



the dti

Department:
Trade and Industry
REPUBLIC OF SOUTH AFRICA

SOUTH AFRICAN AERONAUTICAL INDUSTRY DEVELOPMENT STUDY PART 2: STRATEGIC GROWTH PLAN

Date of Issue: October 2019

Final Report

Document compiled by the CSIR

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Nomenclature

AISI	Aerospace Industry Support Initiative
AMD	Aerospace Maritime and Defence Industry Association
AS9100	More stringent version of ISO9001 for application in the aerospace industry
ATNS	Air Traffic Navigation Services
AU	African Union
BBSDP	Black Business Supplier Development Programme
CAMASA	Commercial Aviation Manufacturing Association South Africa
CAV	Centurion Aerospace Village
CIP	Critical Infrastructure Programme
CPFP	Capital Projects Feasibility Programme
CSIR	Council for Scientific and Industrial Research
DIP	Defence Industrial Participation
DoD	Department of Defence
EASA	European Aviation Safety Agency
EMIA	Export Marketing and Investment Assistance
FAA	Federal Aviation Authority
FDI	Foreign Direct Investment
FIG	Foreign Investment Grant
FIR	Flight Information Region
GCIP	Global Cleantech Innovation Programme
GDP	Gross Domestic Product
IDC	Industrial Development Corporation
IP	Intellectual Property
JASC	Joint Aerospace Steering Committee
MCEP	Manufacturing Competitiveness Enhancement Programme
MIDCAPS	Middle Sized Enterprises
MRO	Maintenance, Repair and Overhaul
NCACC	National Conventional Arms Control Council
NFTN	National Foundry Technology Network
NIPP	National Industrial Participation Programme
NIPMO	National Intellectual Property Management Office
NRF	National Research Foundation
OEM	Original Equipment Manufacturer
PPGI	Public Private Growth Initiative
R&D	Research and Development
RDM	Rheinmetall Denel Munitions
SA	South Africa
SAA	South African Airways
SAAB	Svenska Aeroplan AB (Swedish Aerospace and Defence Company)
SACAA	South African Civil Aviation Authority
SADC	Southern African Development Community
SADI	Strategic Aerospace and Defence Initiative
SANDF	South African National Defence Force
SARChi	South African Research Chair
SDP	Aerospace Sector Development Plan [1]
SEDA	Small Enterprise Development Programme
SETA	Sector Education and Training Authority

SEZ	Special Economic Zone
SIC	Standard Industrial Classification
SMME	Small, Medium and Micro Enterprises
SOE	State Owned Enterprise
SPII	Support Programme for Industrial Innovation
STP	SEDA Technology Programme
the dti	The Department of Trade and Industry
THRIP	Technology and Human Resource for Industry Programme
TIA	Technology Innovation Agency
TICPS	Technology Innovation Cluster Programme
TLIU	Technology Localisation Implementation Unit
TSP	Technology Support Programme
TVC	Technology Venture Capital
UIF	Unemployment Insurance Fund
UK	United Kingdom
USA	United States of America
USD	United States Dollar
WCP	Workplace Challenge Programme
YTIP	Youth Technology Innovation Programme

Executive Summary

Aim

This study is in response to The Department of Trade and Industry (**the dti**) terms of reference for a commercial aerospace industry development strategy study and is aimed at achieving the following goals:

- A limited review of the industry, locally, regionally and internationally.
- A determination of the socio-economic case for aerospace investment by the South African government based on questionnaires which will in parallel be used to map industry capability.
- A policy review with a goal of doubling the aerospace sector in 5 years.
- An evaluation of the transformation potential in the sector.
- An evaluation of the value of a public/private partnership in the sector.

In line with the Terms of Reference the scope is limited to the following industry sub-sectors:

- Aerostructures and propulsion for all aircraft types
- Avionics, surveillance and other aviation related electronics both ground-based and airborne.
- Maintenance, Repair and Overhaul (MRO).

All industry tiers are included to ensure an understanding of the full supply chain. The Aerospace related defence industries are also included as they are in many ways interwoven with the commercial business and the commercial business is, on its own relatively, small.

Action Summary

The following six action areas flow as recommendations from this study:

1. Sector Specific support
 - a. The creation of or strengthening of an existing mechanism with a view to better support the aerospace sector in particular is recommended. A 'one stop shop' approach to channel funding in the aerospace sector in a similar fashion to that employed to support the automotive industry is indicated.
 - b. While the higher tier industry (1-3) that has traditionally benefitted from such support mechanisms, one of the recommendations of this report is to consider supporting the development of a broader supply chain to the industry in order to realise the international promise of the aerospace industry in terms of multiplier effect. This can be achieved by supporting the supply chain at Tier 4 in terms of localising material supply. Additional support in the form of appropriate customs duties on foreign imports (in line with Brazil's experience) might also be considered in this area to encourage localisation.
 - c. The creation of a single reporting structure within Government for the Aerospace manufacturing industry.
2. Encouraging Foreign Direct Investment
 - a. Use of state owned assets and shareholding to attract foreign businesses to invest in South Africa. Attraction of the so called super Tier 1 companies would be of the greatest benefit as they would complement their investment with industry relevant expertise and knowledge. Suitable incentive packages must be utilised to ensure their viability and ensure that they remain in the SA economy and grow the SA share in global aerospace. Delivering jobs and economic growth should be the priority.
 - b. The State should not be passive in pursuing FDI but should rather actively pursue opportunities with a view to attaining the goals of the high road scenario.

3. Clustering

- a. Engage with WesGro and the electronics industry in the Western Cape to develop a set of incentives to assist and nurture that sector which is centred in the Western Cape.
- b. Clusters require incentives in order to attract industry. These incentives may not necessarily be financial, but they must be compelling. Neither CAV nor the Ekurhuleni Aerotropolis have intentional incentive programmes and institutional issues block the application of incentives at the CAV. The following actions are recommended:

Centurion Aerospace Village

- i. Resolve the ownership vs incentives issues at the CAV as a matter of urgency. Failing resolution of the transfer of CAV away from **the dti**, consider a Public Private Partnership (PPP) as a last resort in this regard. Failure to resolve these issues in the near term should result in the closure of the CAV,
- ii. Attract a second major aerospace entity to the CAV,
- iii. Ensure that the CAV is included in the Gauteng SEZ,
- iv. Motivate an appropriate capital budget to enable the CAV to realise its potential.

Ekurhuleni Aerotropolis

- i. This site also has the potential to be developed, but much is dependent on entities such as SAA Technical and Denel Aeronautics. Clarity regarding their future and if possible foreign investment in their business is imperative before a pronouncement can be made with regard to this site.

4. SMME Development

- a. Ensure that the SMME supply chain does not suffer widespread bankruptcies and retrenchments caused by the current problems within the SOEs.
- b. Engage with suitable entities to decide on the feasibility of developing a suitable catapult programme for SMME development.
- c. Engage with the NIPMO to better understand and address the sharing of State owned IP with foreign and local entities and SMMEs in order to grow the economy.

5. Other interventions

- a. Engage with Statistics SA with the aim of implementing up to date SIC codes and timeous reporting of sector specific information to assist in the motivation of projects in the sector to treasury.
- b. Set up a panel of experts with representation from industry, SACAA, appropriate state entities, and DoD to put forward recommendations for the establishment of an entity capable of assisting the industry, military and SACAA in certifying aircraft and aircraft components or modifications. At the same time the BASA agreement with FAA should be expedited and expanded to include EASA agreements.
- c. Consideration should be given to the funding of DoD 'flagships' especially in the electronics domain which are key to industry development and at the same time act to enable key strategic differentiating capability within the SANDF. Streamlining of NCACC processes is another potential area through which the defence business could benefit.

6. Transformation will be achieved through the stabilisation and growth of the industry, nurturing SMMEs, the simplification and transparent application of incentive, capital access and certification assistance mechanisms. To formalise the sectors intent in this area however, an Aerospace Industry Charter should be promulgated and agreed upon to guide the application of state development funds in this sector. This should be developed taking into account existing complimentary industry charters.

1 Introduction

An aerospace capability plays an integral role in the achievement of South Africa's priorities and are fundamental to building the nation's economy, security and transportation network. In the defence sector, aircraft manufacturing generally accounts for a large share of defence equipment expenditures for any modern military. The industry is seen as a technology driver, including in manufacturing techniques, that also encompasses other high-technology sectors such as electronics, advanced materials, and sensors. Since manufacturing is characterised by a long project life cycle spanning R&D, engineering design, manufacturing, assembly, maintenance, repair and overhaul, the government recognises the aerospace sector as a key industry for growth and innovation. The industry however requires large capital investments and government's commitment to increased and sustained investment.

The Aerospace industry is widely regarded as a key industry in many developed and developing countries with the benefit of spill over of skills and capability into other industry sectors, in other words a 'technical university' for the other industries. This alone is often cited as enough of a reason to actively support the aerospace manufacturing sector of a country. Moreover aerospace industry studies in many economies have shown excellent return on investment of government support instruments from these industries in terms of economic impact multipliers (often quoted to be in excess of 2.6 as per the SAAB Gripen study released by Eliasson [3] and in terms of highly skilled jobs grown and retained. A 2014 study of the Rooivalk Attack Helicopter development in South Africa (SA), aimed at calculating the impact multipliers for South African economy but could only conclude that the programme was a 'significant force in producing nationally competitive technologies and capabilities' as a result of a lack of coherent economic data [2]. The United Kingdom (UK) Aviation Industry Socio Economic report [4] talks of £7 economic benefit to the UK over the next decade for every £1 spend on Research & Development (R&D) in the aerospace sector and a 60% higher than average gross value add to the Gross Domestic Product (GDP) of £84 000 per employee in the sector. Numbers such as those in the UK study are far more accessible and tangible than the more abstract economic multiplier construct and it is this form of socio economic impact that this study is aimed at generating for the South African Commercial Aerospace industry.

