian Rehabilitation and Assistive Technology Association, and initiatives such as the Medical Devices Partnering Program.

customisation. This is 'new manufacturing', and significant segments of the assistive technologies market align with it.

Opinions differ on the ultimate balance of costs and benefits from dramatic structural change but, recognising that the costs do not fall evenly on all workers and business owners in declining industries, Australian governments have traditionally implemented assistance and industry transition policies aimed at reducing these costs and at facilitating the redeployment of valuable human and physical capital into industries that are experiencing expansion.

The objective of public policy to facilitate industrial change is to maximise sustainable value creation and employment and minimise the social and economic costs associated with these transformations, by transitioning the valuable human and physical capital that has been accumulated in declining industries into industries that are expanding. This process will invariably require repurposing of the productive capital and retraining of workers, and will likely require the development of new partnerships spanning businesses and university researchers.

FIGURE 1: MAPPING INDUSTRIAL CHANGE – DRIVING INDUSTRIAL TRANSFORMATION TO NEW GROWTH SECTORS THROUGH NEW PARTNERSHIPS AND FACILITATION STRATEGIES



Industrial development exhibits 'path dependency'. As particular industries decline it is possible for national and regional economies to lose industrial capability and capacity, and rebuilding this capability in the future may prove to be prohibitively costly. This is the path to deindustrialization and lower 'economic complexity', which may foreclose on future economic development opportunities. Even if there are new growth opportunities in manufacturing, the transition path to these new activities is likely to be costly and risky, and affected by multiple market failures, including information asymmetries and other informational failures. Government intervention may be critical in facilitating the transition of labour, skills, knowledge and capital into these new activities. Industry policy designed to facilitate such transition needs to build on the capacities and capabilities of existing businesses, target new products with similar production characteristics to those currently produced ('near-by' products), and address capability gaps to move up the value chain progressively to more complex and high value products. Building on existing strengths makes a transition from old to new realistic[2].

The manufacturing industry in South Australia has assembled a formidable set of capabilities that have generated value, jobs and incomes over the long term. In the face of declining demand for the traditional outputs of the sector, particularly in automotive, there are potentially large benefits from investigating areas of rising demand for products and services that can use these productive resources in new ways.

There are a number of economic rationales for such policy intervention. If we view industrial transition assistance as falling under the general umbrella of 'industry policy' then we are able to draw on a wider literature to understand the case for such interventions. Rodrik[3] argues:

> *It is if anything too easy to make the case for industrial policy. Few development economists doubt that the market imperfections on which the theoretical arguments for industrial policy are based do exist, and that they are often pervasive. Collateral constraints combined with asymmetric information result in credit market imperfections and incomplete insurance. Problems with monitoring effort result in labor-market arrangements that are less than efficient. Learning spills over from producers who adopt new processes. Labor can move from employer to employer, taking their on-the-job training with them. Many projects tend to be lumpy relative to the size of the economy, requiring coordination. And so on.*

Thus, there is a sound case for intervention on both social and economic theory grounds. The question becomes: what specifically to do?

[2] Cesar A. Hidalgo and Ricardo Hausmann et al, *The Atlas of Economic Complexity: Mapping Paths to Prosperity*, Cambridge MA, Puritan Press, 2011.
[3] Dani Rodrik, *Industrial Policy: Don't Ask Why, Ask How*, John F. Kennedy School of Government, Harvard, August 2008.

2 BROAD CONTEXT – DEMAND DRIVERS

2.1 OVERVIEW

The significance of technology and innovation in health care provision and health care markets has been widely and long recognised, although its potential as a driver of sector-specific economic development is less widely appreciated in Australia than in other advanced countries. The emerging demographic mega-trend of population ageing (brought about by the combination of reduced fertility and rising life-expectancy) will be a powerful driver for increased adoption of AT in the health system and more broadly, as the basis for productivity improvement in the delivery of costly key services, as well as for the quality of life and dignity of the aged.

As the population ages levels of age-related disability rise. Disability rises in tandem with population ageing. At the same time, the focus on persons with disabilities unrelated to ageing – those with disabilities from birth or by mishap – is rising as evidenced in Australia by the National Disability Insurance Scheme initiative.

The combination of the powerful demographic trends along with the rising expectations of quality of life for the aged and new technologies for providing care means that there are substantial industry development opportunities in the area of assistive technologies across health, ageing and disability. Given the magnitude and cost of the aged care challenge and concern about fiscal balance there is a strong drive to use technology to contain costs, achieve productivity improvement and improved care outcomes.

High levels of customisation are likely to be required to develop AT solutions that meet widely varied needs in home, work and institutional environments. This demands end user engagement in the design process requiring application of co-creation principles and approaches that support the servitisation of manufacturing.

2.2 WHAT ARE ASSISTIVE TECHNOLOGIES?

Assistive Technologies (AT) are defined as devices, software and intelligent systems that enable individuals to perform tasks they would not otherwise be unable to, because of age or disability, or technologies that increase the ease and safety with which tasks can be performed. AT comprises an ensemble of devices from the reasonably simple to more complex technologies as shown in Table 1.

TABLE 1: SIMPLE AND COMPLEX AT

Simple AT	Complex AT
Trolleys, walking frames, beds, hoists, hygiene items, electric wheelchairs and scooters, and home modifications	Electronic magnifying devices, prosthetics, cognitive software, AT for visual impairment, augmented and alternative communication, domestic robots and personal emergency response systems.

The range of ATs has been usefully arranged into a typology as follows:[4]

- Aids, appliances and equipment (from handles to special computer interfaces)
- Environmental adaptations (e.g. remote control of doors, windows and locks)
- Remote monitoring devices (telecare and telehealth), and

[4] Connell, Grealy, Olver and Power, Comprehensive Scoping Study on the Use of Assistive Technology by Older People Living in the Community, Urbis for the Dept. of Health and Ageing (2008). The typology likely has equal application to people with disability.

- Integrated systems (smart homes, etc.).

A full schedule of assistive technologies according to ISO classification is provided in Appendix B.

2.3 KEY TRENDS

In Australia as elsewhere in the developed world, population ageing will continue to drive up healthcare spending. By 2050 the number of people aged 65-85 will have doubled, whilst the number of aged 85 or over will have quadrupled, and ageing alone will have doubled the cost of healthcare[5]. **The ABS estimates that by 2050 those aged 65 or over will comprise nearly one-quarter of the population**[6].

