

The Future of Work

Prepared by Ilse Karg

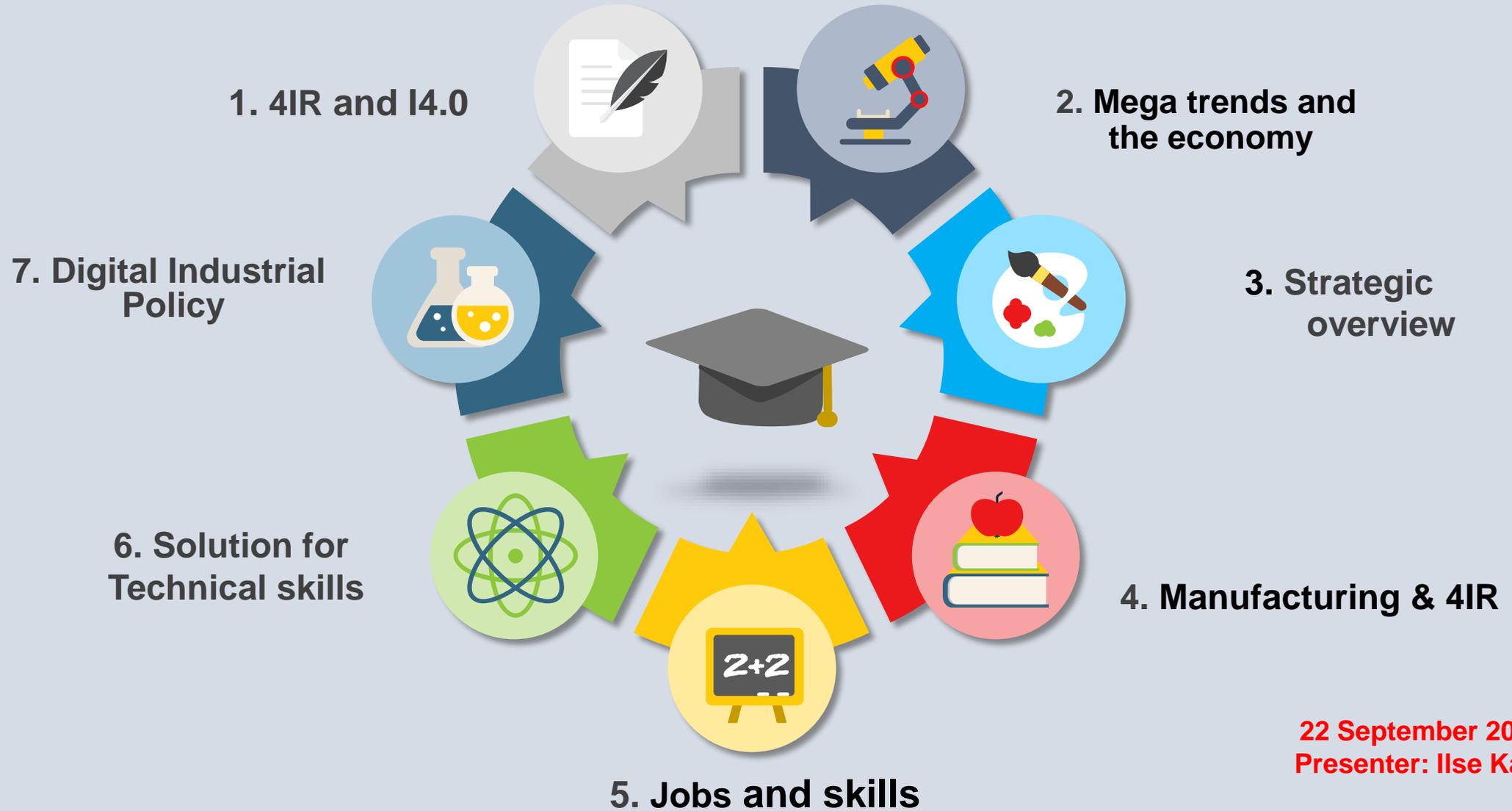


the dti

Department:
Trade and Industry
REPUBLIC OF SOUTH AFRICA



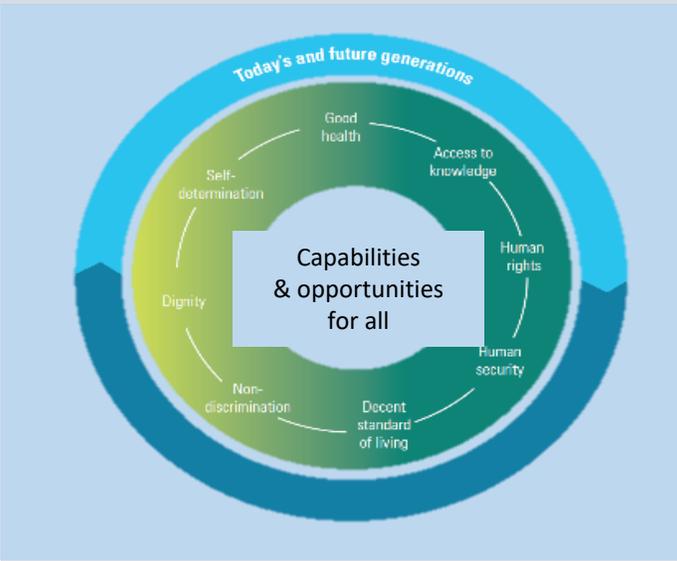
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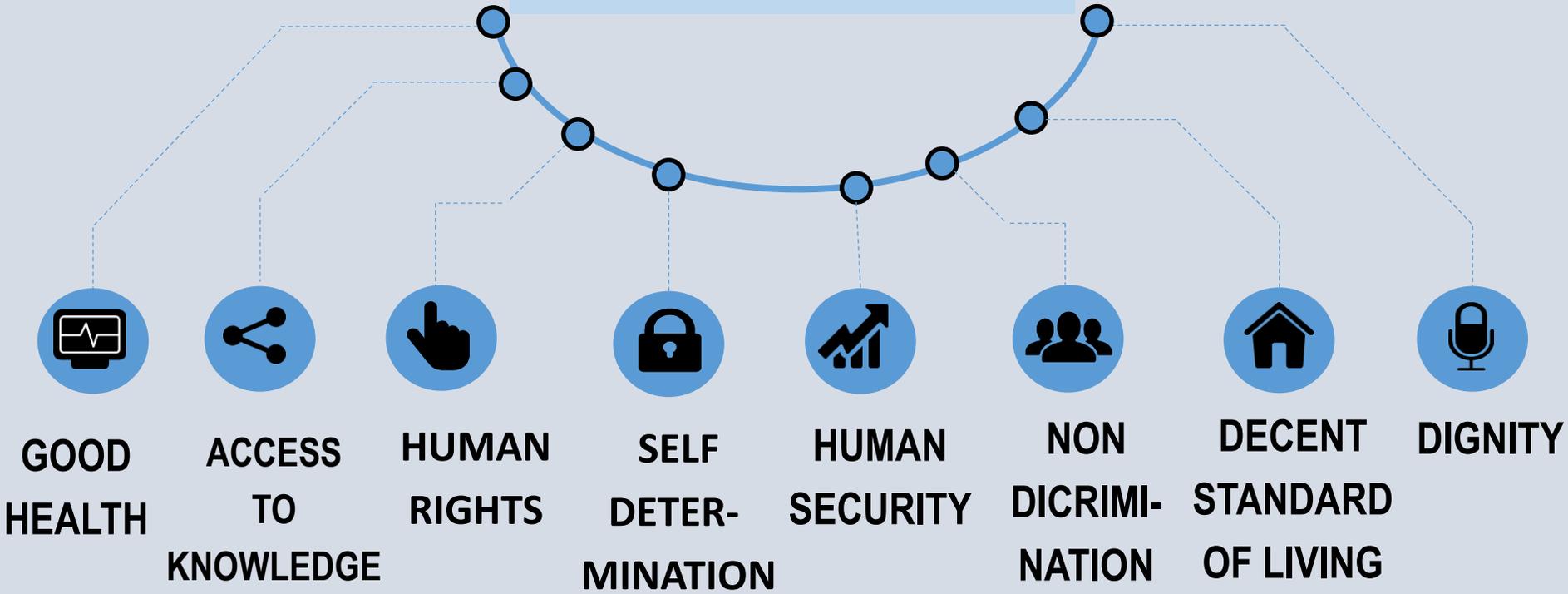
22 September 2019
Presenter: Ilse Karg