The origins of the Aerospace industry in SA are defence related, stemming from large investments in the 1980's. The resultant industry, both state owned and private were then in a position, by the mid-1990s, to take part in offset deals on the defence packages, SAA fleet purchases and Airbus A400M programmes through the skills, capabilities and infrastructure built up through considerable government investment. These capabilities are extensive and by the mid-1990's covered: Aerostructures, propulsion (although this sector was the least developed), Avionics, Surveillance and Sensors as well as MRO activities. In 2012 the aerospace Sector Development Plan (SDP) commissioned by the Department of Science and Technology (DST) and **the dti** [5] advocated the establishment of an intergovernmental committee to provide a strongly co-ordinated governance structure to ensure that future investments, be they via countertrade or direct investment, were directed to achieve the highest gains for the industry. The Sector Development Plan (SDP) further advocated large flagship projects to stimulate the industry, following the model of the Rooivalk project. The South African economic situation has however changed quite dramatically in the interim.

With the large government capital expenditures in the area of aerospace coming to an end, the lack of confidence created by withdrawal from the Airbus A400M purchase and now work packages, dramatic declines in defence technology spending and with little in the way of incentives to the industry that might attract the large OEMs, the aerospace sector has seen a steady decline in turnover, jobs and a slow but inexorable decline in capability. The outcome of the SDP has been the establishment of the JASC but no meaningful flagship projects have emerged and the SDP report itself was never formally published.

The only government support initiative dedicated to the aerospace industry is the Aerospace Industry Support Initiative (AISI), an initiative of the **dti**. This initiative aims at supporting the industry through assistance with certification, standards and accreditation as well as directly funding higher readiness level development projects particularly where SMME's are involved in order to stimulate and subsidise new product offerings. The AISI's funding is however only 1/10th that available in the UK on a per employee, or turnover basis putting the industry sector far below the levels of support that the global aerospace industry operates.

While a broad selection of other mechanisms with the potential to support the Aerospace industry in SA do exist they have had little effect on the industry to date.

Against this backdrop, **the dti** has commissioned a further study of the aerospace manufacturing sector aimed at determining:

1. The value of the aerospace manufacturing sector to the South African economy.
2. The best way to grow and transform the sector over the next 5 years with an aim of doubling the sector's turnover.
3. An effective mechanism to improve transformation in the sector.
4. The possible benefits of public/private partnership in the sector.

Part 2 of this report is aimed at providing a strategic plan for the growth of the industry based on inputs from industry and government.

1.1 Scope

The Terms of Reference is an extremely wide-ranging document and for the purposes of this study the following goals have been distilled and the scope of this proposal is therefore limited to the following:

- A limited review of the industry, locally, regionally and internationally
 - This will include aspects of clusters as one possible instrument as requested by the study committee,
 - A determination of the socio-economic case for aerospace investment by the South African government based on questionnaires which will in parallel be used to map industry capability,
 - A description of existing policies and legislation (including the use of government procurement programmes) and will show how this compares to international legislation and policy.

The above points are covered in Part 1 of this study while the remaining items will be concluded in this report. These are:

- A set of guidelines for a national strategy with a goal of doubling the aerospace sector in 5 years and achieving transformation in the sector,
- An evaluation of the value of a public/private partnership in the sector.

In line with the Terms of Reference, the scope is further limited to the following industry sub-sectors:

- Aerostructures and propulsion for all aircraft types,
- Avionics, surveillance and other aviation related electronics both ground-based and airborne,
- Maintenance, Repair and Overhaul (MRO).

All industry subsectors are included to ensure an understanding of the full supply chain. Space is excluded, however the defence sector is so intertwined with the commercial sector that it is proposed to include this sector in the study in the sections already displayed above.

Additional requests from members of the steering committee have included requests for the team to engage with labour unions and the Department of Labour's SETAs. While the importance of dedicated vocational training is of great significance to the industry the study team will not engage directly with labour or the SETAs, but will provide guidelines from international best practice in regard to training.

1.2 Industry Framework

For the purposes of this study the industry structure proposed as part of the SDP [5] has been modified as per Part 1 of this report and is included here for reference. See Figure 1 for the full diagram, while Figure 2, Figure 3 and Figure 4 are included to give better legibility.