Definitions of disability in Australia vary, and those variations affect estimates of the size of the relevant cohorts. The ABS definition of disability[7] provides a cohort of 680,000, whilst the Productivity Commission inquiry used a definition providing an estimated cohort of 411,000[8]. **Disability Care Australia will see the Commonwealth provide $19.3 billion over the seven years from 2012-13, representing new investment of $14.3 billion over the period. From 2018-19, with the full national rollout of Disability Care Australia, around 460,000 people with significant and permanent disability will receive support.**

Worldwide the number of persons aged 60 or over will reach two billion by 2050. The EC expects that the proportion of Europe's population aged 65 or more will increase from 17.1 per cent in 2008 to 30 per cent in 2060, a numerical rise from 85 to 151 million[9]. It estimates that 45 million Europeans currently have longstanding health conditions or disabilities. In the UK, there is expected to be a 50 per cent increase in the number of people reporting three or more long term conditions by 2018, compared to a decade earlier, whilst dementia sufferers aged 65 or over in England and Wales are expected to grow by 80 per cent between 2010 and 2030[10].

2.4 AT AND LOCAL INDUSTRY DEVELOPMENT

In Europe and the UK particularly, there is an emphasis on the growing importance of technology and service applications in meeting these challenges. Moreover, there is an explicit focus on the leveraging of this demand to create domestic advanced manufacturing for economic and industry development opportunities. In the UK, for example, the *Ageing Society Strategy* includes 'Industrial Opportunities in an Ageing Society', and use of the Small Business Research Initiative (SBRI) to allow businesses to compete "for Government procurement contracts to incentivise early-stage, high technology businesses and support these companies through critical stages in their development", starting with pilots run by the Department of Health and the Ministry of Defence[11]. Subsequently, the 2011 *Innovation, Health and Wealth* initiative seeks to leverage the UK health system's procurement to grow local technology and business, and commits to an expansion of the SBRI for this purpose.

As previously identified, key technologies applicable to assisting the aged and people with disabilities include modifications to homes, advances in diagnosis and treatment through telehealth etc., and a suite of technologies and related services, both traditional and emerging cutting edge.

---

[5] Medical Technology Association of Australia, *Medical Technology: Key Facts and Figures*, 2012
[6] ABS *Australian Social Trends*, 2012
[7] ABS *Survey of Disability, Ageing and Carers*, 2009
[8] Productivity Commission, *Disability and Support*, 2011
[9] EC, *Analysis of the Assistive Technologies Information and Communications Technologies Industry in Europe*, 2009
[10] UK Department of Health, Research and Development *Work Relating to Assistive Technology*. 2013
[11] *Building Britain's Future: New Industry, New Jobs*, April 2009, pp. 24-32.

Australia has been slower to recognise the opportunities associated with the development of an AT industry. There is, of course, demand for relevant technologies, but much less of a focus on leveraging this demand for local innovation and industry development.

For example, in Australia, much of the growth in provision of disability technology and services will come from establishment of Disability Care Australia (previously NDIS). Interestingly, the Productivity Commission report recommends the NDIS/Disability Care Australia provides estimates of growth in demand in Australia for support services (but not for manufactured devices).

The Commission's report examined the economic impact of improved policy largely from the point of view of increased disability workforce participation and concomitantly reduced transfer payments and dependency. However, neither the specific role of technology in lifting the disabled or aged participation rate, nor the potential to leverage this growth in demand to foster new advanced manufacturing and associated service industries, was considered by the Commission.

The National Enabling Technologies Strategy provides some recognition of the importance of AT, but because AT is still aggregated with a range of other technologies and applications, it appears relatively minor.

In the related area of medical devices, the Medical Technology Association of Australia has recently called for measures for 'Building a Sustainable Australian Medical Technology Industry', utilising our existing manufacturing base (e.g., re-deploying the complementary skills sets of the contracting auto industry), leveraging the demand-pull of public procurement, dedicated national institutions and networks, etc.[12].

The Australian Academy of Technological Sciences and Engineering (ATSE) also recently called for establishment of a network on assistive technologies (or 'emerging assistive and medical technologies (EAMTs))' to better link research to opportunities for commercialisation and production[13].

In South Australia the Medical Devices Partnering Program based at Flinders University is leading development of South Australian cutting edge medical technologies for local industry growth. Lessons from its work should be fed into the present project. But the fact remains that there is no comprehensive national strategy or approach to assess this large and growing area of demand and identify opportunities for local industry development.

[12] Medical Technology Association of Australia, *Building a Sustainable Australian Medical Technology Industry*, March 2012, and *New Focus to Achieve Our Potential in Medtech* ATSE Focus, February 2013
[13] ATSE, *Australia needs a healthcare "assistive technology" network*, media release, 1 November 2012.

3 Assistive Technologies – Opportunities for Demand-Led Economic and Industry Development

There are opportunities to carefully target and lead local industry and business development toward areas of strong potential demand growth along selected (not all) parts of the AT value chain. The growth in demand for, and output of AT in wealthy societies is correlated to:

- greater life expectancy and concomitant increases in age-related health expenditures;
- demands for higher quality disability support and care, resulting in establishment of Disability Care Australia and the national disability insurance scheme;
- the general shift towards higher consumption of services as income grows;
- the increasing imbrication of services with advanced manufacturing, highly evident with AT;
- rapid technological innovation that makes the satisfaction of these demands possible, alongside the creation of new wants;
- reform in aged care through the *Living Longer, Living Better* policy agenda, a key focus of which is Consumer Directed Care (CDC).

The ABS reports that in 2009 two million people in Australia used aids and equipment because of various disabling conditions. Use of aids was (not surprisingly) most common amongst older people with disability, and was more common amongst those living alone. Notably, 77,500 children under 15 years of age were users of aids and equipment[14].

Assistive technologies include market segments that are precisely the type of advanced manufacturing activity that should be targeted to achieve sustainable competitive advantage. They have the characteristic of high-income elasticity of demand, meaning that the demand for them grows disproportionately (i.e., faster) as consumer income grows. A growing class of relatively well-off self-funded retirees is likely to demand high quality assistive products and services. Demand for them is relatively insensitive to increases in price, and they embody competitive strengths beyond solely cost-price based models. At the sophisticated end, AT products and services command high margins. They are, prime facie, suited to high-wage, high cost economies such as Australia.

Furthermore, the technical characteristics of production of many segments within AT mean that competitive production can be achieved at relatively small scale. Many new technological applications and reinforce the ability of smaller firms, and clusters of firms, to be competitive internationally.

These potential local advantages are further reinforced by:

- the high service and customisation requirement inherent in the sector, favouring local activity;
- the aged and disability sector's high service and labour intensive characteristics are attractive in a slow-growth labour market;
- the potential to use standards, including sophisticated testing and compliance, as a competitive advantage, including rapidity to market, to favour local activity;
- the requirement for use of materials that are both very light and very strong, such as titanium (Australia has abundant titanium, and the CSIRO is interested in helping to develop an Australian processing capability);

[14] ABS *Survey of Disability, Ageing and Carers*, 2009

- the potential to promote transition of firms and workers with adaptable capabilities from declining sectors such as automotive into new growth areas such assistive technologies - these synergies include high process engineering skills, expertise in materials science and technology, computer controlled processes, etc.;
- the opportunity to use deliberately cultivated closeness between end-users, industry, suppliers, prescribers, funders and the education and research sector;
- the potential to leverage public procurement and major projects[15], including the impacts of 'Manufacturing Works', the SBIR and the new Industry Participation Policy, the new RAH and SAHMRI, the Lyell McEwen upgrade, the National Broadband Network rollout, the redevelopment of the Holden Elizabeth site and the development of the Tonsley Park precinct.

