Towards a transformed defence industry that contributes to the growth of the South African economy

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Based on research performed by Johan Strydom and several other CSIR colleagues
Scope

- Defence budget and the status of the defence industry
- A 2027 vision for the RSA defence industry
- A proposed strategy for realising the vision
- Exciting opportunities and initiatives
- The way forward
Defence budget

<table>
<thead>
<tr>
<th></th>
<th>1989</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defence/GDP</td>
<td>4.30% GDP</td>
<td>0.97% GDP</td>
</tr>
</tbody>
</table>

Defence Acquisition Funding

<table>
<thead>
<tr>
<th></th>
<th>1989</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquisition*</td>
<td>R 26.2 bn</td>
<td>R 6 bn</td>
</tr>
<tr>
<td>% of Defence Budget</td>
<td>58.53%</td>
<td>12.71%</td>
</tr>
<tr>
<td>% of GDP</td>
<td>2.52%</td>
<td>0.12%</td>
</tr>
<tr>
<td>% of Manufacturing</td>
<td>10.71%</td>
<td>1.61%</td>
</tr>
</tbody>
</table>

Source: Briefing on Draft Def Ind Strategy Helmoed Römer Heitman
The status of the defence industry

### Defence Industry Turnover (2017 Rand Bn)

<table>
<thead>
<tr>
<th>Year</th>
<th>Turnover</th>
<th>% of GDP</th>
<th>% of Manufacturing</th>
<th>% of Manufacturing Jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>R 31.6 bn</td>
<td>3.04 %</td>
<td>12.92 %</td>
<td>9 %</td>
</tr>
<tr>
<td>2016</td>
<td>R 19 bn</td>
<td>0.39 %</td>
<td>3.49 %</td>
<td>1.28 %</td>
</tr>
</tbody>
</table>

Source: Briefing on Draft Def Ind Strategy Helmoed Römer Heitman
The RSA defence industry in 2027

• Makes a **significant contribution to the RSA economy:**
  – Adds more than **R200bn** to the GDP (90% export sales)
  – Generates more than **10% of the manufacturing jobs**
  – Contribution to the **reduction in crime** freed up **12% of the GDP:** that is now **invested in economic development**
• **Gave birth to the para-military industry** supporting the **Border Management Authority (BMA)**
• Has become the single biggest contributor to the **reduction in wildlife crime** and the **protection of the booming tourism industry**
The RSA defence industry in 2027

- Establishes **integrated security capabilities** (level 7) to the Security Cluster and other government departments and agencies
- Fulfilled the DoD’s strategic aims:
  - Provides a **sovereign defence technology capability**
  - Provides a real degree of **strategic independence**
  - Provides SANDF with **optimised and locally supported equipment**
  - Provides government with a **valuable diplomatic tool** in the ability to provide friendly states with **equipment, technical support** and the means to stimulate **local industrial development**
- Established an industry and sector that is **representative of South Africa’s demographics**
Realising the 2027 defence industry vision

• **Establish** a transformed and internationally competitive **National Defence System of Innovation**
  – **Enhance** all the elements of an **advanced national defence manufacturing system**
  – **Optimise** the role of **research & technology organisations (RTOs)**
  – **Scale up** to capture value from **defence innovations**

• **Utilise industry growth pathways** as a mechanism to reach the new reality
Enhancing the advanced national defence manufacturing system

<table>
<thead>
<tr>
<th>Different sources of competitiveness</th>
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</thead>
<tbody>
<tr>
<td><strong>Manufacturing perspective</strong></td>
</tr>
<tr>
<td>Product Innovation</td>
</tr>
<tr>
<td>Process Innovation</td>
</tr>
<tr>
<td>Supply chain capability</td>
</tr>
<tr>
<td>Product/service delivery</td>
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</tbody>
</table>
Functions of national innovation systems

Overall function of an innovation system:
• To develop, diffuse and use innovations

Innovation system activities
• **Research** (basic, applied, development, engineering)
• **Implementation** (manufacturing)
• **End-use** (customers of the product or process output)
• **Linkage** (bringing together complementary knowledge)
• **Education**

Source: Introduction to Technology & Innovation Management Strategy and Policy
University of Cambridge, Department of Engineering
IfM Education and Consultancy Services
Functions of national innovation systems

Overall function of an innovation system:
- To develop, diffuse and use innovations

Source: Introduction to Technology & Innovation Management Strategy and Policy
University of Cambridge, Department of Engineering
IfM Education and Consultancy Services
Manufacturing readiness levels and the valley of death

Source: Introduction to Technology & Innovation Management Strategy and Policy
University of Cambridge, Department of Engineering
IfM Education and Consultancy Services
National Systems of Innovation

Why this matters...