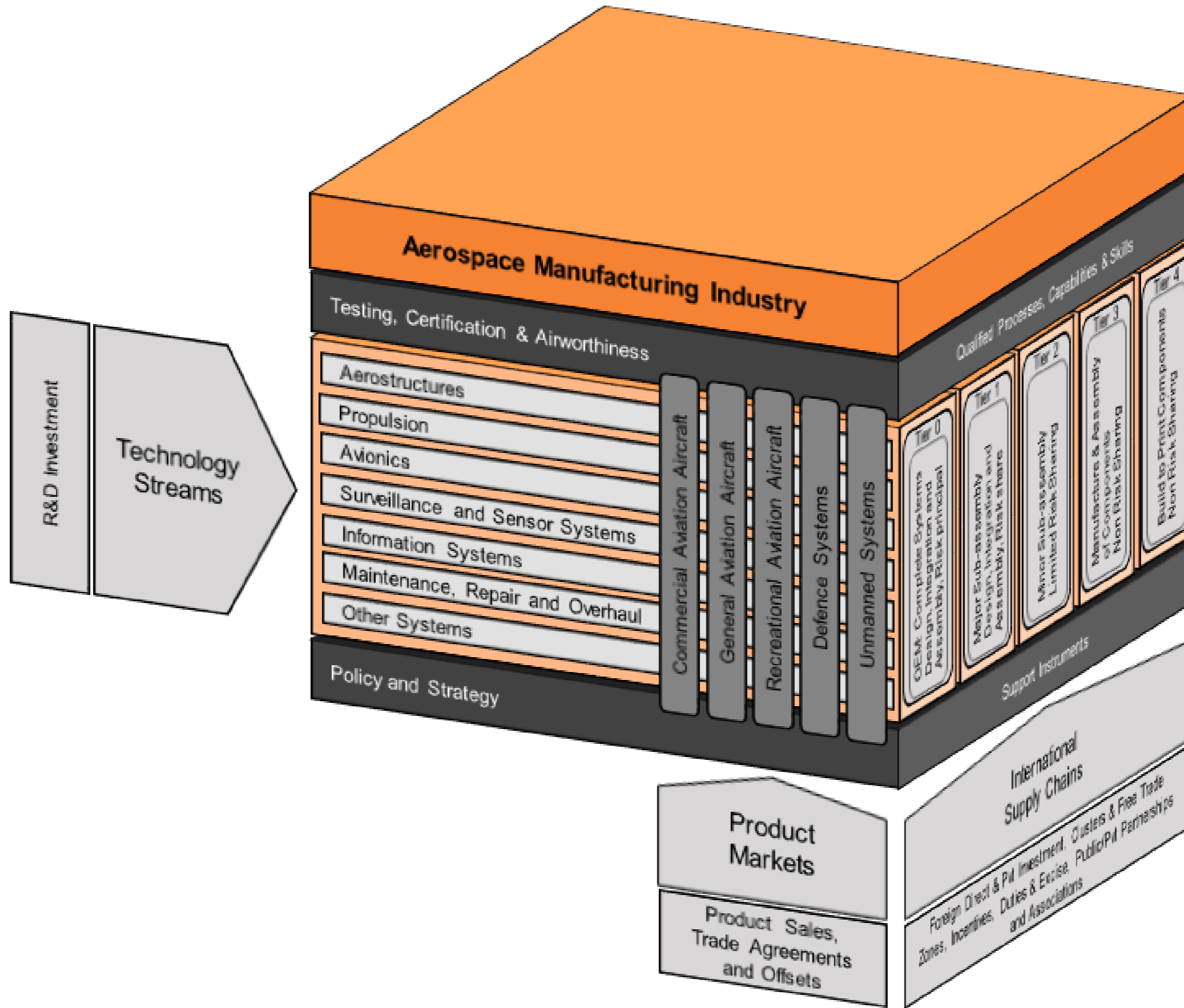


Figure 1: Proposed industry structure

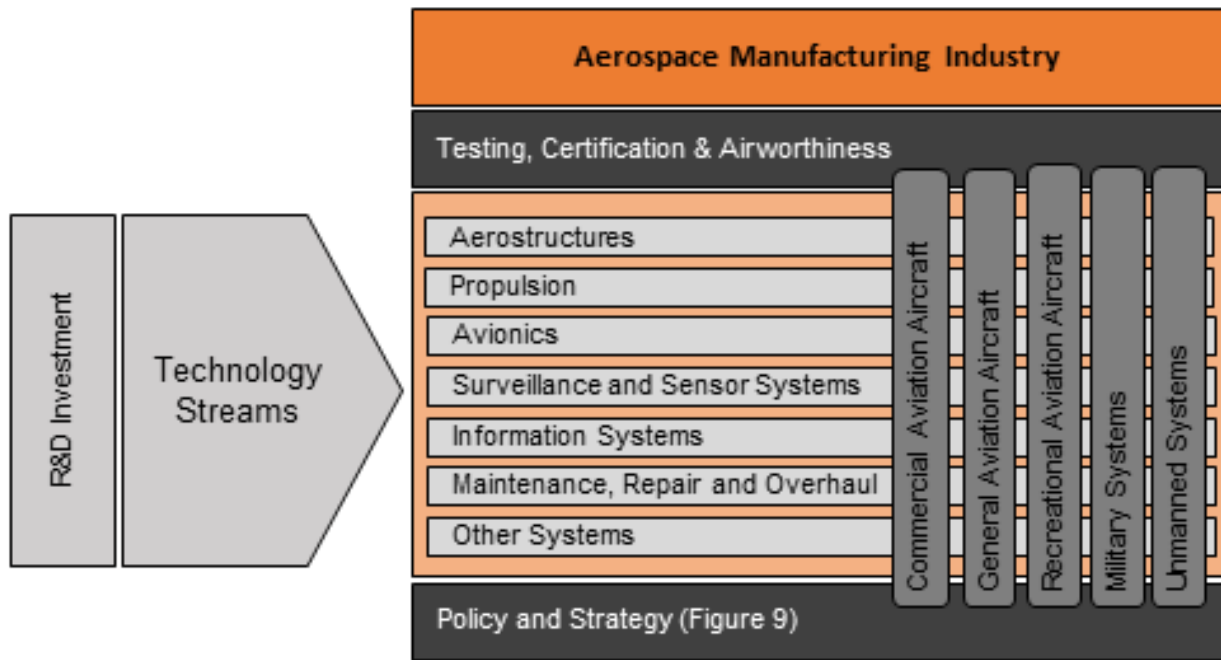


Figure 2: Technology streams and product market details

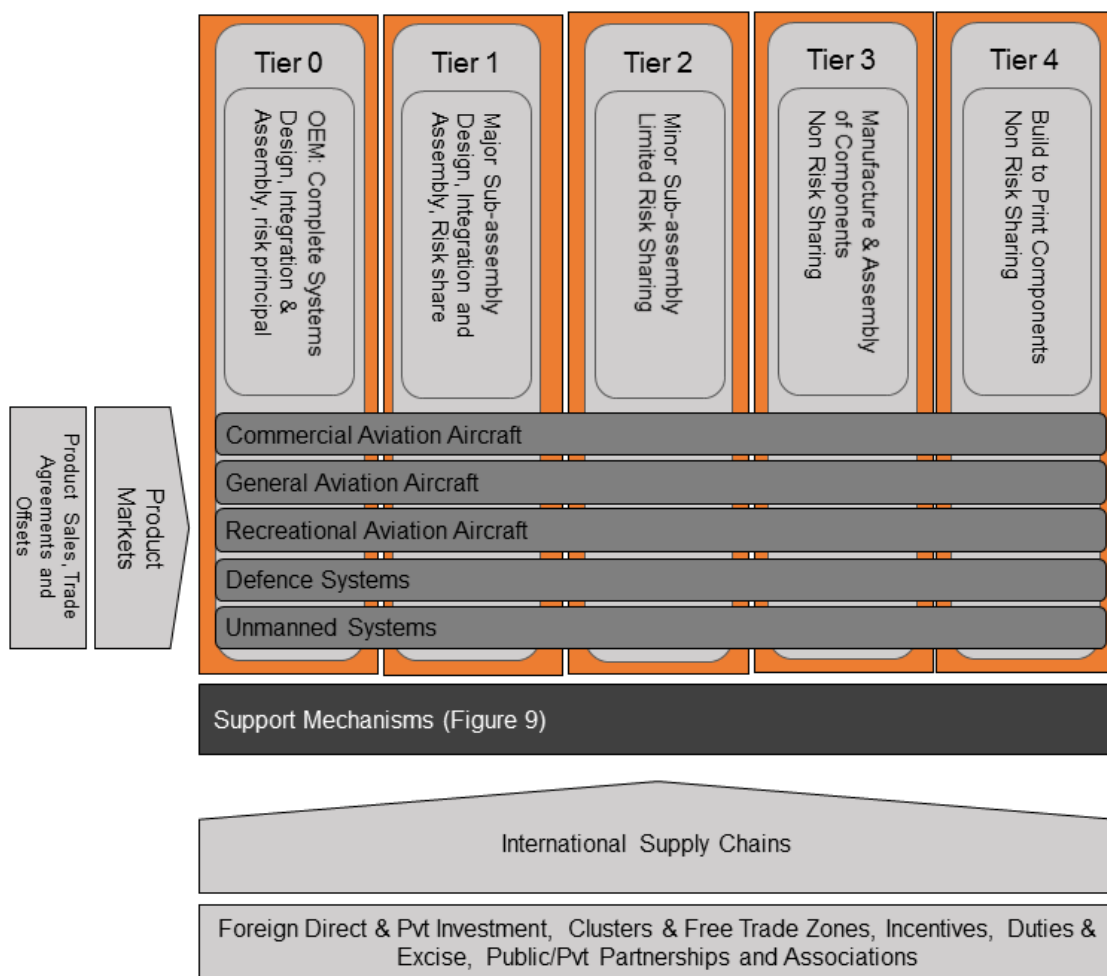


Figure 3: Product markets and industry supply chains details

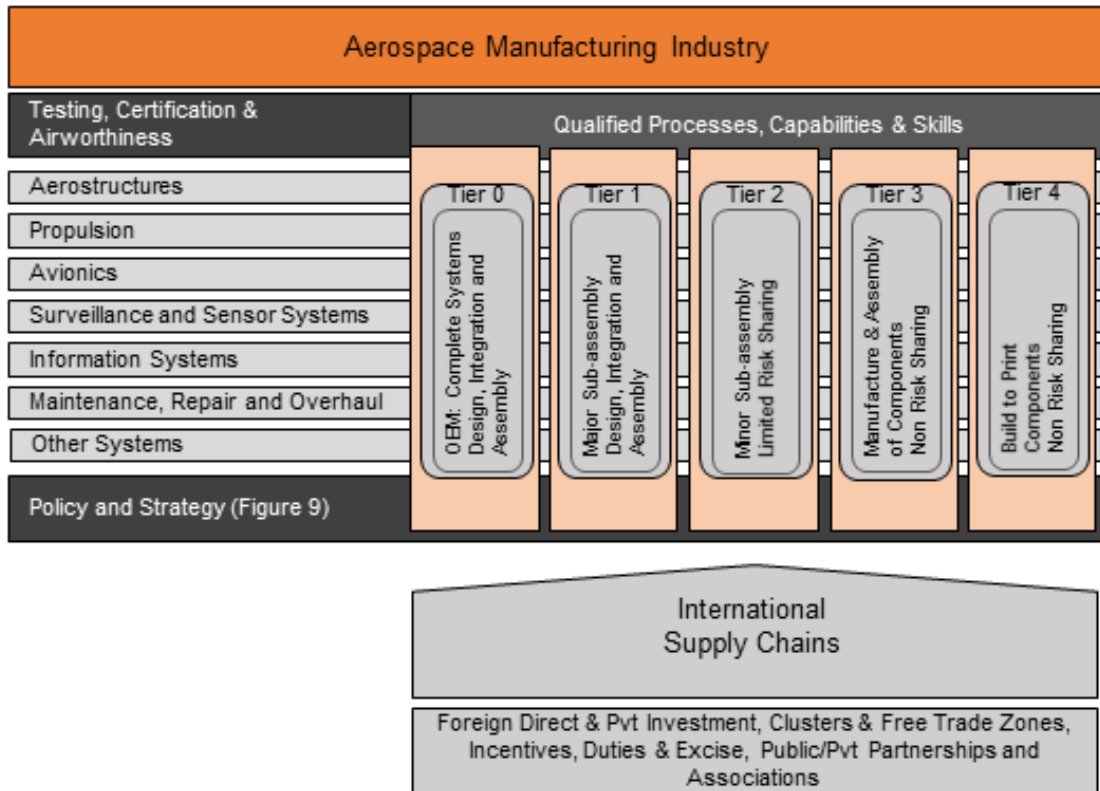


Figure 4: Technology streams and industry supply chain details

2 Summary of findings from Part 1 of this report

2.1 Literature Summary

As the demand for passenger travel is increasing, the aerospace industry continues to be generally profitable and growing. The international supply chain for the aerospace OEMs are thus also in a position to benefit if aligned properly and if they are competitive. As was shown above, a number of countries have successfully developed a profitable aerospace industry by co-operation between suppliers and OEMs. Typically the manufacturing hubs are concentrated in a cluster as these offer tangible advantages and some examples are listed above which, where applicable, could be adopted by the SA aerospace industry. These include clusters and national incentives, tax incentives, making it easy to do business in South Africa and having reliable and skilled labour. In short, a very clear advantage that leads to a financial benefit for the producer is imperative.

A number of countries including the USA and especially Germany are placing emphasis on the implementation of Flight Information Region (FIR). If successful, it is to be expected that the cost of automated manufacturing will be reduced and the quality of manufacturing (and indeed services) will be improved. Another potential advantage is that distributed manufacture (e.g. print on site/demand) will become more accessible. However, the disadvantage (arguable short term) of FIR is that it will be capital intensive to implement. One of the references indicated that China, with its low labour cost rate, is already not necessarily cheaper than the highly automated European manufacturers. A component of SA's offering is lower labour costs but South African aerospace industry needs to take heed of the FIR threat. However, if the South African aerospace industry can make the jump early to the envisaged highly automated industry it could offer a distinct competitive advantage compared to low cost countries. Due to the expected high level of automation which will be brought about by FIR, low-skill jobs are likely to be lost. This factor needs to be anticipated so that personnel can be reskilled timeously. It is projected that the upskilling will lead to the affected personnel being trained to work at a higher technological level.

The commercial aerospace industry globally is effectively an oligarchy dominated by Airbus and Boeing. Their supply chain is however extremely broad based and globally distributed. Components are manufactured all over the world with many so-called low cost countries competing for work share. These countries include, Tunisia, Morocco, Mexico, Malaysia and Singapore as well as South Africa, and in addition one should not forget that as stated above these countries will and are competing for work share with the more established high cost countries in Canada and the European States as well as individual states within the USA. All of these countries/states are highly organised in terms of competing for work share with the obvious exception of South Africa. Each of these countries has a well-articulated plan and vision and offer comprehensive support packages to assist the existing companies operating within their borders as well as to attract new entities who wish to operate in the aerospace sector. There is not particular best practise that can be identified from literature for the support of an aerospace industry but instead there are a range of measures in common practise: These include:

- clusters with advantages such as common logistics pathways, air-side access, access to sponsored training schools and technical institutes as well as tax incentives,
- Tariff rebates and even protective tariffs on key input materials,
- Signing of international agreements to facilitate exports and certification,
- Assistance to foreign investors and start-ups to ease the bureaucratic burden of starting a company
- Financial assistance for R&D, Commercialisation and innovation – often with emphasis on SMME support,
- Active government support in attracting foreign direct investment in the sector,
- Funded flagship projects.

