

Scenario Planning for the Technical Textiles Sector of the TCF&L Industries

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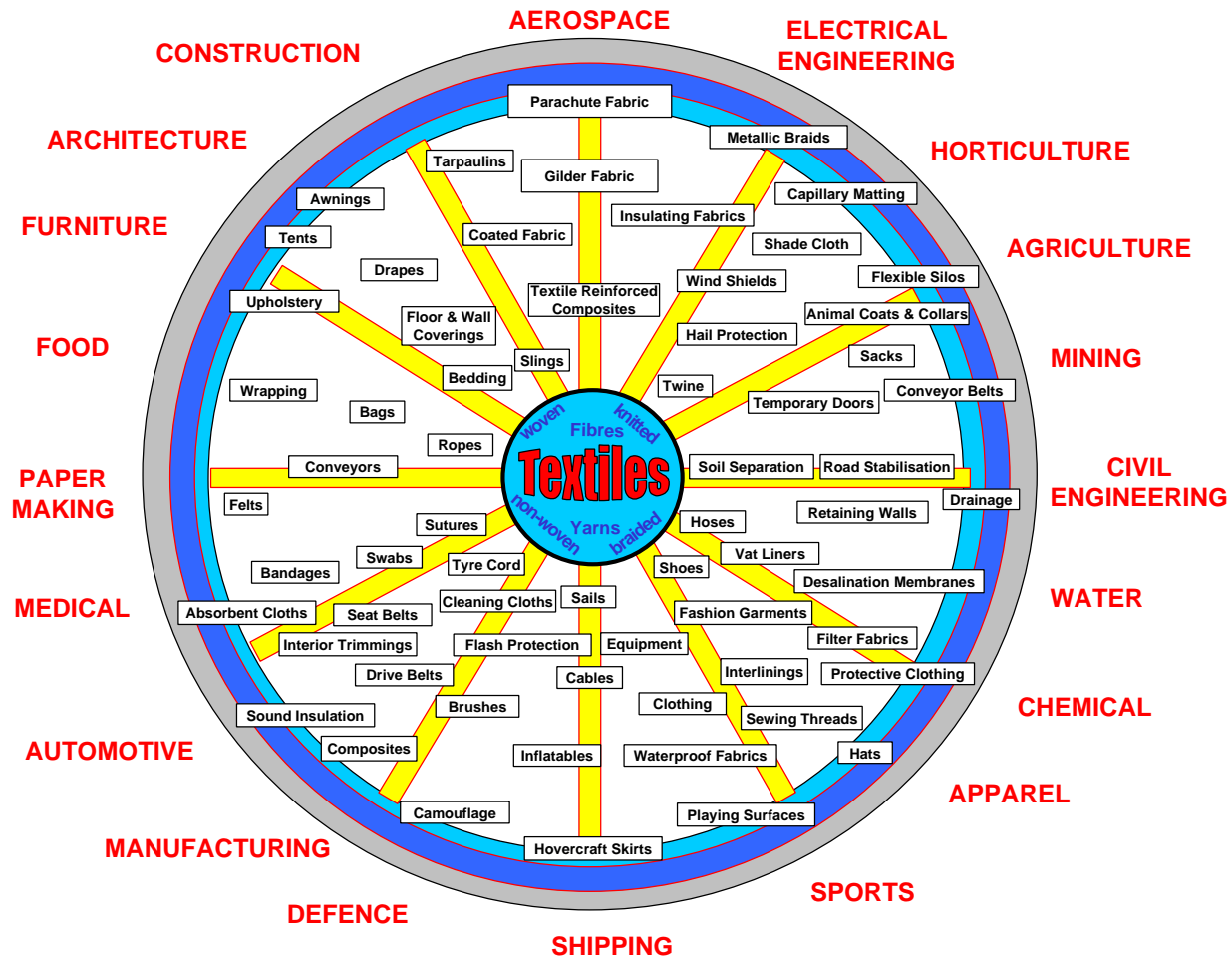
for



**Australian
Business**

140 Arthur Street North Sydney NSW

The Textiles Wheel



Source: Department of Textile Technology, University of New South Wales

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Executive Summary

Technical textiles are ‘textile materials and products manufactured primarily for their technical performance and functional properties rather than their aesthetic or decorative characteristics. A non-exhaustive list of end-uses includes aerospace, industrial, marine, military, safety and transport textiles and geotextiles.’[1]

Technical textiles are about **function not fashion**. ABS figures show the Australian technical textiles industry to be worth approximately \$1.5billion and research indicates that the global industry is growing by about 4% per annum.

The growth in the technical textiles sector in developed countries, including Australia, is being driven by:

- increasingly stringent environmental regulations;
- the need for increased energy efficiency and utilisation of waste;
- high performance/whole of life cost factors;
- changing needs of an ageing population; and,
- an increased focus on leisure.

The sector represents a significant proportion of world textile manufacturing and trade. Recent studies within the field indicate that up to 40% of fibre consumption within developed countries is consumed in the manufacture of technical textiles. The sector therefore provides Australia with the opportunity to capitalise on these global developments by:

1. capitalising on the high rate of growth which has been experienced and is expected to continue in the technical textiles sector worldwide and in Australia;
2. building upon the sporadic and fragmented success Australia has achieved to date in the design, development and manufacture of high-tech technical textiles;
3. nurturing the development of an innovation culture amongst our wool, cotton and leather processors towards higher value adding technical textile products; and,
4. improving the performance of Australia in the development of a synthetic and man-made fibre capability.

This report explores these opportunities by imagining different futures for the broader technical textiles sector and the development of an agreed vision for the sector.

An Agreed Vision for the Sector

The Steering Group for this study has discussed the four scenarios presented in this report and has agreed the following Vision for the technical textiles sector for Australia:

Internationally recognised as a leading centre for the design, development and manufacture of high added value technical textiles and associated services, focussed on those products and services with specialised characteristics.

In essence, it recognises that in global terms, the development of mass consumer products will continue to be developed overseas, and the role Australia should aspire to is one of regional manufacturing hub. Australia should, however, also aspire to fulfilling a specialised role in focussing on products and related services, which are specialised and support textiles for ecology, medical, composite materials, protective clothing, defence and sport/leisure industries.

Current State of the Technical Textiles Sector in Australia

Australian firms and foreign owned subsidiaries with Australian operations have enjoyed some success in the development of export oriented technical textiles. However, that success has been fragmented and secretive.

This has been due to a number of reasons, which are discussed further in this report. However, the key causes include:

1. domination by a small number of foreign owned companies which undertake their activities with high levels of secrecy;
2. the Australian firms in the sector are largely represented by SMEs which have again conducted their affairs with high secrecy and largely operate independently;
3. lack of meaningful data from the ABS and other information sources;
4. there is a significant lack of awareness of the opportunities which exist in the sector; and,
5. the absence of a high performance fibre manufacturing base in Australia causes a significant gap in the supply chain.

Recommendations

How do we achieve the Vision ?

This report suggests a number of recommendations, which will assist the sector address the challenges it faces and move towards the achievement of the agreed vision. These recommendations are grouped in five equally important areas of action for industry and Government and have been validated through an industry survey.

Strategic Planning & Cultural Change:

Programs for firms to achieve Best Practice in leadership; business process improvement; quality management; workplace reform; and supply chain development.

Promotion and Integration of the Sector:

This goal can be achieved through:

- a detailed national study into the technical textiles sector leading into the development of a national database;
- an awareness programme which aims to enhance the reputation and image of the broader TCF&L industry and focuses on the potential for growth & opportunities; and,
- the establishment of an industry forum that would enable all industry stakeholders to network and develop programs and ideas to continue the future growth of the industry.

Innovation & Technology Development:

To be achieved through:

- the development of a National Innovations Network to support innovation and product & process development;
- 'Textiles for the Future'; develop an innovation and creative culture within the industry;
- the development of supply chain knowledge, opportunities and development within the above initiatives; and,
- successful development and utilisation of patents and licences.

Education & Training:

The development of a strategy for tertiary education in technical textiles and management areas. A needs analysis for training and development of industry at vocational and technical levels.

Market Development:

The development of an export marketing approach to markets and the continued support of Government to industry in the development of more open and level international trading.

1. Introduction

1.1 Action Agendas

Action Agendas are a key element in the Federal Government's industry policy framework. They are designed to be a partnership between industry and Government to develop a specific programme of action aimed at creating sustainable long-term development of Australian industry.

The Government's aims for the TCF&L industries are set out in "Action Agenda - A Discussion Paper" – (March 1999) [2].

"The Government is looking to the (TCF&L) industry to become known for its:

- *innovation in designs;*
- *quality of its products;*
- *ability to reach and lead the markets of the world;*
- *brand and product design presence throughout the world;*
- *skill in adding value to our natural resources; and,*
- *use and development of technology to achieve a competitive edge."*

1.2 Background to This Report

Australian Business Limited (ABL) was provided with a grant from the Department of Industry, Science and Resources (DISR) to undertake a sectoral strategic/scenario planning exercise for the Technical Textiles sector of the TCF&L industries in order to develop a vision and robust growth strategies for that sector. DISR have identified that this exercise will also facilitate the identification of enterprise change strategies, product development opportunities and consequent training and educational needs. This is a key outcome being sought from the project as the funds are provided by the TCF 2000 Development package.

We understand that this document will serve as an input into:

- a TCF&L Futures Round Table; and,
- a broad based communication strategy comprising direct communications to firms in the industry, editorial for industry publications and contributions to a web-site.

ABL retained Australian Business Enterprise Development Pty Limited (ABED) to:

- conduct a strategic/scenario planning exercise for the Technical Textiles sector;
- produce a written report which:
 - details a 10 year vision and strategic plan to 2010 for the sector including a description of:
 - *the scenarios used for testing strategies to ensure that they are robust;*
 - *the preferred scenarios, and their driving/critical issues;*
 - *the fundamental changes that are required in order for the sector to align itself with future needs; and,*
 - *the strategies which position the industry on a growth path and that both industry and government can work towards encouraging;*

- details the implications of the scenarios for the issues of:
 - *market development;*
 - *innovation/technology development;*
 - *skills, education and training;*
 - *supply chain management; and,*
 - *and information technology;*
- details, where appropriate, the implications for wool, cotton, leather and fashion.

2. Technical Textiles

The technical textiles industry is a diverse and dynamic one, embracing a wide range of materials, processes, products and applications. It also shares a number of technologies and has overlapping interests with other materials industries such as glass, plastics, films, membranes, metals, composites and paper.

During the course of this study it became quite clear that there is a lack of understanding of the definition, scope, types and coverage of technical textiles. Indeed, DRA [3], in an international study, states that “... *there is a lack of consensus about the scope of the industry and its markets.*”

2.1 Definitions

Throughout the course of this study, and in the development of this plan, we have utilised the following definition of *technical textiles*, devised by the Textile Institute¹:

“Textile materials and products manufactured primarily for their technical performance and functional properties rather than their aesthetic or decorative characteristics. A non-exhaustive list of end-uses includes aerospace, industrial, marine, military, safety and transport textiles and geotextiles.” [1]

One source of confusion is that the term “technical textiles” is often taken to mean “industrial textiles” – an older term with a narrower focus. With the expansion of the technical textiles industry in the latter half of the 20th century, the industrial textiles is now recognised to be a subset of technical textiles, ie. *industrial textiles* are defined as [1]:

1. Textile materials and products intended for end-uses other than clothing, household, furnishing and floorcovering, where the fabric or fibrous component is selected principally (but not exclusively) for its performance and properties as opposed to its aesthetic or decorative characteristics.
2. A category of technical textile used either as part of an industrial process, or incorporated into final products.

