AUSTRALIAN WORKPLACE INNOVATION AND SOCIAL RESEARCH CENTRE

THE UNIVERSITY of ADELAIDE

# Assistive Technologies
## Case studies into South Australian Automotive supplier readiness

A collaborative project between the Stretton Centre, the Australian Workplace Innovation and Social Research Centre, DMITRE and Fraunhofer Gesellschaft
November 2013

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# 1 BACKGROUND

This Assistive Technologies Industry Mapping and Opportunities proposal has arisen from shared interest in the industry and workforce development potential of growth in the demand for Assistive Technologies (AT) in Australia and overseas. The Stretton Centre has identified AT as an area of priority and seeks to enter into a collaboration with the South Australian Government 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 proposal for the 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 will be targeted to problem solving in SA Health.

The focus on Assistive Technology industry development opportunities aligns with the imperative of industrial diversification in the light of the decline of the automotive industry as an employer in Northern Adelaide, 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' realistic.

The Stretton Centre is being established in the City of Playford to work on industry and workforce transitions in the region. There is potential to use the Centre, which is being funded under the Commonwealth's Suburban Jobs Program, to leverage academic resources through business internships to assist the industrial rejuvenation of the region. The opportunities to promote the transition of Northern Adelaide's manufacturing and services businesses to utilise their existing capabilities (and to develop new ones) in emerging product and market segments can be enhanced through such capstone projects.

Postgraduate students and post-doctoral fellows from areas such as Engineering and the Institute of Photonics and Advanced Sensing can be embedded in companies to work on problem-solving projects that might enhance the design or functional qualities of their products, take out production costs, enhance local supply chain efficiency, and so forth. The Stretton Centre could provide the strong connectivity required for the success of such projects, which must combine technically excellent research with commercial relevance.

The prospects for success of these various efforts will be maximised by aligning them into a coherent medium term plan, and a cooperative relationship between DMITRE WISeR, the Stretton Centre and Fraunhofer Gesellschaft, which is the purpose of the proposal.

Key elements that WISeR is capable of contributing to such a joint project include:

- A high level of rigour in economic and industry and labour market analysis.
- Extensive local linkages with industry, government and the university sector.
- Access to technical and scientific excellence and mission-based research of The University of Adelaide's Engineering faculty and leading edge institutes such as the Institute for Photonics and Advanced Sensing, and the Institute for Minerals and Energy Resources.
- The resources and expertise of the Stretton Centre as an applied research and development body with a focus on industrial transition.

## 1.1 Broad context

The significance of technology and innovation in health care provision and health care markets has been widely recognised for a long time, if less widely understood in its technical or economic aspects. 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 attention to assistive technology in the health system and more broadly, as the basis for productivity improvement in the delivery of expensive key services, as well as for the quality of life and dignity of the aged.

A trend strongly correlated to population ageing and rising health care expenditures is rising disability rates. Disability rates are rising in tandem with the ageing population. At the same time, the focus is also growing on the cohort of the population whose disability is the result of birth or mishap, rather than ageing per se, as evidenced in Australia in the Disability Care Australia initiative.

But the relationship of health care, population ageing and rising disability is not just one of powerful demographic shifts; there is also a very strong (and increasing) common relationship between the technologies and treatments deployed across health, ageing and disability, and a common drive to use technology to contain costs and improve outcomes.

## 1.2 What are Assistive Technologies?

Assistive Technologies (AT) are defined as devices that enable individuals to perform tasks they would otherwise be unable to, on account 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:[13]

- 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
- Integrated systems (smart homes, etc.).

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

## 1.3 Trends at a glance

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

[13] 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.

the cost of healthcare[14]. The ABS estimates that by 2050 those aged 65 or over will comprise nearly one-quarter of the population[15].

Definitions of disability in Australia vary, and those variations affect estimates of the relevant cohorts. The ABS definition of disability[16] provides a cohort of 680,000, whilst the Productivity Commission inquiry used a definition providing an estimated cohort of 411,000[17]. 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 million18. 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[19].

## 1.4 Role of technology

In Europe and the UK particularly, there is an evident emphasis on the growing importance of technology 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[20]. 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, both traditional and emerging cutting edge.

Australia stands in many ways in contrast to this international picture. 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

[14] MTAA
[15] ABS Australian Social Trends, 2012
[16] ABS Survey of Disability, Ageing and Carers, 2009
[17] Productivity Commission, Disability and Support, 2011
[18] EC, Analysis of the Assistive Technologies Information and Communications Technologies Industry in Europe
[19] UK Department of Health, Research and Development Work Relating to Assistive Technology. 2013
[20] Building Britain's Future: New Industry, New Jobs, April 2009, pp. 24, 32.

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 this area, but it is still bundled up amongst a range of other technologies and applications, and so 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., deploying the complementary skills sets of the contracting auto industry), leveraging the demand-pull of public procurement, dedicated national institutions and networks, etc.[21].

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[22].

But the fact remains that there is no comprehensive national strategy or approach to the use of this large and growing area of demand to identify opportunities for local industry development.

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

There are opportunities to carefully target and lead local industry and business development to this demand growth along selected (not all) parts of the Assistive Technologies value chain. The growth in demand for, and output of assistive technologies 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[23].

[21] MTAA Building a Sustainable Australian Medical Technology Industry, March 2012, and 'New Focus to Achieve Our Potential in Medtech' ATSE Focus, February 2013

[22] ATSE, 'Australia needs a healthcare "assistive technology" network', media release, 1 November 2012.

[23] ABS Survey of Disability, Ageing and Carers, 2009

Assistive technologies include market segments that are precisely the type of advanced manufacturing activity that should be targeted for achievement of positions of 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 national income grows. Demand for them is less sensitive to increases in price, and they embody competitive strengths beyond solely cost-price based models. They are prime facie suited to high-wage, high cost economies such as Australia.

Furthermore, the technical characteristics of production of many segments within assistive technologies do not necessarily require immense scale to achieve competiveness. Many new technological applications, such as subtractive and additive manufacturing, will 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 absorptive 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);
- 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[24], 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, and the development of the Tonsley Park precinct.

# 3 Case studies into South Australian Automotive supply chain readiness – supporting Assistive technology advanced Manufacturing

South Australia is a key participant of the automotive industry within Australia. In 2013 the tier 1 supplier community, which is made up of 33 SME's, contributed over A$1.1Bn in total revenue. The lower tiers in this supply network result in over 700 further companies being engaged.

Supply chains, as described above, can take many years to develop and many of the 33 companies have evolved their supply chain value over 20 or more years.

It is clear that this inherent value in terms of experience and knowledge built up over time is of enormous importance.

[24] 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.

It is often stated (but rarely verified) that the value and skill that exists within the automotive supply network has spill over benefits or is transferable across other industries.

This study sets out to specifically identify the readiness of the automotive supplier community to support future assistive technology industries.

Five current South Australian automotive suppliers of varying size, scale, locations, specialisations and ownerships were selected to make up the study sample set.

These companies were interviewed with the specific intent of determining what capability gaps exist and therefore need to be closed to enable active participation within a future assistive technologies industry.

A 'whole of business' approach was taken which included everything from investment risk appetite to quality certifications and process readiness.

It is clear that the scope of AT product is very broad – ranging from relatively simple products such as handrails to higher complexity products such as remote monitoring implantable medical devices. For this reason the case study separates the level of complexity into Simple AT and Complex AT as the gaps and challenges differ considerably between the two.

# 4 Case Study Method

## 4.1 Composition of company sample set:

Five companies with the following cross section of characteristics formed the sample set:

**Company 1:** Core competencies in high volume plastic product manufacturing, 100 employees, medium level of reliance on the automotive sector and a diversified customer base. Low levels of R&D. Predominately a TIER 1 supplier with Australian ownership and decision-making, approximately A$30M turnover.

**Company 2:** Core competencies in high quality CNC machining, tooling, plastics injection moulding, low - medium level of reliance on the automotive sector. The company is very active with multiple joint ventures and technical partnerships and a medium level of diversification. Multi site operations, South Australian ownership and revenues of approximately A$15M and 65 employees.

**Company 3:** Core competencies in engineered steel fabricated products requiring high levels of testing and validation. Supplying a large variety of product variants via an established distribution network including OEM and aftermarket. South Australian owned and managed employing approximately 50 people. Low reliance on automotive sector and with a strong focus on sales and marketing methodologies. Australian owned and managed.

**Company 4:** Part of US based global automotive group with core competencies in steel fabrication, welding and precision CNC processes. Exhibiting traditional high volume capital-intensive manufacturing operations. Supporting 550 employees and multisite operations. A$150M revenues p/a and a strong reliance on the automotive sector, but also possessing a successful aftermarket business model.

**Company 5:** Part of an Asian global automotive group with core competencies in engineered plastic product manufacturing. Highly competent engineering and R&D and advanced manufacturing systems. Exporter, focussed on high levels of innovation and value add. Strong ties with research institutions and international technical partnerships. Employing approximately 600 people and revenues of approximately A$120M.

## 4.2 COMPOSITION OF CASE STUDY

The individual case studies were based on face-to-face interviews with CEO's / senior management of each company and included factory and facility tours.

Broadly, the objective of the case study was to highlight potential strengths and weaknesses within the companies when considering participation in the future assistive technologies industry.

Therefore, a cross section of the entire business system needed to be taken. Top-level list of Critical Success Factors (CSF) where generated and then cascaded down to a more detailed CSF subcategory list shown in Table 2 below.

**TABLE 2: CSF CATEGORIES AND SUBCATEGORY SUMMARY**

| | |
|---|---|
| **Finance and cash** | |
| **Finance** | *Financial risk appetite* |
| | *Finance: Ability to support start up.* |
| | *Financial controls* |
| | *Financial business planning* |
| | *Ability to invest* |
| **Banking** | *Banking: value adding relationship* |
| | *Banking: Supportive (reactive / proactive)* |
| **Risk** | *Risk: Strategies for management* |
| **Cash management** | *Cash management* |
| **Strategic focus** | |
| **Strategy capability** | *Strategic planning* |
| | *Strategic deployment* |
| **Engineering and project management** | |
| **Project management (PM)** | *PM: Full service provider* |
| | *PM: system adaptability to AT* |
| | *PM: Delivery of projects outside of Automotive* |
| **Quality systems/ certifications** | *Quality: AS13845 / other* |
| | *Quality: systems implementation* |
| | *Quality: Unique systems* |
| | *Quality: International (eg CE /FDA)* |
| **Engineering** | *Eng: Ability to support AT engineering* |
| | *Eng: Product testing and validation* |
| | *Eng: CAD and design strength to support development* |
| | *Eng: Design strength* |
| | *Eng: Software* |
| **R&D** | *R&D: partnerships and development* |
| | *R&D: value add* |
| **Materials** | *Materials: Advanced materials knowledge* |
| | *Materials: Basic materials knowledge* |

| | |
|---|---|
| **Stakeholder relationships** | |
| **Universities** | *Uni: relationship* |
| | *Uni: Access to technology* |
| **Board / owners** | *Seeking growth / expansion* |
| | *Supportive of new opportunities* |
| | *Local / national / global decision making?* |
| **People / HR** | *Management adapability* |
| | *Management capability* |
| | *Management attitude* |
| | *understanding of future training and development requirements* |
| | *High performing workplace* |
| **Unions** | *Do you see any barriers associated with Unions?* |
| **International business** | *Relationships with international offices or partners.* |
| **Technical partnerships** | *Relevant technical partnerships* |
| **Networks** | *Relevant networks or participation* |
| **Supplier Chain and distribution** | |
| **Supply chain and Distribution** | *Supply Chain: competency* |
| | *Distribution capability* |
| | *Supply chain: partnerships and relationship* |
| | *Supply chain: Access to proven low cost country supply base?* |
| **Sales and Marketing (S&M)** | |
| **Sales and Marketing (S&M)** | *S&M: Value adding skill* |
| | *S&M: Existing strengths in this area? Outside of current markets?* |
| | *S&M: Local, national, international market access and knowledge* |
| | *S&M: Marketing techniques and active use of known process in this space?* |
| | *S&M: Knowledge of 'valley of death'* |
| **Safety / Environment and workplace readiness** | |
| **Compliance** | *Compliance: Evolving / static* |
| **Plant and operations** | |
| **Processes** | *Plant engineering and design* |
| | *Process development?* |
| | *Inhouse automation skill (or outsource if so who?)* |
| | *New process development* |
| **Continuous improvement** | *Lean systems development* |
| **Core process knowledge** | *Advanced assembly* |
| | *Manufacturing engineering* |
| | *High volume / low volume assembly* |
| | *Electronics* |
| | *Robotics* |
| | *3D prototyping* |
| | *CNC or other computer based equipment* |
| | *Other special purpose knowledge* |
| **Plant capital** | *Own , lease, condition* |
| | *Expand - contract or greenfield (interested in Greenfield?)* |

*More detailed CSF definitions can be found in appendix B*

## 4.3 Case study analysis

During the interview process a readiness rating from 1 to 5 (1 = low / poor / no, 5 = high / strong / yes) was allocated for each of the CSF subcategories. Following the completion of all interviews the ratings were moderated for consistency purposes.