There is, however, almost always a strong focus on attracting Foreign Direct Investment and establishing key global companies within their borders.

2.2 Industry Size

From the results of the survey the size of the aerospace manufacturing and MRO industry in SA in 2017/18 was as shown in Table 1. The numbers are provided in conjunction with a confidence level variance based on the response rate from industry.

Table 1: Aerospace manufacturing and MRO industry sizing 2017/18

	NO. OF COMPANIES	TURNOVER (R Billion) (A)	NO. OF EMPLOYEES (C)	LABOUR COST (R Billion) (B)	AVERAGE ANNUAL SALARY (R Thousands) (B/C)	AVERAGE ANNUAL THROUGHPUT (R Thousands) (A/C)	COMMENT
Total	104	9.5±0.53	9440±420	3.400	354	1010	Confidence levels estimated at 25% of difference between known respondent values and extrapolated values
Aerostructures (all)	45	1.67±0.07	2430±155	0.636	262	687	2 Large entities, both with accurate data, large no. of small entities with moderate response rate
Propulsion	3	0.50±0	60±0	0.023	417	901	All entities accounted for
Avionics	13	1.46±0.08	1120±70	0.504	449	1300	2 Large entities, good response rate
Surveillance and Sensors	7	1.93±0.07	1230±55	0.762	619	1570	3 Large entities with good response rate generally
Maintenance, Repair and Overhaul	28	3.08±0.5	3800±140	0.775	204	810	Highly dependent on SAA's and Denel Aviation's figures (50% of total together)
Other Systems	8	1.34±0.01	800±10	0.637	799	1676	Largely comprised of Denel Dynamics
Total (Respondents only)	64	7.411	7763				
SA Manufacturing Totals/Averages		551.6	1 190 000	71.97	60.5	464	
Aerospace as a percentage of SA Manufacturing		1.7%	0.8%	4.7%	585%	218%	

These values are depicted graphically in Figure 6 to Figure 7.

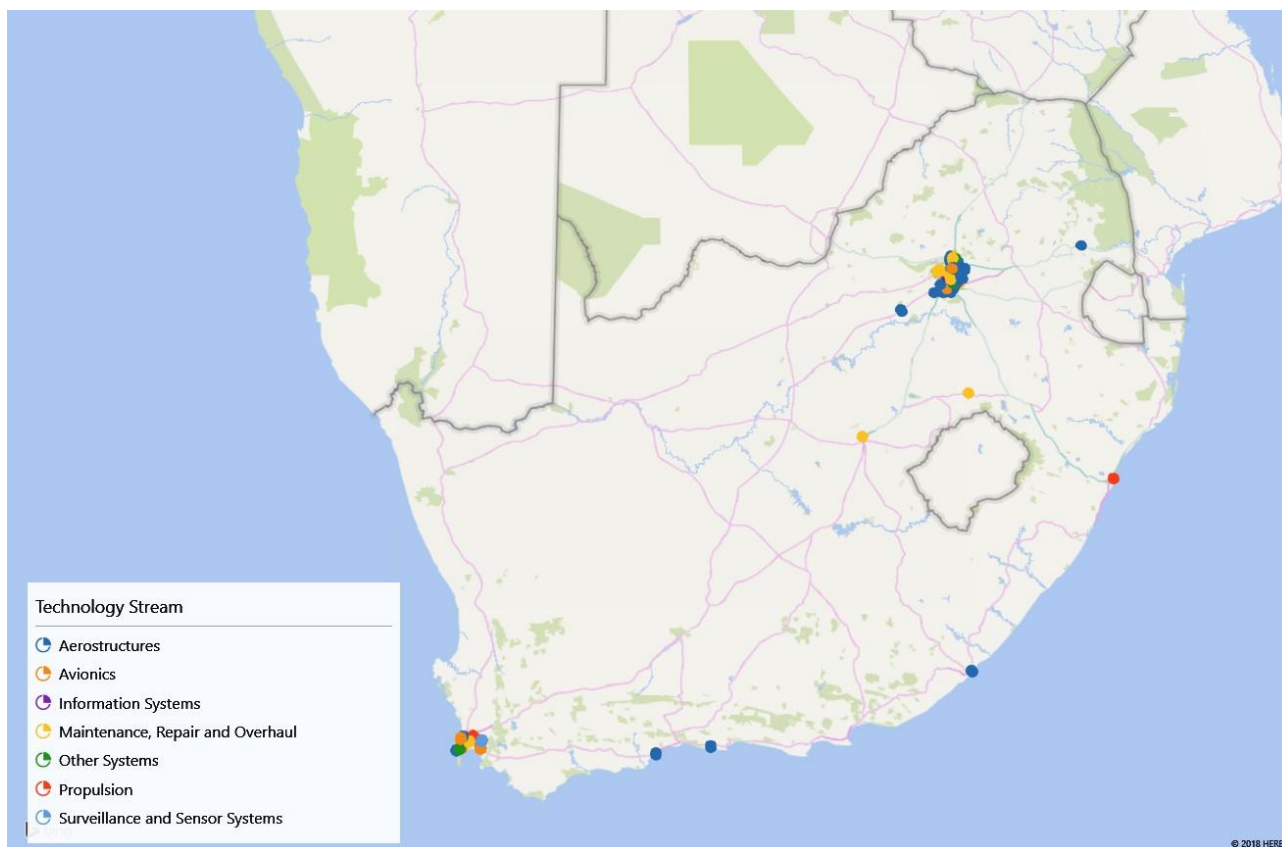


Figure 5: Location of the companies included in this study coloured according to their sector

Locally the aerospace industry is a small but significant element of the South African manufacturing sector comprised of at least 104 companies of varying sizes across 6 technology streams, namely: Aerostructures, Propulsion, Avionics, Sensors and Surveillance, Maintenance, Repair and Overhaul (MRO) and Other Systems. In total the industry size was determined to be in the order of R9.5 Billion and employ nearly 10 000 individuals. This is just 0.5% of total production in the SA economy however. While its overall value may be small, its highly skilled workforce represents one of the highest earning segments earning nearly 6 times the average of the manufacturing sector in South Africa and generates a large export income value for the economy in comparison to its size, estimated to be >55% of direct turnover as compared to 34% of turnover for the automotive industry in 2017. In addition, it has a large tertiary or induced economic value to the economy. Furthermore, the skills generated within the industry are well known to be a critical supply of spill over skills to the rest of the industry.

Locally the industry is roughly 1/3rd MRO based with the aerostructures, avionics, sensors and surveillance and the other (military sub-systems) sectors being roughly equivalent to each other in terms of their turnover (Figure 6 and Figure 7). The propulsion component of the industry is largely insignificant with only relatively small start-up companies currently in operation. Annual compensation to workers in the local aerospace sector is on average nearly 6 times that in the rest of the manufacturing sector. This is in part due to the international mobility of the sector's workforce but has clear advantages in terms of the induced benefits to the South African economy. Similarly the throughput is between 1.5 and 4 times that of the manufacturing sector average and shows the attractiveness of the value addition this industry sector offers. The sensors and surveillance sub-sector represents the highest value add and MRO the lowest.

Although the international aerospace industry is quoted as having extremely advantageous economic multipliers and the evidence from the Rooivalk case study [2] clearly indicates a strongly advantageous result for government investment in aerospace projects in the long term; it may be overstating the value of the aerospace industry to the South African economy to apply these multipliers to the local industry. This is because the industry is clearly heavily dependent on imported raw materials and components and as such, the indirect industry is unlikely to reach the economic potential of that in competing overseas countries.

With respect to government incentives versus tax revenues from the sector the following can be concluded:

- There is little data available from government of industry with regard to what government support has been offered beyond the AISI.
- The benefit of many of the more prominent support mechanisms such as NIPP and DIP are difficult to quantify, it is simplistic to say that the procurement of the defence packages benefited the industry at no additional cost to the DoD for example.
- Data regarding employee costs suggest that the annual tax revenues from employees in the sector alone reaches ±R570 Million which far exceeds the AISI budget of approximately R20 Million annually (a budget that includes the space sector) and anything reported by the industry over the five years of requested input to the questionnaires.

Furthermore, comparing the typical levels of support internationally, South Africa is estimated to lag behind the levels found in the UK, as an example, by a factor of ten if one scales their investment based on either employee numbers or turnover.

Physically the industry is located principally in the Western Cape and Gauteng (Figure 5) with natural clusters for MRO at OR Tambo, Lanseria and Wonderboom airports, commercial manufacturing on the East Rand near OR Tambo and a strong electronics industry in the Western Cape although there are large concerns in this sub-sector in Gauteng.