2.2 A Broader View of Technical Textiles

The need to take a broader view of the scope of technical textiles has prompted re-evaluation of their importance within the textile industry as a whole. To this end, quantitative projections of end-use consumption worldwide have recently been made on the basis of models developed by DRA [3]; these are summarised in Appendix I. Further, that study covered the 12 main application areas defined by Techtextil² and listed in Table 1.

¹ The Textile Institute is the only world-wide association representing professional textile and clothing industry personnel. It was established by Royal Charter in 1909 and has its international headquarters in Manchester, UK. There are three sections in Australia, viz. NSW, Southern Australia and Northern Australia.

² Techtextil is the leading international exhibition and symposium forum for technical textiles, providing an interface between technical textiles manufacturers, their customers and suppliers; it is organised by Messe Frankfurt GmbH.

Much of the material in this report takes this broader definition of technical textiles in section 2.1 together with Table 1. The definition also refers to each of textiles, clothing, distribution and retailing industries. Thus is due to the following:

- the integration of these sectors in the academic and business literatures;
- the growing integration of these sectors through international supply chain management; and,
- the growing integration of these sectors through common ownership, strategic alliances and government actions to assist domestic producers penetrate international supply chains (eg. through overseas assembly provisions and import credit schemes).

Table 1: THE 12 MAIN APPLICATION AREAS OF TECHNICAL TEXTILES [3]	
Agrotech	agricultural textiles (including horticulture and forestry)
Buildtech	construction and architectural textiles
Clothtech	functional textile components of garments and footwear
Geotech	geotextiles and (some) geomembranes
Homotech	functional textile components of furniture, household textiles and floor coverings
Indutech	industrial textiles (including filtration, hoses, cleaning, etc)
Medtech	medical textiles (including health and hygiene)
Mobiltech	transportation textiles (road, rail, marine and aerospace)
Oekotech	environmental and safety textiles
Packtech	packaging textiles
Protech	protective textiles (personal and property)
Sporttech	sports (and leisure) textiles

The inclusion of clothing-related textiles into the technical textiles basket (viz. clothtech, protech, sporttech) is a consequence of two key trends. First, the clothing sector’s use of more technically intense fabric has accelerated. Second, new production technologies and machineries for both woven and nonwoven industrial textiles have been readily adapted for the production of clothing-related textiles. Technical textiles increasingly refer to the broader field of fibre and fabric whether destined for industrial, household or personal use provided that functional properties rather than aesthetics properties are the dominant commercial characteristics.

2.3 Two ‘Levels’ of Technical Textiles

It became clear during the course of this study that the participants in the technical textiles sector operated on two ‘levels’;

1. **Higher-end** – those companies involved in the development and manufacture of more complex technical textiles, eg: carbon fibres; polyester; polyamide; acrylic; polyolefins; glass; aramids; nonwovens; and composites; etc.

2. **Traditional** – those companies in ‘traditional’ textile sectors who develop and manufacture products which are included in the broader definition of technical textiles and are in the application areas listed in Table 1. These companies tend to utilise waste materials or focus on low cost technical textile solutions.

In summary, the technical textiles sector is not just about high-tech development and manufacturing. There is an increasing role and, importantly, markets available for manufacturers in the traditional textile sectors.

Accordingly, the scenarios developed, and the consequent recommendations address the developments required by all the players in both ‘levels’ of the sector.

3. The Current Situation

3.1 Market Overview

The international technical textiles market has been researched extensively by Werner [4] and DRA [3].

Werner in 1994 found:

“The size and relative importance of the technical textile sector has been greatest within the developed countries (US, European Union and Japan). Considering the North American market and the two other leading developing technical textile markets, Europe and Japan, the United States accounts for the largest share at an estimated 49% or 1,830 thousand tons.

Distribution patterns in technical textiles follow the same general lines as in apparel and domestic textiles. The main difference is that in the latter, the “fabricators”, clothing manufactures or other cut and sew operations, are fairly homogenous in character while in technical textiles they represent a varied group ranging from the manufacture of parachutes to makers of golf clubs. The technical textiles industry, however, uses the traditional distribution chain.

The fibre producers operate with their own sales force on a world scale.

There is a need for technical textile companies to become expert in fields other than textiles so that they can provide textile “solutions” to their customers’ problems. A significant obstacle to exporting is the lack of common standards. Differences in national standards make it difficult to compete with local producers and effectively excludes them from government contract work.

Research and development is geared to product and applications development, which is market driven, similar to the fashion driven market of apparel.”

The following was published in a report by DRA in 1997:

“In many developed countries, technical textiles already account for over 40% of textile industry output and end-use consumption. Even in developing countries such as China, the proportion is well over 10% and likely to reach 20% by the year 2000.

Despite this generally optimistic outlook and higher than overall textile industry growth, rates of increase in end-use consumption in most application areas, product groups and geographical markets are likely to be lower in the next decade than in the past one. The industry, especially in developed country markets, will increasingly face problems of market maturity, over-capacity and global competition.

The transportation (Mobiltech) market, for example, while continuing to be the largest and most valuable application sector for the foreseeable future, is expected to experience some distinctly contrasting trends with declines in the per unit consumption of reinforcing textiles for tyres, hoses and belts due to changing product technologies and longer working lifetimes being only partially offset by newer applications, such as air bags and composite materials. A trend towards smaller cars, lighter weight materials

and a projected slow down in total vehicle construction before 2005 all add to the complexity of the situation facing suppliers to this market.

Meanwhile, the highest growth rates are to be found in relatively small and newer application areas for technical textiles such as geotextiles, protective clothing, sport textiles and environmental products.

Nonwovens are projected to become the largest single product group by the year 2005, overtaking woven fabrics. Better prospects are seen for knitted and braided textiles, but the use of fibres and textiles for composite reinforcement is the only area where higher growth rates are expected more or less across the board.

Asia is becoming the powerhouse of both production and end-use consumption for technical textiles. China, in particular, is emerging as a new technical textiles 'super power' although the potential of other developing countries, in particular India, to make an important impact by the year 2005 is already becoming evident.

Following a period of rapid growth in the 1980s, the first half of the 1990s proved to be a watershed for many sections of the technical textiles industry. Rapid and largely unplanned growth has now given way to a more competitive global market characterised by powerful new entrants and increasingly well developed and formalised supply chains. Greater concentration of the industry is anticipated as a result and new strategy perspectives and disciplines will become essential to operating in this changed competitive environment."

3.2 Overview of the Sector

The technical textile sector represents a significant proportion of world textile manufacturing and trade. Recent studies within the field indicate that an estimated 40% of fibre consumption within developed countries is consumed in the manufacture of technical textiles.

Developments within the technical textile sector have been characteristic of high added value (products), high technology and performance and a niche market orientation. Additionally, technical textiles are utilised in a broad cross-section of industries and applications.

Technical textiles are expected to continue to grow at a higher rate than any other segment of the textile market. Table 2 provides a summary data comparison of end-use consumption of technical textiles in the world and in Australasia as an indication of the size and potential growth of this sector.

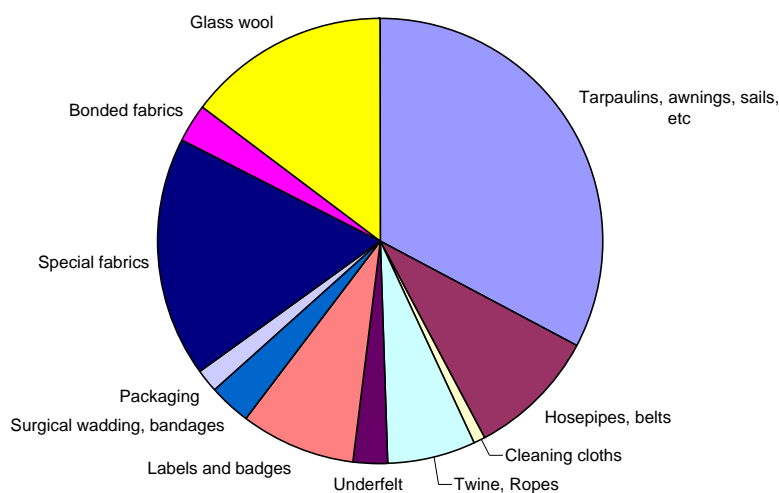
Table 2: END-USE CONSUMPTION OF TECHNICAL TEXTILES				
	WORLD-WIDE		AUSTRALASIA	
	VOLUME '000 tonnes	VALUE US\$ million	VOLUME '000 tonnes	VALUE US\$ million
1985	6,062	33,160	83	472
1990	7,844	42,528	101	544
1995	9,321	49,963	120	630
2000	11,327	60,271	149	762
2005	13,688	72,330	179	904
%CAGR '85-'95	4.4%	4.2%	3.7%	2.9%
%CAGR '95-'05	3.9%	3.8%	4.1%	3.7%

CAGR: Compound Annual Growth Rate
Source DRA[3]

Note – The difference in \$ value between ABS and DRA data is the result of variations in data gathering methodology and definitions.

The size and make up of the industry in Australia is shown in the following diagram,

TECHNICAL TEXTILES
Australian Production - \$M 1,465 (ABS, 1996-97)



Many success stories exist in the Australian technical textiles industry. They include:

- Geofabrics/Excel/Polyfoil: exporting nonwovens;
- Albany International: powerhouse filter bags exported to South Africa;
- United Bonded Fabrics: Weedmat and erosion control mat;
- Smith Family Industries: development of hygienic cloth and pipeliner fabrics;
- Schlagel: development of woven brushes;
- Lantor: bandages; and,
- Colan Products: reinforcement fabric, ballistic fabrics.

Whilst these and other Australian companies have been successful and many are exporting technical textiles, like nonwovens, aircraft seat fabric, specialised felts etc, this study has revealed that the Australian industry has been characterised by:

- a fragmented and secretive industry;
- a relatively small number of major players which are foreign owned and directed;
- a number of innovative Small to Medium Enterprises (SMEs) which have capitalised on the growing market;
- little integration of the supply chain;
- a lack of a performance fibre manufacturing base;
- some traditional textile manufacturers who innovate primarily to utilise spare production capacity;
- no specific education and training modules for the sector;

- weak but strengthening links between research & development (R&D) providers and market needs; and,
- user industries (including CRCs) looking for textile solutions but with an absence of an R&D strategy.

All the above points highlight the lack of understanding with respect to the size and importance of the technical textiles industry.

The high cost of developing high-end technical textile products requires global markets in which to recoup those investments. Accordingly, there is evidence to suggest that the development of technical textiles in, especially, high volume consumer goods will increasingly be driven from overseas, with Australia retaining a manufacturing base which services the domestic market with some export.