The lower the score, either individually or when consolidated, the bigger the gap that exists for the company(s) to be able to support future assistive technologies.

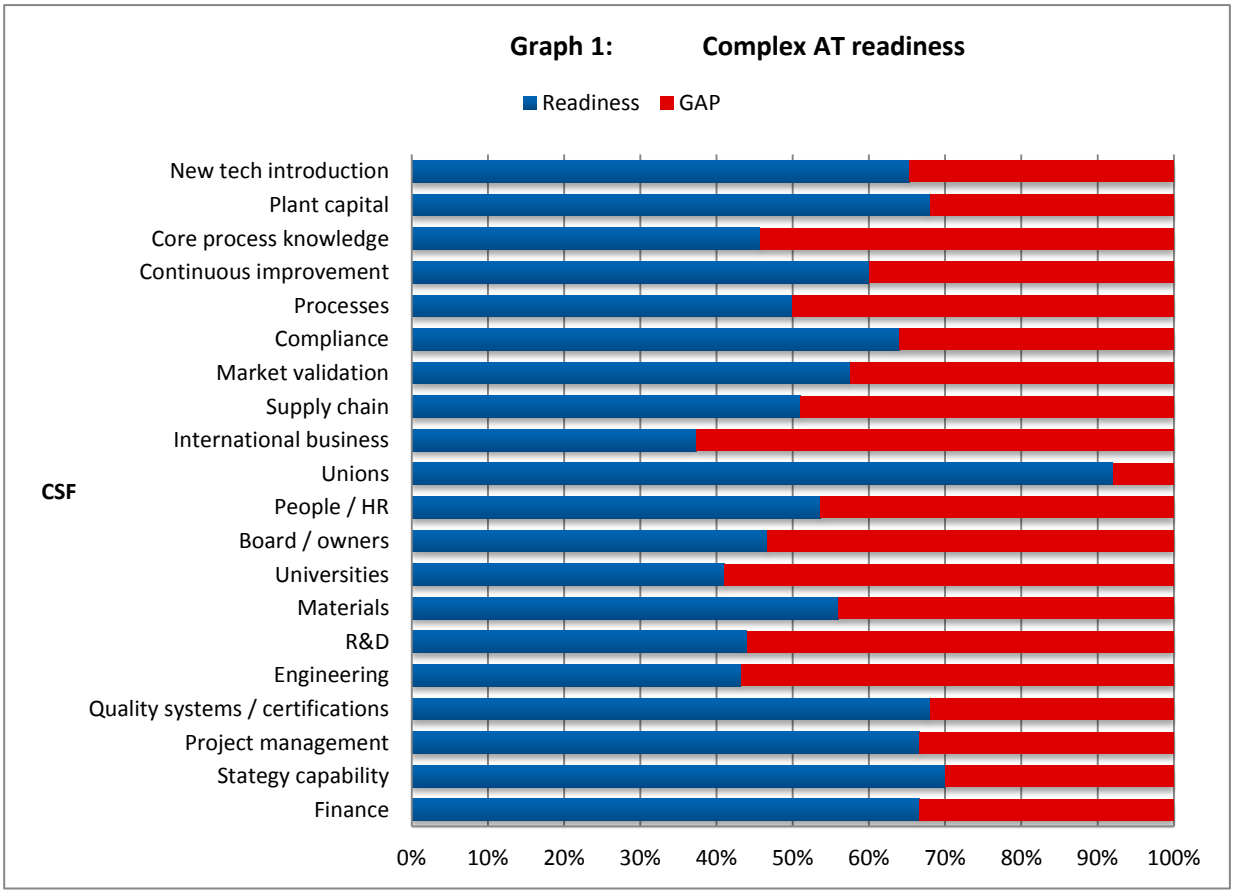
This method was used for both complex AT and simple AT product groups.

# 5 Case Study Macro Findings – **Complex** Assistive Technologies

## 5.1 Critical success factors (CSF) gap analysis for COMPLEX Assistive Technologies.

It is evident that there is a considerable increase in capability required to support complex AT and this alone makes up the key initial finding. Complex AT requires capabilities that in some cases do not exist at all in the companies interviewed. Examples such as computer devices for speech training, devices for urine analysis or any implantable devices would fall into this category.

**Graph 1: Consolidated CSF readiness by core business discipline for complex AT**




*(note: please refer to subcategory CSF for more detailed interpretation)*

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. Only 1 company interviewed exhibited sufficient levels of readiness at a macro level, but a more detailed review of the CSF subcategory level shows core capability gaps within that company (refer table 4)

## 5.2 Explanation of top 5 sub category strength areas (complex AT)

**Union barriers**

Sometimes an area requiring close management, all companies interviewed expressed very little concern in the area of union support and engagement.

**Quality systems**

The 'process driven' nature of all companies who successfully supply to automotive OEM's means that an inherent ability exists to manage alternative quality systems. All companies within the sample demonstrated success in this space and several already have implemented systems in support of future medical based product requirements.

**Cash Management**

Automotive companies generally ensure tight controls relating to cash management and should be seen as strength in terms of future management of new project developments. The flip side of this is a likely future decline in automotive volumes will place additional pressure on company cash position and therefore potentially threaten the security of AT project implementation.

**Management attitude**

All companies expressed strong desire and a positive outlook for a future AT industry. Senior management recognition around the economic drivers (e.g. an ageing population) coupled with diversification objectives meant that overall supporting attitude is evident.

**Marketing knowledge – 'valley of death'**

In general all participants highlighted the concern around funding new developments. Whilst in itself finding cash through the development cycle is an overall concern for AT projects, companies all had a strong appreciation of this possible consequence. This recognition is seen as a strength as the 'valley of death' dilemma is a very real problem for new technology introduction and will need to be addressed with absolute resolve.

**Financial controls**

Although the study did not specifically review the control mechanism in place, it was clear that all companies had a disciplined approach to the finance systems within the business. Cost controls, reporting, KPI's all appeared to be managed to a high standard.

**TABLE 3: THE TOP 10 IDENTIFIED STRENGTH AREAS AT THE CSF SUBCATEGORY LEVEL IN SUPPORTING COMPLEX AT ARE AS FOLLOWS *(MINOR GAP = >75% CAPABILITY, GAP = 50 -75% CAPABILITY, LARGE GAP = <50% CAPABILITY):***

| | |
|---|---|
| *Do you see any barriers associated with Unions?* | Minor GAP |
| *Quality: systems implementation* | Minor GAP |
| *Cash management* | Minor GAP |
| *Management attitude* | Minor GAP |
| *S&M: Knowledge of 'valley of death'* | Minor GAP |
| *Financial controls* | Minor GAP |
| *Strategic planning* | Minor GAP |
| *Seeking growth / expansion* | GAP |
| *PM: Full service provider* | GAP |
| *Financial risk appetite* | GAP |

*Refer appendix C complete list of all subcategory ratings*

## 5.3 EXPLANATION OF TOP 5 SUB CATEGORY GAP AREAS (COMPLEX AT)

**Software design / development**

It is overwhelmingly evident that within the companies interviewed and most likely the broader supply network that software design does not exist in-house. Whilst one organisation identified current software partner based in Victoria this area forms the weakest element. The lack of software development would mean JV's or other commercial arrangements will be required to support complex AT. Technologies such as cognitive skills would not be able to be supported without considerable improvement.

**Understanding future training requirements**

It is evident that little knowledge or attention is being paid to up skilling the workforce to accommodate future digital, electronic or other technological advancements in a controlled and planned manner.

**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 support this area. High complexity electronics associated with devices such as remote movement and control mechanisms would be difficult to support without developing technical partnerships.

**Relationships with international offices or partners**

To support advanced development of product or processes it is extremely beneficial to have value adding international connections. Of the Australian owned companies there was minimal international participation, and the globally owned entities are likely to have their own connections and therefore required to be used by the Australian sites. Given that the global companies are automotive focussed this makes it difficult environment for the Australian operations to focus attention to complex AT activities.

**Relevant networks and participation**

Two companies had formed beneficial alliances with relevant networks, however it was identified that the level of this participation was likely be below that needed for complex AT.

**Additive manufacturing / 3D printing**

There is a reasonable level of 3D printing using older technology however not generally for production purposes. Prototyping capability would be considered to be strong, yet the level of additive manufacturing engagement and skill needed to rise to a level 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.