HUMAN DEVELOPMENT

**Human Development
Action Agenda
requires effective
policy planning
for inclusive growth**



**UN 2016 report
Human
Development
evolves around the
capabilities and
opportunities for all
individuals**



Definition Industry 4.0

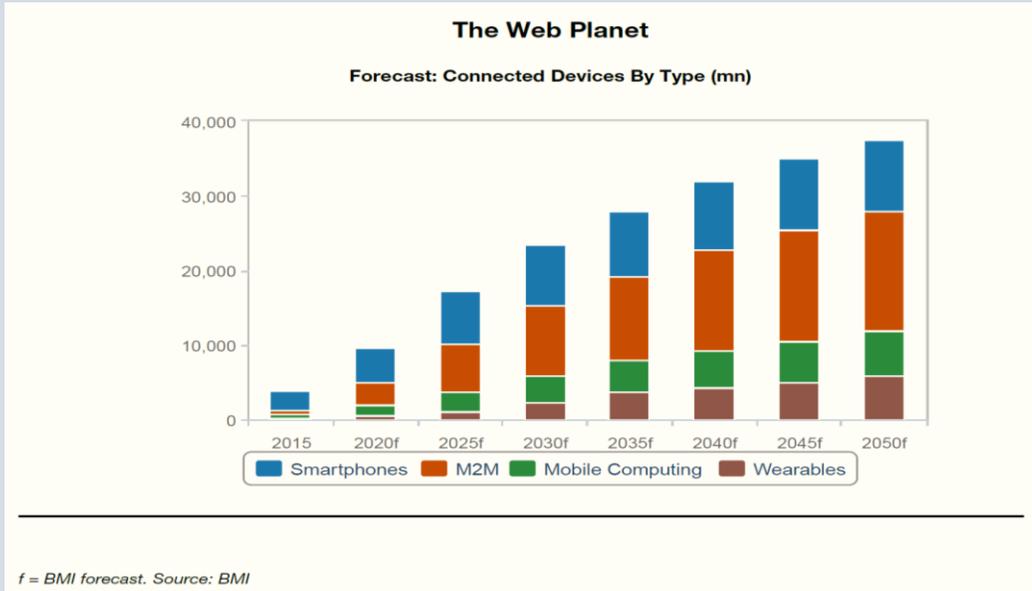
- “INDUSTRIE 4.0 connects embedded system production technologies and smart production processes to pave the way to a new technological age which will radically transform industry and production value chains and business models.” —Germany Trade and Invest
- Deloitte refers to smart, connected manufacturing as Industry 4.0, several other commonly known terms may point to the same:

These include:

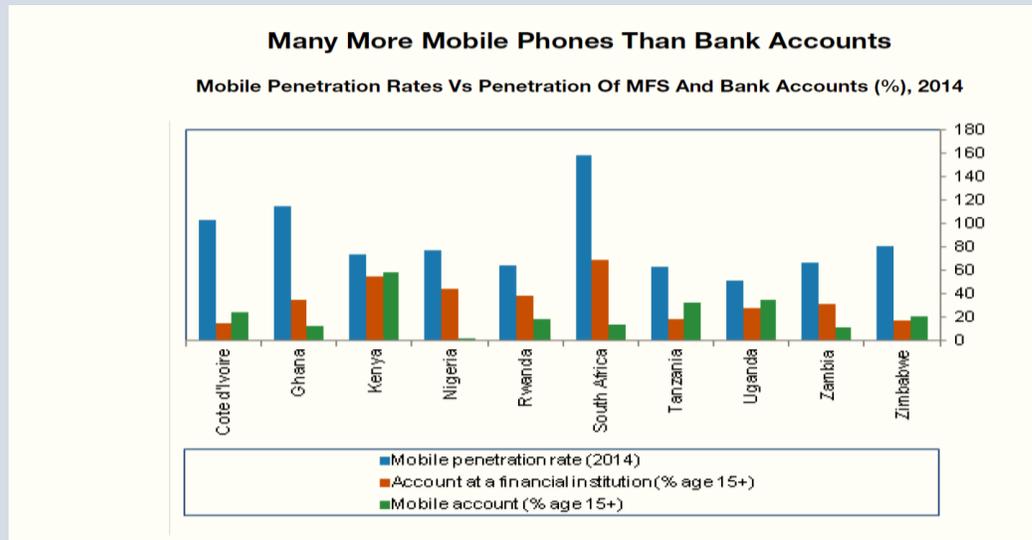
- Industrial Internet • Connected Enterprise
- SMART Manufacturing
- Smart Factory • Manufacturing 4.0 • Internet of Everything
- Internet of Things for Manufacturing



2050: Megatrends in Industry



- 2.528bn smartphones were in use worldwide at the end of 2015, although
- a large number of 'phablets' (phone/tablet computer hybrids) were also in use, tracked under 'mobile computing').
- By the end of 2050, almost 10bn smartphones and 6bn mobile computing devices will be in use.
- Financial transactions will increase drastically.
- South Africa has the highest number of cellphones



Technology Based Companies

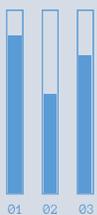
- ❖ The list of large corporations are now dominated by tech.
- ❖ In 2008, only one of the 10 largest companies in the globe was technology-based: Microsoft.
- ❖ Today, it's seven out of 10, and three of those are in Silicon Valley

Largest US companies in 2018 vs 2008

2018				2008			
Rank	Company	Founded	USbn	Rank	Company	Founded	USbn
1.	Apple	1976	890	1.	Exxon	1870	492
2.	Google	1998	768	2.	General Electric	1892	358
3.	Microsoft	1975	680	3.	Microsoft	1975	313
4.	Amazon	1994	592	4.	AT&T	1885	238
5.	Facebook	2004	545	5.	Proctor & Gamble	1837	226
6.	Berkshire	1955	496	6.	Berkshire	1955	206
7.	J&J	1886	380	7.	Google	1998	198
8.	JP Morgan	1871	375	8.	Chevron	1879	192
9.	Exxon	1870	367	9.	J&J	1886	192
10.	Bank of America	1909	316	10.	Walmart	1962	184

Source: *Milford Assessment Management*, from *Bloomberg and Google*

Industrial robots



\$40bn

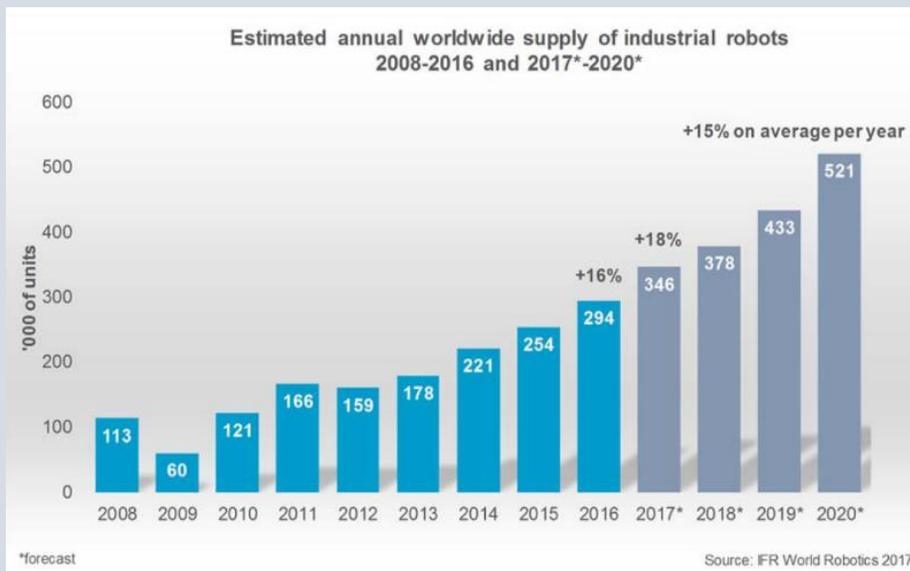
2016 Annual robotics turnover



74% Annual robot sales
5 Countries – China, US, Korea, Japan and Germany



Supply of Robots +18% increase p.a.