One of the first attempts to bring some of the industry participants together was the Aerospace Textiles Collaborative Arrangement centred around the then CRC for Aerospace Structures, the University of New South Wales and RMIT University in 1993. This alliance aimed to support the development of composite textile manufacturing skills in Australian industry (with special emphasis on advanced composite materials utilising high-performance fabric substrates). Recently, the Nonwoven Industry Group was formed, comprising some industry participants and RMIT University. Its mission is stated to provide a forum for the advancement of the Australian and New Zealand industry and foster its development. Such initiatives can only be seen as positive steps in the future development of the technical textiles sector in Australia.

3.3 Preliminary Database of Technical Textiles Sector

Several companies in the Technical Textiles Sector in Australia were interviewed as part of the validation process. The following features are apparent:

- traditional textile companies weaving apparel textiles also supply technical textiles, eg Bradmill and National Textiles,
- most companies interviewed report a turnover in the range \$5m to \$20 m and have 10 – 100 employees involved in the manufacture of technical textiles;
- the automotive sector is a significant producer of technical textiles;
- production exported ranges from nil to 50%;
- growth is reported by most companies as >5%, in some cases as high as 20%, and export is to industrialised nations;
- some companies report no or negative growth and susceptibility to import competition;
- the specialised companies have an age of less than 30 years;
- the product range is diverse;
- the companies are located in all capital cities and major rural locations; and,
- most companies report they carry out product development; in comparison with the apparel textile sector this is relatively high.

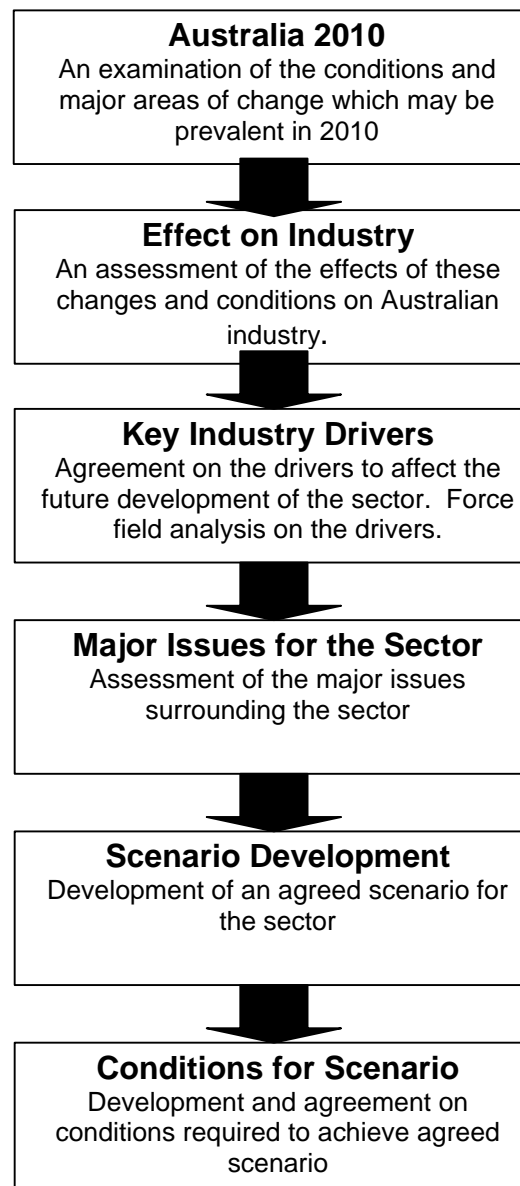
It is believed that a full technical textiles database would feature some 100 companies.

4. Scenarios for the Sector

4.1 Process of Formulation

At the industry workshop held on 10 June 1999, participants worked in groups to undertake the following approach to the formulation of future scenarios for the sector.

Attached, as Appendix II are the detailed outcomes from the industry workshop. Appendix III lists the participants.



4.2 Scenarios

Given the conditions and environmental factors discussed at the workshop there were a number of scenarios developed for the sector. In discussing the scenarios which we will expand upon below, it is important to take into account the following comments in relation to scenarios:

- a scenario should not be confused with a 'Vision' for an industry or an organisation. A 'Vision' is a clear statement of what an industry or organisation has committed itself to achieving in a given time frame. A, or a set of, scenario(s) are possible future results given a set of conditions;
- no scenario is likely to eventuate in itself as a range of conditions will apply to different subsectors; and
- the scenarios here largely move toward both optimistic and pessimistic extremes.

In summary, the scenarios developed as a result of the industry workshop and other research have been developed around two key features:

1. the level of involvement in manufacturing of technical textiles relative to domestic consumption; and
2. the level of involvement in the design and development of technical textiles.

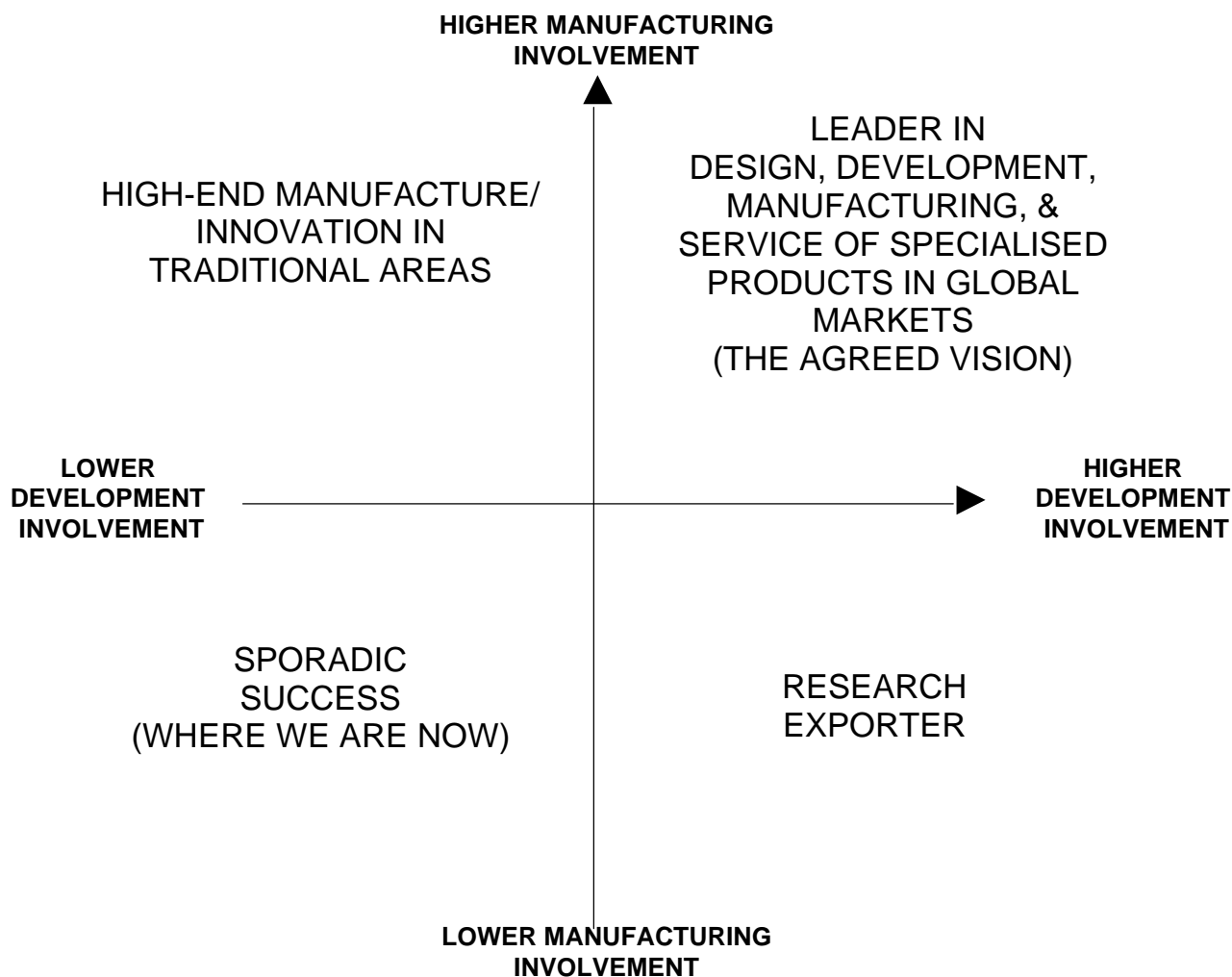
Accordingly, the four scenarios developed have been graphically illustrated overleaf and are discussed further in this report.

As stated earlier in this plan, there is limited objective information available in regard to the state of the technical textiles sector in Australia. The Australian Bureau of Statistics (ABS) data available (Appendix 4) is a summary of the size and diversity of the industry. However, given the highly competitive and profitable nature of the high end of the technical textiles sector, there is, understandably, significant secrecy in discussing commercial activities.

Accordingly, our assessment of each of the scenarios has been drawn from a number of alternative sources, including:

- outcomes from the industry workshop (Appendix 2);
- some international studies into the sector;
- anecdotal evidence from industry site visits and validation survey; and,
- input from members of the steering committee.

The Scenarios



Scenario 1: Sporadic Success

By 2010 sector participants have largely failed to address the issues facing the sector, which are discussed throughout this report.

Given the projected growth in worldwide consumption of technical textiles, those Australian companies which have developed a 'niche' in their respective areas will continue to be successful developers and exporters of technical textiles. They will continue, however, to develop their products in a secretive manner which will perpetuate the fragmentation of the sector participants.

There are likely to be some additional players in the sector who through necessity of continued falling demand for their traditional low value-adding products, will innovate and seek to develop new and/or improved products. These developments will largely be on an ad-hoc basis and reflect a continued lack of a properly developed supply chain that links end users with the sector.

Australian firms have also, with limited exceptions, missed the opportunity to undertake some real strategic planning and vision development in 1999-2000 that addresses the issue of their survival beyond the continuation of the removal of protective barriers beyond 2005.

One of the key competitive advantages Australia has over lower wage Asian nations is our highly skilled and educated workforce, an advantage that is continually being eroded and will continue to do so. The continued absence of an integrated education and training strategy for the sector at tertiary and vocational levels will limit the success Australia achieves in developing further its manufacturing base for foreign corporations in mass consumption market products.

Those foreign corporations which already have a manufacturing base in Australia may continue to do so. However, whilst labour costs are a relatively small proportion of the total costs of development and manufacture of technical textiles, they are a larger proportion of the continued annual costs of operation. Accordingly, there is a risk that some of these operations may be discontinued by 2010. Further, the establishment of further manufacturing operations is limited in scope.

This scenario is clearly not favoured by all involved in this study as it does not capitalise on the manufacturing base Australia is developing in technical textiles, notwithstanding its current weaknesses.

Scenario 2: Research Exporter

This scenario basically presupposes that, by and large, Australia will be involved in the research & development of high value-added products but with limited involvement in manufacturing. This could be either through the sale of technologies or the 'export' of technology for manufacture in a lower wage nation by a multinational corporation.

The current state of R&D in this sector is characterised by ad-hoc research that has been primarily driven by individual academics with little market driven innovation. Again, the development of an effective supply chain with end users as real participants has not occurred across the industry.

As discussed in scenario 1, Australian firms also have, with limited exceptions, missed the opportunity to undertake some real strategic planning and vision development in 2000 which addresses the issue of their survival beyond the continuation of the removal of protective barriers beyond 2005. They have, by and large, not seen the need to innovate and create and meet the changing needs of their current and potential customers.