**TABLE 4: TOP 10 IDENTIFIED GAPS IN CSF SUBCATEGORY LEVEL SUPPORTING COMPLEX AT *(MINOR GAP = >75% CAPABILITY, GAP = 50 -75% CAPABILITY, LARGE GAP = <50% CAPABILITY):***

| | |
|---|---|
| Eng: Software | Large GAP |
| understanding of future training and development requirements | Large GAP |
| Electronics | Large GAP |
| Relevant networks or participation | Large GAP |
| 3D prototyping | Large GAP |
| Relationships with international offices or partners. | Large GAP |
| Eng: Design strength | Large GAP |
| Relevant technical partnerships | Large GAP |
| Advanced assembly | Large GAP |
| Uni: Access to technology | Large GAP |

*Refer appendix C complete list of all subcategory ratings.*

# 6 CASE STUDY MACRO FINDINGS – **SIMPLE** ASSISTIVE TECHNOLOGIES

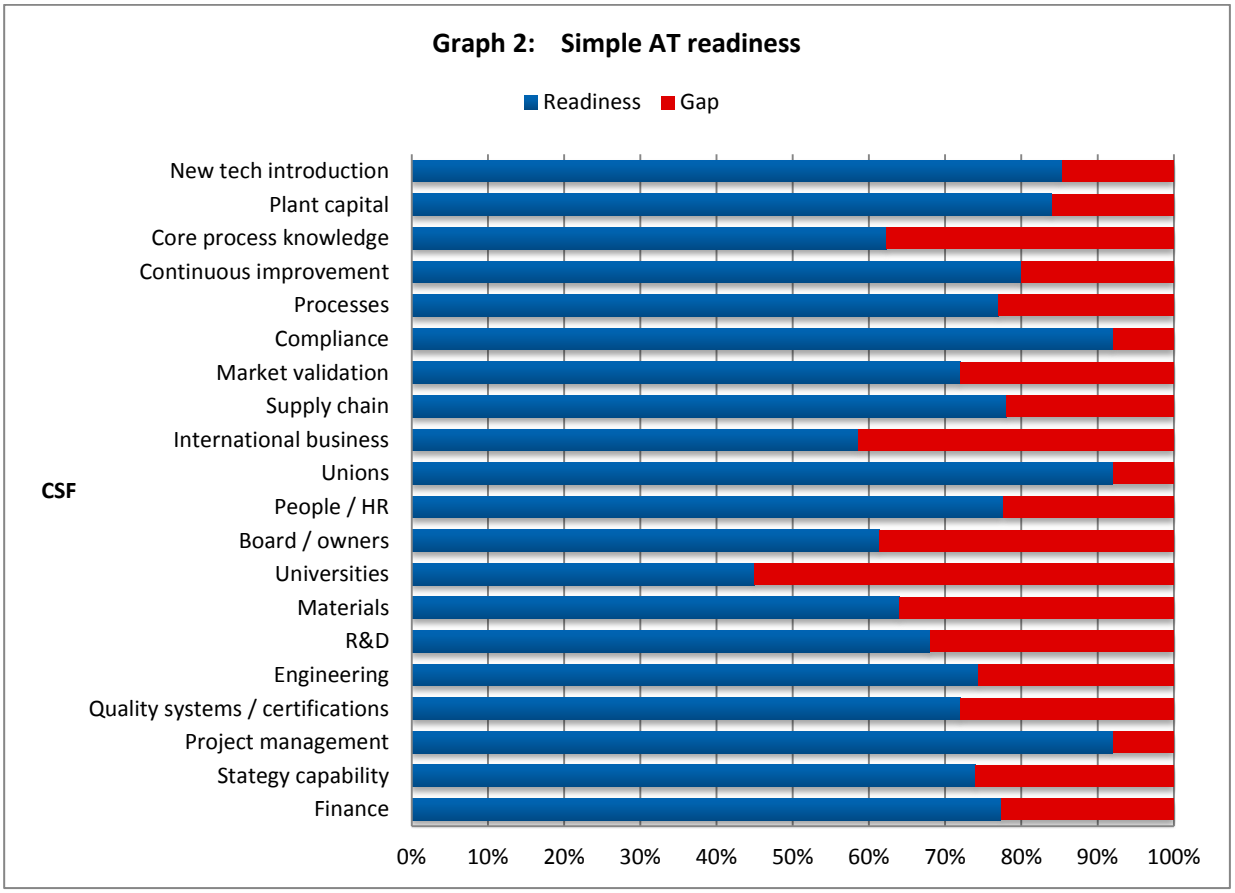
## 6.1 CRITICAL SUCCESS FACTORS (CSF) GAP ANALYSIS FOR SIMPLE ASSISTIVE TECHNOLOGIES.

Overall readiness to support the broad category of Simple AT is at a reasonable level. 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.

By nature, these types of product may therefore be lower value adding than complex AT, and broadly less suited to a high cost manufacturing environment, however the opportunity to take advantage of the well developed business systems that drive high levels of efficiency suggest this is an area of opportunity.

Graph 2 shows weaknesses in university engagement, international relationships and perhaps some risk that the decision makers for the globally owned companies may be apprehensive to enter into non-automotive markets. However the strong project management skills and somewhat similar levels of product complexity suggest reasonable capability alignment.

GRAPH 2: CONSOLIDATED CSF READINESS BY CORE BUSINESS DISCIPLINE FOR SIMPLE AT




*(note: please refer to subcategory CSF for more detailed interpretation)*

## 6.2 EXPLANATION OF TOP 5 SUB CATEGORY **STRENGTH** AREAS (SIMPLE AT)

**Simple AT engineering**

A key strength associated with the automotive supplier base is general mechanical engineering capability. High levels of practical skill and knowledge can be assumed. The transition from engineered steel automotive components to steel fabricated simple AT items such as handrails, wheel chairs (manual or electric) and other mobility devices would be relatively easy.

Engineering systems such as CAD, Finite Element Analysis, testing and validation would support this area seamlessly.

Other plastics based simple AT such as devices for grasping, push buttons and devices for preparing and serving food would also be well supported. *(refer to appendix D for example items)*

**Project management systems**

Robust and proven world-class project management systems are world-class within the automotive sector. All companies interviewed showed long term and high levels of experience in this discipline.

**Quality systems**

As explained with complex AT section of this report the 'process driven' nature of all companies who successfully supply to automotive OEM's means that an inherent ability exists to manage alternative quality systems. All companies within the sample demonstrated success in this space and several already have implemented systems in support of future medical based product requirements.

**Seeking growth / expansion**

This area of AT was attractive to all companies interviewed. Less complexity and change for the business means that product and process development lead times are less likely to be competitive.

**Management attitude**

Similar to the complex AT section of this report all companies expressed strong desire and a positive outlook for a future AT industry. Senior management recognition of the economic drivers (e.g. an ageing population) coupled with diversification objectives meant that overall supporting attitude is evident. The product definitions examined within the simple AT sector were considerably more appealing than complex AT.

**TABLE 5: TOP 10 STRENGTH AREAS AT THE CSF SUBCATEGORY LEVEL IN SUPPORTING SIMPLE AT *(MINOR GAP = >75% CAPABILITY, GAP = 50 -75% CAPABILITY, LARGE GAP = <50% CAPABILITY):***

| | |
|---|---|
| *Eng: Ability to support AT engineering* | Minor GAP |
| *PM: system adaptability to AT* | Minor GAP |
| *Seeking growth/ expansion* | Minor GAP |
| *Management attitude* | Minor GAP |
| *Quality: systems implementation* | Minor GAP |
| *Supply chain: Access to proven low cost country supply base?* | Minor GAP |
| *Evolving/ static* | Minor GAP |
| *PM: Full service provider* | Minor GAP |
| *S&M: Knowledge of 'valley of death'* | Minor GAP |
| *Cash management* | Minor GAP |

*Refer appendix C complete list of all subcategory ratings*

## 6.3 EXPLANATION OF TOP 5 SUB CATEGORY **GAP** AREAS (SIMPLE AT)

**University: Access to technology**

An expanded capability network, which can be achieved through engagement with Universities, is minimal within the sample. Whilst there is one standout example, the remaining are not accessing technology or skill at universities that may assist with understanding an array of challenges such as:

- New materials knowledge
- Advanced testing
- Access to unique and specialised equipment.
- Simulation technology.

**University relationship**

Whilst there is recognition of the value of sustaining a mutual relationship with the educational sector, in practice the application is low. This is detrimental to innovation, limits skill sharing, problem solving and slows new product and process development.

**Relationships with international offices or partners**
*Refer complex AT*

**Software**

*Refer complex AT*

**Electronics**

*Refer complex AT*

In addition, many simple AT product such as a powered wheel chair, which is likely to be using low voltage technology, modern battery development and smart electronic control systems present a challenge for the individual companies.

**TABLE 6: TOP 10 IDENTIFIED GAPS IN CSF SUBCATEGORY LEVEL SUPPORTING SIMPLE AT *(MINOR GAP = >75% CAPABILITY, GAP = 50 -75% CAPABILITY, LARGE GAP = <50% CAPABILITY):***

| | |
|---|---|
| *Eng: Software* | Large GAP |
| *Electronics* | Large GAP |
| *Relationships with international offices or partners.* | Large GAP |
| *Uni: Access to technology* | Large GAP |
| *Uni: relationships* | Large GAP |
| *Quality: International (eg CE/FDA)* | Large GAP |
| *understanding of future training and development requirements* | GAP |
| *S&M: Local, national, international market access and knowledge* | GAP |
| *S&M: Existing strengths in this area? Outside of current markets?* | GAP |
| *3D prototyping* | GAP |

*Refer appendix C complete list of all subcategory ratings*

# 7 CASE STUDY SUMMARY

Overall it is clear opportunity exists for the automotive supply base to participate in the manufacturing of assistive product and technologies.

However, the majority of suppliers have a current capability level that is more aligned to simple assistive technologies. This means that these products are lower value adding, and therefore less suited to high cost manufacturing environments.

Many very simple assistive products (handrails, walking frames) could seamlessly integrate into the current supply base, however these types of products would be more suited to low cost country manufacture.

The challenge facing the automotive supplier community is how to participate in the assistive technology industry at a level of value adding well above current general product lines.

In order to successfully participate at the higher end of complexity, many companies will be required to access additional capabilities via joint ventures, technical partnership and/or through mergers and acquisitions.

This broader local capability network is needed to overcome the capability gaps in reasonable time.

Overall, most automotive suppliers do not have a distribution network that would enable access to assistive technology markets. As such there are multiple participation paths that could be taken. One option is to simply view these companies as possible subcontract manufacturers for new assistive technologies lead companies, or the second option is to create their own new companies to capitalise on this opportunity.

Option one is the most likely option that will be taken by the automotive supply community in the shorter term.

It is evident that for some individual companies closing the gaps will not occur due to difficulty, money and time. It should be recognised of the 33 Tier one suppliers currently participating in the automotive sector less than 25% of them presently exhibit enough criteria to even be considered for future AT industry [25]. This finding is further supported by this study as only 1 of the 5 companies interviewed demonstrated sufficient capability to support complex AT products, whilst the remainder showed varying capability that with some improvement may be able support simple AT.

Detailed below in 7.1 is further classification of how the abovementioned issue may be addressed

## 7.1 Three part Plan for assistive technology industry manufacture

**Very Simple Assistive Technologies**

Definition: Low 'value add' opportunity, low margin, labour content and company operating overhead costs erode margin if manufactured locally.

Approach: Local project management, design using local skill, manufacture in low cost country

Timing: Short term.

**Medium and Complex Assistive Technologies**

Definition: Value adding opportunity and additional feature content. Good margins. Good opportunity for automation. Sound materials knowledge and may require access to or generates IP. Labour content and company overheads at full cost don't impact good margin potential. Requires multiple manufacturing disciplines to succeed.

Approach: Design locally through partnerships and manufacture locally with local JV technical partnerships. Broader industry engagements required, such as medical device and electronics partnerships. Beginning of improved engagement with universities.

Timing: Short – medium term

**Very complex assistive technologies**

Definition: Leading edge technology encompassing advanced design, materials, software and hardware with high regulatory and specification requirements. Superior skill in digital and simulation technology. Medical devices and other implantable product requiring a cleanroom environment and in touch with

[25] DMITRE Automotive supplier mapping 2013

| | |
|---|---|
| | new ground breaking developments. Opportunity for service based businesses. |
| Approach | New company creation and new investment activity. Design locally and internationally. High-level, formal, technical research partnerships, JV's with local and international partners. Focus on high level industrial design support. |
| Timing: | Medium to long term |

Further analysis of assistive technologies is required to clearly identify the types of products and services that fall into the above 3 areas.

## 7.2 Targeted opportunity – Medium to Complex AT

When taking into account all elements of this study and aligning this with the Three Part Plan discussed in 7.1 a very practical targeted approach could be taken to introduce some automotive component manufacturers to assistive living technology advanced manufacturing opportunity.