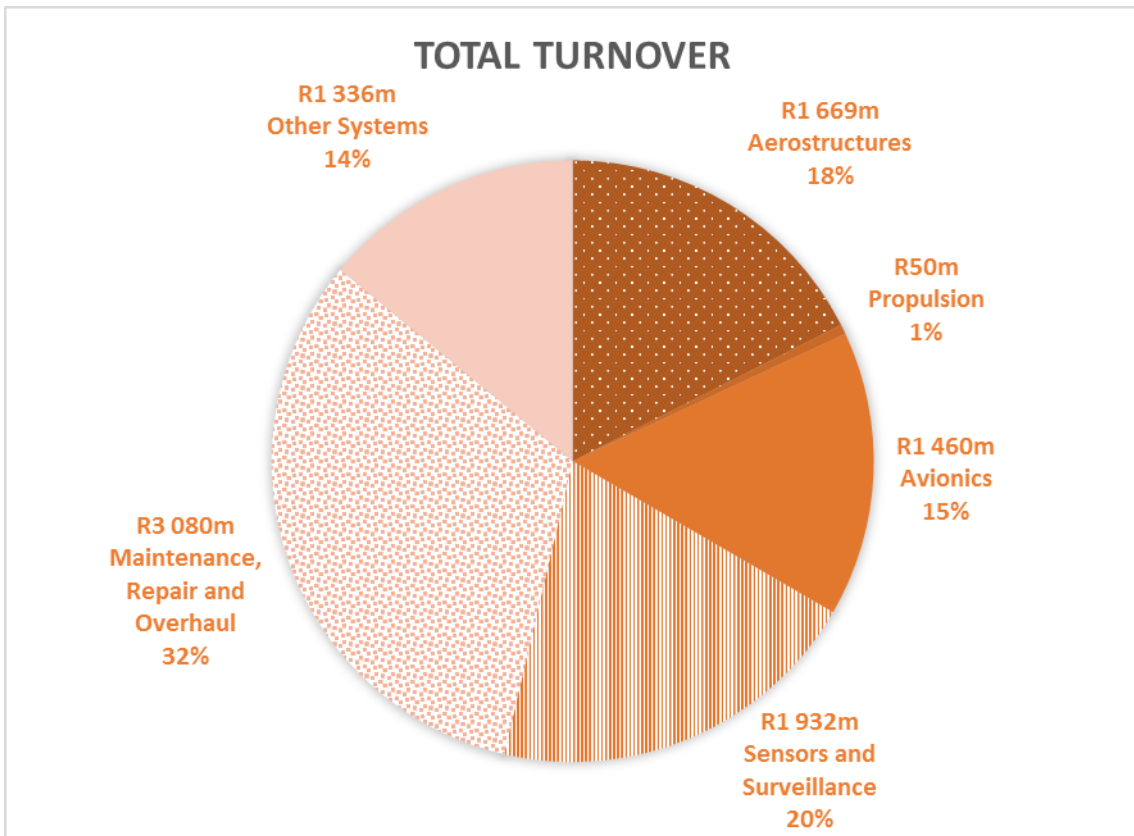


Figure 6: Total industry turnover by Sector

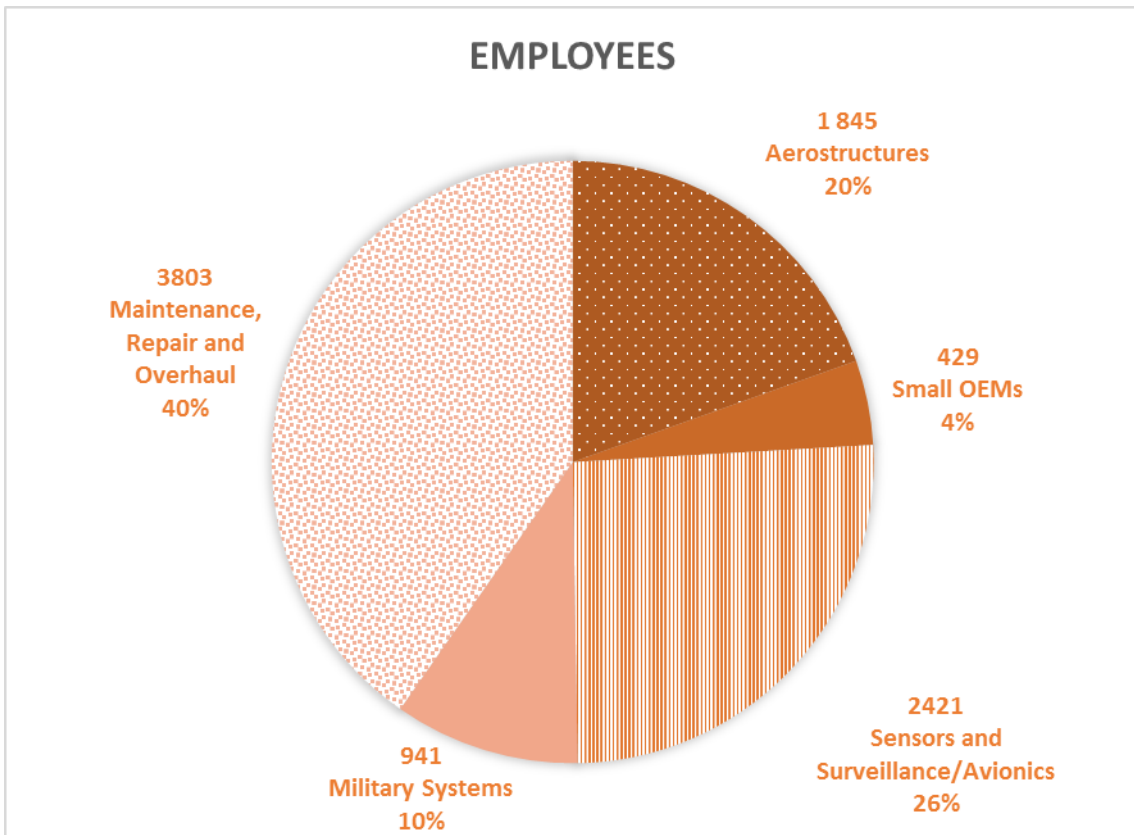


Figure 7: Employees per sector

2.3 Industry Structure: Commercial and Defence

Table 2 shows a breakdown of turnover and employee numbers for the total aerospace industry surveyed, that without MRO (Manufacturing only) and for just the Aerostructures component. What is quite apparent in the figures shown in Table 2, is that the defence sub-sector dominates the commercial sub-sector until the data is reduced to just that for the Aerostructures stream. It is therefore accurate to state that the commercial business is small on its own and would make up less than 0.1% of total production in the SA economy. Any strategy therefore should not focus on only the commercial sector if one is to generate meaningful impact to the economy as a whole.

In addition the proportion of dual use activities which are made up a broad spectrum of small to large companies supplying into the industry at many levels is large, 10% of the total make-up of the industry sector growing to between 10 and 20% if MRO activities are removed, and finally if only the Aerostructures stream is considered, over 30%. The dual use industries are a fundamental component of both sub-sectors, contributing key capabilities and expertise to both and cannot be readily separated out. This is particularly true in the Aerostructures sector which has the highest percentage contribution from Dual Use entities.

In the process of interviewing and workshopping with various entities within the industry the following explanations for this can be offered:

- The Aerospace industry emerged out of a historical investment in the defence sector which is still known internationally for its innovative and highly cost effective products. Defence products are certified according to military regulations and procedures, which, thanks to the history of the industry and the role of the SANDF and Armscor, are well understood and achievable within the existing facilities, capabilities and expertise. Commercial products are regulated by a different legal framework not readily achievable in South Africa without bilateral agreements with the FAA and EASA as well as significant investments in testing and certification facilities, expertise and regulation limits the ability of the local industry to penetrate the international market. The domination of the defence sector therefore remains.
- In the Aerostructures sector the certification and regulation requirements are manageable through a reliance on supply to OEMs and higher tier entities who only require AS9100 and ISO9001 certification or equivalents, whereas the Defence sector opted to purchase foreign made airframes for the most part. Aerostructures is therefore dominated by commercial work and has different entry requirements – access to capital, cost effective skilled labour, and a compelling case for OEMs to direct work to South Africa.

This implies that the defence and commercial sectors have to be treated differently in order to support them each optimally.

Table 2: Aerospace sector breakdown of turnover and employee numbers

Turnover	Employees																								
<p>Total Industry surveyed</p>  <table border="1"> <caption>TOTAL TURNOVER</caption> <thead> <tr> <th>Category</th> <th>Value (Rm)</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Defence</td> <td>4937</td> <td>52%</td> </tr> <tr> <td>Commercial</td> <td>3718</td> <td>39%</td> </tr> <tr> <td>Dual Use</td> <td>880</td> <td>9%</td> </tr> </tbody> </table>	Category	Value (Rm)	Percentage	Defence	4937	52%	Commercial	3718	39%	Dual Use	880	9%	<p>TOTAL EMPLOYEES</p>  <table border="1"> <caption>TOTAL EMPLOYEES</caption> <thead> <tr> <th>Category</th> <th>Count</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>Commercial</td> <td>4682</td> <td>50%</td> </tr> <tr> <td>Defence</td> <td>3634</td> <td>38%</td> </tr> <tr> <td>Dual Use</td> <td>1132</td> <td>12%</td> </tr> </tbody> </table>	Category	Count	Percentage	Commercial	4682	50%	Defence	3634	38%	Dual Use	1132	12%
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2.4 Existing Support Mechanisms

The primary mechanism that has been wielded to support the industry to date has been NIPP and DIP. These have been a 'foot-in-the-door' but cannot sustain business especially as the international OEMs still evaluate the NIPP beneficiaries on a cost basis just as they would any other supplier. In addition, the lack of planned capital expenditures negates this approach as a viable future alternative to grow the industry. Additionally other government instruments are often excluded in the cases where NIPP/DIP are deployed on the basis of eliminating 'double-dipping'. The latter factor means that the 'foot in the door' must be translated from opportunity into reality by private capital, which in the Aerospace industry may difficult even for large companies.

On the other hand there are many funding mechanisms available from government, they overlap in terms of intent, and feature different application requirements and qualifying criteria (see Appendix A). Additionally the number of government departments involved in decision making in the sector is also problematic to coordinate. The only place in which these departments come together is at JASC. However, JASC is not empowered to make decisions that can grow the industry and make appropriate investments.