Accordingly, with a lack of a vibrant manufacturing base which has seized the opportunity to innovate and create, and without the development of a cohesive and co-operative sector, much of the research and development will be exported in that form to foreign multinationals.

This scenario is clearly the least favoured by all involved in this study as it does not capitalise on the development and manufacturing base Australia is developing in technical textiles, notwithstanding its current weaknesses.

Scenario 3: High-End Manufacture/Innovation in Traditional Areas

By 2010 Australia will become a significant manufacturer of high value added technical textiles, but with limited involvement in the development of those products. This scenario is characterised by:

1. high level of involvement in the manufacture of mass consumption high-end technical textile products and services (consumer, industrial, and medical); and,
2. high level of development of innovative products by the 'traditional' as part of the supply chain of technical textiles.

The global technical textiles sector will continue to be dominated by a relatively small number of large players. The development of technical textiles in, especially, high volume consumer goods will increasingly be largely driven from overseas, with Australia retaining a manufacturing base which services the domestic market with some export.

Australian manufacturers have grasped the opportunity to become a regional manufacturing hub for technical textiles for Australasia and South East Asia. Major foreign corporations which dominate the sector have also seen Australia as a regional manufacturing hub as they have seen Australia has significant advantages over other Asian nations. This has been achieved through Government policy in taxation, investment, education, transport, and environmental areas which has 'competed' successfully with other Asian nations for the attraction of these manufacturers.

At the 'traditional' end of textile manufacture, the largely SMEs have capitalised on the growth in technical textiles consumption.

This has required a high level of creativity and innovation in a section of the industry which, with limited exceptions, has been lacking in this aspect.

There has been significant cultural change within the traditional sectors of the industry to adapt and become relevant. This cultural change and the need to innovate and create in order to produce higher value added products is consistent with scenario planning reports written for each of those sectors, and the Action Agenda group on innovation and Technology.

This development of an innovation and creation culture has required the participants in the sector to develop:

- a shared vision for the industry through the establishment of an industry forum;
- a breakdown of the current level of secrecy to a level where Australian firms collaborate on product and market development through the development of a National Innovations Network;
- the development of appropriate standards (eg. test methods and design guidelines for applications) and certification criteria.
- industry leaders with the required vision and skills and entrepreneurial flair;
- cross functional supply chains with other TCF&L industry participants;
- market focus through closer links and mutual relationships with customers in Australia and overseas. The key to success will be on the development of 'complete' solutions for customers from the initial development of product through to delivery and after sales service including education and product continuous improvement;
- innovative solutions to product development which meets the markets' changing needs, through a commitment to education, research & development;
- flexibility in operations to meet shorter development cycles;
- best practice in all aspects of operations; and
- the skills and competencies of managers and staff to meet the requirements of a demanding global market;

Government has facilitated this development process through:

- the application of SIP funds to firms who develop this innovative culture;
- continuation of direct incentives for research & development;

- commitment to tertiary education in technical areas of textile technology and the development of leadership skills by the people in the industry;
- development of an industry forum which has closed the gap between industry and government and has jointly developed actions to assist the industry;
- commitment to manufacturing in Australia through an effective industry policy;
- development of a taxation and investment regime which will compete for manufacturing investment with other South East Asian nations;
- continued commitment to the achievement of a 'level playing field' in international trade through participation in WTO and APEC agreements;
- improved export assistance to firms through Austrade, and other forms of export assistance; and,
- effective protection of Australian firms, not through tariffs, but more effective anti-dumping measures and the review of quotas with countries utilising unfair trade barriers, where considered in the national interest.

Scenario 4: Leader in Design, Manufacture, Development and Service of Specialised Products in Global Markets

This scenario represents the agreed Vision for the sector.

The Steering Group for this study has agreed a Vision for the technical textiles sector which is representative of this scenario:

Internationally recognised as a leading centre for the design, development and manufacture of high added value technical textiles and associated services focussed on those products and services with specialised characteristics.

This scenario is largely the same as scenario 3 (refer points 1 & 2 below), and extends Australia's involvement to points 3 & 4 below. This scenario is characterised by developments to 2010 which result in:

1. high level of involvement in the manufacture of mass consumption high-end technical textile products and services (consumer, industrial, and medical);
2. high level of development of innovative products by the 'traditional' as part of the supply chain of technical textiles; and,
3. focus of research and development and subsequent manufacture on specialised products where Australia has a competitive advantage and/or significant domestic consumption market; and,
4. the development of a performance fibre manufacturing base which is largely non-existent in Australia in 1999.

Accordingly, the conditions required for the achievement of this scenario are similar to those discussed in scenario 3.

There is anecdotal evidence of a number of Australian companies, which have been successful in developing and manufacturing high value added technical textiles. Again, we cannot be specific as to quantum as reliable data does not exist.

It would seem, on balance, that where there has been a high level of involvement in the development of the product, there has followed a high level of involvement in subsequent manufacturing. However, on a national scale, it would also appear that there have been only been 'pockets' of success in meeting both of the conditions in this scenario.

In order to achieve this scenario by 2010 there has been a significant cultural change in the participants in the 'traditional' side of the industry as discussed in detail in scenario 3.

The key difference between this scenario and scenario 3 is the higher level of involvement in the design, development of high-end technical textiles.

The sector has accepted the fact that the development of mainly mass consumption technical textiles would continue to be driven by larger multi-national organisations. Australia will play a key role in the manufacture of those products. The industry has further accepted and agreed that the continuation of high levels of protection for the 'traditional' TCF&L sectors will not continue beyond 2005, and accordingly those sectors will need to innovate to survive.

This has been achieved through a focus on the development of specialised products which have unique characteristics driven by engineering applications (civil), environmental regulations for effluent discharge (filter fabrics), erosion control (weedmats), energy consumption (lightweight composites), recycling (fibre re-use), leisure oriented lifestyles (functional fabrics) and an ageing population (functional textile products for hospitalisation, incontinence).

The existence of a significant domestic market upon which to research, develop and test in a commercial environment, new product developments is critical. It also has required the collaboration through supply chain development, joint venture or alliance of research, academic, manufacturing, and retailing organisations.

Critical to the successful achievement of this scenario has been the development of a high level of dialogue and relationships along the whole supply chain, from fibre producer through to the "consumer". There is a need for each segment of the supply chain to become "expert" with, at least, the science and technology of segments immediately upstream and downstream. Development of improved and/or new and novel technical textiles and application areas requires collaboration between textile scientists/technologists and user groups (eg. engineers) [5].

In the study and development of the supply chain from 1999 it has become evident that there is a gap in the supply chain due the absence of a significant performance fibre manufacturing base in Australia. Through Government assistance, the sector has attracted a major manufacturer of high performance fibre by 2005.

In many areas, Australia has already achieved world leadership status in the development of technical textiles. The role of industry and government is largely the same as that discussed in scenario 3.

5. Key Recommendations

5.1 Promotion of the Technical Textiles Sector

5.1.1 Industry Forum

In order to achieve greater cohesion, communication and co-operation in the sector, there should be established an appropriate forum to act as an advisory mechanism between the sector and Government. The forum should comprise of all key stakeholders in the industry.

The role of the forum would include:

- liaising with Government in the implementation of the Action Agenda;
- advising Government on broader policy issues affecting the sector from time to time;
- creating an environment where industry participants would be encouraged to co-operate in a broad range of areas such as research & development; export market development; manufacturing; distribution; and other resource use areas; and,
- manage to initial study referred to below.

The various options for the establishment of this forum include:

- a committee under the 'Peak Council' proposed by the Innovations & Technology Working Group;
- the creation of a separate and new industry association; and,
- the establishment of a special focus group including existing industry associations.

5.1.2 Development of Sector Database and Website

In order to develop a centralised and robust source of data in regard to the sector in Australia, it is recommended a comprehensive study be undertaken into the sector. This study would cover such issues, and would be useful to Government and the industry in understanding of:

- the firms which operate in the sector and their capabilities;
- relevant industry statistics and performance indicators;
- domestic & overseas market trends;
- supply chains;
- new product & process technology developments;
- market intelligence - growth plans and changes taking place;
- participants needs from Government;
- impediments to further development;
- levels and types of imports and exports;
- employment levels, types and skills gaps;
- competencies required
- education and training providers;

- research & development support providers; and,
- user industry associations and groups;

We recommend this initial study be funded by Government. The study should also address in what form and by whom should be maintained an industry database so as to ensure the above data remains relevant into the future.

The data collected in the study and its subsequent maintenance should be available through the internet on a specific sector website or the Department of Industry, Science and Resources proposed TCFOz website. The site should also include a bulletin board and chat room facilities, together with links to relevant websites in Australia and overseas

5.1.3 Awareness of Sector Growth & Opportunities

The study found there is a real need to raise the awareness level, profile and image of technical textiles within the TCF&L industries, user industries, education & training institutions, R&D organisations and the general public.

Included in this would be growth & opportunities (refer to database and industry forum), the importance of innovation in product and process development, relevant government programs, both TCF&L specific (eg. SIP, Action Agendas, etc) and generic (eg. AusIndustry) success stories, both of companies and of innovation.

A programme of awareness would need to follow the industry study discussed above as the findings of the study would be critical in this programme. This awareness programme might also be undertaken together with the dissemination of the study. It would also be appropriate for the Industry forum discussed above to manage this programme.

The various media which could be utilised to undertake the programme includes:

- direct mail to the TCF&L industry participants through databases of various industry associations; and,
- a 'roadshow' of industry seminars in capital cities and major regional centres to disseminate the outcomes from the detailed study.

5.2 Education & Training

The study found that there exists a significant gap between the needs of the sector in the competencies of its people, and the current state.

Accordingly, it is recommended that a long-term strategy be developed for appropriate education and training courses in technical textiles. This would include:

- an audit of technical textiles content in existing education & training courses and the proposed TCFL training package;
- an audit of industry requirements (needs analysis) for education and training in technical textiles, including curriculum content, competencies and extent of student market; and,
- the development of appropriate modules in technical textiles for the proposed National Framework (NFE) of Excellence in TCF&L Education and Training and to service not only the technical textiles industry but also the supplier and user industries.

A national degree framework be included as part of the NFE to allow for development of articulation pathways from TAFE through to university degree and postgraduate qualifications, with multiple entry and exit points to facilitate and encourage lifelong learning. Included in this would be pathways for graduates from other disciplines to obtain appropriate learning and qualifications for careers in the technical textiles industry (and the TCF&L industries in general).

The NFE would include program modules in information technology, business and manufacturing management, marketing, and supply chain management to address current deficiencies in industry leadership and management.

To encourage the entry of high-calibre young people into the technical textiles industry (and the TCF&L industries in general), government and industry should seek to establish:

- technical textiles modules in appropriate high school subjects (eg. engineering, design & technology, and textiles subjects); and,
- university scholarships and cadetships for high school (HSC) graduates.

5.3 Innovation & Technology Development

5.3.1 National Innovations Network for Technical Textiles

It is recommended that a National Innovations Network (NIN) be established to support innovation in product & process development and to support information dissemination for the Technical Textiles sector in Australia. The NIN should comprise a collaborative network of R&D service providers (including universities), Government and industry. It should encourage clustering of technical textile manufacturing industry, suppliers and user industry groups (including user R&D providers, such as CRCs). The NIN should have strong links to the NFE to support information dissemination to and about the Technical Textiles industry.