A suggested approach is as follows:

- Establish and lock in State or Federal Government policy for assistive technology industry development.
- Match AT product groups with capability amongst the supply base.
- Establish a small cluster group focussed on progressing the product opportunity with interested parties in a project based manner with:
    - Medical partners
    - Industry partners (manufacturing, sales and marketing)
    - Project management
    - Design partners
    - International excellence contacts.
- Close gap areas via managed engagement with technical partners, universities and investors.
- Identify signature projects starting with Mobility and other devices with 'Medium and complex assistive technologies'.
- Over a period of 5 years initially continue to provide ongoing partnerships and collaborations to ensure sustained AT development within the automotive community.

## 7.3 Targeted opportuinity – Very complex AT

Planning for the development of local advanced manufacturing opportunity to support **very complex AT** will require broad cross industry engagement. The gap that exists between most current local automotive suppliers and the requirements for very complex AT is deemed to be too large to ensure success. Therefore it is recommended that a 'new company' project based strategy be developed and the strengths found within the automotive sector to be relied upon for selected design and manufacturing requirements.

In order to facilitate an holistic and well considered approach to this element of AT additional ingredients are suggested such as:

- High-level leadership team with international perspective and cross-functional skill set and experience with new company and industry development.
- Create a project-based agenda targeting specific very complex AT areas.
    - Detailed market validation to highlight global opportunity areas is essential.

- Identify advanced manufacturing technical requirements and commence skills training in key weakness areas. Encourage international placements.
- Identify manufacturing capability gaps and prepare roadmap for implementation of new technologies.
- Establish joint venture or technical partnerships with international medical device companies and identify 'very complex AT' and engage appropriate high performing local company as partners.
- Cluster team should also encompass new generation industrial design aspects that will help drive product innovation and differentiation.

## 7.4 Summary Conclusions

It is certainly apparent that the automotive supplier community is abundant with broad skills and capability. However, direct alignment of to AT technology advanced manufacturing is complicated by key factors including:

1. High cost manufacturing environment is more suited to complex AT and very complex AT – yet the automotive supplier community is mostly more appropriately aligned (currently) to simple to medium complexity AT outcomes. Unless this changes potential margins may be too low to justify investment.
2. Strengths identified within the automotive supplier community in 'business systems' overall are promising, however the benefits of these strengths are likely to be offset in the shorter term due to the larger gaps identified in providing tangible high tech advanced manufacturing solutions.
3. A broader network of capability (outside of automotive) will be required to accelerate achievement, close the gaps and complement the automotive supply base skills.
4. Internationally owned and managed automotive suppliers with operations located in South Australia are likely to find investment in non automotive business opportunities more difficult than locally owned.
5. Locally owned and managed automotive supplier will respond to new AT advanced manufacturing opportunities, however investment of significance will challenge risk appetite.
6. A large misalignment exists in plant and equipment 'quality' and the higher expectations associated with advanced high tech manufacturing. It is therefore envisaged that a 'greenfield' approach will in many cases be required to meet the expectation of future AT customers. This therefore will result in higher investment demands.

# APPENDIX A – ASSISTIVE PRODUCTS

04 ASSISTIVE PRODUCTS FOR PERSONAL MEDICAL TREATMENT

For instance:

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)

06 ORTHOSES AND PROSTHESES

For instance:

06.12 Lower limb orthoses (1327)

06.24 Lower limb prostheses (886)

06.06 Upper limb orthoses (836)

12 ASSISTIVE PRODUCTS FOR PERSONAL MOBILITY

For instance:

12.22 Manual wheelchairs (2607)

12.23 Powered wheelchairs (2020)

12.36 Assistive products for lifting persons (1879)

18 FURNISHINGS AND ADAPTATIONS TO HOMES AND OTHER PREMISES

For instance:

18.12 Beds (3347)

18.09 Sitting furniture (2257)

18.18 Supporting handrails and grab bars (2113)

24 ASSISTIVE PRODUCTS FOR HANDLING OBJECTS AND DEVICES

For instance:

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)

28 ASSISTIVE PRODUCTS FOR EMPLOYMENT AND VOCATIONAL TRAINING

For instance:

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)

05 ASSISTIVE PRODUCTS FOR TRAINING IN SKILLS

For instance:

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)

09 ASSISTIVE PRODUCTS FOR PERSONAL CARE AND PROTECTION

For instance:

09.33 Assistive products for washing, bathing and showering (4036)

09.12 Assistive products for toileting (2448)

09.03 Clothes and shoes (2059)

15 ASSISTIVE PRODUCTS FOR HOUSEKEEPING

For instance:

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)

22 ASSISTIVE PRODUCTS FOR COMMUNICATION AND INFORMATION

For instance:

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)

27 ASSISTIVE PRODUCTS FOR ENVIRONMENTAL IMPROVEMENT AND ASSESSMENT

For instance:

27.06 Measuring instruments (109)

27.03 Assistive products for environmental improvement (56)

30 ASSISTIVE PRODUCTS FOR RECREATION

For instance:

30.03 Assistive products for play (1559)

30.09 Assistive products for sports (280)

30.12 Assistive products for playing and composing music (201)

# APPENDIX B – CATEGORY EXPLANATIONS

| Critical Success Factor (CSF) definitions and summary | | |
|---|---|---|
| CSF Category | CSF Subcategory | CSF Definitions |
| **Finance and cash** | | |
| **Finance** | *Financial risk appetite* | How enthusiastic is the organisations decision makers to enter into new markets and take financial risk to do so? Without top level decision makings 'buying off' on opportunity will not even commence. |
| | *Finance: Ability to support start up.* | This is not actual cash, but the ability of the organisation to financial manage the specific challenges associated with modelling, risk, forecasting, cash flow etc. |
| | *Financial controls* | General maturity the organisation exhibits relating to financial control methodologies. Level of sophistication. |
| | *Financial business planning* | The organisations current level of sophistication and effectiveness relating to existing business financial modelling. |
| | *Ability to invest* | This is actual access to investment, either cash, debt financing, venture capital or other tangible mechanisms to support investment. |
| **Banking** | *Banking: value adding relationship* | Is the banking relationship one that improves your company's effectiveness - strategic, performance enhancing, business development. |
| | *Banking: Supportive (reactive / proactive)* | Is the bank behaviour that of being reactive to business risk and one of constant restraint, or is it supportive of general day to day business. |
| **Risk** | *Risk: Strategies for management* | How sophisticated are the company's mechanisms to identify, articulate and manage risk. |
| **Cash management** | *Cash management* | Is cash management focus done on an as needs basis or is it a process driven and effective discipline. Is cash management effective within your organisation? |
| **Strategic focus** | | |
| **Strategy capability** | *Strategic planning* | Is the company's strategic plan managed in a formal deployment manner or is it adhoc. |
| | *Strategic deployment* | Is the deployment of objectives backed into all company process including forward budgets (human resource and capital requirements) |
| **Engineering and project management** | | |
| **Project management (PM)** | *PM: Full service provider* | Do the project management capabilities offer a full service to the customer in terms of conception to delivery (the alternative is make to print project management) |
| | *PM: system adaptability to AT* | Have the project management systems been used for non automotive projects and adapted to various levels of customer requirements. |
| | *PM: Delivery of projects outside of Automotive* | This is validation of the prior question. |
| **Quality systems/ certifications** | *Quality: AS13845 / other* | No necessarily specific to one certification, however important to determine status as it can take 2 - 3 years to develop appropriate programs to reach certification status. |
| | *Quality: systems implementation* | Finding skill in the area of systems implementation (medical quality systems etc) are difficult in SA. |
| | *Quality: Unique systems* | Are there any unique quality systems that exist within the company outside of TS16949 |
| | *Quality: International (eg CE /FDA)* | How international is the organisations certification ability. It is a long and arduous road for companies to achieve these types of stati. |

| | | |
|---|---|---|
| **Engineering** | *Eng: Ability to support AT engineering* | this will vary considerably depending on if it is simple AT or complex AT. How experienced and diverse is your engineering talent, and are the skill and systems capable to support assistive technologies. |
| | *Eng: Product testing and validation* | Level of sophistication of testing and validation capability. |
| | *Eng: CAD and design strength to support development* | how effective is the backroom CAD processes and equipment - has the engineering capability continued training and development to keep the performance level high? |
| | *Eng: Design strength* | This refers to 'real design' the word design is used to loosely, this question targets the deeper design ability that may exist within an organisation. |
| | *Eng: Software* | Same as above but specifically relating to software. |
| **R&D** | *R&D: partnerships and development* | Level of experience working on 'co-development' activities and partnerships. Taking an new opportunity and creating an effective working partnership |
| | *R&D: value add* | Does the company have a recognised R&D element that could strategically value add to an AT opportunity. |
| **Materials** | *Materials: Advanced materials knowledge* | Is there any specific high end materials knowledge that could value add to particular elements of AT product developments? (titanium etc) |
| | *Materials: Basic materials knowledge* | Basic materials use and knowledge (metals, polymers etc) |
| **Stakeholder relationships** | | |
| **Universities** | *Uni: relationship* | Does the company have a networks and connections at any universities that are meaningful in terms of strategic value and knowledge access. Including student projects etc. |
| | *Uni: Access to technology* | Does the company have direct and first visibility of potential new technology and discuss regular potential applications of such technology. |
| **Board / owners** | *Seeking growth / expansion* | What are the specific intentions of the company owners or board - is growth and expansion into AT an area of interest are there any barriers? |
| | *Supportive of new opportunities* | Will the owners or board provide relevant support (approvals and willingness) outside of day to day operations in an effort to drive success of new opportunities in AT. |
| | *Local / national / global decision making?* | Are final decisions made locally, nationally (outside SA) or globally. |
| **People / HR** | *Management adapability* | Is the current management structure and skill set sufficiently equipped to adapt to a change from Auto to AT thinking? Or are there concerns about moving away from the kniting? |
| | *Management capability* | Is the level of management ability capable of driving the required transformations in support of new AT projects and operations? |
| | *Management attitude* | Are management within the current company generally accepting and supporting of the intention to diversify into new technologies and industries including AT? |
| | *understanding of future training and development requirements* | Is the company actively planning and pursuing training and development opportunities targeted at future skill requirements? |
| | *High performing workplace* | Does the company focus on improving people performance and support business excellence activities? |
| **Unions** | *Do you see any barriers associated with Unions?* | *Are there any perceived or actual barriers evident as a result of union or other associations activity that would slow or prevent accessing a AT future.* |