[15] Some of the $120 billion of annual Australian health expenditure can be leveraged in this way, as is explicitly done in the UK, for example.

4 ASSISTIVE TECHNOLOGIES INDUSTRY MAPPING AND OPPORTUNITIES – PROJECT DESCRIPTION

This Assistive Technologies Industry Mapping and Opportunities project has arisen from shared interest in the industry and workforce development potential of AT in Australia and overseas and its potential to provide value creating employment for automotive industry workers and businesses and other sectors of the manufacturing industry.

The Stretton Centre in collaboration with WISeR has identified AT as an area of priority and has entered into a collaboration with the DMITRE and Fraunhofer to map existing and potential demand for AT locally, nationally and internationally. The collaboration also seeks to identify associated opportunities for industry and workforce development. The project is a foundation for a longer term effort designed to generate the industry intelligence required to inform the development of a strong AT goods and services industry in South Australia.

The project involves international collaboration with the German technology and industry development body Fraunhofer Gesellschaft, which has considerable expertise in the area. The proposed Assistive Technologies Industry Development (ATID) Program is entirely consistent with the Manufacturing Works strategy and its key initiatives, as well as with the development of the Tonsley Precinct and efforts to develop the medical devices sector. It is noted that the SBIR second round has been targeted to problem solving in SA Health.

The project will consider the value proposition of the establishment of an Assistive Technologies Industry Innovation Centre (or similar) linked to the Stretton Centre and Fraunhofer. The Centre would act as an accelerator and enabler for the industrial transition of northern Adelaide, with a specific focus on the Assistive Technology value chain. It would work with the SA Government and its Manufacturing Works programs, WISeR, Stretton and northern Adelaide local councils, together with medical technology researchers and the Medical Devices Partnering Program centred at Flinders University and Tonsley Park.

The focus on AT industry development opportunities aligns with the imperative for industrial diversification given the closure of the automotive manufacturing industry over the next two to three years, and further in recognition of the significant synergies and complementarities underlying technical excellence in both sectors. These complementarities make a transition from ‘old to new’ industries a substantive opportunity.

4.1 PROJECT ELEMENTS

The project will involve the following core elements:

- The development of a Demand/Supply/Capability matrix designed to target and inform the development of credible industry development and investment attraction propositions and opportunities.
- Identification of targets for a 5-year industry development and an investment attraction strategy for the industry.
- A structured on-going industry engagement program including workshops to examine opportunities for South Australian firms to benefit from opportunities in this industry sector, including understanding international trends and future technologies.
    - This will involve the following activities: Demand mapping and future technology fore-sighting to provide the initial suite of opportunities;

- Results of surveys into local industry capability and opportunities for investment attraction;
- Providing a Demand/Supply/Capability matrix to define a hierarchy of high value industry and economic development opportunities along the value chain for AT;
- Tailored policy proposals targeted to highest value economic development opportunities.

4.1.1 Demand/supply/capability matrix

Identifying viable and pragmatic opportunities requires that we have a methodical and staged approach, starting with a provisional schedule of product/market categories, distinguishing AT items that are:

- 'naturally protected' from import competition or otherwise likely to be sourced from within South Australia and Australia due to bulk, or high service content to meet customisation requirements, or strong existing capability, possibly linked to university research activity and protected unique intellectual property, from;
- mostly sourced from overseas, but that might be able to be manufactured competitively in South Australia;
- unlikely to be able to be produced efficiently over the 5-year strategy (and will therefore remain import-dependent).

Comparing this schedule to the expected demand growth by product/market segment leading to:

- a strategic schedule of high value credible opportunities for local industry development and foreign direct investment attraction;
- mapping the current capacity and capabilities of existing South Australian industries, including companies outside AT with the ability to effect a transition to these new opportunities, against the prospective demand for AT (capability mapping);
- the identification of **capacity and capability gaps** needing to be addressed, leading to recommendations;
- Using **opportunity and capability information and gap analysis** to ensure we focus on both our strengths and **areas of high value and high and growing demand** in order to build local capacity and to attract targeted new investment into South Australia, leading to recommendations, including development of clusters.

4.1.2 Project stages

In stage 1 we will:

- Undertake initial demand mapping and future technology foresighting to yield proximate leads on opportunities
- Establish dialogue with South Australian companies, comprising existing AT and medical technology companies, and companies from outside with synergies (e.g., tier two and three automotive suppliers), as well as industry associations and importers of AT. In this way, we will start to test ideas and hypotheses from the initial demand mapping and assess the level of interest from companies.
- Present propositions including this discussion paper at the first Industry Workshop to test hypotheses, provide proximate leads and present showcases.

In stage 2 we will:

- Refine the demand mapping and technology foresighting to:

  - Provide estimates of demand (current size, rate of growth, expected size) for key goods and services in Australia and internationally over coming decade.
  - Pinpoint credible opportunities (intermediate) to provide a preliminary schedule of product/market segment opportunities.

- Simultaneously assess the group of South Australian companies against characteristics of internationally competitive firms in these value chains, and their potential to capture opportunities in AT
- Present intermediate results at the second Industry Workshop as well as to individual firms, including assessment of potential for cluster development, and present showcases and exemplars.

In stage 3 we will:

- use outputs from Stages 1-2 to provide the Demand/Supply/Capability matrix which will pinpoint credible industry development and investment attraction targets.
- provide advice to government, industry and industry associations, as well as universities and researchers on targeting of well-defined policy proposals (existing and new) to ensure capture of highest value economic development opportunities through a 5-year strategy (the Assistive Technologies Industry Development program) and a possible Assistive Technologies Innovation Industry Centre.