An audit to be undertaken of existing R&D service providers to cover facilities, capabilities and knowledge base (IP) with respect to Technical Textiles to ascertain additional requirements in support of the NIN and its activities.

Initial funding for the NIN should be obtained from the TCF Technology Development Fund. The funding would be used to facilitate the formation of the NIN, to address current gaps in R&D support infrastructure, and to support initial projects in priority areas that would enhance the formation of industry consortia/clustering.

Subsequent and continuing funding for the NIN should be obtained from a number of sources, including:

- a competitive TCF&L R&D grant scheme;
- generic Government R&D programs such as AusIndustry Start and various relevant Australian Research Council programs; and,
- industry via company specific projects (ie. commissioned R&D) or industry consortia/co-operatives (eg. strategic R&D).

5.3.2 Innovation Awareness & Commercialisation – ‘Textiles for the Future’

A key finding in this study has been the need for the industry to develop an innovation and creativity culture to meet the challenges for the sector's future success.

It is recommended the Government support a marketing and awareness raising campaign to lift the profile of generic innovation and R&D programmes amongst firms within the industry.

In addition to raising awareness, the campaign should aim to make more effective use of Government assistance programmes as part of an overall promotion for TCF&L innovation.

It is recommended that Government work with industry to develop a more accurate understanding of the process of innovation within the sector and the broader TCF&L industry. This process should include information for industry participants for them to:

- develop a better understanding of the process of innovation and development including key players (eg. universities, CSIRO, CRCs etc);
- understand and implement performance indicators for innovation;
- awareness of success stories in best practice in innovation;
- awareness levels of the importance of innovation in productivity and growth of the industry; and,
- develop and use patents and licences.

This study recognises the soon to be commenced Commercialising Emerging Technologies (COMET) programme as a useful programme to assist firms in this regard.

5.3.3 Supply Chain Enhancement

A significant issue hindering the successful growth of the sector is the lack of a clearly defined supply chain. This is a result largely of many of the possible participants in the sector, from especially the traditional sectors of wool, cotton and leather, not being aware of the role they could play in the sector's development.

In general terms, this study supports the recommendations of the Supply Chain Working Group and its key recommendations which include:

- develop Management and Leadership Skills and Knowledge;
- create a Supply Chain Management Leadership Team;
- conduct Detailed Sectoral Mapping Exercise;
- strongly Promote and Communicate Benefits to Industry;
- adopt Information Technology Standards; and,
- create linkages between supply chain improvement and SIP.

This study also identified a potential issue in the supply chain in this sector in Australia in that we do not have a major high performance fibre manufacturing base. This is considered a major gap in a critical part of the supply chain for which we are currently relying on imported product.

Accordingly, it is recommended that a feasibility study be undertaken to examine the possibility of establishing a high performance fibre manufacturing base in Australia to address this major gap (ie. current import dependence) in the technical textiles supply chain. This study to consider the possible multiplying effect that such a development could have in expanding the technical textiles and user industries (eg. defence and medical sectors).

5.4 Strategic Planning & Cultural Change

In order for industry participant firms to capitalise upon the growth in the industry, and make effective use of the innovation and creativity awareness and education programmes recommended in this report, they need to be in a position to take advantage of the information and opportunities.

This positioning is both:

- **structural** in terms of organisation, commercial, and legal considerations; and,
- **cultural** in terms of having a clearly defined vision and direction, leadership skills, and customer.

Rapidly changing market forces demand that firms ensure the business environment in which they operate is well defined and understood. There is a very real need for firms to have the ability to respond to change through the formulation of a clear 'roadmap' towards business success.

They will need to implement strategies, systems and processes, which are aligned with clearly defined strategic goals.

Importantly, they will also need to ensure their people believe in and value the strategic direction and have the competence, to achieve business objectives.

It is recommended the Government assist firms undertake organisation development programmes which seek to address:

- planning – strategic, business and operational;
- corporate culture – creating a culture that is aligned with their business goals;
- development of learning organisations;
- innovation and change as a permanent feature of company operations;
- quality management;
- workplace reform
- evaluating the need to renew or create systems and processes – organisational structure, management information, performance management, financial and commercial, communications, maintenance, safety, resource utilisation;
- management and leadership development; and,
- teamwork – the development of effective teams which will achieve common goals;

This assistance could be achieved through the extension of the TCF Best Practice Program with greater emphasis on dissemination of outcomes.

5.5 Market & Investment Development

This data relating to projected market growth in technical textiles indicates significant growth in international markets. In order to capitalise on this growth, a complimentary initiative to those in this section of this report, is the role of Government in the facilitation of access to international markets for Australian firms and the investment of foreign firms in Australia.

It is recommended this be achieved through:

- continued and improved activities and outcomes from AusTrade in its various overseas missions;
- more particularly, AusTrade can facilitate export development through raising the profile of the sector; and facilitating specific overseas missions relating to this sector;
- continued efforts by the Government to enhance the exportability of technology and product through the WTO process, APEC and/or bilateral and multilateral agreements;
- pursuing through non-tariff means, the notion of a 'level playing field' with our trading partners;
- consider non-tariff barriers to those trading nations which do not provide Australian firms with the same access to their domestic markets, which Australia provides to their firms; and,
- a suite of taxation, investment, banking & finance, industrial relations and other Government policies which effectively 'competes' with other Australasian nations for the attraction of foreign multinationals to establish their regional hubs in Australia.

5.6 Validation of Recommendations

The recommendations developed in this study were put to selected industry participants. Appendix VI shows the reaction by the participants in the industry who graded the recommendations from 1-10, on the basis of how they felt their company would benefit from their implementation. Participants were also invited to make comments.

The following observations are pertinent:

- some companies highly support the recommendations, not only for their own companies, but for the industry sector as a whole;
- other companies are sceptical of the recommendations and require further demonstration of the proposed benefits of the recommendations. This is not surprising because many of the companies did not participate in the scenario planning exercise. Possibly those sceptical also reflected a personal bias against bureaucratic intervention. Some of these companies are highly successful in what they do, believe their staff can satisfactorily respond to market changes and do not want to share their information;
- many respondents requested a copy of the final report;
- the most highly rated recommendations were as follows:
 - market & investment program;
 - education/training;
 - raising of awareness of opportunities in the sector;
 - establishment of industry forum; and,
 - establishment of innovation network;

- several previous government programs were well regarded eg NIES, JobStart, Export Credits scheme; and,
- need for industry forum to include the other industry associations such as the Insulation Manufacturers Association of Australia and the Association of Canvas and Synthetic Products of Australia, and to resolve any duplication.

In summary:

- given the fact that those interviewed did not attend the scenario planning workshop, the recommendations have been well received;
- the proposed industry wide study and compilation of the database and opportunities in the technical textiles sector, and its promotion should dispel any doubts.

6.0 References

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4. Review of the Textile, Clothing & Footwear Industries Development Strategy – Final Report, Werner International Inc (October 1994), pp.V35-V36; prepared for the TCF Future Strategies Committee, Australia
5. Curiskis, J., *A Brief of Overview of Technical Textiles*

Other References:

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2. Australian Business Foundation, *The High Road or the Low Road ? – Alternatives for Australia's Future*, 1997;
3. O'Neill, P., *A Review of Recent Literature on the Global Textiles Sector*, 1999;
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Appendix I

Extracts from the DRA [3] Associates report: The World Technical Textiles Industry and its Markets: Prospects to 2005.

Summary Of Technical Textiles End-Use Consumption 1985-2005

Source for information in Section 2.6 is DRA [3] & Associates:
 "The World Technical Textiles Industry and its Markets: Prospects to 2005", April 1997

Textile Volume ('000 Tonnes)

Table 1.1: Summary of End-Use Consumption by Application, 1985-2005 – Textile Volume

000 tonnes	1985	1990	1995	2000	2005	% CAGR 85-95	% CAGR 95-05
Agrotech	554	661	741	895	1,021	3.0%	3.3%
Buildtech	508	683	849	1,026	1,266	5.3%	4.1%
Clothtech	505	548	647	731	824	2.5%	2.5%
Geotech	99	178	251	400	574	9.7%	8.6%
Hometech	854	1,140	1,439	1,803	2,259	5.3%	4.6%
Indutech	980	1,278	1,523	1,875	2,344	4.5%	4.4%
Medtech	703	958	1,177	1,374	1,652	5.3%	3.4%
Mobiltech	1,408	1,774	1,918	2,220	2,483	3.1%	2.6%
Oekotech	88	128	167	228	305	6.6%	6.2%
Packtech	278	347	423	533	658	4.3%	4.5%
Protech	45	84	117	159	215	10.1%	6.3%
Sporttech	127	193	237	310	390	6.5%	5.1%
Totals	6,062	7,844	9,321	11,327	13,688	4.4%	3.9%

Table 1.2: Summary of End-Use Consumption by Product Type, 1985-2005 – Textile Volume

000 tonnes	1985	1990	1995	2000	2005	% CAGR 85-95	% CAGR 95-05
Yarns/fibres	6,062	7,844	9,320	11,327	13,688	4.4%	3.9%
Fabrics	2,629	3,114	3,406	3,763	4,096	2.6%	1.9%
Non-wovens	1,257	1,868	2,506	3,303	4,300	7.1%	5.5%
Composites	887	1,288	1,492	1,968	2,581	5.3%	5.6%
Other textiles	1,289	1,575	1,917	2,294	2,711	4.0%	3.5%
All products	6,062	7,844	9,321	11,327	13,688	4.4%	3.9%

Table 1.3: Summary of End-Use Consumption by Region, 1985-2005 – Textile Volume

000 tonnes	1985	1990	1995	2000	2005	% CAGR 85-95	% CAGR 95-05
W. Europe	1,674	2,133	2,367	2,693	3,111	3.5%	2.8%
E. Europe	407	519	296	418	563	-3.1%	6.6%
N. America	2,240	2,625	3,057	3,446	3,886	3.2%	2.4%
S. America	181	213	280	346	428	4.4%	4.3%
Asia	1,262	1,945	2,696	3,555	4,510	7.9%	5.3%
Australasia	83	101	120	149	179	3.7%	4.1%
Rest of World	214	308	505	721	1,011	8.9%	7.2%
Totals	6,062	7,844	9,321	11,327	13,688	4.4%	3.9%

Textile Value (\$ Million)

**Table 2.1: Summary of End-Use Consumption by Application, 1985-2005
– Textile Value**

\$ Million	1985	1990	1995	2000	2005	% CAGR 85-95	% CAGR 95-05
Agrotech	2,456	3,021	3,466	4,255	4,944	3.5%	3.6%
Buildtech	1,460	2,109	2,676	3,387	4,316	6.2%	4.9%
Clothtech	5,047	5,344	6,071	6,794	7,642	1.9%	2.3%
Geotech	468	834	1,171	1,857	2,656	9.6%	8.5%
Hometech	3,929	5,058	6,293	7,784	9,678	4.8%	4.4%
Indutech	5,037	6,371	7,584	9,294	11,556	4.2%	4.3%
Medtech	3,643	5,295	6,656	7,818	9,526	6.2%	3.7%
Mobiltech	8,667	10,925	11,475	13,082	14,365	2.8%	2.3%
Oekotech	607	805	1,000	1,274	1,609	5.1%	4.9%
Packtech	1,132	1,446	1,805	2,324	2,915	4.8%	4.9%
Protech	451	857	1,202	1,643	2,227	10.3%	6.4%
Sporttech	869	1,268	1,565	2,034	2,505	6.1%	4.8%
Totals	33,160	42,528	49,963	60,271	72,330	4.2%	3.8%