2016 = \$1.8bn
2020 = \$3bn

World operational stock of industrial robots



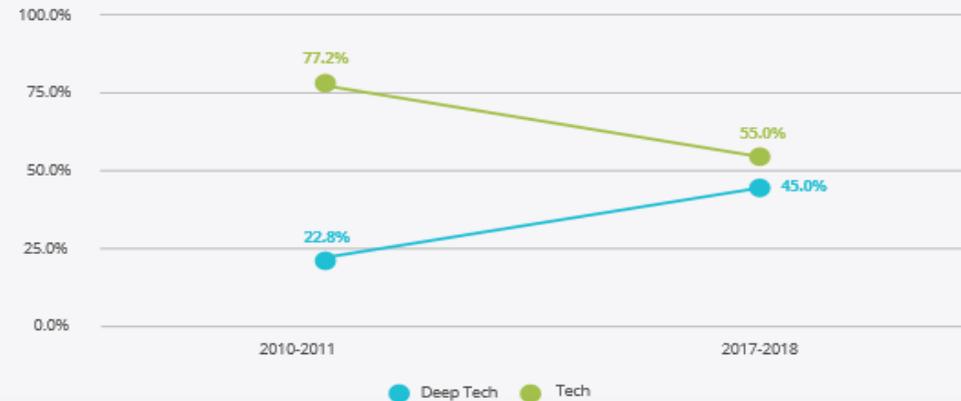
Deep Tech Start-Ups

- One rapidly growing area - Deep Tech
- — sub-sectors that require tangible IP to succeed, like Life Sciences, Robotics, and AI.4
- Nearly half (45%) of start-ups being created globally now are in Deep Tech-related sub-sectors — twice the share they made up in 2010-2011.5
- Top 4 fastest-growing start-up sub-sectors are all Deep Tech-related
 - #1 Advanced Manufacturing & Robotics (107.9%)
 - #2 Blockchain (101.5%)
 - #3 Agritech & New Food (88.8%)
 - #4 Artificial Intelligence, Big Data & Analytics (64.5%)

Today, 45% of startups created are in Deep Tech-related sub-sectors, compared to only 22.8% in 2010-2011

Share of startups created, 2010-2011 vs 2017-2018

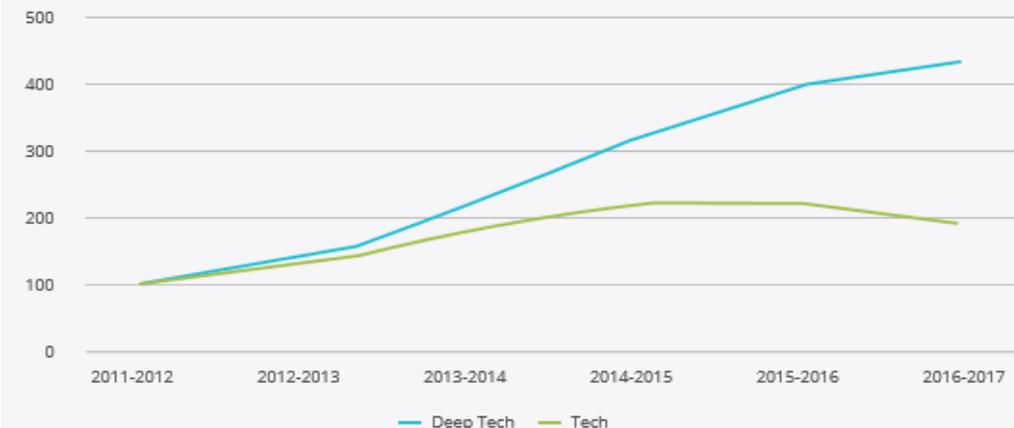
Startup Genome



Deep Tech-related Startup Sub-Sectors have increased Early-Stage Funding by 4x since 2011-2012, more than twice as much as other Tech Sub-Sectors

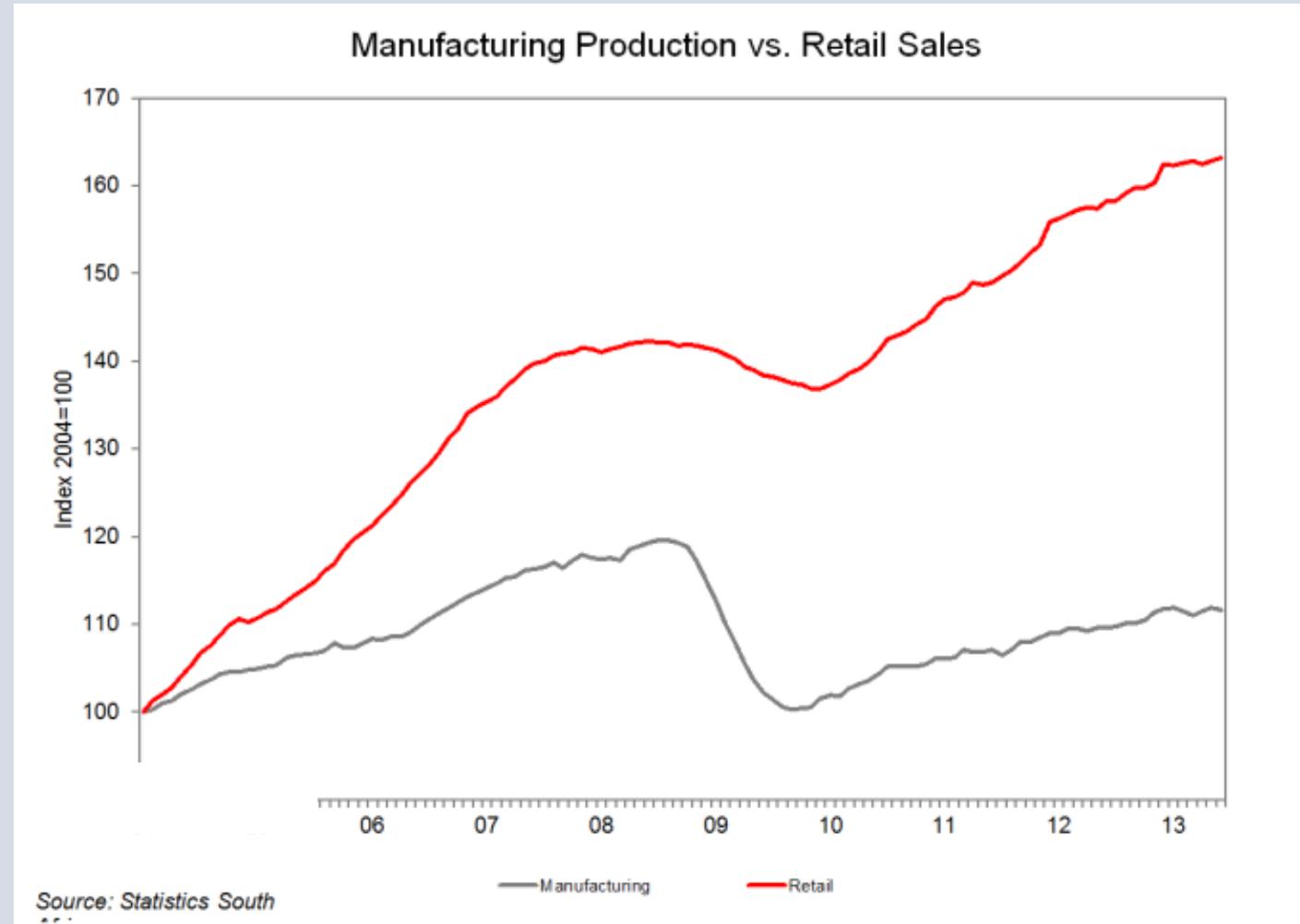
Early-Stage Funding by Sub-Sector, 2-year moving averages indexed. 2011-2012 = 100