| | | |
|---|---|---|
| **International business** | *Relationships with international offices or partners.* | What international offices or partners is the company engaged with that demonstrates international business relations and experience. Experience that would be beneficial when entering new markets such as AT |
| **Technical partnerships** | *Relevant technical partnerships* | Does the company have any strong technical partnerships that complement and enhance the business capability. This could be in the form of JV, TA's or other. |
| **Networks** | *Relevant networks or participation* | Does the company actively seek and drive new affiliations outside of Automotive sectors that would be considered enablers to entering AT? |
| **Supplier Chain and distribution** | | |
| **Supply chain and Distribution** | *Supply Chain: competency* | Is the companies supply chain able to offer value and competency (supplier partners) to future AT industry |
| | *Distribution capability* | what is the companies experience with distribution? Local, national, global (Tier 1 or retail) and export ready? |
| | *Supply chain: partnerships and relationship* | Does the company harness supplier network capability and utilise it to collectively improve outcomes and seek opportunities. Response in context of AT. |
| | *Supply chain: Access to proven low cost country supply base?* | Does the company harness the benefits of LCC supplier to support broader market needs? (cost focussed) |
| **Sales and Marketing (S&M)** | | |
| **Sales and Marketing (S&M)** | *S&M: Value adding skill* | Does the company contain specific sales and marketing skill that can value add to a non automotive market opportunity, such as AT. |
| | *S&M: Existing strengths in this area? Outside of current markets?* | Does the company have experience in market validation and strengths enabling new opportunities to be approached with professional S&M skill. |
| | *S&M: Local, national, international market access and knowledge* | Has the company explored international markets and exhibit skills to access new markets |
| | *S&M: Marketing techniques and active use of known process in this space?* | Does the company use recognised and skilled marketing processes in support of new market growth? |
| | *S&M: Knowledge of 'valley of death'* | Is the company aware of the risks associated with development cycle, which includes cash drain before finally achieving return |
| **Safety / Environment and workplace readiness** | | |
| **Compliance** | *Compliance: Evolving / static* | Does the company have a focus on continued development and evolution of business systems to ensure relevance with future increasing safety / environment and workplace improvement. |
| **Plant and operations** | | |
| **Processes** | *Plant engineering and design* | Is the level of plant engineering and design at a world class standard and capable of high level support for future AT product and process initiatives? |
| | *Process development?* | What is the level of production process development - static or continuously improving? Does the company demonstrate high levels of process innovation? |
| | *Inhouse automation skill (or outsource if so who?)* | Demonstrate fundamental and or advance automation capability for either high volume or low volume high complexity production activities. |
| | *New process development* | Demonstrating new process development that indicates advanced manufacturing focus. |

| | | |
|---|---|---|
| **Continuous improvement** | *Lean systems development* | *Lean is taken for granted in automotive. Is lean at a high level - a level that provides an immediate competitive advantage for AT manufacturing.* |
| **Core process knowledge** | *Advanced assembly* | Is assembly a core strength and if so, is it at an advanced level |
| | *Manufacturing engineering* | Is the company resourcing manufacturing engineering to constantly develop or improve manufacturing systems? |
| | *High volume / low volume assembly* | What is the core strength, low or high volume |
| | *Electronics* | Demonstrated core skills in electronics manufacturing? |
| | *Robotics* | Demonstrated ability to source, program, optimise robotics technologies |
| | *3D prototyping* | Demonstrated capability or access to additive manufacturing technology |
| | *CNC or other computer based equipment* | Demonstrated capability using CNC or other computer controlled equipment |
| | *Other special purpose knowledge* | Is there any unique processes that provide niche capability |
| **Plant capital** | *Own , lease, condition* | Is plant capital owned and if so, is the condition at a level required for advanced manufacturing. |
| | *Expand - contract or greenfield (interested in Greenfield?)* | Does the company have capacity and interest in expansion and possible greenfield development. |

# APPENDIX C – COMPLETE COMPLEX AT GAP SUMMARY – LARGEST GAP RED TO SMALLEST GAP GREEN

| | | |
|---|---|---|
| *Eng: Software* | 20% | Large GAP |
| *Electronics* | 32% | Large GAP |
| *understanding of future training and development requirements* | 32% | Large GAP |
| *Relationships with international offices or partners.* | 36% | Large GAP |
| *3D prototyping* | 36% | Large GAP |
| *Relevant networks or participation* | 36% | Large GAP |
| *Uni: Access to technology* | 40% | Large GAP |
| *Advanced assembly* | 40% | Large GAP |
| *Relevant technical partnerships* | 40% | Large GAP |
| *Eng: Design strength* | 40% | Large GAP |
| Uni: relationship | 42% | Large GAP |
| Quality: International (eg CE /FDA) | 44% | Large GAP |
| S&M: Local, national, international market access and knowledge | 44% | Large GAP |
| Robotics | 44% | Large GAP |
| R&D: partnerships and development | 44% | Large GAP |
| R&D: value add | 44% | Large GAP |
| Supply chain: Access to proven low cost country supply base? | 44% | Large GAP |
| S&M: Existing strengths in this area? Outside of current markets? | 48% | Large GAP |
| High performing workplace | 48% | Large GAP |
| Manufacturing engineering | 48% | Large GAP |
| process development? | 48% | Large GAP |
| New process development | 48% | Large GAP |
| Eng: CAD and design strength to support development | 48% | Large GAP |
| Plant engineering and design | 48% | Large GAP |
| Supply chain: partnerships and relationship | 52% | GAP |
| Supply Chain: competency | 52% | GAP |
| Management capability | 52% | GAP |
| Eng: Product testing and validation | 52% | GAP |
| Advanced materials knowledge (metals, polymers other) | 56% | GAP |
| Banking: value adding relationship | 56% | GAP |
| Finance: Ability to support start up. | 56% | GAP |
| S&M: Marketing techniques and active use of known process in this space? | 56% | GAP |
| Inhouse automation skill (or outsource if so who?) | 56% | GAP |
| Distribution capability | 56% | GAP |
| Management adapability | 56% | GAP |
| Eng: Ability to support AT engineering | 56% | GAP |
| Other special purpose knowledge | 60% | GAP |
| Financial business planning | 60% | GAP |
| S&M: Value adding skill | 60% | GAP |
| Lean systems development | 60% | GAP |
| CNC or other computer based equipment | 60% | GAP |
| PM: Delivery of projects outside of Automotive | 60% | GAP |
| Banking: Supportive (reactive / proactive) | 64% | GAP |
| Strategic deployment | 64% | GAP |
| Risk: Strategies for management | 64% | GAP |
| Evolving / static | 64% | GAP |
| Quality: AS13845 / other | 68% | GAP |
| Ability to invest | 68% | GAP |
| Supportive of new opportunities | 68% | GAP |
| PM: system adaptability to AT | 68% | GAP |
| *Financial risk appetite* | 72% | GAP |
| *Quality: Unique systems* | 72% | GAP |
| *PM: Full service provider* | 72% | GAP |
| Seeking growth / expansion | 72% | GAP |
| *Strategic planning* | 76% | Minor GAP |
| *Financial controls* | 76% | Minor GAP |
| *S&M: Knowledge of 'valley of death'* | 80% | Minor GAP |
| *Management attitude* | 80% | Minor GAP |
| *Cash management* | 84% | Minor GAP |
| *Quality: systems implementation* | 88% | Minor GAP |
| *Do you see any barriers associated with Unions?* | 92% | Minor GAP |

# APPENDIX D – COMPLETE SIMPLE AT GAP SUMMARY – LARGEST GAP RED TO SMALLEST GAP GREEN

| | | |
|---|---|---|
| *Eng: Software* | 20% | Large GAP |
| *Electronics* | 32% | Large GAP |
| *Relationships with international offices or partners.* | 44% | Large GAP |
| *Uni: Access to technology* | 44% | Large GAP |
| *Uni: relationship* | 46% | Large GAP |
| *Quality: International (eg CE /FDA)* | 48% | Large GAP |
| *understanding of future training and development requirements* | 52% | GAP |
| *S&M: Local, national, international market access and knowledge* | 56% | GAP |
| *S&M: Existing strengths in this area? Outside of current markets?* | 56% | GAP |
| 3D prototyping | 60% | GAP |
| Advanced assembly | 60% | GAP |
| *Supply chain: partnerships and relationship* | 60% | GAP |
| Relevant networks or participation | 64% | GAP |
| Robotics | 64% | GAP |
| Advanced materials knowledge (metals, polymers other) | 64% | GAP |
| Relevant technical partnerships | 68% | GAP |
| R&D: partnerships and development | 68% | GAP |
| R&D: value add | 68% | GAP |
| High performing workplace | 68% | GAP |
| Banking: value adding relationship | 68% | GAP |
| Other special purpose knowledge | 68% | GAP |
| Banking: Supportive (reactive / proactive) | 68% | GAP |
| Manufacturing engineering | 72% | GAP |
| Finance: Ability to support start up. | 72% | GAP |
| Strategic deployment | 72% | GAP |
| Quality: AS13845 / other | 72% | GAP |
| Financial risk appetite | 72% | GAP |
| Quality: Unique systems | 72% | GAP |
| process development? | 76% | Minor GAP |
| New process development | 76% | Minor GAP |
| Supply Chain: competency | 76% | Minor GAP |
| S&M: Marketing techniques and active use of known process in this space? | 76% | Minor GAP |
| Inhouse automation skill (or outsource if so who?) | 76% | Minor GAP |
| Strategic planning | 76% | Minor GAP |
| Eng: CAD and design strength to support development | 80% | Minor GAP |
| Plant engineering and design | 80% | Minor GAP |
| Financial business planning | 80% | Minor GAP |
| S&M: Value adding skill | 80% | Minor GAP |
| Lean systems development | 80% | Minor GAP |
| CNC or other computer based equipment | 80% | Minor GAP |
| Risk: Strategies for management | 80% | Minor GAP |
| Ability to invest | 80% | Minor GAP |
| Eng: Design strength | 84% | Minor GAP |
| Management capability | 84% | Minor GAP |
| Distribution capability | 84% | Minor GAP |
| Financial controls | 84% | Minor GAP |
| Eng: Product testing and validation | 88% | Minor GAP |
| Management adapability | 88% | Minor GAP |
| PM: Delivery of projects outside of Automotive | 88% | Minor GAP |
| Supportive of new opportunities | 88% | Minor GAP |
| *Supply chain: Access to proven low cost country supply base?* | 92% | Minor GAP |
| Evolving / static | 92% | Minor GAP |
| *PM: Full service provider* | 92% | Minor GAP |
| *S&M: Knowledge of 'valley of death'* | 92% | Minor GAP |
| *Cash management* | 92% | Minor GAP |
| *Do you see any barriers associated with Unions?* | 92% | Minor GAP |
| *PM: system adaptability to AT* | 96% | Minor GAP |
| *Seeking growth / expansion* | 96% | Minor GAP |
| *Management attitude* | 96% | Minor GAP |
| *Quality: systems implementation* | 96% | Minor GAP |
| *Eng: Ability to support AT engineering* | 100% | Minor GAP |