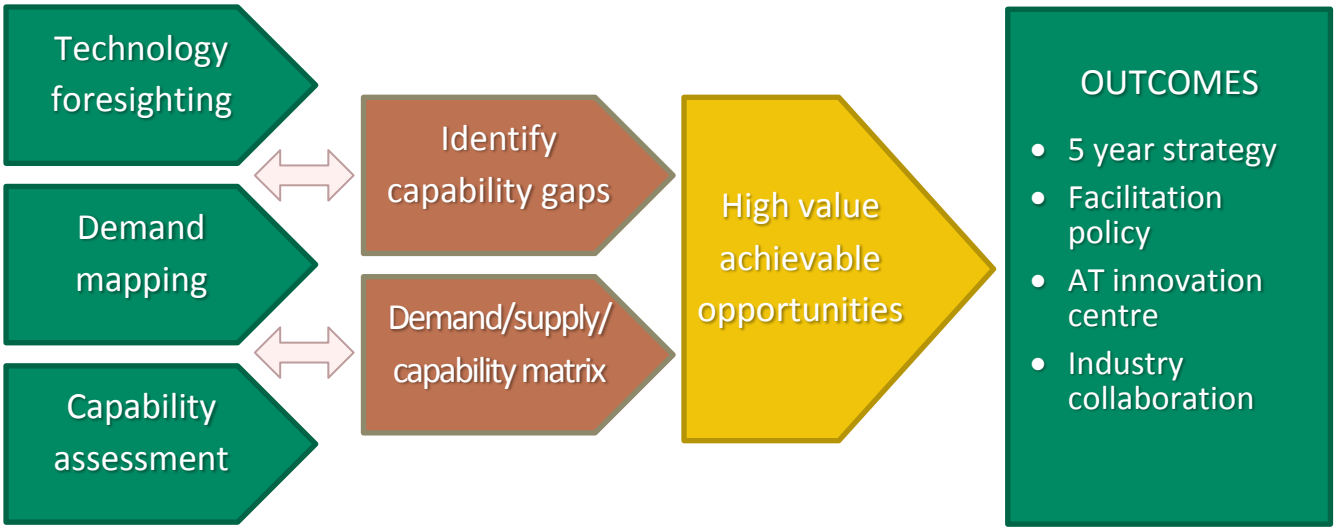
4.2 Industry Engagement

To advise and help direct research and industry engagement, an industry reference group will be established involving the following stakeholders:

- Australian Industry Group (Ai Group)
- Australian Manufacturing Workers Union
- Aged care services industry organisations
- Supplier organisations
- DMITRE

The group will meet at least four times during the implementation of the project and be consulted during the intervening times by the Project Team.

Figure 2: Identifying high value opportunities in AT



5 RESULTS OF WISER RESEARCH TO DATE

WISeR has undertaken two primary pieces of research to date: a survey of issues and scope of AT from the perspective of aged care organisations in their roles as purchasers of AT, and a survey of readiness and capability to participate in AT production among South Australian manufacturers within the automotive supply chain. The results of this work are reported below.

5.1 ASSISTIVE TECHNOLOGIES: CARE ORGANISATION AND PROCUREMENT

5.1.1 BACKGROUND

In late 2013 WISeR undertook a study to explore the scope and issues related to AT in the aged care sector in South Australia. The study captured information from 25 interviews and written material from a total of 15 procurement, community/home care and residential care staff from seven aged care providers and 10 representatives from professional associations, suppliers and developers.

WISeR sought to understand the bases of current and future AT procurement decisions by these organisations. This is an essential ingredient in scoping demand and opportunities for local industry. An underlying assumption was that local production and supply might in future be stimulated by having well-informed and demanding lead customers in close proximity.

5.1.2 FINDINGS

TRENDS

A local AT supplier reported that over the last 3 years (2010-13) there has been growth in home based equipment rental of 70% in disability sector services, 25% in aged care services and 49% in palliative care.

Not all interviewed organisations were able to provide dollar estimates for their AT procurement costs. For the six aged care organizations that could provide reliable information, expenditure on AT in the last financial year ranged from 0.3% - 4.6% of annual revenue. Much of this is lumpy, increasing whenever a new facility is constructed or refurbished.

There is consensus amongst care providers that the environment for spending on aged care and therefore related AT is changing in response to major policy shifts. There is also a consensus that it is useful and essential for researchers, customers and suppliers to work closely together on the development of new AT to ensure that products are responsive to changing demand.

Changes affecting clients, service providers and the industry are being driven by the greater range of products, where they are made, the need for customization, the move from congregate living to people remaining in their homes, the shift from owning to renting, and levels of government support in aged care, to name the more significant factors at work.

The move to Consumer Directed Care (CDC) provides the older person and support networks with the responsibility to plan for and choose what they spend their aged care funds upon. Previously a client in their own home would have taken the advice of a health professional such as an occupational therapist. Now, however, tech savvy consumers are increasingly searching online and to make their own choices. Previously the aged care provider coordinating a person's care had some flexibility that enabled lending equipment. Now all expenses must be accounted for.

Local small scale manufacturers have been replaced over time in the AT supply chain by national and international manufacturers, with local small scale work limited to customization.

Aged care providers express an interest in buying Australian made. The cost of purchasing from Australian producers, however, is estimated to be 30 - 50% more than products sourced from Asia. At a broad level, such a cost differential may not be a barrier to competitive local production depending product and service quality, and other non-price factors.

The five care organisations that reported expenditure on AT specifically spent approximately $10.3 million annually at the time of the study. Of this total approximately 60 per cent was locally sourced and the balance imported.

Around the world there is a significant level of research and development activity in AT (see Appendix A for details). Outside Australia, the UK, Dubai (especially for medical equipment), Europe (particularly Germany), and the USA are the primary areas for AT design, research and development.

Historically, most locally purchased AT was manufactured in Australia but its position in the marketplace has significantly diminished, and Australia was described as being behind the US and the European Union in developing AT industry opportunities. Increasingly ATs are manufactured in Asia even if they are assembled in Australia, which has increased competitive pressure on local manufacturing.

Interviewees identify the most common locations for AT manufacturing as China, India, and Thailand, with China (where quality is described as improving) being identified as the most common location for production. Interviewees would like to be able support the creation of jobs in South Australia but the perceived small size of the domestic market, and cost structures relative to those of Asian manufacturers are seen as the primary barriers to manufacturing in Australia.

DISTRIBUTION AND PURCHASING

The aged care organisations consider that South Australia is well served by a relatively small number of AT distributors. The organisations have well-established sources of supply, and rely on a small number of these for their requirements. In addition to sales skills, follow up, timely service and reliable after sales service, distributors need to ensure their staff have considerable health care knowledge.

Aged care staff rely on the following for information about products, their functionality and availability: conferences (Australian and international), trade displays, buyers guides, online searches, innovation networks, suppliers, networking with colleagues in other organizations locally and interstate, professional associations, the OT Board, the Independent Living Centre, books and industry journals. Staff of the various South Australia-based aged care organisations, including procurement managers, meet together to share information and increase buying power by working as a group. This will be essential to cost-effective purchase of high-end AT items. Care organizations engage in group purchasing where the demand for similar products can be leveraged to reduce unit costs.

Aware and knowledgeable purchasers can help drive local business and supply chain development and innovation. Presently, the signs appear mixed. Price factors remain very important in shaping purchasing decisions. Paradoxically perhaps, many organisations appear not to know the amounts they are spending on these technologies, especially from a whole-of-life perspective of the product service combination. This indicates that there is likely to be a benefit to the sector from creating better information about products, quality, prices and product performance. This could be achieved through better networking and collaboration in the sector.

On the other hand, non-price factors are becoming more important, possibly favouring high end sophisticated AT. ICT accounts for a growing share of AT procurement spending. Better understanding these trends is one of the objectives of the proposed project.