Startup Genome



Regression of SA Economy 2004

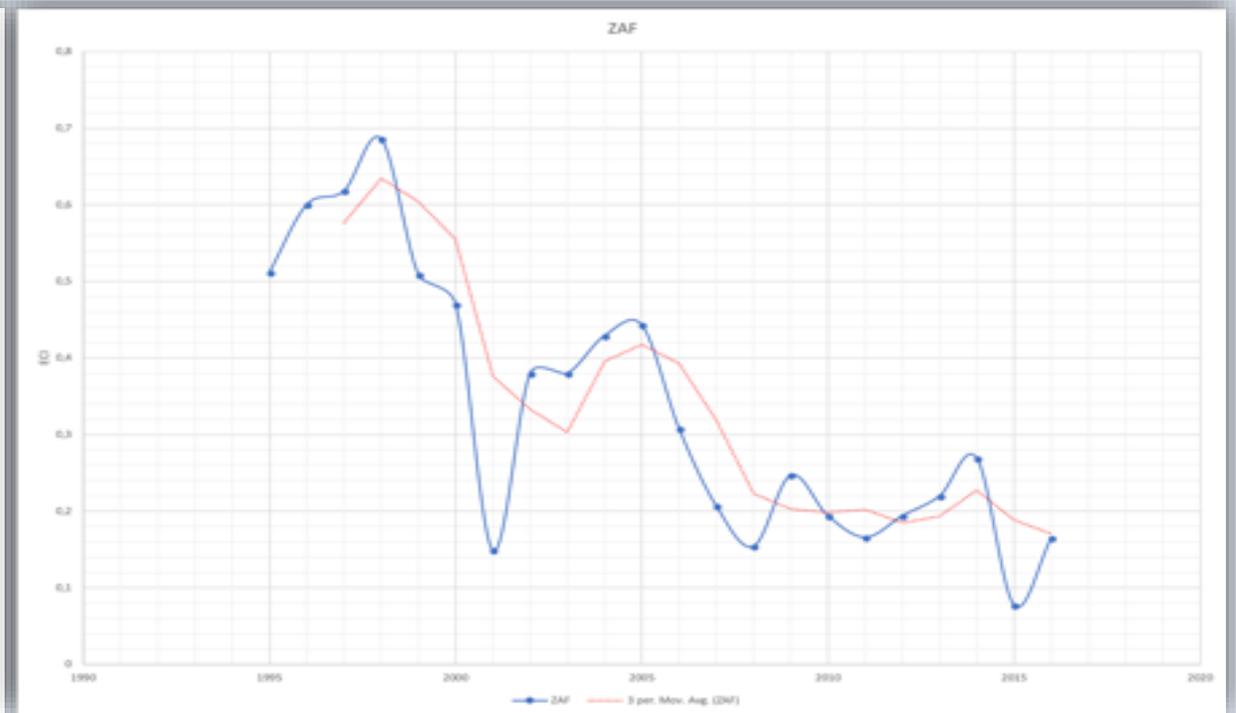
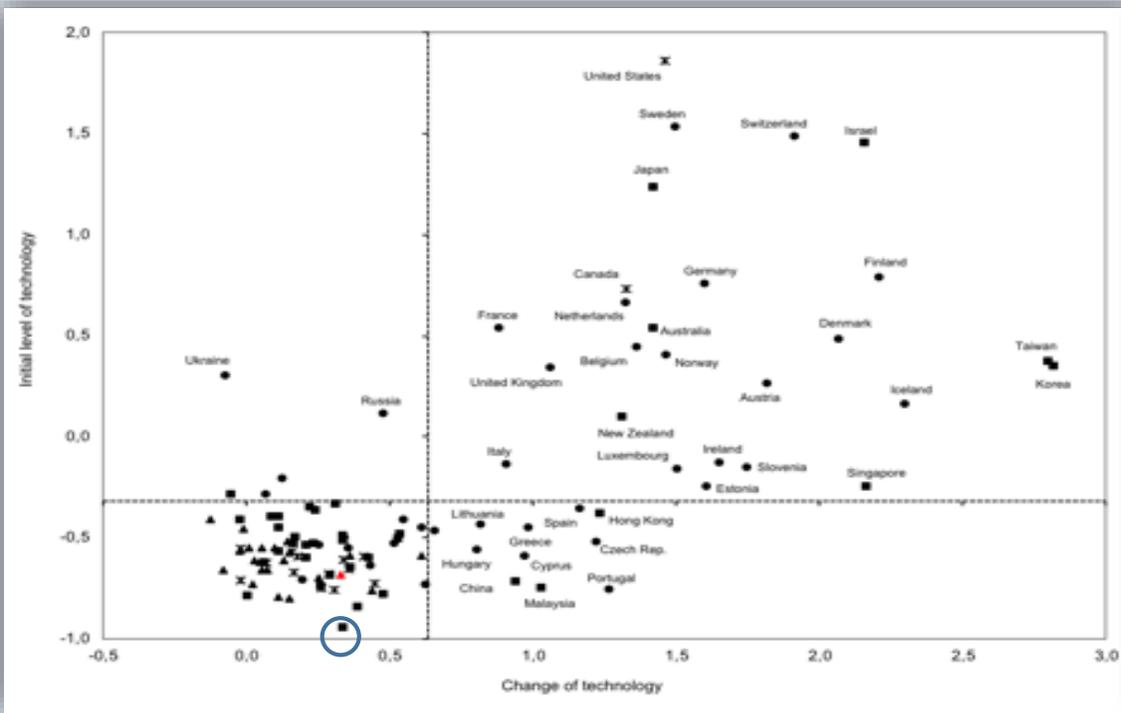
- Manufacturing output volume increased marginally since 2004, while retail sales volume boomed more than 60%.
- No new capital accumulation is happening in producing sectors of the economy, and
- money that could be going toward capital accumulation is being spent on more instant gratification consumption items. In other words, South Africa is getting poorer, fast.
- The economy is characterised by “jobless growth”, a stubbornly high unemployment rate and low economic growth.
- Between 1994-2016, every 1% economic growth corresponded with a gain of just 0.06% in employment.



Source: Aggregated data from Stats SA chart compiled by Econometrix

Global Technological Capability Assessment

Hard to predict digital technology uptake and impact on jobs, social security, inequality, etc.



Indicators based on

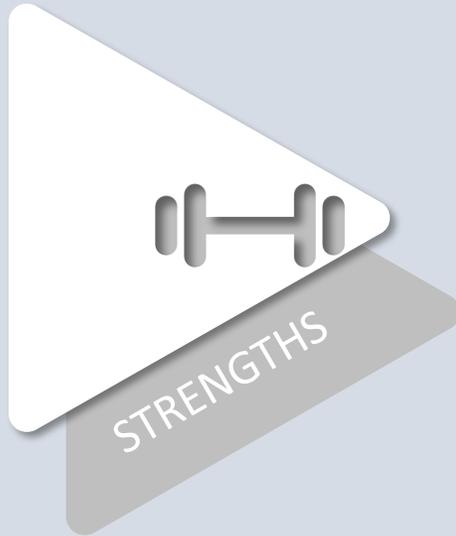
- Quality of research system; Patent applications
- R&D expenditure; ICT infrastructure
- Skill level of the population (literacy)
- Quality of the governance system
- Corruption in public and private sector
- Efficiency of government

Economic complexity of the South African Economy is decreasing

FAGERBERG, J. & SRHOLEC, M. 2017. Capabilities, economic development, sustainability. *Cambridge Journal of Economics*, Vol. 41 pp. 905-926.