# APPENDIX E – EXAMPLES OF CURRENT CAPABILITY ALIGNMENT

| ISO Code | Code Description | ISO Sub Code | Sub Code Description | Product Explanation | Example Product Sub Code | Example Description | Example Image | South Australian Capability Level |
|---|---|---|---|---|---|---|---|---|
| 04 | ASSISTIVE PRODUCTS FOR PERSONAL MEDICAL TREATMENT | 04.33 | ASSISTIVE PRODUCTS INTENDED TO MANAGE TISSUE INTEGRITY | PRODUCTS TO PREVENT PRESSURE SORES AND DECUBITIS ULCERS | 04.33.03 | SEAT CUSHIONS AND UNDERLAYS FOR TISSUE INTEGRITY (I.E. REDISTRIBUTION OF LOAD) |  | HIGH CAPABILITY |
| | | 04.48 | EQUIPMENT FOR MOVEMENT, STRENGTH AND BALANCE TRAINING | EQUIPMENT FOR TRAINING, BALANCE AND STRENGTHENING | 04.48.03 | EXERCISE AND ERGOMETER CYCLES |  | HIGH CAPABILITY |
| | | 04.24 | PHYSICAL, PHYSIOLOGICAL AND BIOCHEMICAL TEST EQUIPMENT AND MATERIALS | MEASURING INSTRUMENTS AND EQUIPMENT FOR THE WORKPLACE | 04.24.03 | URINE ANALYSIS EQUIPMENT |  | NO CAPABILITY |
| 06 | ORTHOSES AND PROSTHESES | 06.12 | LOWER LIMB ORTHOSES | ORTHOSES THAT ARE DESIGNED TO MODIFY THE STRUCTURAL AND FUNCTIONAL CHRACTERISTICS OF THE NEURO MUSCULAR AND THE SKELETAL SYSTEMS OF THE BODY | 06.03.12 | FOOT ORTHOSES |  | HIGH CAPABILITY |
| | | 06.24 | LOWER LIMB PROTHESES | ORTHOSES THAT ARE DESIGNED TO MODIFY THE STRUCTYRAL AND FUNCTIONAL CHRACTERISTICS OF THE NEURO MUSCULAR AND THE SKELETAL SYSTEMS OF THE BODY | 06.24.03 | PARTIAL FOOT PROTHESES |  | HIGH CAPABILITY |
| | | 06.06 | UPPER LIMB ORTHOSES | ORTHOSES THAT ARE DESIGNED TO MODIFY THE STRUCTYRAL AND FUNCTIONAL CHRACTERISTICS OF THE NEURO MUSCULAR AND THE SKELETAL SYSTEMS OF THE BODY | 06.06.03 | FINGER ORTHOSES |  | HIGH CAPABILITY |
| 12 | ASSISTIVE PRODUCTS FOR PERSONAL MOBILITY | 12.22 | MANUAL WHEELCHAIRS | DEVICES PROVIDING WHEELED MOBILITY AND BODY SUPPORT FOR PERSONS WITH LIMITED ABILITY TO WALK THAT RELY ON AND OCCUPANT DRIVEN ASSISTANT TO PROVIDE POWER | 12.22.03 | BIMANUAL WHEELED PROPEPELLED WHEELCHAIRS |  | HIGH CAPABILITY |
| | | 12.23 | POWERED WHEELCHAIRS | DEVICES WITH POWERED PROPULSION INTENDED TO PROVIDE WHEELED MOBILITY AND BODY SUPPORT FOR PERSONS WITH LIMITED ABILITY TO WALK | 12.23.03 | ELECTRICALLY POWERED WHEELCHAIRS WITH MANUAL STEERING |  | HIGH CAPABILITY |
| | | 12.36 | ASSISTIVE PRODUCTS FOR LIFTING PERSONS | EQUIPMENT FOR TRANSFERRING BY LIFTING AND REPOSITIONING OF A PERSON TO ENABLE AN INTENDED ACTIVITY | 12.36.03 | MOBILE HOISTS FOR TRANSFERRING A PERSON IN SITTING POSITION WITH SLINGS SEATS |  | HIGH CAPABILITY |
| 18 | FURNISHINGS AND ADAPTATIONS TO HOMES AND OTHER PREMISES | 18.12 | BEDS | BEDS WITH ADJUSTABLE AND NON ADJUSTABLE BODY POSITIONS AND DETACHABLE BED BOARDS/MATRESS SUPPORT PLASTFORMS | 18.12.04 | BEDS AND DETACHABLE BED BOARDS/MATTRESS SUPPORT PLATFORMS, NON-ADJUSTABLE |  | HIGH CAPABILITY |
| | | 18.09 | SITTING FURNITURE | ADJUSTABLE AND ACCESSORIES FOR SITTING FURNITURE | 18.09.03 | CHAIRS |  | HIGH CAPABILITY |
| | | 18.18 | SUPPORTING HANDRAILS AND GRAB BARS | ARM, TRUNK AND LEG EXERCISE DEVICES | 18.18.03 | HAND RAILS AND SUPPORT RAILS |  | HIGH CAPABILITY |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 24 | ASSISTIVE PRODUCTS FOR HANDLING OBJECTS AND DEVICES | 24.18 | ASSISTIVE PRODUCTS TO ASSIST OR REPLACE ARM FUNCTION, HAND FUNCTION, FINGER FUNCTION OR ANY COMBINATION OF THESE FUNCTIONS | ASSISTIVE PRODUCTS FOR HOISTING OR REPOSITIONING OBJECTS IN A WORKPLACE | 24.18.03 | DEVICES FOR GRASPING |  | HIGH CAPABILITY |
| | | 24.09 | ASSISTIVE PRODUCTS FOR OPERATING AND CONTROLLING DEVICES | DEVICES FOR OPERATING AND CONTROLLING EQUIPMENT | 24.09.03 | PUSH BUTTONS |  | HIGH CAPABILITY |
| | | 24.13 | ASSISTIVE PRODUCTS FOR CONTROLLING FROM A DISTANCE | ASSISTIVE PRODUCTS FRO CONTROLLING FROM A DISTANCE | 24.13.03 | ENVIRONMENTAL CONTROL SYSTEMS |  | HIGH CAPABILITY |
| 28 | ASSISTIVE PRODUCTS FOR EMPLOYMENT AND VOCATIONAL TRAINING | 28.03 | WORKPLACE FURNITURE AND FURNISHING ELEMENTS | LIGHT FIXTURES | 28.03.03 | WORK DESKS |  | HIGH CAPABILITY |
| | | 28.15 | MACHINES AND TOOLS FOR USE IN THE WORKPLACE | TOOLS, HEAVY EQUIPMENT AND OTHER MACHINES ADAPTED OR DESIGNED FOR USE BY A PERSON IN THE WORKPLACE | 28.15.03 | MANUALLY OPERATED HAND TOOLS |  | HIGH CAPABILITY |
| | | 28.06 | ASSISTIVE PRODUCTS FOR TRANSPORTING OBJECTS IN THE WORKPLACE | DEVICES FOR TRANSPORTING AND MOVING CARGO OR OTHER OBJECTS OVER LONG DISTANCES AT WORK | 28.06.03 | TRUCKS, CARTS AND LORRIES FOR THE WORKPLACE |  | HIGH CAPABILITY |
| 05 | ASSISTIVE PRODUCTS FOR TRAINING IN SKILLS | 05.03 | ASSISTIVE PRODUCTS FOR COMMUNICATION THERAPY AND COMMUNICATION TRAINING | PRODUCTS FOR IMPROVING COMMUNICATION SKILLS IN WRITTEN OR SPOKEN LANGUAGE | 05.03.03 | ASSISTIVE PRODUCTS FOR VOICE TRAINING AND SPEECH TRAINING |  | NO CAPABILITY |
| | | 05.12 | ASSISTIVE PRODUCTS FOR TRAINING IN COGNITIVE SKILLS | ASSISTIVE PRODUCTS DESIGNED TO ENHANCE THE ABILITIES THAT UNDERLIE THE REASONING AND LOGICAL ACTIVITIES | 05.12.03 | ASSISTIVE PRODUCTS FOR MEMORY TRAINING |  | NO CAPABILITY |
| | | 05.33 | ASSISTIVE PRODUCTS FOR TRAINING IN DAILY LIVING ACTIVITIES | ASSISTIVE PRODUCTS FOR TRAINING IN DAILY LIVING ACTIVITIES | .05.33.09 | ASSISTIVE PRODUCTS FOR TRAINING IN PERSONAL MOBILITY |  | NO CAPABILITY |
| 09 | ASSISTIVE PRODUCTS FOR PERSONAL CARE AND PROTECTION | 09.33 | ASSISTIVE PRODUCTS FOR WASHING, BATHING AND SHOWERING | ASSISTIVE PRODUCTS FOR WASHING, BATHING AND SHOWERING | 09.33.03 | BATH/SHOWER CHAIRS (WITH AND WITHOUT WHEELS), BATH BOARDS, STOOLS, BACK SUPPORTS AND SEATS |  | HIGH CAPABILITY |
| | | 09.12 | ASSISTIVE PRODUCTS FOR TOILETING | ASSISTIVE PRODUCTS FOR TOILETING | 09.12.03 | COMMODE CHAIRS |  | HIGH CAPABILITY |
| | | 09.03 | CLOTHES AND SHOES | CLOTHES AND SHOES | 09.03.05 | OUTWEAR (E.G. COVERS FOR SCOOTERS) |  | SOME CAPABILITY |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 15 | ASSISTIVE PRODUCTS FOR HOUSEKEEPING | 15.09 | ASSISTIVE PRODUCTS FOR EATING AND DRINKING | ASSISTIVE PRODUCTS FOR EATING AND DRINKING | 15.09.03 | ASSISTIVE PRODUCTS FOR SERVING FOOD AND DRINK |  | HIGH CAPABILITY |
| | | 15.03 | ASSISTIVE PRODUCTS FOR PREPARING FOOD AND DRINK | ASSISTIVE PRODUCTS FOR PREPARING FOOD AND DRINK | 15.03.03 | ASSISTIVE PRODUCTS FOR WEIGHING AND MEASURING TO PREPARE FOOD AND DRINK |  | HIGH CAPABILITY |
| | | 15.15 | ASSISTIVE PRODUCTS FOR MAKING AND MAINTAINING TEXTILES | ASSISTIVE PRODUCTS FOR MAKING AND MAINTAINING TEXTILES | 15.15.03 | SEWING MACHINES (EG. NEEDLE THREADER) |  | HIGH CAPABILITY |
| 22 | ASSISTIVE PRODUCTS FOR COMMUNICATION AND INFORMATION | 22.27 | ASSISTIVE PRODUCTS FOR ALARMING, INDICATING, REMINDING AND SIGNALLING | ASSISTIVE PRODUCTS FOR ALARMING, INDICATING, REMINDING AND SIGNALLING | 22.27.03 | INDICATORS WITH VISUAL SIGNALS |  | HIGH CAPABILITY |
| | | 22.03 | ASSISTIVE PRODUCTS FOR SEEING | EG. MAGNIFYING DEVICES | 22.03.03 | LIGHT FILTERS (ABSORPTION FILTERS) |  | SOME CAPABILITY |
| | | 22.36 | INPUT DEVICES FOR COMPUTERS | COMPUTERS AND TERMINALS | 22.36.03 | KEYBOARDS |  | SOME CAPABILITY |
| 27 | ASSISTIVE PRODUCTS FOR ENVIRONMENTAL IMPROVEMENT AND ASSESSMENT | 27.06 | MEASURING INSTRUMENTS | DEVICES FOR MEASURING PHYSICAL PROPERTIES | 27.06.03 | ASSISTIVE PRODUCTS AND TOOLS FOR MEASURING LENGTH |  | SOME CAPABILITY |
| | | 27.03 | ASSISTIVE PRODUCTS FOR ENVIRONMENTAL IMPROVEMENT | DEVICES FOR PROTECTING A PERSON FROM ADVERSE ENVIRONMENTAL INFLUENCES BY ELIMINATING OR CONTROLLING UNFACVOURABLE FACTORS | 27.03.03 | ASSISTIVE PRODUCTS FOR CONTROLLING THE INTERNAL CLIMATE |  | SOME CAPABILITY |
| 30 | ASSISTIVE PRODUCTS FOR RECREATION | 30.03 | ASSISTIVE PRODUCTS FOR PLAY | PRODUCTS THAT ENABLE PEOPLE TO ENGAGE IN GAMES WITH RULES OR UNSTRUCTURED OR UNORGANISAED GAMES AND SPONTANEOUS RECREATION | 30.03.09 | GAMES (E.G. PLAYING CARDS HOLDER) |  | HIGH CAPABILITY |
| | | 30.09 | ASSISTIVE PRODUCTS FOR SPORTS | DEVICES THAT AID PEOPLE TO ENGAGE IN COMPETITIVE AND INFORMAL OR FORMALLY ORGANISED GAMES OR ATHLETIC EVENTS PERFORMED ALONE OR IN A GROUP | 30.09.03 | ASSISTIVE PRODUCTS FOR TEAM BALL SPORTS |  | HIGH CAPABILITY |
| | | 30.12 | ASSISTIVE PRODUCTS FOR PLAYING AND COMPOSING MUSIC | DEVICES THAT AID PEOPLE TO PERFORM, READ AND CREATE MUSIC. ASSISTIVE PRODUCTS FOR VOICE TRAINING AND SPEECH TRAINING | 30.12 | MOBILE SENSORY EXPERIENCES FOR THE ELDERLY |  | SOME CAPABILITY |