Durability and quality are key criteria for purchasing, with risk assessments a part of purchasing decisions. Trialling before buying is common. Performance and through life support costs are important. Questions about quality equipment user-manuals, clear and easy to read instructions, the existence of a manufacturer's risk assessment, the provision of training by the supplier for safe operation, spare parts availability, inclusion of a service agreement, as well as a check list about identified hazards criteria used by one organisation.

Supply and manufacture of ATs is hence a highly 'servitised' area – a significant proportion of whole-of-life value arises from services associated with AT products. This should constitute a point of competitive advantage for local industry.

KEY CHALLENGES AND OPPORTUNITIES

Standards are a major consideration in the manufacture and importing of AT. As stated above, standards can be a factor favouring local production. Statements about standards compliance are relatively complex – for example, the handles on a walking frame may be compliant but the seat not. Complexity creates a potential compliance barrier to local manufacturers of AT but it also creates a barrier to overseas manufactures.

Asian production accounts for an increasing share of AT sold in Australia, and ensures the market is highly competitive at the price-sensitive, simple AT product market segment.

Targeting the more complex and higher quality product market segments for Australian manufacturers is, however, not straightforward. Cheap reproductions often make it difficult for purchasers and end consumers to discern differences in quality; it is sometimes unclear as to what drives the cost of some items and this puts buyers under pressure to collect more information about the range of offerings.

Some of the interviewees see untapped opportunity for development and manufacturing and this includes for South Australian companies. Opportunities cluster into five areas.

Home modifications

There is scope to develop the kinds of AT that make a difference in supporting independence for the older person, including people with dementia. This includes the vast area of home modifications including wider doorways for bariatric wheelchairs, about which there are policy discussions at present. Folding beds that can fit into people's homes are now in use.

In residential care there is continuous thinking about ensuring safety and security while affording a sense of freedom for residents and their visiting families. In modern facilities there is an increasing integration of systems that requires the coordination of any additional components.

Aesthetically appealing products that meet technical criteria but also fit well into home décor is another area requiring innovation. Most older users of AT want a home that is aesthetically pleasing and where the equipment required to meet their physical needs is not excessively evident. Innovation in this area needs to also consider the role and safety of care staff or carers working in the home. In addition to users, family members and care providers also make decisions about AT. It was suggested that appeal to individual end users tends to be more aesthetically driven and appeal to staff is more technical – reinforcing the need for collaborative input by end users and care workers in the design of AT.

New design and materials

Another area is the need for lighter weight and less bulky products that can reduce the demands on users, carers or care staff for manual handling and be more easily transported. Concern about the space taken up by equipment in homes or in storage, the concern about people handling large heavy items and the requirement to have two pieces of equipment when one might do the job, e.g. a hoist for sitting and another for standing, are areas demanding innovation in design and materials.

Chairs that are light enough to pull to the table, but not so light they tip over, with arms to provide support, or a gliding device that can be put under heavy furniture to help it be moved easily for cleaning purposes, are examples of AT that enhance independent living. Designing certain types of equipment for an allied health worker to bring into the home or room of a resident is another example of unmet need.

Low cost

Another area is innovation in low cost AT. Making items unnecessarily complex which drives up costs was criticized. Sometimes items that are more attractive or complicated are chosen over simpler and more robust items that are easier to clean. This ties to better use of existing ICT rather than the need to create new technologies. Examples of existing applications are communication being enabled by high end eye gaze sensitivity on an iPad or icons for yes or no on an iPad for a person with aphasia.

Telehealth and Telelink

Telehealth practices are growing in places like the UK, whilst they are at their earliest stages of development in Australia. Telelink uses ICT to reduce the time for home visits and is currently being trialled by at least one local provider. Telehealth enables remote monitoring e.g. to check blood pressure or weight.

After sales service

After sales service can be as important as the AT item itself for aged care providers, with many negotiating preventative maintenance contracts as part of the sale. Advice to clients living in their home about AT includes information about the service and reliability of the supplier Organizations also value being able to raise queries with suppliers and obtaining spare parts. Aged care organizations describe their maintenance staff as doing limited repair and specialized repairs being done by original equipment manufacturers or suppliers. Electronic equipment is often maintained by one organization.

Suppliers describe after sale service as crucial for customer service but as not being a lucrative business stream because of the cost of this labour intensive activity. After sale service was cited as constituting 5-10% of supplier business. Suppliers are expected to have service staff on call and be available 24/7 to respond to people e.g. whose powered wheelchair or scooter may have broken down.

5.2 South Australian Automotive supply chain readiness for AT opportunities

5.2.1 Background

In parallel with research on engagement of the aged care sector with AT, WISeR has also undertaken preliminary research on the capacity and capability of automotive companies to transition to AT. This involved an in-depth investigation of five manufacturing businesses in the South Australian automotive components sector. The individual case studies were based on face-to-face interviews with CEO's or senior management of each company and included factory and facility tours.

The five South Australia based firms were selected to represent variations with respect to size, scale, location, specialisation, position within the automotive supply chain, and local versus foreign ownership.

The objective of the case studies was to highlight potential strengths and existing weaknesses within the companies when considering participation in the future AT industry. This information is critical to our ability to lift capability levels to participate in the AT value chain, to target effort to greatest effect and benefit, through the Assistive Technologies Industry Development program.

The study examined the capacity of manufacturers to participate in 'Simple AT', 'Medium complexity AT' or 'High complexity AT' categories, and undertook an analysis of 'critical success factors' and of 'capability gaps' for the participating firms.

5.2.2 FINDINGS

A significant, if unsurprising, challenge is highlighted. It is that whilst there is a clear opportunity for auto companies to participate in the manufacture of AT, the current capability level of most companies is aligned to the simple AT end. This means they are more susceptible to low cost competition from offshore and are less suited to competing effectively in Australia's high cost manufacturing environment.

Only one of the five companies studied was considered to have the capability to support complex AT production **at this time,** although the remainder demonstrated sufficient capability that might serve as a platform for growth into AT production. This is likely to be reflected more broadly. That is why a coordinated strategy focussed on value chain opportunities and enterprise improvement is highly desirable.

The study suggests that accelerated transition to complex AT will require acquisition of capabilities through joint ventures, technical partnerships, or mergers and acquisitions.

COMPLEX AT

It is evident that there is a considerable increase in capability required to support complex AT. Complex AT requires capabilities that in some cases do not yet exist in the companies interviewed.

The study was conducted on a broad, 'whole of business' basis, assessing not only technical and production requirements but also business characteristics from investment risk appetite to quality certification and process readiness.

The case study companies were found to have strengths for potential Complex AT production, as follows: a favourable and cooperative industrial relations climate; ability to adapt quality systems to the requirements of this value chain, and with several automotive companies having already implemented systems in support of future medical based product requirements; strengths in cash management necessary for future management of new project developments related financial controls including cost controls, reporting, and KPI's, all of which appeared to be managed to a high standard; positive management attitudes to possibilities within the AT industry; and an understanding of the 'valley of death' issue associated with introduction of new technology.