Source: WEF, 2018

STRATEGIC OVERVIEW : SA 4IR



- Innovative nation
- Diverse Cultural
- Economic Infrastructure



- Structural imbalances
- Political economy – lack of commitment
- Poor service delivery
- Poor coordination and policy coherence.



- Leapfrog into 4IR
- Develop talent
- Investment into educational system
- Support small business



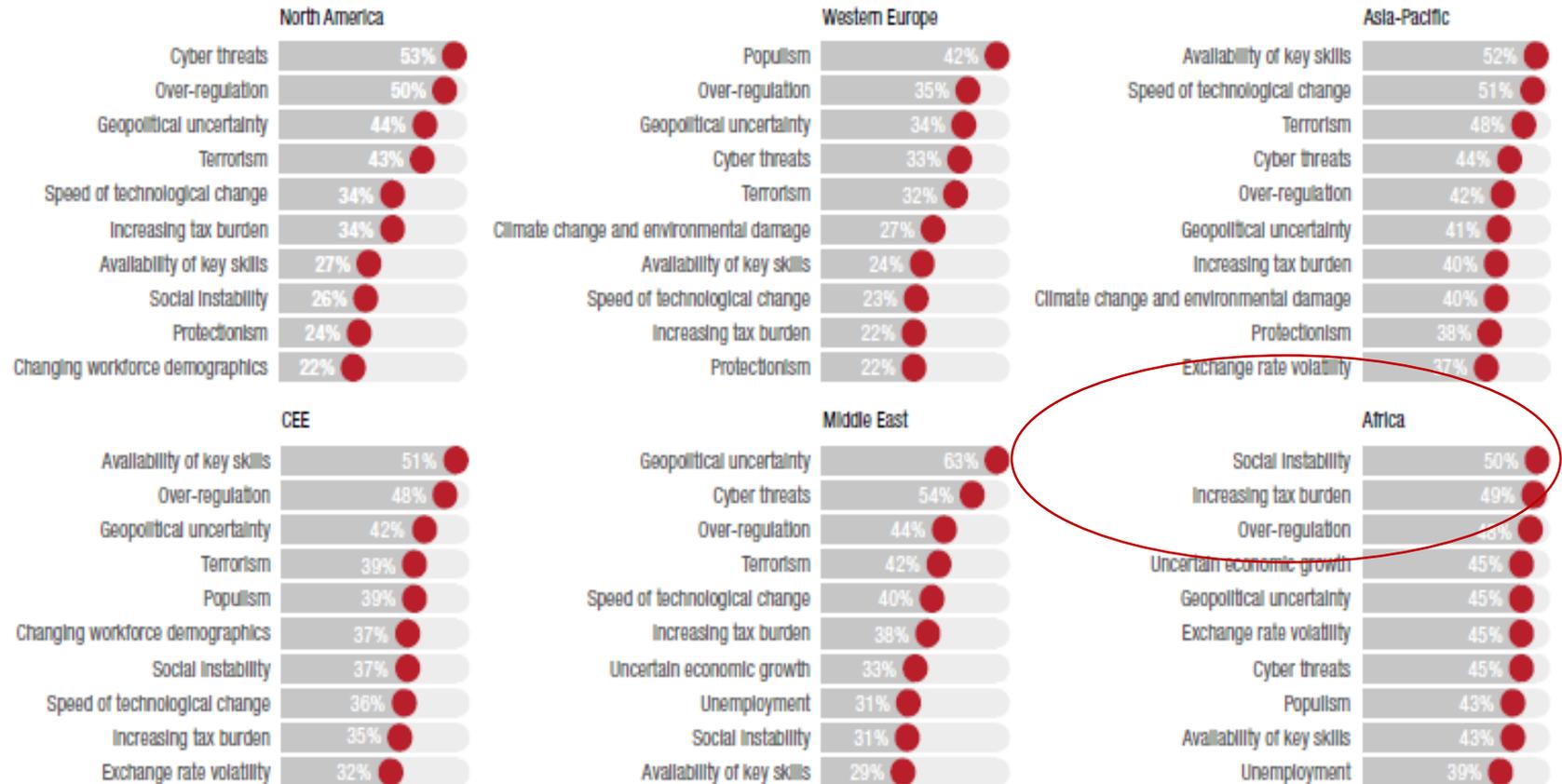
- Data and information management – protection of IP
- Cyber/Data security
- Economy too open
- Large youth population
- High unemployment
- Skills gap

4IR Threats

The perception of top threats varies by region

Q Considering the following threats to your organisation's growth prospects, how concerned are you about the following?

i Chart shows percentage of respondents answering 'extremely concerned'.



Source: PwC, 21st Annual Global CEO Survey

AFRICA

Top 3

1. Social Instability
2. Increasing tax burden (SA NHI)
3. Over-regulation

Digital Transformation Opportunities

TOTAL VALUE AT STAKE (ZAR, billions)

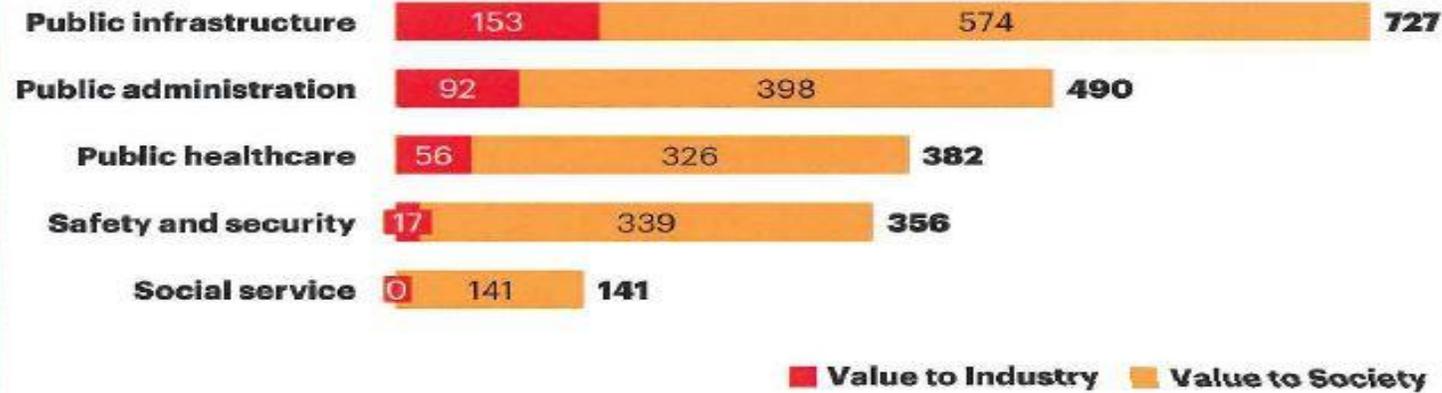


Figure 1: Value at stake for government services

Digital initiatives hold the key to unlocking R5 trillion of value in South Africa over the next decade (*Accenture & WEF 2018 - Unlocking Digital Value for Business & Society in SA*)

TOTAL VALUE AT STAKE (ZAR, billions)