**Table 2.2: Summary of End-Use Consumption by Product Type, 1985-2005
– Textile Value**

\$ Million	1985	1990	1995	2000	2005	% CAGR 85-95	% CAGR 95-05
Yarns/fibres	16,890	21,977	25,792	31,376	37,593	4.3%	3.8%
Fabrics	17,897	21,380	23,801	26,714	29,865	2.9%	2.3%
Non-wovens	5,323	8,112	10,930	14,643	19,250	7.5%	5.8%
Composites	2,909	4,633	5,130	6,964	9,156	5.8%	6.0%
Other textiles	7,031	8,404	10,102	11,950	14,058	3.7%	3.4%
All products	33,160	42,528	49,963	60,271	72,330	4.2%	3.8%

**Table 2.3: Summary of End-Use Consumption by Region, 1985-2005
– Textile Value**

\$ Million	1985	1990	1995	2000	2005	% CAGR 85-95	% CAGR 95-05
W. Europe	9,018	11,188	12,229	13,771	15,733	3.1%	2.6%
E. Europe	2,543	3,107	1,736	2,501	3,261	-3.7%	6.5%
N. America	11,281	13,381	15,264	16,982	18,923	3.1%	2.2%
S. America	1,060	1,195	1,550	1,865	2,271	3.9%	3.9%
Asia	7,543	11,430	15,880	20,564	25,866	7.7%	5.0%
Australasia	472	544	630	762	904	2.9%	3.7%
Rest of World	1,243	1,683	2,673	3,826	5,371	8.0%	7.2%
Totals	33,160	42,528	49,963	60,271	72,330	4.2%	3.8%

Australasian Consumption

Textile Volume ('000 Tonnes)

Summary of End-Use Consumption in Australasia by Application, 1985-2005

000 tonnes	1985	1990	1995	2000	2005	% CAGR 85-95	% CAGR 95-05
Agrotech	6	7	8	9	10	2.3%	2.4%
Buildtech	4	6	9	11	14	8.2%	5.4%
Clothtech	8	7	6	6	5	-2.1%	-1.2%
Geotech	3	6	7	10	12	8.0%	5.2%
Hometech	15	18	22	27	34	3.9%	4.4%
Indutech	13	17	21	26	33	4.5%	4.8%
Medtech	9	12	15	18	21	4.5%	3.9%
Mobiltech	18	20	23	28	33	2.4%	3.5%
Oekotech	2	2	3	4	5	6.9%	6.0%
Packtech	4	4	6	7	9	4.3%	4.3%
Protech	1	1	2	2	3	10.3%	7.5%
Sporttech	2	3	3	4	5	3.2%	4.4%
Totals	83	101	120	149	179	3.7%	4.1%

Textile Value (\$ Million)

Summary of End-Use Consumption in Australasia by Application, 1985-2005

\$ Million	1985	1990	1995	2000	2005	% CAGR 85-95	% CAGR 95-05
Agrotech	21	27	30	34	39	3.5%	2.7%
Buildtech	12	20	29	38	50	8.9%	5.6%
Clothtech	78	67	59	54	51	-2.7%	-1.5%
Geotech	15	26	32	44	54	7.8%	5.2%
Hometech	67	80	96	119	146	3.6%	4.3%
Indutech	71	86	102	127	156	3.8%	4.3%
Medtech	46	60	73	93	109	4.7%	4.0%
Mobiltech	125	130	147	172	200	1.7%	3.1%
Oekotech	10	13	16	21	26	4.6%	4.7%
Packtech	16	18	25	33	40	4.9%	4.8%
Protech	6	11	17	25	34	10.3%	7.2%
Sporttech	15	18	19	22	26	2.5%	3.1%
Totals	472	544	630	762	904	2.9%	3.7%

Appendix II

Outcomes from industry workshop on 10 June 1999:

1. *Australia 2010 – change factors and their likely impact on the sector;*
2. *Force Field analysis*

Australia 2010 – Significant Change Factors

Politics and Government

Australia 2010 – Significant Change Factor		Likely Needs / Result on Industry
Outline	<ul style="list-style-type: none"> • Education will undergo more cuts. • Demand for more flexible list courses. • Taxation - determines investments and how people spend their money. • GST. • Current account deficit. • Regulation (more) – difficult for small businesses to operate. • Other governments will be more protective. 	<ul style="list-style-type: none"> • Industry taking on more responsibility for it's own wellbeing. • More self-reliance – scope in changing attitudes. • Increase in export capabilities. • Lack of direct government support for industry development (more facilitative than administrative role). • International protection barriers. • Reduced market scope. • Greater competition.
Summary	<p>That government will increasingly pull back from direct support of industry.</p> <p>Uncertain changes in taxation (GST) may place greater costs on industry or be an opportunity.</p> <p>Increasing deregulation in Australia and regulation overseas will make it more difficult for (small) business to trade – regulations on industries.</p> <p>At an international level there is likely to be continuing trade “blocks”.</p>	<p>Industry will take on more responsibility for its own well being.</p> <p>It will develop stronger industry links to ensure that it survives in an environment of increasing international competition.</p> <p>Government will adopt a more facilitative approach to enable the above.</p>

International Affairs

Australia 2010 – Significant Change Factor		Likely Needs / Result on Industry
Outline	<ul style="list-style-type: none"> • Increase in deregulation / globalisation for technology. • Major increases in immigration to Australia. • Innovation will drive export markets for Australia international affairs. • Growing power of multi-national corporations. • Increase in nationalism at a regional level (almost going back to tribal loyalties). • WTO / NAFTA / EU / APEC. 	<ul style="list-style-type: none"> • Uncertain. • More imports. • More protection – both locally and internationally. • Gaps in the supply chain. • Niche markets. • Need for commodities. • Lack of cash flow.
Summary	<p>A degree of scepticism about the likely degree of ‘genuine’ globalisation and open markets – more likely is an increasing level of trade blocks that will cause barriers to entry into all markets - and – a possible increase in local / regional nationalism.</p> <p>Major immigration will provide opportunities for growth at a local level.</p>	<p>Government intervention to create a level playing field.</p> <p>More focus on niche markets to build on competitive advantages.</p>

Education

Australia 2010 – Significant Change Factor		Likely Needs / Result on Industry
Outline	<ul style="list-style-type: none"> • “Dumbing down” – reduced intellectual quality of courses at the top professional / technology level. • Unitisation – shorter and merger courses – more focused on what user / individual / industry wants (vocational training). • Heightening the image of the industry. • Introduction to industry from an early age (level). • More corporatisation. • More internationalisation. • Increased use of IT. • Re-education of people for leisure / work / technical skills / managerial skills. • Industry led and supported education and training (opportunities to improve career path for employees). • Life-long learning (work / leisure, etc). • Government supported technical training (?). 	<ul style="list-style-type: none"> • Greater and more direct interaction between education and industry. • Flexibility of workforce will be decreased. • Less creativity and innovation.
Summary	<p>While the education sector is likely to have the flexibility to provide focused training activities to meet specific vocational needs, pressures at the ‘higher level’ may effect the ability for the industry to innovate.</p> <p>The industry’s image of ‘doom and gloom’ may effect the level of interest in developing career paths – thus setting up a self-fulfilling prophecy.</p>	<p>The industry will drive the education agenda (at all levels) – working cooperatively to ensure that its needs for access to a competent workforce, and first class educational and research facilities, are being met.</p>

Environmental / Ecological

Australia 2010 – Significant Change Factor		Likely Needs / Result on Industry
Outline	<ul style="list-style-type: none"> • International potential: large domestic and export needs / solutions. • Potential for development – which is a large Australian need. • Local community / government resistance to manufacturing. • Opportunities, ie. in filters. • Threats to existing technologies. • Some limiting influences, ie. a number of materials aren't user friendly –worldwide resistance to their usage. • Differing worldwide standards. 	<ul style="list-style-type: none"> • Need to change work and environmental practices to comply with ever increasing environmental standards. • Need for flexible and forward-thinking [pragmatic] people (of any level) to make changes. • People will become more hedonistic – which will lead to a necessity for highly sophisticated leisure / health technology. • Need for strict and analytical testing to support new technologies.
Summary	<p>There are specific Australian environmental issues that provide opportunities for growth in the industry – in both industry clusters for the local market and export of new technology internationally.</p> <p>Likely threats to existing products and processes.</p>	<p>The industry has to pay attention to the development of clean technologies for the manufacture of technical textiles and / or products utilising technical textiles.</p> <p>The Australian environment provides a unique platform for development of unique innovative products for technical textiles.</p>

Population / Social / Infrastructure

Australia 2010 – Significant Change Factor		Likely Needs / Result on Industry
Outline	<ul style="list-style-type: none"> • Increase in internal growth / migration. • Private health care products / medical textiles. • Changing age profiles. • Replacing old infrastructure / housing / construction. 	<ul style="list-style-type: none"> • Domestic market provides a platform for the export market. • Growth in leisure related materials.
Summary	<p>The ageing of the population is one of the key drivers of the rapid developments in the health care. Increasing use of technical textiles in housing and construction.</p>	<p>Developments in health care will present significant development opportunities for the sector.</p>

Technology

Australia 2010 – Significant Change Factor		Likely Needs / Result on Industry
Outline / Summary	<ul style="list-style-type: none"> • Protection of technology. • Commoditisation of raw material / patents expiring. • Use of IT. 	<ul style="list-style-type: none"> • New materials and processes available. • IT advancements will change perceptions and enhance processes and innovation.

Key Issues Affecting Technical Textiles

Politics and Government

-
- Education:
- More cuts to educational institutions;
- More generalist courses;
- Less government support for industry.
- Taxation:
- Decides what must take place;
- GST.
- Deficit:
- Current account;
- Driven by foreign markets.
- Regulation.

International Affairs

-
- WTO agreements.
- Deregulation.
- Globalisation:
- IT.
- Immigration / population pressures.
- Export markets – innovation.
- Environment.
- Multinational corporations.
- Nationalisation / tribal loyalties.
-

Education

-
- “Dumbing down” of educational curricular.
- Corporatisation of Universities.
- Internationalisation of institutions.
- IT.
- Re-education:
- Leisure;
- Work;
- Technical skills.
- Industry led and supported managerial skills and training:
- Marketing;
- Wages;
- Opportunities.
- Lifelong learning.
- Government support of “technical” training.

Key Issues Affecting Technical Textiles

Environmental / Ecological

-
- Sustainability:
- Raw materials;
- By products;
- Recycling.
- Market to:
- World;
- By Internet;
- By export;
- Government:
- By standard;
- By trade association;
- Devaluation.
- Training:
- Facilities;
- Skill.

Population / Social / Infrastructure

-
- Aging:
- Implications for health.
- Affluence vs poverty.
- Immigration:
- Increased inequality:
- Privatised policing;
- Privatised prisons;
- Private health insurance.
- Infrastructure.