The largest gaps exist in the areas of engineering and R&D, international business relationships, university partnerships and engagements, and core process knowledge required to support the higher levels of complexity associated with complex AT products, as follows:

Software design / development: within the companies interviewed software design does not exist in-house. The lack of software development would mean JV's or other commercial arrangements would be required to support complex AT. Capabilities such as interface and cognitive design would require considerable improvement.

Understanding future training requirements: little knowledge exists and little attention is being given, to up skilling the workforce to accommodate future digital, electronic or other technological advancements.

Electronics: there is minimal complex electronics design and development capability amongst the automotive supply base. Most companies outsource this area and therefore strong technical alliances would need to be developed to capture the new opportunities. Technical partnerships would be necessary to develop the high complexity electronics required for devices such as remote movement and control mechanisms. .

Relationships with international offices or partners: to support advanced development of product or processes it is extremely beneficial to have value adding international connections. In general, companies would need to improve their participation in relevant networks for Complex AT production. Of the case studies, only two companies had formed beneficial alliances with relevant networks.

Additive manufacturing / 3D printing: there is a reasonable level of 3D printing using older technology. This is mostly, however, for prototyping, not for production purposes.

Prototyping capability would be considered to be strong, yet the level of additive manufacturing capability needed for complex implantable product, such as joint replacements, is significant. Adding to this issue is the absence of sterilisation and cleanroom capability within the sample set.

SIMPLE AT

There is overall readiness to support the broad category of Simple AT. Whilst within this category there will be particular materials, processes and requirements that cannot be supported (such as specific textiles and associated processes) it is evident that the general nature of mechanical engineering, materials such as polymers and metals, and strong project management and business systems, are transferable to many simple AT products.

Simple AT products are lower value added than medium to high complexity AT, and hence less suited to a high cost manufacturing environment. There may be, however, opportunity to take advantage of the well-developed business systems and automation amongst many automotive suppliers.

The surveyed companies exhibited strengths for simple AT as follows: strong process and general mechanical engineering capability, with high levels of practical skill and knowledge, making engineering transition from automotive relatively easy; high project management capabilities inherited from the automotive sector; and highly developed quality process systems, with several companies engaged in transition of their quality systems in support of future medical based product requirements; there was an evident desire to pursue AT opportunities with simple AT's lower complexity (which represents easier product and process change for the firm); and a strong management desire to pursue opportunities.

Weaknesses, however, are evident even when transition to simple AT is considered, the principal ones being: poor connectivity with universities and poor overall networking industry networking relating to capability improvement; minimal relationships with international offices or partners; and low internal software and electronics capabilities (as for Complex AT, above).

6 TRANSITION STRATEGIES

This section broadly surveys, and asks questions concerning, what kinds of transition are possible (for both automotive and other companies), and what successful transition would look like, and what it would require? It is intended to provoke early consideration of these issues. Three levels of AT complexity are considered.

6.1 SIMPLE AT

Opportunities here are inherently limited, but, because of possible low barriers to entry afforded by relatively low levels of technological complexity, they may provide some limited short-term opportunities. These would involve local project management and design, with offshore manufacture. It may help some companies, but unless used as a platform to higher complexity by those companies, it would be of lower importance to the strategy overall. Simple ATs are also less likely to require significant service components and therefore this is less likely to be a factor favouring local production.

6.2 MEDIUM COMPLEXITY AT

With respect to both automotive and non-automotive firms, it is likely that medium complexity AT are relatively 'near-by' products from the point of view of translating existing capabilities to required new ones (without underestimating the challenges of successful translation), and that large scale inward investment is unlikely to be required.

- Progress the product/market opportunity with project partners (cluster or community of interest) in
    - Medical industry
    - Local industry (manufacturing, sales and marketing)
    - Project management
    - Designers
    - International networks
- Use technical partner, university and investor links to better define opportunities and ways to close the capability and investment gaps
- Proceed with identified high value key projects.

Questions: Are the above assumptions realistic? How important is design excellence in this segment of the AT market?

6.3 HIGH COMPLEXITY AT

At the high complexity end, the gaps between the present and desired position are large, with respect to industrial capability and investor readiness. Here, the 'translation' might need to come from a 'new company' inward investment strategy combined with augmented, locally existing, design and manufacturing capabilities. This would require a similar, but stronger, approach to making good on capability gaps as for medium complexity AT, as well as:

- Joint ventures or technical partnerships with international players
- Long term technology and capability development
- High quality IP linking to clear market opportunities with some degree of IP protection in place
- A strong emphasis on industrial design
- High levels of investment in prototyping, manufacturing infrastructure and distribution

Questions: What is the potential for production of high complexity AT in South Australia? What are the important locally-based networks and relationships needed to support this?

7 RESEARCH AND DEVELOPMENT OF AT PRODUCTS AND SERVICES

7.1 RESEARCH

The significant level of interest in AT is indicated by the extent of research occurring around the world. In Appendix A we present examples of research organisations, universities, conferences that are focused on AT.

There are AT research centres at universities in Europe and the USA as well as several in Australia. These are typically focused on particular areas of AT, usually at the more complex end of the spectrum.

In addition, government agencies have established organisations to promote the use of AT and international conferences are now common.

A number of the university research centres are also focused on industry development. An example is the Assistive Technologies Research Center, College of Engineering and Computer Science, Wright State University, Ohio, USA. One of the goals of ATRC is *"conducting industrially relevant R&D and technology transfer and commercialization for creating economic development".*

These activities are consistent with the industrial transformation agenda advocated in this document. The fact that there is a significant research agenda in AT indicates that there is substantial scope for new products and services to be created in a growing market.

7.2 CO-DESIGN

As the demand for assistive technologies grows and becomes more diverse and sophisticated, it is likely that opportunities for using co-design processes in the development of new products and services will increase.

Co-design involves end-users as well as professional designers in the design process for products service or even organisations and policies. "*Design professionals empower, encourage, and guide users to develop solutions for themselves. Co-design encourages the blurring of the role between user and designer, focusing on the process by which the design objective is created".*[16]

[16] http://www.seainsideproject.com/wp-content/uploads/2011/12/CoCreation_Sanders_Stappers_08_preprint.pdf accessed 06/03/13

As part of the collaborative industrial process that underpins this paper, a set of co-design processes could be initiated between end users, care organisations, researchers and manufactures to develop new products and services in the gaps between existing offerings.

Case study: co-design in assistive technology

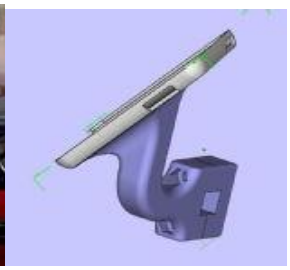
Engaging young people with assistive technologies using 3D printing technologies and computer aided design (CAD) software.