A key determinant of competitiveness of a knowledge economy is quality of connections between the different system elements

- There is national competitive advantage from proactively fostering an infrastructure of linkages between actors
- Different innovation actors making different contributions to technologies/production systems/infrastructure; engaging with different elements of manufacturing value chain systems
Why public investment in RTOs is justified

MARKET FAILURES ADDRESSED BY RTOs

Rooted in the **economics of research** and the idea that ‘**market failures’** makes it difficult for companies to invest in general forms of knowledge\(^1\)

Therefore:

- Public funding for RTOs represents a **social investment**\(^1\) and its rationale stems from the barriers to strategic and co-ordinated capability development, which may apply to infrastructure, equipment and skills which would not otherwise be in place\(^2\)

- RTOs exist to **help firms innovate**, and to solve innovation problems that are beyond the capabilities of individual firms\(^2\)

- Spillover effect: RTO technological **capabilities are passed on** to its customers whose performance improves, who become more competitive, employ more people, pay more taxes, increase the quality of life, and so on\(^1\)

Sources:

2. Hauser, H. “The Current and Future Role of Technology and Innovation Centres in the UK”

Source: Introduction to Technology & Innovation Management Strategy and Policy
University of Cambridge, Department of Engineering
IfM Education and Consultancy Services
The role of RTOs in national innovation systems

RTOs can:
- (a) Assume a coordination role to de-risk innovation projects, acting as a bridge between businesses and the research and academic communities to enable projects that no single actor would be able to perform by itself (Technology R&D function).

Source: Introduction to Technology & Innovation Management Strategy and Policy
University of Cambridge, Department of Engineering
IfM Education and Consultancy Services
SCALING UP to capture value from defence innovations

Co-evolving innovation journeys: technology, process, firm, value chains…

The multi-dimensional nature of ‘scale-up’

Source: Emerging trends in global advanced manufacturing: Challenges, Opportunities and Policy Responses
United Nations Industrial Development Organization
Industry growth pathways

• **Pathways involving local and foreign OEMs**
  - Local manufacturers doing joint R&D and manufacturing with a **foreign OEM** on a risk share/work share agreement
  - **Attracting major foreign OEMs to establish new assembly plants locally**, as well as establishing the required upstream suppliers (multi-tier industries) locally, for local and export markets
  - **Local exporting OEMs expanding their export product lines**;
  - **Local manufactures entering export markets** by supplying a foreign OEM.
Industry growth pathways

**Import substitution**
Import substitution has potential for growth of the local industry, especially when it is used as an interim step towards exports.

- **In-licensing** (new manufacturer/SMME or established manufacturer)
  - Initially for the local market but with an intention of entering export markets
- Import substitution of **imported components** that are **integrated into existing export products**;
- Import substitution **based on locally developed technology alternatives**;
- **Putting local procurement requirements on foreign OEMs** supplying to Government Department, with the intent to have the OEMs integrate SA products into their systems;
- Development of local manufacturing capability on the back of major **capital acquisition programs** (e.g. the NIP and DIP approaches used recently as part of the Strategic Defence Packages);
Industry growth pathways

- Local manufacturers entering export markets
  - Existing product lines
  - New product lines
  - New high-technology manufacturers with locally developed IP and products
Industry growth pathways

- SMMEs and transformative enterprise & supplier development
  - Preferential procurement driven enterprise development support
  - Local OEMs spinning out companies around technologies with wider application beyond their primary markets
  - Utilise the DoD’s Transformative Enterprise Development (TED) programme
  - Utilise and expand dti’s Aerospace Industry Support Initiative (AISI)
  - Identifying localisation opportunities through the DST’s Technology Localisation Implementation Unit (TLIU)
  - Form SMME/RTO/OEM partnerships to address DoD acquisition programme requirements
  - Involve SMME in the development of advanced technology demonstrators
  - Support SOEs with transformative supplier development
Exciting initiatives and opportunities

- Launch of the Product Lifecycle Management Technology Centre
- Africa Truck
- Small African Regional Aircraft (SARA)
- AHRLAC
- Cmore
- Hostile Fire Indicator (HOSFIN)
- Synthetic Aperture Radar (SAR) technology development
- Persistent Wide Area Surveillance technology development
- Inundu fast jet test, evaluation and training pod
Launch of the CSIR Product Lifecycle Management Technology Centre
Africa Truck
Small African Regional Aircraft (SARA)
Cmore - Command & Control Collaborator
Persistent Wide Area Surveillance
Recent Synthetic Aperture Radar (SAR) highlights

First Bistatic SAR Image

TCCBI SAR C-Band 60cm Resolution image

The SAR Team
Hostile Fire Indicator (HOSFIIN)
The way forward

- Finalise the NDIC Defence Industry Strategy
- Finalise CSIR Industrial Development Strategy
- Implement industrial development strategies in collaboration with all role players of the South African National Systems of Innovation
Joining forces for growth and development