2.5 Industry Input

After collation and consolidation the projects and initiatives proposed by industry can be summarised as follows (Please note that this in no way reflects the opinions of the authors or the CSIR but faithfully records the views expressed by industry):

1. In the short term, fund stalled DoD acquisition programmes (move forward with the projects already defined).
2. Implement strategies for the retention, rescue and long term viability of the key elements of SAA Technical and Denel that:
 - Allows them to grow, earn export income and reinvest.
 - Retain niche manufacturing capabilities that enable other industry entities.
 - Allows them to partner with OEMs and Tier 1 suppliers to benefit the industry as a whole.
 - Alleviates procurement regulations that drive unsustainable input costs.
 - Provides a supply of key skills to the benefit of the industry at large.
3. Create an economic environment that stimulates business confidence.
4. Create a single aerospace fund:
 - One organisation who engages industry.
 - That can fund R&D, industrialisation, SMME “catapult” incubator etc.
 - Retains and maintains key infrastructure.
 - With in-house expertise and an industry advisory board.
 - The capacity (people and funding) and capability (knowledge and freedom to act) to implement a strategy to grow the industry as a whole.
5. Certification:
 - Review the SACAA:
From every industry workshop it is apparent that the SACAA is not meeting industry expectations and needs. Ultimately the SACAA can be seen as a genuine brake on industry growth. Processes are bureaucratic; often run by personnel without the relevant authority stemming from inappropriate education or training. The result is unpredictable and delayed outcomes to certification audits. This is exacerbated by the mismatches between SACAA, EASA and FAA type classes and the lack of bilaterals with FAA and especially EASA to facilitate the export of type certified aircraft and major sub-systems.
 - Setup an SAEASA Design Organisation
 - Secure Bilateral agreements with EASA and FAA that includes type and non-type certified aircraft
 - Investigate extending certification capability to address safety radars.
6. Provide promotion of the industry at the highest level (presidential project, embassy focus etc):
 - OEM and tier 1 deals in both the aerostructures and MRO domains).
 - Fund a bilateral growth agreement to attract OEMs to participate in the expansion of the local industry.
7. Provide seed funding for flagship programmes at a sufficient level that industry could potentially use this to leverage other funding sources and develop international collaborations.
8. Enable and insist on an aerospace industry association that:
 - Provides a single, unified opinion and approach to developing the industry.
 - Forces a collaborative approach with education, scientific and industry players to produce capability.
 - Provides guidance to government investment.
 - Whose opinion is sought and acted upon.

9. Review of the IPR Act:
- Many perceive the IPR Act as inhibiting the ability of the industry to collaborate internationally especially as some of the key stakeholders in the industry remain parastatal.
 - In addition it was felt that the IPR Act inhibits access to commercialisable IP held within parastatal institutions that could unlock the growth potential of SMME's.

At no point in the consultation process did a consolidated plan for the doubling of the industry emerge from the discussions, there is no list of projects and milestones. Each sub-sector has nuanced requirements and different support needs.

2.6 Unsuccessful Public-Private Growth Initiative Submissions

After the initial drafts of this report were submitted for review a separate presidential initiative was launched and separate proposals for the doubling of the commercial aerospace industry and the defence industry were submitted by CAMASA and AMD respectively. Unfortunately neither were selected for further development. They are however compared in a summary fashion in Table 3 below.

Table 3: Comparison of PPGI submissions

	Commercial Aerospace	Defence
Goal	Double the Industry	Double the industry (The total defence industry is larger than the commercial aerospace industry by more than a factor of 4 and this is therefore the more ambitious goal)
Method	Capital injection	Easing of regulatory bureaucracy and delays as well as adequate funding for DoD acquisitions and development projects (implementation of the Defence Review)
Projects	Government co-investment via exiting mechanisms of between R200m and R300m per annum, 2/5ths of total investment targeted from local and international sources (no details given). R100m per year is earmarked for the CAV. Three example projects are listed: Advanced Composites manufacture, hard metal machining and test facilities, the latter presumably for the space sector.	Export permit facilitation and government support Coordination of security sector government purchases Funding for the Defence Force to maintain equipment and pursue existing technology development projects. (Amounts are not clear, but could be in the order of R15Billion over 5 years)
Transformation	Incubation of SMMEs with a goal of 30% contribution from black owned SMMEs in 5 years.	SADI charter

The plans articulated by each sector as part of the PPGI are broadly in agreement with the outputs or the industry workshops.

3 Potential Scenarios

In this section the authors put forward three possible growth strategies based on high, medium and low road scenarios. Naturally these are just three quantum steps in what could be a continuum if one combined different scenarios to get additional outcomes.

3.1 High road – An Africa based OEM

Doubling the size of the aerospace sector in South Africa is not a scenario that would make a substantial difference to the South African economy. In order to achieve a high road growth strategy there must be a shift in the sector turnover to reposition aerospace as an industry of significance in GDP terms. This might be characterised as ten-fold growth.

To achieve such a strategy all available instruments would have to be brought to bear synergistically, but most importantly a long-term master plan with the inherent capability to achieve this goal is required. The only such concept with the inherent properties would be to move up the tiers of the aerospace industry and significantly reposition South Africa internationally and with Africa. In practical terms in the commercial sector, this would mean the production and assembly of commercial aircraft/helicopters in South Africa. This could be achieved in two ways:

- By designing and building an aircraft locally (high risk, high cost, high return)
- By opening an assembly/production line locally for an international OEM (medium risk, high cost, high return). This second option is similar to the automotive industry model.

Similar initiatives in the Defence Aerospace sector (Rooivalk MkII, a trainer aircraft or even license production of a transport or light fighter for broader application within the AU or SADC Stand-by force) could also be used as could common air-to-air missile capabilities and military radar systems in the other sub-sectors.

Any aircraft would require a guaranteed market larger than that available within the South African economy. The only solution that begins to fulfil that requirement would be for the product to be sold within the African Union countries as a continent wide initiative. A regional airliner would be a candidate for such an initiative.

To achieve such a strategy the following would be required amongst others:

- Significant FDI,
- Elevation of the project to achieve presidential support,
- Utilising clustering,
- Investment in the development of raw material and component supply chain companies,
- Investment in certification and qualification facilities and capabilities,
- Investment in and prioritisation of appropriate training interventions.

3.1.1 Benefits

Actively participating in a global supply chain, ensuring FDI in local skills and the economy. Substantial growth in jobs and GDP. In the order of 3 500 highly skilled jobs would be created on an aircraft assembly line (Alabama Airbus production line example).

Potential to grow the supply chain for these aircraft as well as MRO services downstream.

3.1.2 Challenges

Risk management and ensuring adequate market for the product. The Malaysian example should serve as a warning with respect to potential pitfalls. In Malaysia they have announced plans to generate 32 000 high earning jobs by 2030 and have used a fund matching principal to encourage their aerospace industry. Between 2011 and 2016 Malaysia saw a total investment in the order of USD 2 500 Million of which 25% was from foreign sources and their industry is not yet self-sustaining [6].

3.1.3 Cost

Estimated Cost of R10 Billion based on popular news articles regarding the establishment of an Airbus A320 final assembly plant in Alabama which is expected to yield 3700 additional jobs in the State of Alabama. Roughly half that again was invested to add A220 production and an additional 700 jobs. State and local authorities contributed nearly 10% of that value for the additional facility. Additional funds for additional systems in the defence and sensors and surveillance sectors, possibly as much as R15 Billion as per AMD's submission as part of the PPGI, but with the benefit that these systems would directly contribute to the security of the nation and region through their contribution to the SANDF's capabilities.

3.1.4 Implementation Plan

The implementation of this approach would require careful groundwork and planning. The initial step would be to establish the market and carefully select the class of aircraft in conjunction with the national carrier of several African nations who would have to commit orders to the project at its initiation. As a result this is largely a DIRCO function in conjunction with **the dti** who would have to put bilateral trade agreements in place and in addition then incentivise the local production of an aircraft with an OEM and local investors and industry.

3.1.5 Government's Role

High level government participation in the process of developing the opportunity both with the OEM and the AU as a market for the products.

Facilitate FDI. Be prepared to co-invest in the development of facilities to the order of R1 Billion in the case of the commercial sector and to increase the DoDs budget to accommodate increased investment in defence technology projects.

Creating a set of incentives to attract foreign manufacturers to establish facilities locally.

Ensure public procurement has offset obligations that benefit the procuring entity.

3.2 Medium Road – Reinforce and grow the existing industry

The medium road might be considered a doubling of the aerospace turnover within the South African economy as was the initial intention specified in the terms of reference. Achieving this goal can involve a great many paths. Industry engagements as part of this study have revealed a variety of ideas within sub-sectors and no one sub-sector necessarily shares the vision of others, which makes it difficult to recommend a single clear-cut approach to achieve this goal. Noteworthy options put forward by industry included:

- Creating a dedicated aerospace industry incentive fund with an estimated value of R600 Million to leverage a R3 Billion investment over 5 years, within the commercial aerospace sector, this R600 Million investment has been suggested by CAMASA to take the following form:
 - Support to secure business from international OEMs,
 - Promoting the aerospace industry in trade alliance talks with the EU, USA and BRICS,
 - Enabling the use of multiple incentives with different purposes to assist in securing business (i.e. an end to the double dipping argument),
 - Giving priority access to the sector at Deputy Director General level or at very least a Chief Director level within **the dti**,
 - R330 Million for capital investment in establishing an appropriate cluster over three years,
 - Utilising SETA and other mechanisms to create a training facility,
 - As a corollary to this different industry members report to different SETA's (Transport or Manufacturing) this should be consolidated.
 - Funding of small aircraft certification projects,
 - Creating an SMME Catapult facility,
 - Quality certification support (AS9100), business and PLM support and technology support projects (could be AISI).

Other industry sectors or more specific interventions (with some overlap) have been suggested to be:

- Urgently setting up bilateral agreements with the FAA and EASA to assist the small aircraft OEMs with selling their products internationally (Small OEMs),
- Establish a South African design authority organisation to assist the SACAA with the certification of aircraft to EASA standards (Small OEMs),
- Create or strengthen a single entity to support the aerospace sector with incentive funding rather than relying on a multitude of industry wide schemes with disparate requirements (Small OEMs and SMMEs),
- Utilise a system such as the UK Catapult scheme to assist and incubate SMMEs (SMMEs),
- Review the IPR act in order to allow SMMEs and industry greater access to IP within state owned entities (military, SMMEs and Aerostructures),
- Funding current DoD requirements locally (mainly from the Surveillance and sensors as well as the Military sub-sectors),
- Solve the current problems within Denel and other SOEs to assist the SMMEs in the supply chain to survive and maintain key capabilities within the SOEs with the potential to benefit the industry as a whole.