Students with learning difficulties and disabilities at Hereward College in Coventry have expert knowledge of disability and what assistance is needed by young people living with disability. This project is about enabling them to tailor the design of tools and accessories to their own requirements and to investigate how they can share their designs and expertise with the wider community. By providing this opportunity we aim to raise aspirations of Hereward students, as they are currently unlikely to go into STEM areas.

Initial WMG research & design work with Hereward College

Over the summer months, WMG worked with Hereward College to design and 3D print an iPhone mount with a bespoke attachment for a student's wheelchair. There are numerous different wheelchair designs and different users require items such as iPhones to be attached in different positions, so this work provided an excellent example of how 3D design and print can help to produce bespoke user solutions. The design and 3D print process can be seen below:

Assessing user needs



ing 3D CAD drawing

Printed iPhone mount in use

The wheelchair user was consulted regarding required position, angle and anchoring point for the iPhone mount. Photographs and measurements were taken and used to produce the 3D computer aided design of the iPhone mount ready for it to be 3D printed at WMG. The finished printed iPhone mount was delivered to Hereward College and installed on the student's wheelchair. The position and angle were correct and the product was left with the user for evaluation.

http://www2.warwick.ac.uk/services/academicoffice/ourservices/saro/wp/heat/stemprogramme/assistivetech/james_atkinson_-_academic_posterfinal.pdf

8 NEXT STEPS

The next step in the progress of the AT transformation agenda is to hold the first Industry Workshop in April 2014 to test industry responses to AT opportunities. Following this workshop, initial approaches to policy and program design will be developed. Further activities will include:

- gathering additional data about demand for AT
- investigating current and potential future gaps in the supply of AT product from the perspective of corporate buyers of AT
- further assessment of capabilities of local industry to participate in the AT value chain
- build the Demand/Supply/Capability matrix.

See Sections 4.1.1 and 4.1.2 for greater detail.

APPENDIX A: RESEARCH AND DEVELOPMENT OF AT PRODUCTS AND SERVICES

The significant interest in AT is indicated by the extent of research occurring around the world. There are based AT research centres at universities in Europe and the USA as well as several in Australia. These are typically focused on particular areas of AT usually at the more complex end of the spectrum.

In addition, government agencies have established organisation to promote the use of AT and international conferences are now common.

A number of the university research centres are also focused on industry development. An example is the Assistive Technologies Research Center, College of Engineering and Computer Science, Wright State University, Ohio, USA. One of the goals of ATRC is "conducting industrially relevant R&D and technology transfer and commercialization for creating economic development".

INTERNATIONAL UNIVERSITY BASED RESEARCH

ATRC Assistive Technologies Research Center, College of Engineering and Computer Science, Wright State University, Ohio, USA

The ATRC mission includes: (i) conducting cutting edge engineering-driven basic and applied research on devices, methodologies and technologies for enhancing assistive and diagnostic discoveries for people of disabilities and the elderly; (ii) promoting activities relevant to assistive technologies and discoveries; (iii) conducting industrially relevant R&D and technology transfer and commercialization for creating economic development.[17]

The Rehabilitation and Assistive Technology research group, University of Sheffield, Yorkshire, United Kingdom

The Rehabilitation and Assistive Technology (RAT) research group at the University of Sheffield is a multidisciplinary team researching the use of assistive technologies, and investigating the use of these technologies in prototype and practice.

Bath Institute of Medical Engineering

'Designability' is a national charity joining expertise and knowledge to enhance people's lives.

The BIME was established in 1968, with support from the University and local health board and now based in the Wolfson Centre at the Royal United Hospital, Bath. Although an independent body, the Institute has strong academic collaborations with the University of Bath.

- BIME has engineering and design experts with a passion for creating life-changing assistive technologies, conducting original research and developing commercial products, according to the following core themes:
    - Medical Engineering
    - Children's Mobility and Seating
    - Technology for People living with Cognitive Impairments and Dementia
    - Technology for the Ageing Population

[17] http://cecs.wright.edu/atrc/vision%20and%20mission%20objectives.html accessed 07/03/2014

BIME investigates areas of unmet need and applies research methodology to measure the outcomes and benefits of various interventions. Many of its projects are carried out with a multidisciplinary team of researchers. The Institute also works collaboratively with the best local and national academic healthcare partners.

Newcastle University: SALT - Designing Scalable Assistive Technologies and Services

This project brings together a strong consortium of academics, businesses, health and social care professionals, third sector organisations and user representatives to address challenges and opportunities in both economic and business models, to develop assistive technologies to promote independence for older people.

SALT's main objectives are to identify and develop new business models for scalable assistive technologies and services to promote sustainable market development for independent healthy living in the mixed digital economy; and to understand the factors that promote or inhibit the uptake, use and integration of assistive technologies for older people living in the community from a user-centred perspective.

UMass Boston and IBM Advance Technology Accessibility Research

The University of Massachusetts Boston (UMass Boston) and IBM (NYSE: IBM) has sponsored a new research initiative to advance accessible technology solutions for people with disabilities, the growing elderly population, those with low literacy and novice technology users.

IBM will provide access to technology and industry expertise to students, professors and researchers at UMass Boston's newly formed School for Global Inclusion and Social Development.

IBM and UMass Boston will work with state and federal government agencies as well as local and global non-governmental organizations to advocate for key policies and legislation related to technology accessibility. Additionally, the collaboration will explore new ways to integrate assistive technologies into the design of mobile devices, apps or websites that enable access for people with disabilities and improve the overall user experience.

OTHER AT RESEARCH / PROMOTION INITIATIVES

The Association for the Advancement of Assistive Technology in Europe

AAATE's mission is to stimulate the advancement of assistive technology for the benefit of people with disabilities, including elderly people, and is the interdisciplinary pan-European association devoted to all aspects of assistive technology, such as use, research, development, manufacture, supply, provision and policy. Over 250 members from all over Europe and throughout the world currently take part in the AAATE.[18]

Journal of Assistive Technologies

ISSN: 1754-9450

http://www.emeraldinsight.com/journals.htm?issn=1754-9450

DOCTRID Conference in Assistive Technologies for people with Autism and Intellectual Disability

The first structured research programme in Europe to develop Assistive Technologies for People with Autism and Intellectual Disability was launched 15 October 2013.

The ASSISTID EU Marie Curie COFUND programme will promote research into the development and application of assistive technologies for the practical benefit of carers and individuals to enhance the quality of life for people with intellectual disabilities.

---

18 http://www.aaate.net/about accessed 07/03/2014

A recent National Disability Authority Ireland (NDA) report states "*Assistive Technologies is centrally important for disability policy as it is one of the more concrete ways that the barriers to participation in society can be overcome for people with disabilities".*

Symposium: Global Challenges and Global Collaboration in Assistive Technologies, EU

Three key areas were explored in the course of the Symposium and Workshop:

1. Establishing and utilizing internationally-based collaborations to conduct Assistive Technology research using EU Horizon 2020 Funding instruments.