Force Field Analysis

Politics and Government Policy

Forces Assisting	Forces Hindering
<ul style="list-style-type: none"> • Australia more influential in SE Asian region. • Political stability. • Government will adopt a more facilitative approach to enable the above. 	<ul style="list-style-type: none"> • Government sees it as being more important to play at political statesmanship rather than securing a favourable position for Australian trade. • The adoption of neo classical economics takes precedence over the real practice of international trade. • Government has created an environment through the tariff reduction program of discouraging future investment in the industry. • Government intervention to create level playing field. • Create a situation whereby government supports manufacturing in the area of balanced competition. • More focus on niche markets to build on competitive advantage.

Industry Leadership

Forces Assisting	Forces Hindering
<ul style="list-style-type: none"> • Industry will take more responsibility for its own well being. • It will develop stronger industry links to ensure that it survives in an environment of increasing international competition. • Diversity of textile industry (eg. Carpet / textile fabric metal applications etc.) • Those remaining in the industry after restructuring are left with a wealth of experience and knowledge. • Tendency for government to move towards facilitation of the technical textiles industry. 	<ul style="list-style-type: none"> • No representative group for technical textiles (eg. TFIA, Australian Business, etc). • Technical textiles (as a group) have no critical mass; fragmented. • Technical textiles not a homogenous group. • No cohesive linkages between end users, researchers and manufacturers.

Education / Training

Forces Assisting	Forces Hindering
<ul style="list-style-type: none"> • Current educational expertise. • R&D. • C.R.C. • I.F.C. facilities. • Vocational training – best practice. • TCF / training package. • Raw materials: <ul style="list-style-type: none"> • Human capital; • Affluent; • Educated workforce. • IT. 	<ul style="list-style-type: none"> • Secrecy within existing technical textile companies. • Re-structure in higher education – lack of strategic focus. • Diminishing number of professional technical courses. • Lack of industry support. • Lack of government funding / funding formulate. • Demand – not sexy! • Industry focus on wool and cotton blends, ie., traditional textiles. • Size of Australian industry? • No flexible delivery, ie., understanding of quality.

Environmental Platform

Forces Assisting	Forces Hindering
<ul style="list-style-type: none"> • Image – green: <ul style="list-style-type: none"> • Geographical; Isolation. • Land mass: <ul style="list-style-type: none"> • Size; Climate; • Outback; • Extremes (hot / cold); • Commodities: • Water-in-land – ocean. • Ozone – hole. • Space – final frontier. 	<ul style="list-style-type: none"> • Leadership – vision. • Lack of regulation: <ul style="list-style-type: none"> • ISO14000; • E.F.A. • Venture capital (size). • Industry resistance. • Commodities / manufacture processes. • Business infrastructure.

Technology - Materials / Processes

Forces Assisting	Forces Hindering
<ul style="list-style-type: none"> • Skills base. • Sophisticated affluent market. • REG environment. 	<ul style="list-style-type: none"> • Costs / tariffs. • Lack of high performance manufacture. • Size of local market. • Multinational operations.
<ul style="list-style-type: none"> • IT. • Software skills / culture. • Design / standards. • QR. • Increase markets. 	<ul style="list-style-type: none"> • Share IP. • Unemployment.

Clean Technologies

Forces Assisting	Forces Hindering
<ul style="list-style-type: none"> • Environmental legislation - “Australianism” – green image. • Worldwide innovation. • Consumer demand: <ul style="list-style-type: none"> • Product image; Price premium; ISO14000. • Intellectual property management. • Industry adaptability. • Technical expertise – R&D. • Source of commodities. 	<ul style="list-style-type: none"> • Exploitation of R&D: <ul style="list-style-type: none"> • Capital resource; • Market size. • Lack of progressive industry management (?). • Lack of political leadership. • Cost. • Waste management – weak supply chain.

Niche Markets

Forces Assisting	Forces Hindering
<ul style="list-style-type: none"> • A niche market is often low volume – high return. • Satisfaction for customer. 	<ul style="list-style-type: none"> • High risk. • Specialisation, more necessarily.

Appendix III

Workshop participants

No.	First	Surname	Title	Company
1	Sally	Stemi	Human Resources Manager	Amoco Chemicals Pty Limited
2	Susan	Woodward	General Manager	Australian Light Manufacturing Industry
3	Stuart	Dutton	Deputy Director	CRC for Advanced Composite Structures
4	Peter	Gordon	T C F Sector Co-ordinator	CSIRO Division of Wool Technology
5	Sarah	Miller	Research Project Leader	CSIRO, Scientific Research
6	John	Curiskis	Senior Lecturer	Department of Textile Technology, University of New South Wales
7	Jacqueline	Postle		Department of Textile Technology, University of New South Wales
8	Michael	Agapitos	Client Manager, TCF	Dept of State & Regional Development
9	Margaret	Crennan	Assistant Manager	DISR - TCF Action Agenda Unit
10	Luke	Holmick	Trainee Design & Technical	Elegant Knitwear
11	Harry	Czeiger	Director	Forbat Styles Pty Ltd
12	Roger	Foulds	Director	R A Foulds Consultancy
13	Peter	Selbie	Sales & Marketing Executive, Technical Textiles Section	Melba Industries
14	George	Napper	Managing Director	My Garment Company Pty Ltd
15	Stuart	de Jong	Director	Planning & Management Projects P/L
16	Hector	Gauci	Training Consultant	Royal Melbourne Institute of Technology - Textiles
17	Adrian	Greentree	Purchasing Manager	Speedo Australia Pty Limited
18	David	Ellis	H/T of Textiles Footwear	Sydney Institute of Technology
19	David	Warden	Chief Executive Officer	Textile Dyers of Australia Pty Ltd
20	Anne	Fritz	School of Educational Psychology, Literacy & Learning	University of Sydney
21	Jim	Kelman	Managing Director	Wax Converters Textiles Pty Ltd
22	Rob	Sutton	Accounts Director	Woven Image Pty Ltd

Appendix IV

ABS Industry Statistics

VALUE OF TECHNICAL TEXTILES SECTOR (Source: ABS 8365.0)						
Code		Value of sales & transfers out				Code
ANZSCC	Commodity Description	1993-94	1993-94	1995-96	1996-97	MIOCC
268	Special Fabrics	72.1		111.4	136.4	222955
271.16	Articles of bonded fibre fabrics or similar bonded yarn fabrics (excluding labels, badges and the like, and cleaning cloths)	48.5		55.8	39.7	222952
271.17	Sacks and bags. Of a kind used for packing of goods					
271.17.10	of canvas	1.2		32.0	23.6	222940
271.17.90	other (excluding canvas)	15.6				
271.18	Tarpaulins, sails for boats, etc, awnings, sunblinds, tents and camping goods (including pneumatic mattresses)					
271.18.11	exterior blinds and awnings of canvas	17.4		172.7	162.9	222132
271.18.12	exterior blinds and awnings of other than canvas	13.7		82.4	202.9	222131
271.18.13	tarpaulins			182.4	115.0	222121
271.18.13.11	canvas	22.8				
271.18.13.12	PE/PP	5.8				
271.18.13.90	Other	39.1				
271.18.14	Tents	4.2				
271.18.15	Sails	13.7				
271.18.16	Annexes	11.2				
271.18.19	Other camping goods of textile fabric (including pneumatic mattresses, excluding sleeping bags)	7.9				
271.21	Quilts, eiderdowns, cushions, pouffes, pillows, sleeping bags and the like fitted with springs or stuffed or internally fitted with any material or of cellular rubber or plastics					
271.21.01	sleeping bags		4.6			
271.21.02	continental quilts, plumage filled		20.0			
271.21.03	continental quilts, other than plumage filled		22.2			
271.21.06	pillows cushions, bolsters, bean bags etc		85.3			
	Quilted textile products; textile hosepiping and similar textile tubing; bias binding narrow fabrics; non-wovens (bonded fibre and yarn fabrics); textile transmission or conveyor belts and belting; textile wicks			112.8	136.5	222111
	Textile fabrics (excluding tyre cord) impregnated, coated, covered or laminated with plastics			n.p.	61.5	256341
271.9	Other made-up textile articles (including floor cloths, dish-cloths, dusters and similar cleaning cloths, life jackets and life belts					
271.90.11	Floor cloths. Dish-cloths, dusters and similar cleaning cloths	10.7		10.8	12.7	222951
271.90.12	Motor vehicle covers of textile fabrics	12.1				see 222121
271.90.14	Life jackets and life belts and other made-up textile articles nec	22.9		29.2	60.2	222141
271.90.90	Made-up textile articles nec	45.8				
273	Twine, cordage, ropes and articles thereof - including netting	64.7		84.4	96.0	222310