# APPENDIX F – COMPANY CASE STUDY RAW FINDINGS

| Partnering a growing AT industry | | |
|---|---|---|
| **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. | B |
| **Company 1: Core competencies in high volume plastic product manufacturing, 100 employees, medium level of reliance on the automotive sector and a diversified customer base. Low levels of R&D. Predominately a TIER 1 supplier with Australian owner ship and decision-making, approximately A$30M turnover.** | | |

| **Critical Success Factor (CSF) definitions and summary** | | | |
|---|---|---|---|
| | | *1 = low / poor / no* | |
| | | *5 = high / strong / yes* | |
| CSF Category | CSF Subcategory | Simple AT | Complex AT |
| | | 1-5 | 1-5 |
| **Finance and cash** | | | |
| **Finance** | *Financial risk appetite* | 4 | 5 |
| | *Finance: Ability to support start up.* | 4 | 3 |
| | *Financial controls* | 3 | 3 |
| | *Financial business planning* | 3 | 2 |
| | *Ability to invest* | 5 | 4 |
| **Banking** | *Banking: value adding relationship* | 5 | 3 |
| | *Banking: Supportive (reactive / proactive)* | 4 | 4 |
| **Risk** | *Risk: Strategies for management* | 5 | 3 |
| **Cash management** | *Cash management* | 5 | 4 |
| **Strategic focus** | | | |
| **Strategy capability** | *Strategic planning* | 4 | 4 |
| | *Strategic deployment* | 4 | 3 |
| **Engineering and project management** | | | |
| **Project management (PM)** | *PM: Full service provider* | 4 | 4 |
| | *PM: system adaptability to AT* | 4 | 4 |
| | *PM: Delivery of projects outside of Automotive* | 5 | 4 |
| **Quality systems / certifications** | *Quality: AS13845 / other* | 1 | 1 |
| | *Quality: systems implementation* | 5 | 5 |
| | *Quality: Unique systems* | 4 | 4 |
| | *Quality: International (eg CE / FDA)* | 1 | 1 |
| **Engineering** | *Eng: Ability to support AT engineering* | 5 | 3 |
| | *Eng: Product testing and validation* | 5 | 3 |
| | *Eng: CAD and design strength to support development* | 3 | 2 |
| | *Eng: Design strength* | 4 | 2 |
| | *Eng: Software* | 1 | 1 |
| **R&D** | *R&D: partnerships and development* | 5 | 3 |
| | *R&D: value add* | 5 | 3 |
| **Materials** | *Materials: Advanced materials knowledge* | 2 | 4 |
| | *Materials: Basic materials knowledge* | 3 | 3 |
| **Stakeholder relationships** | | | |
| **Universities** | *Uni: relationship* | 1 | 1 |
| | *Uni: Access to technology* | 1 | 1 |
| **Board / owners** | *Seeking growth / expansion* | 5 | 5 |
| | *Supportive of new opportunities* | 5 | 5 |
| | *Local / national / global decision making?* | local | local |
| **People / HR** | *Management adapability* | 5 | 3 |
| | *Management capability* | 5 | 3 |
| | *Management attitude* | 5 | 4 |
| | *understanding of future training and development requirements* | 4 | 3 |
| | *High performing workplace* | 4 | 3 |
| **Unions** | *Do you see any barriers associated with Unions?* | 5 | 5 |
| **International business** | *Relationships with international offices or partners.* | 2 | 2 |
| **Technical partnerships** | *Relevant technical partnerships* | 3 | 3 |
| **Networks** | *Relevant networks or participation* | 3 | 3 |
| **Supplier Chain and distribution** | | | |
| **Supply chain and Distribution** | *Supply Chain: competency* | 4 | 4 |
| | *Distribution capability* | 4 | 4 |
| | *Supply chain: partnerships and relationship* | 1 | 4 |
| | *Supply chain: Access to proven low cost country supply base?* | 5 | 3 |
| **Sales and Marketing (S&M)** | | | |
| **Sales and Marketing (S&M)** | *S&M: Value adding skill* | 4 | 3 |
| | *S&M: Existing strengths in this area? Outside of current markets?* | 4 | 3 |
| | *S&M: Local, national, international market access and knowledge* | 4 | 3 |
| | *S&M: Marketing techniques and active use of known process in this* | 3 | 2 |
| | *S&M: Knowledge of 'valley of death'* | 4 | 3 |
| **Safety / Enviroment and workplace readiness** | | | |
| **Compliance** | *Compliance: Evolving / static* | 4 | 3 |
| **Plant and operations** | | | |
| **Processes** | *Plant engineering and design* | 5 | 2 |
| | *process development?* | 5 | 2 |
| | *Inhouse automation skill (or outsource if so who?)* | 5 | 4 |
| | *New process development* | 4 | 3 |
| **Continuous improvement** | *Lean systems development* | 5 | 4 |
| **Core process knowledge** | *Advanced assembly* | 3 | 3 |
| | *Manufacturing engineering* | 3 | 3 |
| | *High volume / low volume assembly* | | |
| | *Electronics* | 1 | 1 |
| | *Robotics* | 3 | 3 |
| | *3D prototyping* | 1 | 1 |
| | *CNC or other computer based equipment* | 3 | 3 |
| | *Other special purpose knowledge* | 5 | 3 |
| **Plant capital** | *Own , lease, other* | 4 | 3 |
| | *Expand - contract or greenfield (interested in Greenfield?)* | 4 | 3 |

| Partnering a growing AT industry | | | |
|---|---|---|---|
| **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. | P | |
| **Company 2:** Core competencies in high quality CNC machining, tooling, plastics injection moulding, low - medium level of reliance on the automotive sector. The company is very active with multiple joint ventures and technical partnerships and a medium level of diversification. Multi site operations, South Australian ownership and revenues of approximately A$15M and 65 employees. | | | |
| **Critical Success Factor (CSF) definitions and summary** | | | |
| | | *1 = low / poor / no* | |
| | | *5 = high / strong / yes* | |
| CSF Category | CSF Subcategory | Simple AT | Complex AT |
| | | 1-5 | 1-5 |
| **Finance and cash** | | | |
| **Finance** | *Financial risk appetite* | 5 | 5 |
| | *Finance: Ability to support start up.* | 3 | 3 |
| | *Financial controls* | 3 | 3 |
| | *Financial business planning* | 2 | 2 |
| | *Ability to invest* | 5 | 4 |
| **Banking** | *Banking: value adding relationship* | 3 | 3 |
| | *Banking: Supportive (reactive / proactive)* | 4 | 4 |
| **Risk** | *Risk: Strategies for management* | 3 | 3 |
| **Cash management** | *Cash management* | 3 | 3 |
| **Strategic focus** | | | |
| **Strategy capability** | *Strategic planning* | 4 | 4 |
| | *Strategic deployment* | 3 | 3 |
| **Engineering and project management** | | | |
| **Project management (PM)** | *PM: Full service provider* | 4 | 4 |
| | *PM: system adaptability to AT* | 5 | 4 |
| | *PM: Delivery of projects outside of Automotive* | 5 | 4 |
| **Quality systems / certifications** | *Quality: AS13845 / other* | 5 | 5 |
| | *Quality: systems implementation* | 5 | 5 |
| | *Quality: Unique systems* | 5 | 5 |
| | *Quality: International (eg CE /FDA)* | 5 | 5 |
| **Engineering** | *Eng: Ability to support AT engineering* | 5 | 4 |
| | *Eng: Product testing and validation* | 4 | 4 |
| | *Eng: CAD and design strength to support development* | 4 | 4 |
| | *Eng: Design strength* | 4 | 3 |
| | *Eng: Software* | 1 | 1 |
| **R&D** | *R&D: partnerships and development* | 5 | 3 |
| | *R&D: value add* | 5 | 3 |
| **Materials** | *Materials: Advanced materials knowledge* | 5 | 3 |
| | *Materials: Basic materials knowledge* | 5 | 3 |
| **Stakeholder relationships** | | | |
| **Universities** | *Uni: relationship* | 2.5 | 2.5 |
| | *Uni: Access to technology* | 2 | 2 |
| **Board / owners** | *Seeking growth / expansion* | 5 | 5 |
| | *Supportive of new opportunities* | 4 | 4 |
| | *Local / national / global decision making?* | local | local |
| **People / HR** | *Management adapability* | 5 | 5 |
| | *Management capability* | 4 | 4 |
| | *Management attitude* | 5 | 5 |
| | *understanding of future training and development requirements* | 1 | 1 |
| | *High performing workplace* | 2 | 2 |
| **Unions** | *Do you see any barriers associated with Unions?* | 5 | 5 |
| **International business** | *Relationships with international offices or partners.* | 1 | 1 |
| **Technical partnerships** | *Relevant technical partnerships* | 5 | 2 |
| **Networks** | *Relevant networks or participation* | 5 | 2 |
| **Supplier Chain and distribution** | | | |
| **Supply chain and Distribution** | *Supply Chain: competency* | 4 | 4 |
| | *Distribution capability* | 3 | 3 |
| | *Supply chain: partnerships and relationship* | 4 | 4 |
| | *Supply chain: Access to proven low cost country supply base?* | 4 | 2 |
| **Sales and Marketing (S&M)** | | | |
| **Sales and Marketing (S&M)** | *S&M: Value adding skill* | 2 | 2 |
| | *S&M: Existing strengths in this area? Outside of current markets?* | 2 | 2 |
| | *S&M: Local, national, international market access and knowledge* | 1 | 1 |
| | *S&M: Marketing techniques and active use of known process in this* | 2 | 2 |
| | *S&M: Knowledge of 'valley of death'* | 4 | 4 |
| **Safety / Enviroment and workplace readiness** | | | |
| **Compliance** | *Compliance: Evolving / static* | 5 | 3 |
| **Plant and operations** | | | |
| **Processes** | *Plant engineering and design* | 3 | 3 |
| | *process development?* | 3 | 3 |
| | *Inhouse automation skill (or outsource if so who?)* | 3 | 3 |
| | *New process development* | 3 | 3 |
| **Continuous improvement** | *Lean systems development* | 2 | 2 |
| **Core process knowledge** | *Advanced assembly* | 1 | 1 |
| | *Manufacturing engineering* | 2 | 2 |
| | *High volume / low volume assembly* | | |
| | *Electronics* | 1 | 1 |
| | *Robotics* | 2 | 2 |
| | *3D prototyping* | 4 | 4 |
| | *CNC or other computer based equipment* | 5 | 3 |
| | *Other special purpose knowledge* | 4 | 4 |
| **Plant capital** | *Own , lease, other* | 5 | 5 |
| | *Expand - contract or greenfield (interested in Greenfield?)* | 5 | 5 |

| Partnering a growing AT industry | | | |
|---|---|---|---|
| **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. | M | |
| **Company 3:** Core competencies in engineered steel fabricated products requiring high levels of testing and validation. Supplying a large variety of product variants via an established distribution network including OEM and aftermarket. South Australian owned and managed employing approximately 50 people. Low reliance on automotive sector and with a strong focus on sales and marketing methodologies. Australian owned and managed. | | | |

