

3.2. The Digital Industrial Revolution



Situational analysis

The Digital Industrial Revolution (DIR) (also known as 4-IR or Industry 4.0) will profoundly shape our efforts to promote industrial development. The scale, scope and complexity of this new technological revolution will bring experiences unknown to humankind in the form of Cyber-Physical Systems (CPS) where computers, networks and physical processes are integrated. In particular, when compared to the previous industrial revolutions, the DIR is occurring at an exponential pace.

In an already uncertain global economy the DIR is expected to have disruptive impacts on all economies, but especially on lower- to middle-income countries that find it difficult to keep abreast of the rapid speed of technological advancement and innovation.

For South Africa, the Digital Industrial Revolution poses substantial challenges and offers perhaps rather fewer immediately clear-cut opportunities for the domestic economy.

Opportunities

A strength of South Africa's position in the context of the DIR is its access to market opportunities across the African continent. Potential advantages include a broad youth base, a fast-growing growing continental middle class, access to global value chains as technology suppliers and the chance for SMEs to capitalise on new technologies.

Threats

Currently, we are not very well placed, ranking between 46th and 75th globally on a variety of metrics termed 'Readiness for the 4th Industrial Revolution'.

The key known components of the DIR - the Internet of things, big data, artificial intelligence, automation, robotics, new processes and materials, additive manufacturing, logistics, marketing techniques and sales channels - will put enormous pressure on areas where South Africa is currently lagging or weak:

- enabling infrastructure (broadband and communications);
- system of education and skills – more skilled jobs, less manual work;
- the traditional separation between primary and tertiary industrial sectors will not be sustainable as the distinctions between different sectors becomes increasingly blurred. (cf. the 'industrialisation of freshness').

Further potential threats include:

- selective 'reshoring' of industrial processes to major markets in advanced economies and other structural changes to global value chains;
- significant technology-driven employment losses in retail and services, mining and parts of manufacturing value chains (e.g. automotives), particularly for lower-skilled workers;
- growing inequality and exclusion;
- the danger of "winner-takes-all" outcomes, leading to greater concentration of production and higher barriers to entry. (While there may be potential for entrepreneurial/SME 'leapfrogging' up the value chain, new entrants will have to be well-positioned to begin with).

- The necessity of urgently developing a realistic, smart set of regulations attuned to the challenges that the digital revolution will bring to communications, e-commerce, environmental matters and so forth.

It is therefore imperative to rethink the whole framework of public sector collaboration with the private sector. The traditional paradigm of low cost, export-oriented industrial policy is already under intense scrutiny; but, going forward, it will be critical to sort myths and projections from emerging tangible realities and, on this basis, to develop sector-specific strategies that take account of the full range of threats and opportunities presented by the DIR.

As a first step, in 2017 **the dti** established a new Chief Directorate, the Future Industrial Production & Technologies (FIP&T) unit, within the Industrial Development Division, to examine likely impacts and build capacity around government to confront the challenges of the DIR.

The FIP&T unit is contributing to international research through the World Economic Forum's *Shaping the Future of Production Systems*. This framework includes assessments of both country readiness and future skills requirements.

The Unit is also taking the lead in the industrialisation segment of the economic cluster through the newly established Digital Industrial Revolution National Coordination Committee.

Partnerships are commencing between **the dti** and the manufacturing sector through Industry Associations and Export Councils to prepare for the DIR. The augmented **dti** Intsimbi programme will be launched as a Future Production and Technologies initiative in 2018.

South Africa has also been appointed as Chair of the International Special Tooling & Machining Association (ISTMA) World Board (2018 to 2020), which aims to fully align the ISTMA World Association's work with DIR production systems and technologies. Taking advantage of the opportunity, South African Industry will establish an ISTMA Africa Forum to promote special tooling and machining in Africa.

In 2016 Cabinet approved the National Integrated ICT Policy White Paper which addresses the development of converged technologies, digitisation, how South Africans use the internet, communication and work.

The White Paper recommends that all South African citizens, irrespective of where they live or their socio-economic status, have a right to access and participation in the digital society. In addition, the department of Telecommunication and Postal Services (DTPS) has developed a National e-Government Strategy aimed at modernising and transforming future public service delivery.

Immediate ways forward

Here are some important steps that are already being taken and/or can be taken in the near future:

- Continue work with DST/CSIR Technology Localisation Unit (TLIU) and Product Life Cycle support initiative at CSIR (under the Siemens NIPP obligation.)
- Deepen research programmes with the WEF and OECD Development Centre on preparation for the Digital Industrial Revolution. This offers the necessary scope for deep-dive research into sector-specific country preparedness; our own in particular.
- Absorb and leverage learnings from the Manufacturing Indaba 2018 – particularly from the workshop on the Digital Industrial Revolution co-hosted by the World Manufacturing Forum, the DST and **the dti**.