None of these options are sufficient to support all sub-sectors of the industry in achieving the goal of doubling turnover. Instead all should be explored to the extent that they can be achieved within the current fiscal constraints should this road be confirmed as the strategic intent for this industry sector.

3.2.1 Benefits

The growth of a high technology, advanced manufacturing sector such as aerospace is proven internationally to have a high spill over effect into the rest of the economy. At some point, the growth of the industry will reach a tipping point at which the base supply of raw materials and small components and tooling may become a viable product for local production. This aspect requires further study.

Any growth will allow for the entry of previously disadvantaged individuals into the industry.

This scenario may support the possibility for the industry to move to being a Tier 1 supplier, which has significant growth potential and could attract further growth and FDI.

Creation of 2 000 jobs, increase exports and increased tax revenues.

3.2.2 Challenges

The potential for FDI is largely limited to the extent that foreign entities might buy up Government shareholding in private and state owned entities.

Limited availability of NIPP support to aid in securing additional projects to support growth.

3.2.3 Cost

Increased investment in support instruments: R600 Million, which is roughly equivalent to the estimated income tax revenues from this sector.

3.2.4 Implementation Plan

As the most viable solution the implementation of a medium road strategy assuming that there are readily identifiable projects within the global supply chain on which to grow the commercial and defence industry sub-sectors this scenario's implementation plan is described in Section 4.2 of this report in some detail and is compartmentalised along the lines of the sub-sectors used through this study to allow for the different approaches required by each sub-component.

3.2.5 Government's Role

High level support in the development of international trade alliances that benefit the Aerospace sector.

Create a dedicated fund for the development of the Aerospace sector (approximately R600 Million).

Creating a set of incentives to attract foreign manufacturers to establish facilities locally.

Establish air safety bilateral agreements with EASA and FAA.

Establish a catapult programme for SMMEs.

Establish the viability of selling Government entities and stakes in the aerospace industry to attract FDI.

Ensure public procurement has offset obligations that benefit the procuring entity.

Invest in DoD programmes for the development of unique products and capability that are both strategic to the SANDF and will assist the industry in industrialising products.

3.3 Low Road

This is a status quo approach, organic growth or decline dependent on commercial forces with little or no intervention from Government. Even this scenario would be severely hampered or rather set on a path toward decline without some intervention in the matter of Denel's financial position, which is currently threatening the survival of a great many of the SMME supplier network within the industry.

3.3.1 Benefits

Little or no real additional cost to government.

3.3.2 Challenges

Potential decline in skills and the reduction in tax revenues from the sector.

Decline in a strategic capability in advanced manufacturing, engineering and defence.

Loss of standing in the international arena.

Job losses.

Potential collapse of a niche set of manufacturing SMMEs who may form the high technology supply to other sectors such as Defence and Automotive.

3.3.3 Cost

Loss of approximately R570 Million in annual income tax revenues, decline in the balance of payments and in the order or 2 000 jobs at risk.

3.3.4 Implementation Plan

None required. Interventions to slow the decline in the industry that have no cost implications might be:

- Redefining the dti assistance to trade show participation to assist commercial rather than defence aerospace sectors,
- Placing the clusters such as the CAV, Ekurhuleni Aerotropolis and the Western Cape electronics sector within a structure that allows for the development of the planned infrastructure and the incentivisation of tenants in the aerospace sector.
- Consolidating state assets and institutes (Denel, SAA Technical, CSIR) in the sector in a way that reduces overheads and creates a synergistic offering.

3.3.5 Government's Role

No additional interventions.

Sustained but low level investment in AISI and other industry-wide incentive schemes.

4 Growth Plan

As discussed in section 2.3 the commercial sector has different needs to that of the defence sector especially with regards to certification differences and these factors drive differing support requirements. Similarly there are important differences between suppliers of aerostructures to large international OEMs and the local OEMs of recreational aircraft, and the electronics industry that supply sensors, surveillance and avionics equipment into the commercial aviation market. As a result the plan laid out below will address the needs of each of these sub-sectors independently with a view to growing the sector as a whole. Firstly, however, industrywide interventions will be addressed.

4.1 Industry Wide Requirements

The following subsections represent the outcome of both the industry engagements and the review of the literature in terms of the required interventions across all sectors. The interventions listed in 4.1.1 to 4.1.6 should be prioritised for implementation to support the industry. Following this section is a set of sub-sector specific interventions tailored to the needs of the each sub-sector.

4.1.1 Government Focus and Principal Support

The industry is petitioning for and requires a higher level of support, not just in terms of funding but perhaps more importantly in terms of influence and authority to act in support of the opportunities brought to government by industry. This could be in terms of assisting with incentivising FDI, ensuring appropriate skills are available, or access to technology or capital. This might well be embodied in the next part of the support plan.

4.1.2 Sector Specific Support and Coordination

The recommendation of this report is that JASC is disbanded and a single line department be given budget, authority and responsibility to act to improve all aspects of the aerospace industry, training, technology, FDI, and market penetration.

Many of the entities surveyed asked for a sector specific fund that could replace all other government mechanisms, but that is specific to the aerospace sector. The most commonly quoted model is that of the Automotive Investment Scheme. In this case the idea is for the empowerment of an entity with knowledge of the industry, which would engage with the industry rather than passively await proposals and one with significant budget. During the workshops it was suggested by some entities that the AISI was just such a body but would require at least a 10 fold increase in funding to be effective on a scale that would approach that of their global competitors. Furthermore, industry requested more say in the governance of such a body. The recommendation of this report is that **the dti** develop a dedicated scheme for the support of the Aerospace industry in line with the Automotive Investment Scheme. This scheme should be structured in consultation with a representative cross-section of the full industry in South Africa.

4.1.3 Foreign Direct Investment

Encouraging FDI is the most common form of growth strategy used in developing nations to grow jobs in the Aerospace industry. South Africa has not exploited this approach successfully in the past, partly due to an insistence on retaining control of the entities in question. Sale of state owned assets and shareholding in aerospace companies remains potential mechanism to attract FDI in the South African economy at little or no cost to the country while maintaining jobs in the sector. In fact sale of state assets might attract foreign capital, and if major foreign companies are in control of the asset, and are properly incentivised to grow the business in South Africa they will invest appropriately and grow the jobs and skills appropriate to the demands of the international industry without much intervention from government as has been the case in Morocco and Tunisia as well as locally at RDM.

This and every other possible mechanism available to Government should be directed towards increasing levels of FDI in the Aerospace sector.

4.1.4 Developing SMMEs

The UK catapult model of closely supporting and incentivising SMMEs in specific sectors through dedicated centres with the ability to provide business support, appropriate IP (which may require adjustments to the IPR Act in order to facilitate easier access to State owned IP) and access to knowledge, floor and office space is clearly the leading contender for the international best practise in developing SMMEs.

It is therefore a recommendation of this report that **the dti** might consider establishing SMME catapult like entities based on the UK or Canadian model in a variety of strategic sectors and placed within appropriate institutions capable of supporting the development of these SMMEs in terms of technology, logistics, business skills and training.

This aspect can be seen as a critical success factor in transforming the industry.

4.1.5 Cluster development

Clusters are undoubtedly beneficial in creating a community of practise and an economy of scale in a well-defined geographic area. The only actual or potential aerospace clusters in SA are those centred on the Denel Campus at Kempton Park, the CAV adjacent to Aerosud, the mainly MRO based clusters at Wonderboom and Lanseria and the Dube Tradeport SEZ.

While the CAV is the only officially declared aerospace cluster it is undercapitalised and has no incentive package associated with it, which makes it non-competitive with the internationally accepted practise of clusters. At its birth the CAV was hamstrung as a result of its ownership by **the dti** and the resultant inability of **the dti** to support industry in its own cluster initiative with incentives. At the same time the perception persists and will remain that the CAV only exists to benefit a single company and therefore the first order of business for the CAV should be to attract a significant 'second tenant' to the site. Work is progressing on efforts to finally have infrastructure in place and at the same time to change the CAV's ownership to the Gauteng Province which should alleviate the incentives problems, failing this a PPP should be considered as a way forward. Inclusion of the CAV in the proposed Gauteng SEZ would also be a positive step in the right direction.

The Wonderboom and Lanseria clusters should likewise be made part of the Gauteng SEZ.

The Ekurhuleni Aerotropolis already has access to air-side operations and is considerably larger, especially if combined with SAA Technical and in addition is already part of the Gauteng SEZ. There is also land to the west to allow for expansion. The disadvantage of the Denel campus is its aging buildings and infrastructure, however there are a number of existing companies on campus unlike the CAV, as well as existing apprentice training facilities and thus it has at least some of the potential characteristics to satisfy the criteria of a cluster including recognition and support from the local city authorities. A PPP model might also be considered at this location.

The Dube Tradeport is a going concern in cluster terms but lacks an aerospace tenant and skills market and training facility. It does however have excellent potential for large greenfield developments as might be envisaged as part of the high road scenario.

4.1.6 Industry Data

Just as the automotive industry size and economic value to SA can be readily tracked through the examination of the input/output tables provided by Statistics SA so should any other sector regarded as strategic be traceable in the national accounts. This would significantly ease the burden of proof on government department who are required to motivate their investments based on such data.

To this end Statistics SA should be engaged by and inter-ministerial committee to over-come the hurdles to the introduction of the latest standard SIC codes to map the national accounts and to ensure the timeous and appropriate level of reporting for this data.

4.2 Subsector Strategies

4.2.1 Commercial Aerostructures

The SOEs need to be dealt with in a manner that retains key/strategic facilities and infrastructure, and does not collapse the tiered hierarchy of its supplier base including many of the SMMEs operating in the sector. Meaning that the small companies supplying Denel for example are owed large sums of money and are largely dependent on Denel for business. The sudden closure of Denel could lead to the fore-closure of these companies in addition to the job and capability losses within the SOEs.