| **Critical Success Factor (CSF) definitions and summary** | | | |
|---|---|---|---|
| | | *1 = low / poor / no*<br>*5 = high / strong / yes* | |
| CSF Category | CSF Subcategory | Simple AT | Complex AT |
| | | 1-5 | 1-5 |
| **Finance and cash** | | | |
| **Finance** | *Financial risk appetite* | 4 | 3 |
| | *Finance: Ability to support start up.* | 4 | 3 |
| | *Financial controls* | 5 | 5 |
| | *Financial business planning* | 5 | 5 |
| | *Ability to invest* | 4 | 4 |
| **Banking** | *Banking: value adding relationship* | 4 | 4 |
| | *Banking: Supportive (reactive / proactive)* | 4 | 4 |
| **Risk** | *Risk: Strategies for management* | 4 | 4 |
| **Cash management** | *Cash management* | 5 | 5 |
| **Strategic focus** | | | |
| **Strategy capability** | *Strategic planning* | 5 | 5 |
| | *Strategic deployment* | 5 | 5 |
| **Engineering and project management** | | | |
| **Project management (PM)** | *PM: Full service provider* | 5 | 3 |
| | *PM: system adaptability to AT* | 5 | 3 |
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| **Quality systems / certifications** | *Quality: AS13845 / other* | 5 | 4 |
| | *Quality: systems implementation* | 5 | 4 |
| | *Quality: Unique systems* | 3 | 3 |
| | *Quality: International (eg CE /FDA)* | 2 | 2 |
| **Engineering** | *Eng: Ability to support AT engineering* | 5 | 1 |
| | *Eng: Product testing and validation* | 4 | 1 |
| | *Eng: CAD and design strength to support development* | 4 | 1 |
| | *Eng: Design strength* | 4 | 1 |
| | *Eng: Software* | 1 | 1 |
| **R&D** | *R&D: partnerships and development* | 1 | 1 |
| | *R&D: value add* | 1 | 1 |
| **Materials** | *Materials: Advanced materials knowledge* | 2 | 2 |
| | *Materials: Basic materials knowledge* | 3 | 2 |
| **Stakeholder relationships** | | | |
| **Universities** | *Uni: relationship* | 2 | 1 |
| | *Uni: Access to technology* | 2 | 1 |
| **Board / owners** | *Seeking growth / expansion* | 5 | 3 |
| | *Supportive of new opportunities* | 5 | 3 |
| | *Local / national / global decision making?* | local | local |
| **People / HR** | *Management adapability* | 4 | 2 |
| | *Management capability* | 4 | 2 |
| | *Management attitude* | 5 | 5 |
| | *understanding of future training and development requirements* | 3 | 2 |
| | *High performing workplace* | 4 | 2 |
| **Unions** | *Do you see any barriers associated with Unions?* | 5 | 5 |
| **International business** | *Relationships with international offices or partners.* | 3 | 2 |
| **Technical partnerships** | *Relevant technical partnerships* | 3 | 1 |
| **Networks** | *Relevant networks or participation* | 3 | 1 |
| **Supplier Chain and distribution** | | | |
| **Supply chain and Distribution** | *Supply Chain: competency* | 3 | 1 |
| | *Distribution capability* | 5 | 3 |
| | *Supply chain: partnerships and relationship* | 3 | 1 |
| | *Supply chain: Access to proven low cost country supply base?* | 4 | 2 |
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| **Sales and Marketing (S&M)** | *S&M: Value adding skill* | 5 | 4 |
| | *S&M: Existing strengths in this area? Outside of current markets?* | 2 | 2 |
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| | *S&M: Marketing techniques and active use of known process in this* | 5 | 3 |
| | *S&M: Knowledge of 'valley of death'* | 5 | 5 |
| **Safety / Enviroment and workplace readiness** | | | |
| **Compliance** | *Compliance: Evolving / static* | 4 | 3 |
| **Plant and operations** | | | |
| **Processes** | *Plant engineering and design* | 3 | 1 |
| | *process development?* | 3 | 1 |
| | *Inhouse automation skill (or outsource if so who?)* | 3 | 1 |
| | *New process development* | 3 | 1 |
| **Continuous improvement** | *Lean systems development* | 3 | 1 |
| **Core process knowledge** | *Advanced assembly* | 2 | 1 |
| | *Manufacturing engineering* | 3 | 2 |
| | *High volume / low volume assembly* | | |
| | *Electronics* | 1 | 1 |
| | *Robotics* | 3 | 1 |
| | *3D prototyping* | 3 | 1 |
| | *CNC or other computer based equipment* | 3 | 1 |
| | *Other special purpose knowledge* | 1 | 1 |
| **Plant capital** | *Own , lease, other* | 4 | 2 |
| | *Expand - contract or greenfield (interested in Greenfield?)* | 4 | 2 |

| Partnering a growing AT industry | | | |
|---|---|---|---|
| **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. | T | |
| **Company 4:** Part of US based global automotive group with core competencies in steel fabrication, welding and precision CNC processes. Exhibiting traditional high volume capital-intensive manufacturing operations. Supporting 550 employees and multisite operations. A$150M revenues p/a and a strong reliance on the automotive sector, but also possessing a successful aftermarket business model. | | | |
| **Critical Success Factor (CSF) definitions and summary** | | | |
| | | *1 = low / poor / no* | |
| | | *5 = high / strong / yes* | |
| CSF Category | CSF Subcategory | Simple AT | Complex AT |
| | | 1-5 | 1-5 |
| **Finance and cash** | | | |
| **Finance** | *Financial risk appetite* | 3 | 3 |
| | *Finance: Ability to support start up.* | 2 | 2 |
| | *Financial controls* | 5 | 3 |
| | *Financial business planning* | 5 | 3 |
| | *Ability to invest* | 3 | 3 |
| **Banking** | *Banking: value adding relationship* | 3 | 2 |
| | *Banking: Supportive (reactive / proactive)* | 3 | 2 |
| **Risk** | *Risk: Strategies for management* | 4 | 3 |
| **Cash management** | *Cash management* | 5 | 4 |
| **Strategic focus** | | | |
| **Strategy capability** | *Strategic planning* | 2 | 2 |
| | *Strategic deployment* | 2 | 2 |
| **Engineering and project management** | | | |
| **Project management (PM)** | *PM: Full service provider* | 5 | 3 |
| | *PM: system adaptability to AT* | 5 | 2 |
| | *PM: Delivery of projects outside of Automotive* | 4 | 2 |
| **Quality systems / certifications** | *Quality: AS13845 / other* | 2 | 2 |
| | *Quality: systems implementation* | 4 | 4 |
| | *Quality: Unique systems* | 2 | 2 |
| | *Quality: International (eg CE /FDA)* | 1 | 1 |
| **Engineering** | *Eng: Ability to support AT engineering* | 5 | 2 |
| | *Eng: Product testing and validation* | 4 | 1 |
| | *Eng: CAD and design strength to support development* | 4 | 1 |
| | *Eng: Design strength* | 4 | 1 |
| | *Eng: Software* | 1 | 1 |
| **R&D** | *R&D: partnerships and development* | 1 | 1 |
| | *R&D: value add* | 1 | 1 |
| **Materials** | *Materials: Advanced materials knowledge* | 2 | 1 |
| | *Materials: Basic materials knowledge* | 3 | 1 |
| **Stakeholder relationships** | | | |
| **Universities** | *Uni: relationship* | 1 | 1 |
| | *Uni: Access to technology* | 1 | 1 |
| **Board / owners** | *Seeking growth / expansion* | 4 | 2 |
| | *Supportive of new opportunities* | 4 | 2 |
| | *Local / national / global decision making?* | global | global |
| **People / HR** | *Management adapability* | 4 | 2 |
| | *Management capability* | 4 | 2 |
| | *Management attitude* | 5 | 3 |
| | *understanding of future training and development requirements* | 2 | 1 |
| | *High performing workplace* | 3 | 2 |
| **Unions** | *Do you see any barriers associated with Unions?* | 4 | 4 |
| **International business** | *Relationships with international offices or partners.* | 1 | 1 |
| **Technical partnerships** | *Relevant technical partnerships* | 1 | 1 |
| **Networks** | *Relevant networks or participation* | 1 | 1 |
| **Supplier Chain and distribution** | | | |
| **Supply chain and Distribution** | *Supply Chain: competency* | 3 | 1 |
| | *Distribution capability* | 5 | 1 |
| | *Supply chain: partnerships and relationship* | 3 | 1 |
| | *Supply chain: Access to proven low cost country supply base?* | 5 | 1 |
| **Sales and Marketing (S&M)** | | | |
| **Sales and Marketing (S&M)** | *S&M: Value adding skill* | 5 | 4 |
| | *S&M: Existing strengths in this area? Outside of current markets?* | 3 | 3 |
| | *S&M: Local, national, international market access and knowledge* | 3 | 3 |
| | *S&M: Marketing techniques and active use of known process in this* | 5 | 4 |
| | *S&M: Knowledge of 'valley of death'* | 5 | 3 |
| **Safety / Enviroment and workplace readiness** | | | |
| **Compliance** | *Compliance: Evolving / static* | 1 | 1 |
| **Plant and operations** | | | |
| **Processes** | *Plant engineering and design* | 5 | 2 |
| | *process development?* | 3 | 2 |
| | *Inhouse automation skill (or outsource if so who?)* | 4 | 2 |
| | *New process development* | 4 | 1 |
| **Continuous improvement** | *Lean systems development* | 5 | 3 |
| **Core process knowledge** | *Advanced assembly* | 4 | 1 |
| | *Manufacturing engineering* | 5 | 1 |
| | *High volume / low volume assembly* | | |
| | *Electronics* | 1 | 1 |
| | *Robotics* | 4 | 1 |
| | *3D prototyping* | 4 | 1 |
| | *CNC or other computer based equipment* | 5 | 4 |
| | *Other special purpose knowledge* | 3 | 3 |
| **Plant capital** | *Own , lease, other* | 3 | 2 |
| | *Expand - contract or greenfield (interested in Greenfield?)* | 3 | 2 |

| Partnering a growing AT industry | | | |
|---|---|---|---|
| **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. | S | |
| **Company 5:** Part of an Asian global automotive group with core competencies in engineered plastic product manufacturing. Highly competent engineering and R&D and advanced manufacturing systems. Exporter and focussed on high levels of innovation and value add. Strong ties with research institutions and international technical partnerships. Employing approximately 600 people and revenues of approximately A$120M. | | | |
| **Critical Success Factor (CSF) definitions and summary** | | | |
| | | *1 = low / poor / no* | |
| | | *5 = high / strong / yes* | |
| CSF Category | CSF Subcategory | Simple AT | Complex AT |
| | | 1-5 | 1-5 |
| **Finance and cash** | | | |
| **Finance** | *Financial risk appetite* | 2 | 2 |
| | *Finance: Ability to support start up.* | 5 | 3 |
| | *Financial controls* | 5 | 5 |
| | *Financial business planning* | 5 | 3 |
| | *Ability to invest* | 3 | 2 |
| **Banking** | *Banking: value adding relationship* | 2 | 2 |
| | *Banking: Supportive (reactive / proactive)* | 2 | 2 |
| **Risk** | *Risk: Strategies for management* | 4 | 3 |
| **Cash management** | *Cash management* | 5 | 5 |
| **Strategic focus** | | | |
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| | *Management capability* | 4 | 2 |
| | *Management attitude* | 4 | 3 |
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| | *S&M: Marketing techniques and active use of known process in this* | 4 | 3 |
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| | *Electronics* | 4 | 4 |
| | *Robotics* | 4 | 4 |
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| | *Expand - contract or greenfield (interested in Greenfield?)* | 5 | 5 |