2. Creating a global Assistive Technologies consortium to access and utilize new European Union research and development funding to partner in collaborative research.

3. Maximizing the role of international Assistive Technologies R&D structures including DOCTRID and AAATE, the private sector, advocacy groups and charities to expand access to diverse networks, assess research initiatives for broader impact and advice on policy and new directions.

AUSTRALIAN UNIVERSITY-BASED AT RESEARCH AND OTHER ACTIVITIES

The Medical Device Research Institute, Flinders University

The Medical Device Research Institute (MDRI) is a multi-disciplinary research network that aims to be the national research leader in the medical devices industry. The MDRI is a network of researchers, highly skilled in the development and application of a diverse range of medical technologies. This collaborative approach to the research for innovative solutions and services makes the MDRI useful as a single site for product development and testing - taking projects from fundamental concepts through to preliminary clinical trialing.

The MDRI includes more than fifty researchers and clinicians from Flinders University, Flinders Medical Centre and the Repatriation General Hospital. The MDRI collaborates in research, development, application and commercialisation of medical devices and technologies.

Medical Device Partnering Program

The MDPP brings together industry, researchers, government and end-users to accelerate development of cutting edge medical devices. The MDPP coordinates the efforts of key stakeholders, focusing on problem-solving for clinicians, the ageing and the disabled. It provides a mechanism for the development of prototypes, proof of concept and/or commercialization planning for potential Australian medical device products.

The MDPP is explicitly an industry development initiative and states: *"Medical devices provide Australia with the opportunity to position itself in a growing global market, taking advantage of current research and manufacturing capability across the nation".* In 2013, the MDPP received triennial funding from DMITRE to facilitate the delivery of the Medical Technologies Program under the state's industry strategy, *Manufacturing Works.*

Assistive Technologies for Virtual Rehabilitation Engineering (ATVRE)

ATVRE aims to merge smart engineering and rehabilitation technologies to enable individuals with disabilities to perform functions that might otherwise be difficult or impossible. It brings a cross-disciplinary team of University of Sydney's senior key Researchers from multiple Faculties, together with a network of distinguished external associate investigators.

Assistive technologies for aged care, University of Southern Queensland

"Technologies are increasingly available but the challenge is getting those technologies into the hands of people who can benefit. We need quality research data to prove the benefit."

The focus is on alleviating falls, incontinence, social isolation and cognitive decline are significant issues for the elderly - about one third of people over the age of 65 have a fall once a year and that is often the trigger for people to end up in a nursing home.

Independent Living Centre NSW: The Economics of Assistive Technology - Health Economics

In 2006 the Fremantle Collaboration commissioned an investigation of the economic framework for people with a disability and the provision of specialist equipment for their needs. The Research Partnership Project is entitled '*Assistive Technology in Australia: Economic Analyses from a user standpoint – methodological implications*'. Independent Living Centres Australia, the National Council on Rehabilitation Engineering and Novita Tech are grant industry partners.

Papers were presented at two state-wide, four national and nine international conferences. Other outputs include publication of a book chapter, a number of refereed abstracts and a refereed journal article (in press). Key external links were established with Renzo Andrich of Don Gnocchi Foundation, Italy.

At its third research workshop the Fremantle Collaboration decided to change its name to Assistive Technology Collaboration and to establish a public website.

Articles and Papers:

- Assistive Technology - A part of the rehabilitation solution poster (PDF, 1Mb)
- Assistive Technology - A part of the rehabilitation solution abstract (PDF, 18Kb)
- Assistive Technology and Universal Design (PDF, 18Kb)
- Equipped for Living (PDF, 27Kb)
- Universal design: Is it accessible? (PDF, 22Kb)
- Using the ICF in economic analyses of Assistive Technology systems: Methodological implications of a user standpoint (PDF, 18kb).

APPENDIX B: A FULL SCHEDULE OF ASSISTIVE TECHNOLOGIES

A full schedule of assistive technologies according to ISO classification is given below with examples.

04 ASSISTIVE PRODUCTS FOR PERSONAL MEDICAL TREATMENT
04.33 Assistive products intended to manage tissue integrity (2440)
04.48 Equipment for movement, strength and balance training (1920)
04.24 Physical, physiological and biochemical test equipment and materials (694)
05 ASSISTIVE PRODUCTS FOR TRAINING IN SKILLS
05.03 Assistive products for communication therapy and communication training (288)
05.12 Assistive products for training in cognitive skills (244)
05.15 Assistive products for training in basic skills (216)
06 ORTHOSES AND PROSTHESES
06.12 Lower limb orthoses (1327)
06.24 Lower limb prostheses (886)
06.06 Upper limb orthoses (836)
09 ASSISTIVE PRODUCTS FOR PERSONAL CARE AND PROTECTION
09.33 Assistive products for washing, bathing and showering (4036)
09.12 Assistive products for toileting (2448)
09.03 Clothes and shoes (2059)
12 ASSISTIVE PRODUCTS FOR PERSONAL MOBILITY
12.22 Manual wheelchairs (2607)
12.23 Powered wheelchairs (2020)
12.36 Assistive products for lifting persons (1879)
15 ASSISTIVE PRODUCTS FOR HOUSEKEEPING
15.09 Assistive products for eating and drinking (1460)
15.03 Assistive products for preparing food and drink (691)
15.15 Assistive products for making and maintaining textiles (301)
18 FURNISHINGS AND ADAPTATIONS TO HOMES AND OTHER PREMISES
18.12 Beds (3347)
18.09 Sitting furniture (2257)
18.18 Supporting handrails and grab bars (2113)
22 ASSISTIVE PRODUCTS FOR COMMUNICATION AND INFORMATION
22.27 Assistive products for alarming, indicating, reminding and signalling (2391)
22.03 Assistive products for seeing (1552)
22.36 Input devices for computers (1443)
24 ASSISTIVE PRODUCTS FOR HANDLING OBJECTS AND DEVICES
24.18 Assistive products to assist or replace arm function, hand function, finger function or a combination of these functions (860)
24.09 Assistive products for operating and controlling devices (807)
24.13 Assistive products for controlling from a distance (363)
27 ASSISTIVE PRODUCTS FOR ENVIRONMENTAL IMPROVEMENT AND ASSESSMENT
27.06 Measuring instruments (109)
27.03 Assistive products for environmental improvement (56)
28 ASSISTIVE PRODUCTS FOR EMPLOYMENT AND VOCATIONAL TRAINING
28.03 Workplace furniture and furnishing elements (739)
28.15 Machines and tools for use in the workplace (247)
28.06 Assistive products for transporting objects in the workplace (137)
30 ASSISTIVE PRODUCTS FOR RECREATION
30.03 Assistive products for play (1559)
30.09 Assistive products for sports (280)
30.12 Assistive products for playing and composing music (201)