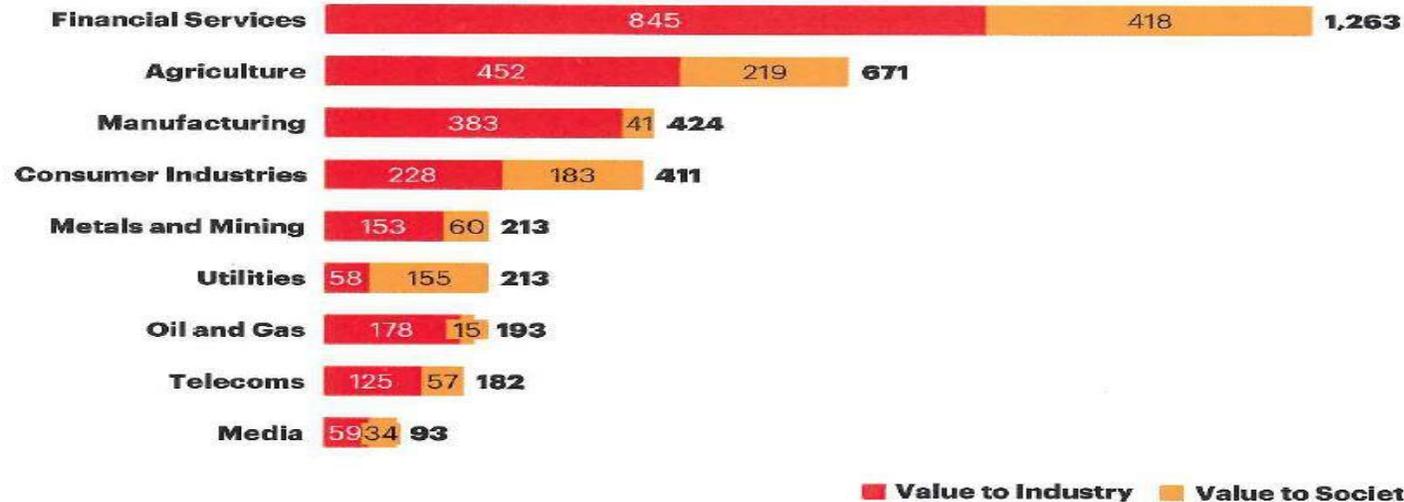


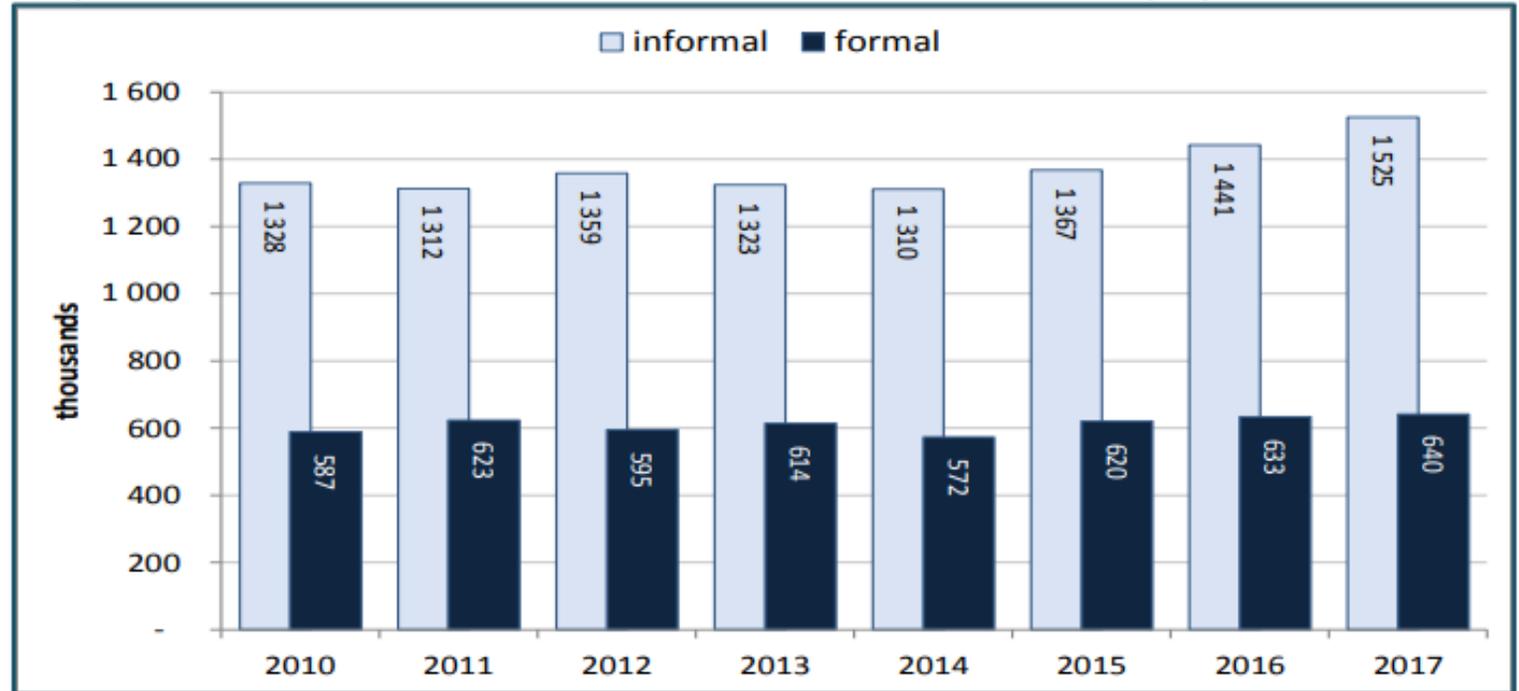
Figure 2: Value at stake for industry sectors

SA: SME Formal vs Informal sector

HOW MANY SMALL BUSINESSES ARE THERE?

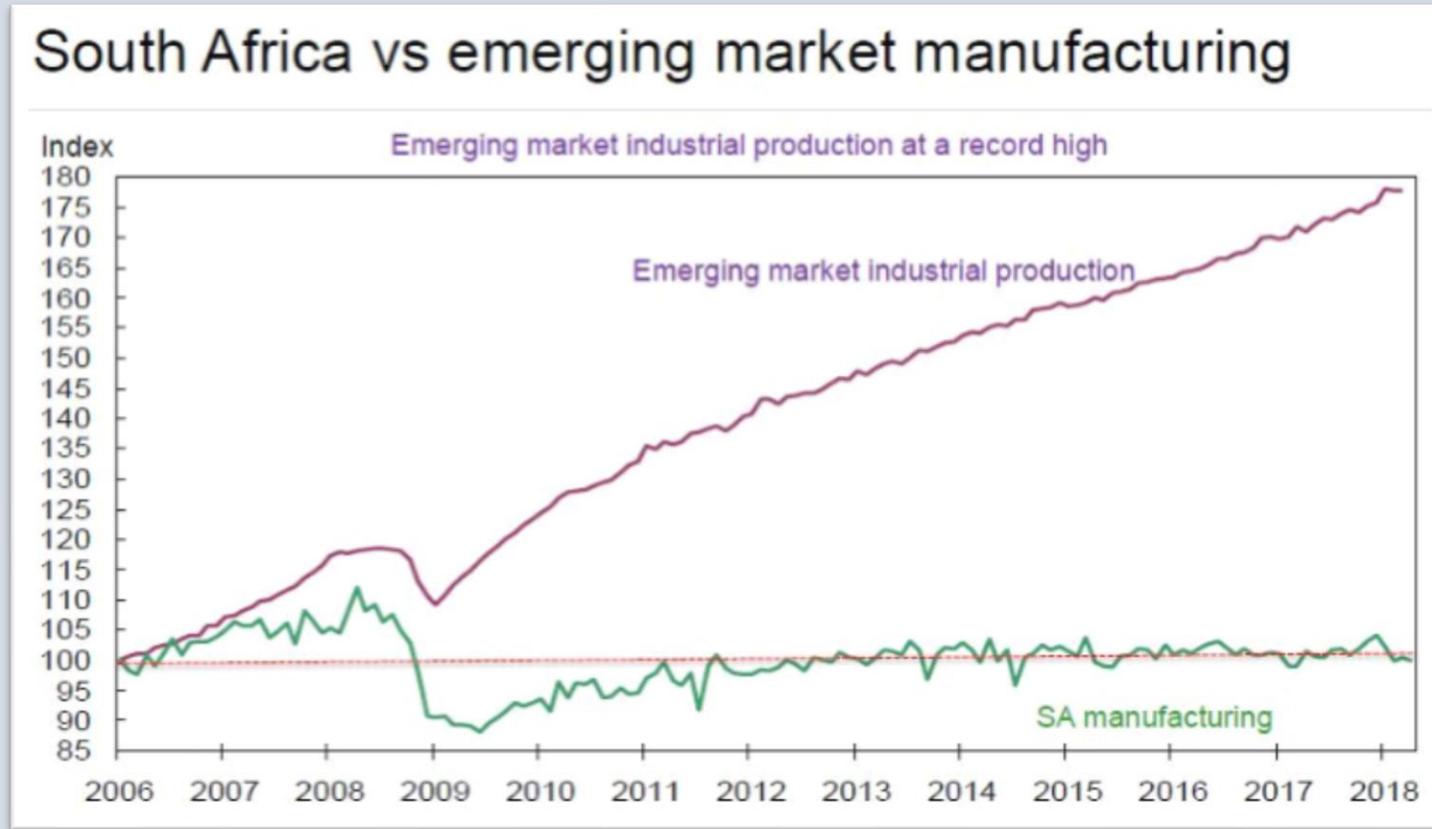
- Graph shows, the number of formal small business reported in the labour market surveys climbed from around 600 000 in 2010 to 640 000 in 2017.
- The number of informal business grew from 1,3 million to 1,5 million in the same period.

