Collaborative engineering for complex products

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Contribution of manufacturing

Source: IDC, compiled using SARB, Stats SA and Quantec data

- Manufacturing GDP as % of SA GDP (Lhs)
- Manufacturing GDP at 2010 prices (Rhs)
Manufacturing employment

Source: IDC, compiled using SARB, Stats SA and Quantec data
Manufacturing in SA

• Employs around 1.7 million people
• R1 invested → R1.13 of value

• Among the top three multiplier sectors in terms
  – value addition
  – job creation
  – export earnings and
  – revenue generation

• Base load and scale for key national infrastructure
• Only viable means of beneficiating natural resources in SA
Current situation

Competitiveness of manufacturing in SA has dramatically decreased [1]

NIPF: Manufacturing drives employment and growth in the economy [2]
IPAP: 16 industry sectors to be targeted for governmental support in an attempt to increase local production [3]

Most products are becoming more complex, calling for more sophisticated and advanced ways to design, manufacture and support [4]

Industrial Policy Action Plan

The 5th CSIR
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IDEAS THAT WORK
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Roll-out of the CTCP: strengthen clusters, QR work and competitiveness upgrades

Expand, strengthen and review the APDP and other support measures

Leverage government capex and opex programmes to stimulate the industry through localisation and supplier development

Polypropylene beneficiation; designation of pharmaceutical tenders; local vaccine production

Fast-track issue of forestry water licences; upgrade saw-milling productivity & furniture design skills

Leverage niche resources; enhance productivity & competitiveness; grow exports & employment

Broaden & deepen SA’s product offering; develop demand-led service skills

Support design innovation, standards, cultural branding & digital-telecoms convergence

Clothing, textiles, footwear & leather

Automotive products, components, medium/heavy commercial vehicles

Metals fabrication, capital & rail transport equipment

Plastics chemicals, cosmetics & pharmaceuticals

Forestry, timber, paper, pulp & furniture

Agro-processing

Business process services

Cultural & Creative Industries: crafts, music & film

Boatbuilding

Develop export opportunities in areas of world-class strength; develop industry clusters; upgrade skills & technologies

Solar water heating, concentrated solar power, wind power, energy efficiency, recycling

Leverage competitive advantage in minerals endowment to develop new value chains

Resolve key ports constraints & import duty issues for intermediate inputs & machinery; market SA’s specialist engineering, repair, logistics & technical support services

Roadmap for exploration & exploitation of shale gas reserves, with strong emphasis on environmental sustainability and maximised upstream and downstream linkages

Upstream oil & gas services & equipment

Nuclear

Upstream oil & gas services & equipment

IPAP SECTORAL INTERVENTIONS

Upstream oil & gas services & equipment

Advanced manufacturing

Advanced materials

Aerospace & defence

Electro-technical

White goods

Feed into new growth industries: composite materials, additive manufacturing

Strengthen integration into supply chains: Centurion Aerospace Village cluster

Strengthen industry capacity in electronics & software development

Strengthen support measures & exports

Support design innovation, standards, cultural branding & digital-telecoms convergence

Southern Africa’s product offering; develop demand-led service skills

Leverage niche resources; enhance productivity & competitiveness; grow exports & employment

Resolve key ports constraints & import duty issues for intermediate inputs & machinery; market SA’s specialist engineering, repair, logistics & technical support services

Roadmap for exploration & exploitation of shale gas reserves, with strong emphasis on environmental sustainability and maximised upstream and downstream linkages
Increased complexity


Humans and organizations are unable to cope with increasing complexity.
Contributors to complexity

- More complicated product
  - Customisation
  - Electronics
  - Software
  - Servitisation

- Product creation and support
  - Advanced manufacturing
  - More components
  - More suppliers
  - More complicated supply chain

- Business environment
  - Stricter regulations
  - Globalisation
  - More competition and potential customers
  - Industrial symbiosis and circular economy

The AUTOSAR example

- Modern luxury vehicle contains 50+ electronic control units
- Code bases of more than 100 million lines
- 40% of market value and 80% of innovation
- Responded with collaboration and cooperation
- Now they compete on implementation (application) instead of standards (infrastructure)

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Changes in industry

OEMs have become assemblers, from multiple tier 1 and 2 suppliers

Problem statement

Deliver into global supply chains

Create our own OEMs

Compliance to regulations

Be globally competitive

IP management

Supplier development and localisation

Supply chain integration
Disconnected industry

OEM

I NEED THIS COMPONENT...

SMME

I CAN MAKE THAT!
Connecting industry

I NEED THIS COMPONENT...

I CAN MAKE THAT!

OEM

SMME
Connective technology

I NEED THIS COMPONENT...

I CAN MAKE THAT!

OEM

SMME

Industry collaboration technology
Enterprise technology defined

Integrating tools
• Computer aided design
• Software engineering
• Analysis and simulation
• And more…
Can support 14 of the 16 sectors targeted by IPAP
People

Our focus

Small, Medium and Micro Enterprises

Large South African Enterprises

Large Global Enterprises

People
The vision

Connecting SA industry to global supply chains
Benefits to networked SMMEs

- Material and finishing data search and inspection
- Technical data promoting
- Technical drawings distribution
- PDF creation of approved drawings
- Approved drawings visualization
- Recovery of engineering changes related to a specific product
- Information recovery about engineering changes
- Engineering change process management
- Engineering change creation (report)
- ERP attributes designation
- Manufacturing coding
- Data sharing managing for a new project
- Work list visualization
- ERP product data search and inspection
- Product-related process identification and reference
- Product structures (BOM) visualization and navigation
- 3D CAD models search
- Product data search and visualization

Time saved (hours)

What is it actually?

Industry specific starter packs to accelerate industrialisation

PLM in the cloud for South African industry
Local knowledge centres

PLM facilities for co-creation

Classroom and hands-on training

Professional services
- Advanced simulations
- Rapid prototyping and 3D printing
- Technical and scientific problem solving
The future

Industry analysis and research to identify further opportunities

Procurement, tendering and contract management in the cloud

Brokering and facilitation of professional services
Thank you