Key Action Programmes

1. Establish a National Coordination Committee

Nature and purpose of the intervention

After a discussion held at the August 2017 Cabinet Lekgotla on the DIR, the Department of Telecommunication and Postal Services (DTPS) was appointed to take the lead in government consultations on DIR. To improve inter-governmental coordination, three government departments have been

selected to lead and develop an integrated strategy and policy in consultation with industry, labour and civil society: The DTPS, **the dti** and the DST).

Targeted outcomes

Establishment of a national coordinating committee for the development of an integrated DIR strategy and policy.

Key milestones

- 2018/19 Q1: Nomination and appointment of representatives from each of the three leading national departments.
- 2018/19 Q2: Report to the Economic Cluster.

Lead departments/agencies: DST, **the dti**, DTPS, EDD

Supporting departments/agencies: Other government departments in the Economic Cluster

2. Intsimbi Future Production Technology Initiative

Nature and purpose of the intervention

Statistics released by the International Specialised Tooling and Machining Association (ISTMA) at the World Tooling Conference in Toronto, Canada in 2013, indicated that up to 50% of all manufactured components' cost competitiveness is governed by tooling.

The industrialisation process in SA has been continuously hampered by a long-standing lack of tooling development support, resulting in many critical products being imported from the Far East.

In response to this predicament – and after extensive consultations with the industry - **the dti** and TASA launched the Intsimbi National Tooling Initiative as a turnaround strategy for South Africa's distressed tooling industry. Under the NTI, the NTIP acts as implementing agency and is responsible for the facilitation and management of all Intsimbi NTI programmes. The NTIP, a wholly-owned subsidiary of the Toolmaking Association of South

Africa (TASA), is also responsible for the engagement of competent project resources.

The aim of the Initiative is to enable government and industry to cooperate on the large-scale interventions required to rehabilitate the South African Tool, Die and Mould-making (TDM) sector and to embark on a robust rehabilitation programme to put the local industry on a firm trajectory towards international competitiveness. The partnership between the tooling industry (TASA) and **the dti** is governed by an overarching memorandum of agreement (MOA) and is supported by an annual service level agreement (SLA) between the two parties.

The main aim of the NTI is to raise the competitiveness of the TDM sector through critical skills development and job creation programmes, technology development and adoption, enterprise development and export promotion. Two major programmes have been identified, namely:

- The TDM Skills Development Programme; and
- The Enterprise Development Programme (EDP) focusing on SMME competitiveness improvement, localisation, clustering and export development activities.

Significant progress has been made under the Skills Development Programme since the inception of the partnership. In 2016, the Master Toolmaker qualification was registered; the South African Nuclear Energy Corporation SOC Ltd (NECSA) was accredited as the first national trade test centre; and capacity at delivery colleges was enhanced.

In this IPAP, we will build systematically on the foundations laid and the successes achieved thus far and seek integration into the education mainstream, working in partnership with DHET. Key immediate goals include the following:

- the accreditation of additional trade test centres for the new Toolmaker Trade Test (NQF level 5);

- trade testing all eligible students for the Toolmaker Trade Test;
- institutionalising applicable elements of the skills development programme at TVET colleges and other training institutions and embedding sustainable solutions for the programme as part of the current post-pilot phase;
- developing a suitable funding model to sustain the work in the current pilot programme; and
- exploring the expansion of the programme - its architecture and integrated solutions - to other advanced sectors of the economy.

Targeted outcomes

- improved technical capability of young talent to enter the manufacturing sector. This will, in the medium term: enhance skills and capabilities in South Africa's tooling industry; improve the sector's competitiveness; increase local content, promote investment in tooling manufacturing; increase employment.
- Introduction of two new trades into the new programme called Intsimbi Future Production Technologies Initiative - as identified by the industry.

Key milestones

- 2018/19 Q1: Launch of the new programme: Intsimbi Future Production Technologies Initiative.
- 2018/19 Q1-Q4: 120 eligible students to undergo trade testing on the new Toolmaker qualification.
- 2018/19 Q1-Q4: Benchmark 15 TDM sector companies.
- 2018/19 Q1-Q4: Implement intervention projects at 8 TDM sector companies.
- 2018/19 Q1-Q4: Operational learning and business process training at the pilot incubator for entrepreneurial enterprise development in support of localisation.

- 2018/19 Q4: Master Toolmakers Group 1 to complete their training programme.
- 2019/20 Q1-Q4: 150 eligible students to undergo trade testing on the new Toolmaker qualification.
- 2019/20 Q1-Q4: Further operational learning and business process training at the pilot incubator for entrepreneurial enterprise development.
- 2019/20 Q1-Q4: Benchmarking of 15 TDM sector companies.
- 2019/20 Q1-Q4: Intervention projects at a further 8 TDM sector companies.
- 2019/20 Q4: Master Toolmakers (Group 2) to complete its training programme.

Lead departments /agencies: **the dti**, Intsimbi partnership and NTIP

Supporting departments/agencies: NT, DST, DHET and NTIP, QCTO, merSETA, NAMB, Industry association and Export councils.