Graph 1. Number of formal and informal small business (under 50 employees), 2010 to 2017



Source: Calculated from Statistics South Africa. Labour Market Dynamics Surveys for relevant years. Electronic datasets. Series on sectors including agriculture in formal and informal sectors; employers and own-account workers; and number of employees. Datasets downloaded from Nesstar facility at www.statssa.gov.za.

SA: De-Industrialisation vs 4IR



A growing manufacturing sector offers transformation opportunities in

- Skills development
- New jobs
- Job creation multiplier 3 indirect jobs for every manufacturing job
- New businesses (range of size and geographic location)

SA manufacturing has 300 000 fewer manufacturing jobs than in 2008

- For every manufacturing job impacted, an estimated three to five indirect jobs are affected
- Premature de-industrialisation is a key driver of unemployment in SA

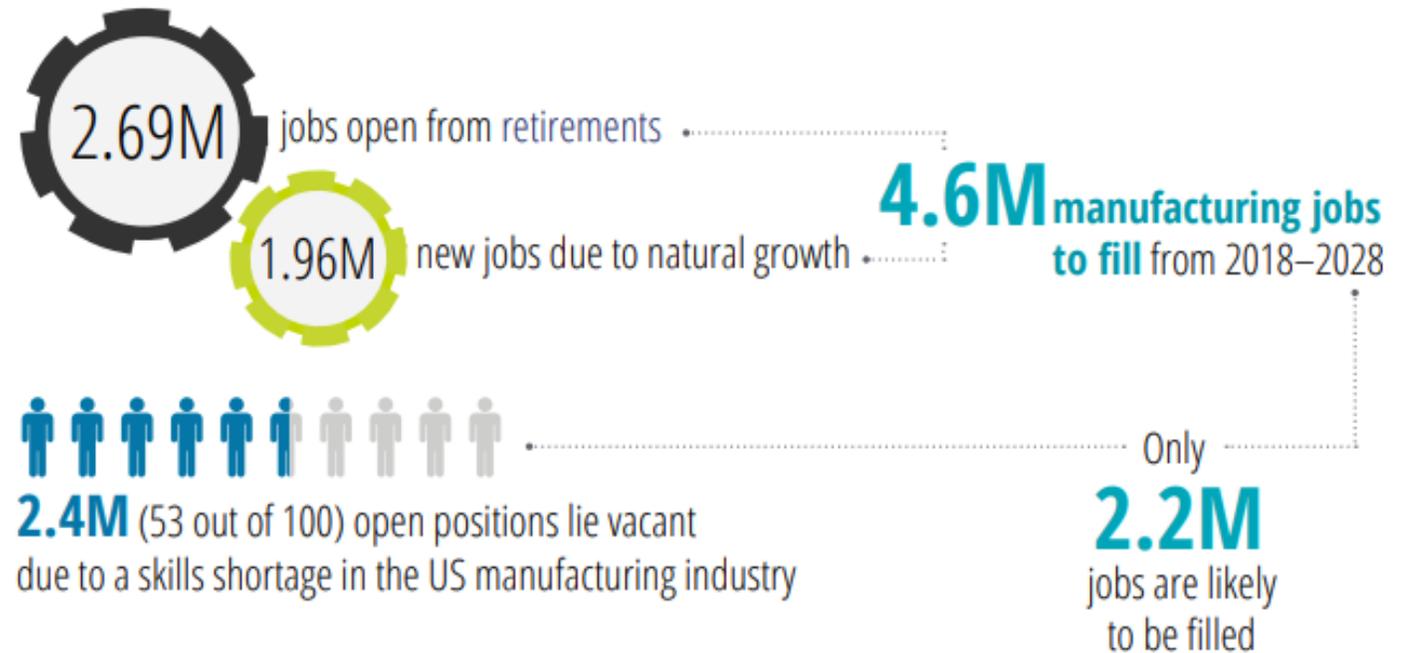
Key Findings: Future of Manufacturing Work

Future of manufacturing: The jobs are here, but where are the people?

- ❖ Results highlight a widening gap between jobs that need to be filled and skilled talent pool capable of filling them
- ❖ Search for skilled talent—ranked as no. 1 driver of manufacturing competitiveness by global manufacturing executives

FIGURE 1

The skills gap may leave an estimated 2.4 million positions unfilled between 2018 and 2028



*Calculated on the basis of 52.7% of the skilled manufacturing positions that are unfilled (per the 2018 survey)

**Retirement age of 66

Source: BLS Data, OEM (Oxford Economics Model), Deloitte and Manufacturing Institute skills research initiative.

Source: deloitte

Employment in Manufacturing



- During the past decade its evident from the labour trends (employment in manufacturing by gender) that inequality remains a concern
- Women employment remain roughly half of that of men during the past decade
- In the context of 4IR, going forward what would we like to see?

National Integrated Human Resource Development (NIHRD) Plan

The NIHRD Plan(2014 -2018) revised the HRDC’s original five-point plan and developed the following strategic outcome-oriented goals:



GOAL 1

Strengthening basic education and foundation programmes in science, technology, engineering, maths, languages and life orientation/skills



GOAL 2

Expanded access to quality post-schooling education and training



GOAL 3

Improved research and technological innovation outcomes



GOAL 4

Production of appropriately skilled people for the economy



GOAL 5

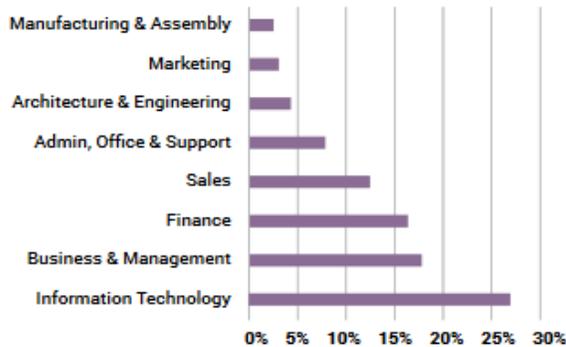
A developmental/capable state

Skills Gap: Demand vs Supply

DEMAND vs SUPPLY

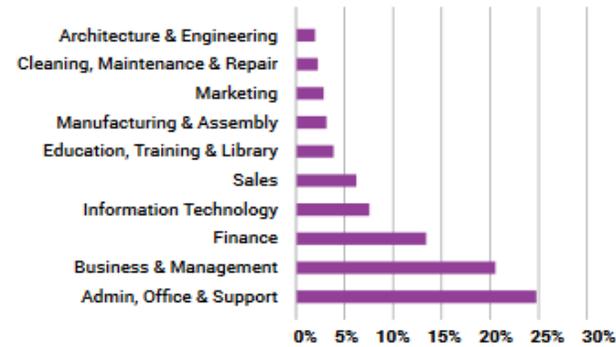
High in Demand

Sectors in terms of major demand.



High in Supply

Sectors in terms of major supply.



- Increasing skills gap between Demand and Supply of skills
- TVET: +730 000 (2018)
- Universities +1 000 000
- Future skills requirements for 4IR
- Trends?