FDI investment is a key element in the development of this sector internationally and with this sector exhibiting a high degree of state ownership locally, in both the SOEs and private industry, the sale of such interests by the state as a means to attract FDI is recommended. The industry must however be further supported to ensure the growth, longevity and further expansion of the industry by:

- Allowing foreign entities to retain a controlling interest,
- Capital equipment imports are not taxed,
- Foreign skilled labour can move freely in and out of the country imparting skills,
- A concerted effort to provide appropriate skills across all levels,
- The modification of import and export duties and a concerted effort to reduce the industry dependence on imported raw materials through import substitution,
- Exempt company tax for 5 years and reduced taxation thereafter following established international practises.

If the right partners are attracted, the international experience has shown that such an approach has grown tax revenues from highly skilled labour and expanded the number of jobs in the industry.

Clustering of industries is an international best practise with clear advantages. In this scenario smaller clusters without airside operations or restrictions on assembly sizes are viable, which would make the CAV and Ekurhuleni Aerotropolis suitable options, the real question that remains for either location is how to fund the necessary infrastructure and incentivise industry to settle and invest there.

A further intervention aimed at increasing the economic multiplier effect of the industry and at the same time addressing the international competitiveness of the industry would be to investigate import substitution of some of the higher volume raw materials or components. These might include aviation grade aluminium, tools and composite materials such as carbon cloth. These items may further be considered for tariff protection, as was the case in Brazil. This would represent an intervention at Tiers 3 and 4 of the industry, one that would have to follow the requirements of the higher tier entities.

4.2.1.1 Small Aircraft OEMs

This is a small but growing sector, which requires the indirect support of SA government as well as access to capital and R&D funding. The indirect support would involve the establishment of bilateral agreements with EASA and the FAA; and to engage with, and capacitate the SACAA to ensure that they can support certification to international standards locally. In this regard the industry has proposed an independent review of the SACAA and the establishment of an SA/EASA Design Organisation to support the SACAA. The proposal from industry is widely supported and should be implemented to establish a South African model and entity that can service the military and commercial requirements for the design and modification of all aircraft types in line with the Swedish model. Funds should also be made available to establish a number of projects which can successfully complete certification without burdening the local companies.

SMME development, access to capital and R&D interventions will be dealt with in a later section.

4.2.1.2 Propulsion

This sector is too small to consider for strategic interventions apart from SMME development programmes, which are proposed below.

4.2.2 MRO

The MRO industry largely ignored attempts to entice them into providing data and input into this study and therefore the conclusions made here are quite possibly flawed and unsupported by the industry.

MRO activities at the general aviation level are a function of the popularity of flying and ownership of aircraft in SA. This is a function of wealth and the size of the upper middle class of society. To stimulate MRO therefore at the general aviation level one needs to expand the wealth of the nation and uplift people through economic growth. There is no more fundamental requirement for any government. Hence there is really very little to consider to stimulate this industry. Should **the dti** choose to intervene directly in this sector then a targeted discussion with CAASA is recommended.

SAA Technical may also be considered as a candidate for FDI.

4.2.3 Surveillance, Sensors and Avionics

Leveraging of any future state acquisition to localise manufacture, in for example the acquisition of new surveillance systems for ATNS and directing defence acquisitions towards locally developed, or African co-developed products is one potential way forward for this sector. The certification challenges for moving towards commercial safety radars are not trivial however, and in the short term, the only real solution would be for the DoD to fund the existing capital requirements it has planned in this industry.

Given prior interest from the Western Cape Local Government and the predominance of this sector in the Western Cape it is further recommended that the sector be proposed to WesGro for targeted support as it has done with the outsourced software development industry in the Western Cape before.

4.2.4 Other (Military Sub-) Systems

As this sector is in fact largely tied to the fortunes of Denel Dynamics the only way to truly address the difficulties in this sector are in conjunction with the DoD and with cognisance of the strategic nature of this industry. The strategic nature of this industry should however been seen against the background of extreme financial pressure on the defence budget and this entity should be considered for FDI.

4.3 Transformation

The Aerospace Sector should agree on an 'Aerospace Industry Transformation Charter' similar to that of the Defence industry to which any industry member must subscribe in order to receive support. An element of this charter should be the support of black owned SMMEs.

5 Action Summary

Aside for his key decision the following interventions should be considered by Government:

1. Sector Specific support
 - a. The creation of or strengthening of an existing mechanism with a view to better support the aerospace sector in particular is recommended. A 'one stop shop' approach to channel funding in the aerospace sector in a similar fashion to that employed to support the automotive industry is indicated.
 - b. While the higher tier industry (1-3) that has traditionally benefitted from such support mechanisms, one of the recommendations of this report is to consider supporting the development of a broader supply chain to the industry in order to realise the international promise of the aerospace industry in terms of multiplier effect. This can be achieved by supporting the supply chain at Tier 4 in terms of localising material supply. Additional support in the form of appropriate customs duties on foreign imports (in line with Brazil's experience) might also be considered in this area to encourage localisation.
 - c. The creation of a single reporting structure within Government for the Aerospace manufacturing industry.
2. Encouraging Foreign Direct Investment
 - a. Use of state owned assets and shareholding to attract foreign businesses to invest in South Africa. Attraction of the so called super Tier 1 companies would be of the greatest benefit as they would complement their investment with industry relevant expertise and knowledge. Suitable incentive packages must be utilised to ensure their viability and ensure that they remain in the SA economy and grow the SA share in global aerospace. Delivering jobs and economic growth should be the priority.
 - b. The State should not be passive in pursuing FDI but should rather actively pursue opportunities with a view to attaining the goals of the high road scenario.
3. Clustering
 - a. Engage with WesGro and the electronics industry in the Western Cape to develop a set of incentives to assist and nurture that sector which is centred in the Western Cape.
 - b. Clusters require incentives in order to attract industry. These incentives may not necessarily be financial, but they must be compelling. Neither CAV nor the Ekurhuleni Aerotropolis have intentional incentive programmes and institutional issues block the application of incentives at the CAV. The following actions are recommended:
 - c. Centurion Aerospace Village
 - i. Resolve the ownership vs incentives issues at the CAV as a matter of urgency. Failing resolution of the transfer of CAV away from **the dti**, consider a Public Private Partnership (PPP) as a last resort in this regard. Failure to resolve these issues in the near term should result in the closure of the CAV,
 - ii. Attract a second major aerospace entity to the CAV,
 - iii. Ensure that the CAV is included in the Gauteng SEZ,
 - iv. Motivate an appropriate capital budget to enable the CAV to realise its potential.
4. Ekurhuleni Aerotropolis
 - i. This site also has the potential to be developed, but much is dependent on entities such as SAA Technical and Denel Aeronautics. Clarity regarding their future and if possible foreign investment in their business is imperative before a pronouncement can be made with regard to this site.
5. SMME Development
 - a. Ensure that the SMME supply chain does not suffer widespread bankruptcies and retrenchments caused by the current problems within the SOEs.
 - b. Engage with suitable entities to decide on the feasibility of developing a suitable catapult programme for SMME development.

- c. Engage with the NIPMO to better understand and address the sharing of State owned IP with foreign and local entities and SMMEs in order to grow the economy.
6. Other interventions
- a. Engage with Statistics SA with the aim of implementing up to date SIC codes and timeous reporting of sector specific information to assist in the motivation of projects in the sector to treasury.
 - b. Set up a panel of experts with representation from industry, SACAA, appropriate state entities, and DoD to put forward recommendations for the establishment of an entity capable of assisting the industry, military and SACAA in certifying aircraft and aircraft components or modifications. At the same time the BASA agreement with FAA should be expedited and expanded to include EASA agreements.
 - c. Consideration should be given to the funding of DoD 'flagships' especially in the electronics domain which are key to industry development and at the same time act to enable key strategic differentiating capability within the SANDF. Streamlining of NCACC processes is another potential area through which the defence business could benefit.
 - d. Transformation will be achieved through the stabilisation and growth of the industry, nurturing SMMEs, the simplification and transparent application of incentive, capital access and certification assistance mechanisms. To formalise the sectors intent in this area however, an Aerospace Industry Charter should be promulgated and agreed upon to guide the application of state development funds in this sector.

Appendix A: Existing incentives

Table 4: Mapping of Incentives to JASC framework

Category	R&D	Product ment	Develop-	Production	Innovation	Competitiveness/ Market upscaling	Incubators	Clustering
Skills	SARChi THRIP NRF Interns	THRIP TLIU TSP			TIA Innovation Skills Development	THRIP		
R&D	NRF Freestanding Innovation and Scarce Skills	THRIP TDF SPII		THRIP	NRF Freestanding Innovation and Scarce Skills	TLIU THRIP		
Infrastructure		MCEP THRIP SPII TSP		CIP MCEP 12I (Tax Allowance Incentive) FIG SEDA STP		TLIU THRIP MCEP		
Target groups (Youth, Women, Disabled)	YTIP	YTIP SPII		IDC Youth Pipeline Development Fund		WCP	TIA Youth Fund	
Entrepreneurs		TSP SPII THRIP TLIU YTIP TVC TIA Seed Fund		TSP	TVC	TSP EMIA		
SMMEs		AISI TSP, THRIP SPII TVC		AISI NIPP DIP NCPC EIP SPII EIB, SME & MIDCAPS BBSDP	TVC AISi	AISI EMIA SSAS TLIU TCIPS CIS		CAV TCIPS
Medium-large firms	R&D Tax Incentives	AISI SPII THRIP		AISI MCEP NIPP DIP NCPC EIP EIB, SME & MIDCAPS	AISI GCIP SA	AISI CPFP EMIA TCIPS UIF II		Gauteng and Dube Tradeport SEZs CAV TCIPS
Aerospace Sector Fo- cussed		AISI		AISI		NFTN		CAV