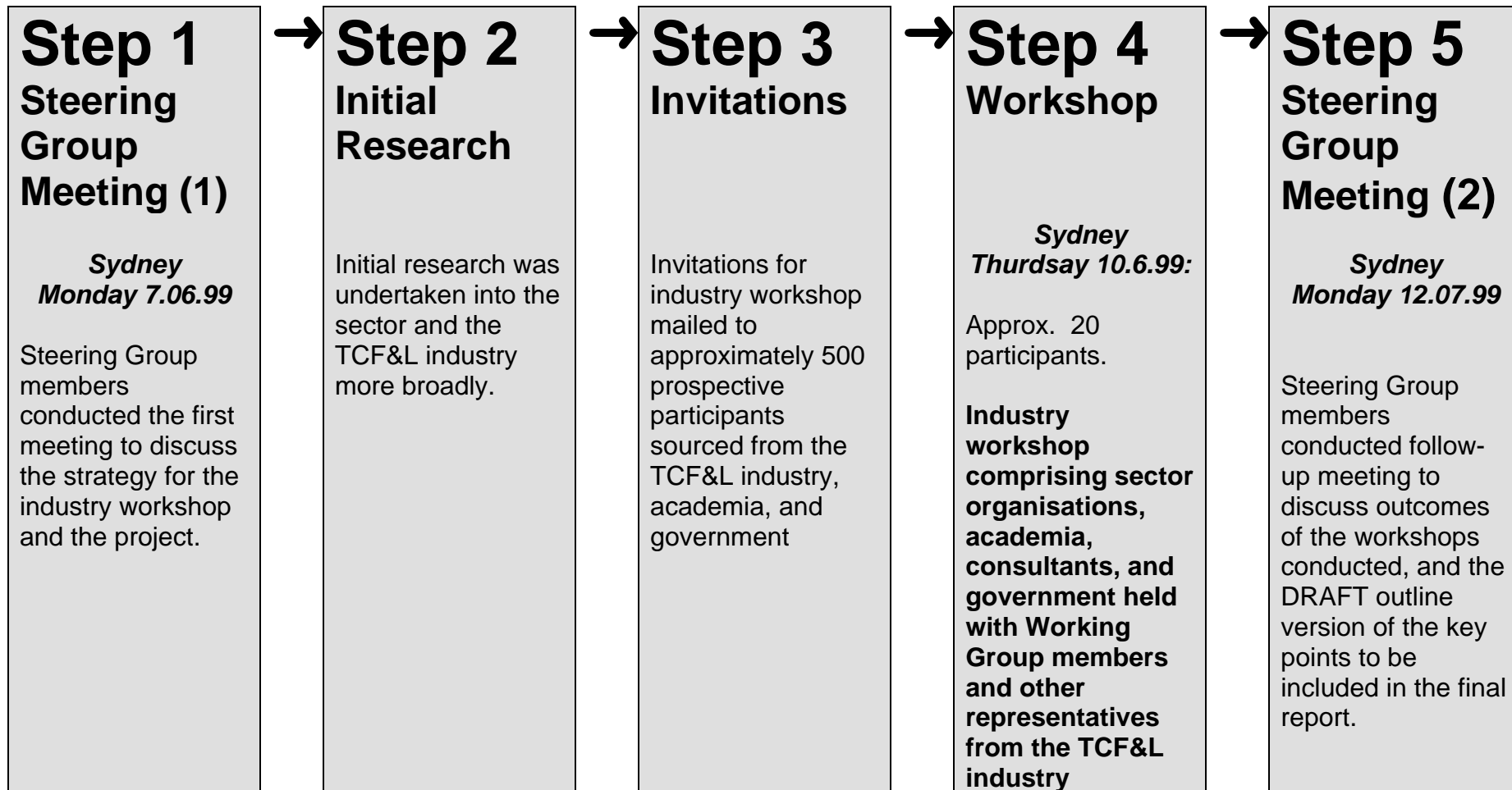
	Underfelt and other products (excluding floor coverings, headwear and clothing)			n.p.	35.1		222221
279.11.11	Narrow (up to 30 cm wide) elastic or elastomeric (containing 5% or more by weight of elastomeric yarn or rubber thread) woven textile fabrics (excluding of a kind commonly used in machinery or plant, or woven labels, badges and similar articles)	14.8					
279.11.12	Narrow (up to 30 cm wide) woven textile fabrics (excluding of a kind commonly used in machinery or plant, or woven labels, badges and similar articles)	40.2					
279.11.13	Textile labels and badges	47.9		93.6	123.4		222910 221510
	Surgical or medical wadding, cotton wool or gauze and bandages			n.p.	44.2		222920
279.15	Wadding of textile materials and articles thereon; textile fibres not exceeding 5 mm in length (flock), textile dust and mill neps						
279.15.02	Articles of wadding (excluding of cellulose wadding, clothing pads, impregnated or coated with pharmaceutical substances or put up in retail packings for medical or surgical purposes), textile flock, dust and mill neps.	25.5					
279.23	Textile products and articles for technical uses						
279.23.01	Textile wicks, woven, plaited or knitted, for lamps, stoves, lighters, candles, or the like; incandescent gas mantles and tubular knitted fabric therefor, whether or not impregnated	2.7					
279.23.02	Textile fabrics (excluding rubber or plastics coated) and textile articles (excluding bags), of a kind commonly used in machinery or plant	20.8					
279.9	Other textiles nec	71.3					
355	Man-made fibres	6.9					
	Glass fibre and glass wool products			200.3	214.7		264030
	Total	659.3	132.1	1,167.8	1,464.8		
	Related industries						
321.14	Toilet or facial tissue stock towel or napkin stock and similar paper, cellulose wadding and webs of cellulose fibres (of a kind used for household or sanitary purposes)	28.2					
321.21	Paper, paperboard, cellulose wadding and webs of cellulose fibres	233.1					
321.28	Toilet paper, cut size, in rolls or sheets (including perforated for tearing intop sheets)	290.6					
321.32	Sanitary towels and tampons and baby napkins (nappies) of paper or cellulose wadding	123.3					
	Baby napkins (excluding textile) sanitary towels and tampons of paper or cellulose wadding			415.6	412.1		254313
321.43	Articles of paper, pulp, paper nec (excluding gaskets for motor vehicles)	103.4					
363.21	Rigid fibre reinforced plastic rods, sticks, profile shapes, sheeting, plates, boards, and panels (excluding floor, wall or ceiling coverings, self adhesive or plastic foam)						
	of polymers of ethylene	70.3	includes laminates	42.5	51.1		256411
	of polymers of vinyl chloride			24.6	47.0		256412
	of other polymers			163.6	105.4		256413
362.16.02	Rubber tubes pipes and hoses (reinforced)	44.6		50.7	46.2		255932
	Plastic tubes pipes and hoses	527.8		667.1	605.9		256210

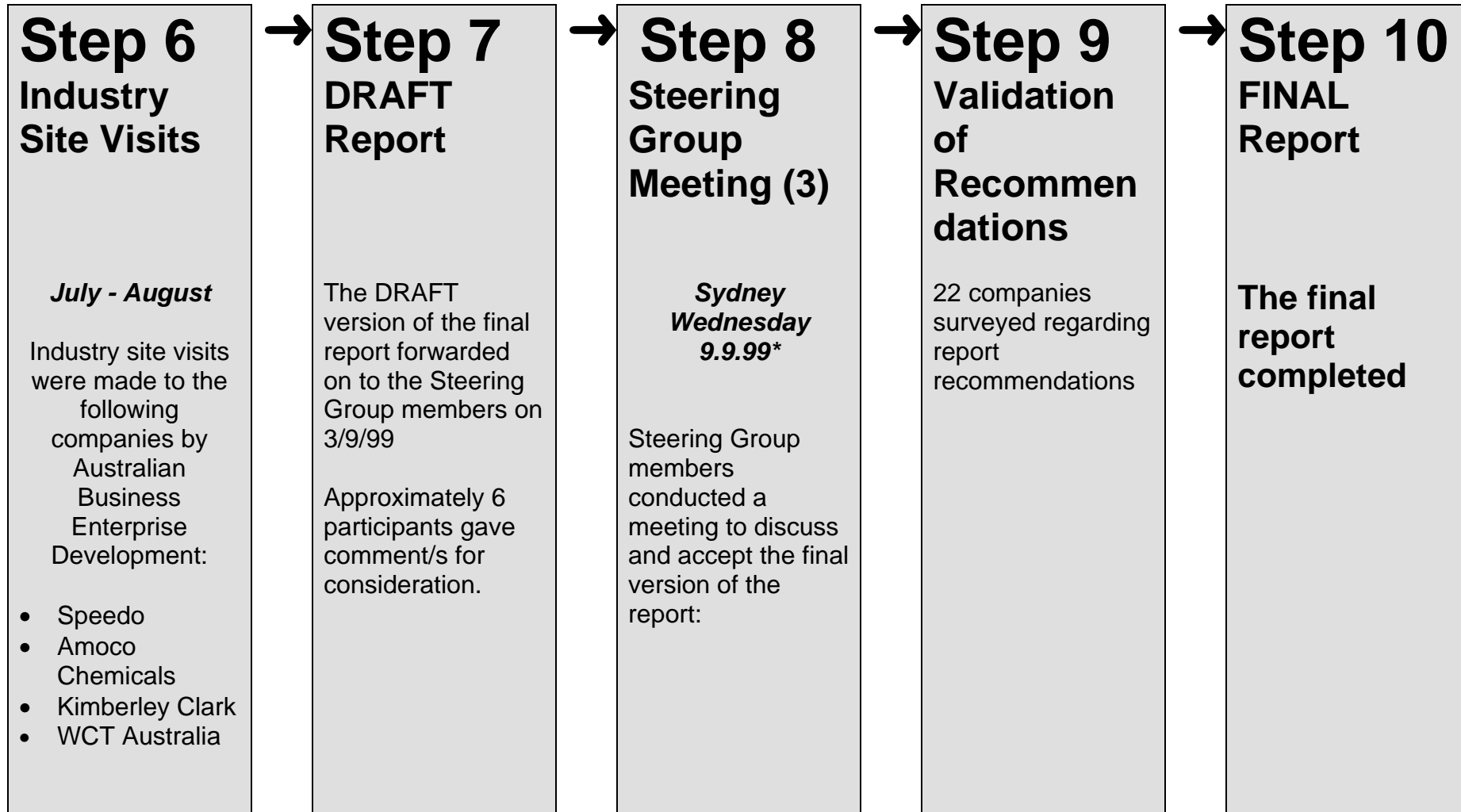
362.12 362.16.02	Rubber belting (includes unvulcanised rubber strip (eg orbi-strip) for retreading)	93.8		106.0	97.1		255192 255933
	Plastic conveyer belting			55.3	23.1		256221
	Total	1,515.0		1,525.4	1,387.9		

Appendix IV

Validation of Recommendations – Summary of Interviews

COMPANY RESPONSES FROM TECHNICAL TEXTILES SECTOR													
1 = low interest, 10 = high interest													
Company	Forum R 5.1.1	D/base R 5.1.2	Oppor- tunities R 5.1.3	Ed/tr R 5.2	Inn Netw R 5.3.1	Inn progs R 5.3.2	Supply chain R 5.3.3	Strat pl. R 5.4	M. & Invest- ment R 5.5	Additional comments			
Industrial fabrics and GeoTextiles													
Geofabrics													
Excel Non-woven		2	2	2	1	7	3	9	2	9	non-woven group and IFC overlap, already doing own strategic planning etc	toothless recommendations	more a plastics company so a lot of industry based training
Canvas / Tarpaulins / Tents / Awnings / Outdoor fabrics													
Bradmill		3	3	3	5	5	5	5	5	5	ACASPA (Australian Canvas and Synthetic Products Association) is peak body		
National Textiles		1	8	8	5	4	4	4	8	10			
Bruck Textiles													
Coatings / finishes													
Specialty Coatings		7	8	9	10	2	1	2	3	2	desire access to o/s consulting expertise; not enough people here with industry knowledge; growth is feature of the industry export requires financing	would like to see the report	part of Fabrics Australia with focus on exporting goods, funding exhibitions, desire marketing fees; benefits are intangible
Surgical / Medical / Hospital Care													
Lantor													
George Norman													
Automotive / industrial													
Melba											Extremely competitive industry. Why share it? Already have advantage. Training interchange with RMIT. IFC is good but not up and running.	automotive warp and weft knitted and weaving (60%) balance is: theatre seating and tech textiles	80% share of automotive market) (not
Austrim													
Composite Fibre Reinforcement													
Colan Industrial Textiles		5	8	2	3	1	1	5	1	10	big changes in staff and planning is in hand	Training targeted also at operators and sales staff understanding product	
Australian Tapes & Webbing		2	2	2	2	3	3	3	2	2	suffers from imports, feels small companies will lose out, and \$ from government will go to consultants and big companies		
Shade cloth / packagings etc													
Sarlon / Donegny		5											
Gale Pacific		8	5	5	8	8	8	8	9	8			
Underfelts/Insulation (non-wovens)													
Autex													
United Bonded Fabrics / Felt Traders		10	8	10	10	10	8	5	9	5	RMIT run courses. Favourably disposed to RMIT but need regional training.		
SFI													
Tontine													





Working Group Members	
Dr Peter Gordon	CSIRO
Ms. Sally Stemi	Amoco Chemicals
Mr Geoffrey Coghlan	Colan Products
Mr Trevor Smith	J. Robins & Sons
Mr George Napper	My Garment Company
Dr Ron Postle	University of New South Wales
Mr Stuart de Jong	Planning & Management Projects
Mr Allan Ryan	TCF&L Design & Technology Centre
Ms Susan Moxham	Australian Business
Mr Greig Ryan	DISR - TCF Action Agenda Unit
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Dr John Curiskis	University of New South Wales