Source: eskilzcollege



Future of Work: Digital Skills & Global work jobseekers

DIGITAL SKILLS

Upskilling: learning new competencies to stay in current role, due to the change in skills required, or adding certain competencies for career progression.

Reskilling: learning new sets of competencies to transition to a completely new role.

Table 4: Top 10 global work preferences of employees and jobseekers

Rank	Global work preferences
1	Good relationship with colleagues
2	Good work-life balance
3	Good relationship with superior
4	Learning & training opportunities
5	Career development options
6	Financial stability of employer
7	Job security
8	Financial compensation
9	Work being appreciated
10	Interesting work

Source: *Decoding Global Talent 2018*, Boston Consulting Group.

Note: Survey respondents were offered a total of 26 options from which to choose.

Knowledge Economy Index (WORLDBANK)

Figure 1 The four pillars of the knowledge economy

PILLAR 1 Economic and institutional regime	PILLAR 2 Education and skills	PILLAR 3 Information and communication infrastructure	PILLAR 4 Innovation system
<p>The country's economic and institutional regime must provide incentives for the efficient use of existing and new knowledge and the flourishing of entrepreneurship.</p>	<p>The country's people need education and skills that enable them to create and share, and to use it well.</p>	<p>A dynamic information infrastructure is needed to facilitate the effective communication, dissemination, and processing of information..</p>	<p>The country's innovation system—firms, research centers, universities, think tanks, consultants, and other organizations—must be capable of tapping the growing stock of global knowledge, assimilating and adapting it to local needs, and creating new technology.</p>

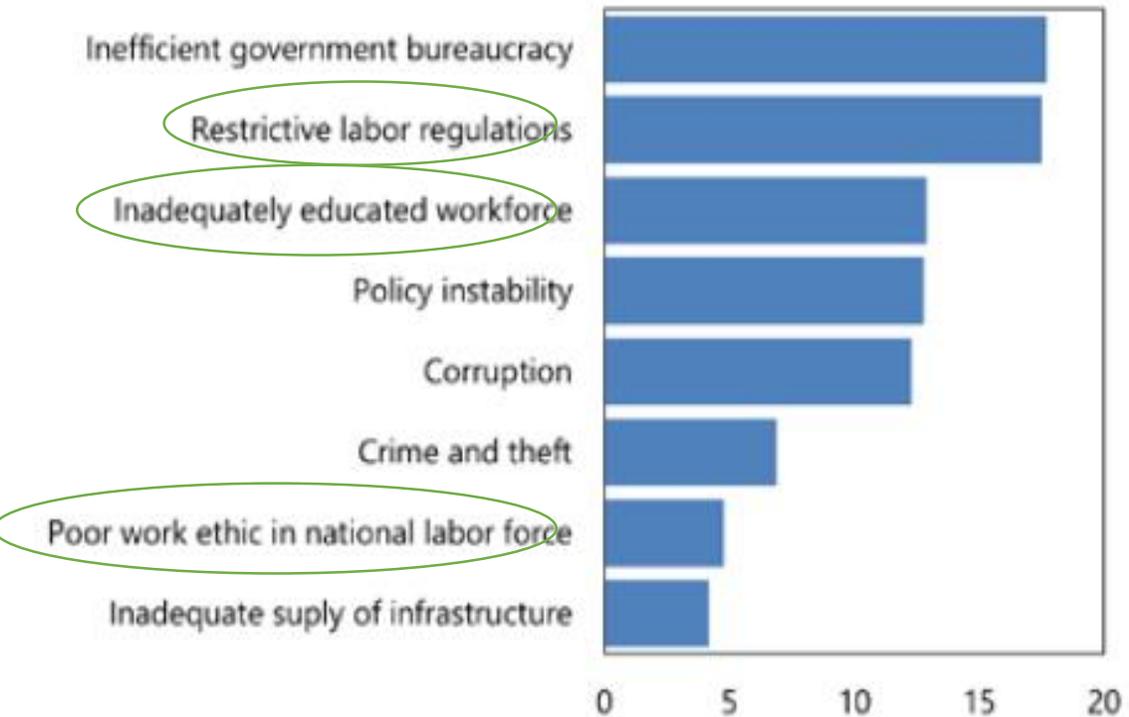
IMF Country Report No. 18/246

Article IV Consultation with South Africa

- Do these constraints increase inequality?
- Restrictive labour regulations
- Inadequately educated workforce
- Poor work ethics in national labour force

Investor surveys point to inefficient bureaucracy, restrictive labor regulations...

Most Problematic Factors for Doing Business, Top 8



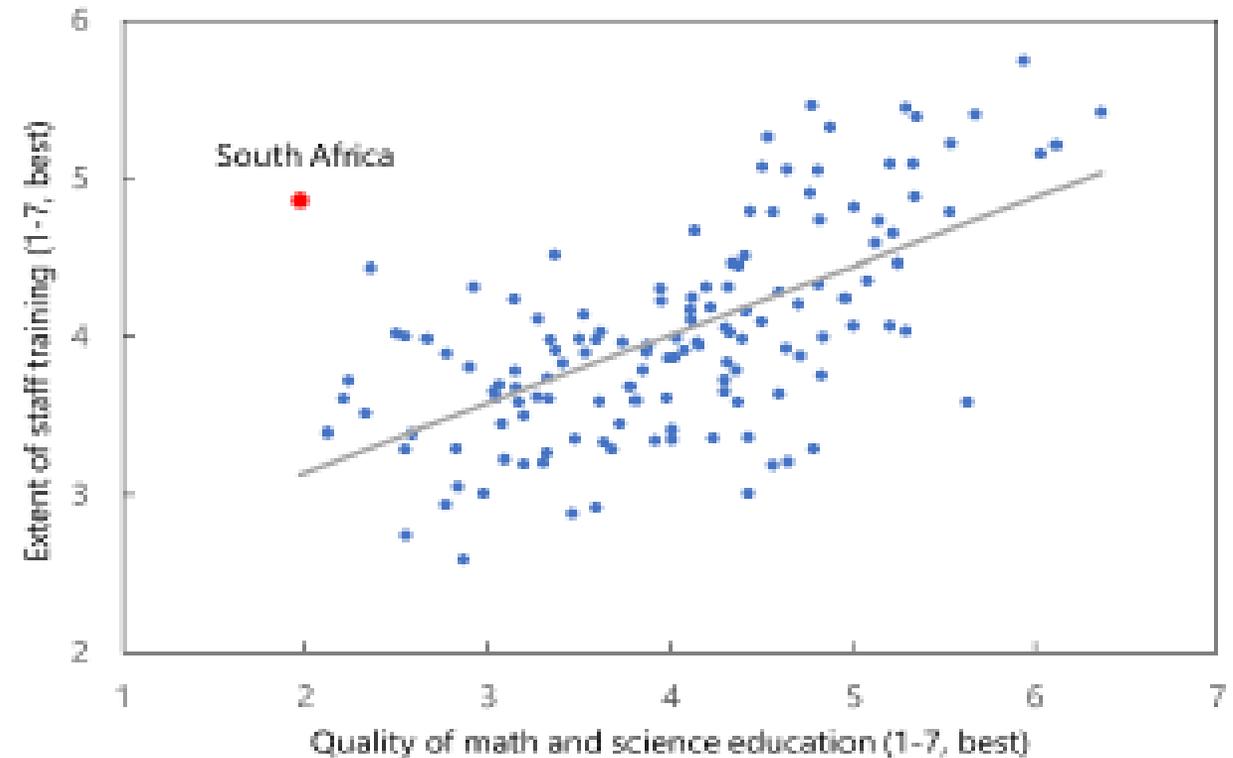
IMF Country Report No. 18/246

Article IV Consultation with South Africa

- **Structural reforms** should aim at attracting private investment, including
 - by encouraging product market competition, making labour markets more flexible and addressing skills mismatches, tackling corruption and leveraging digitalization.
 - By leveraging the full potential of a young and growing population, the existing capacity in all economic sectors, and the opportunities provided by digitalization, growth could increase significantly above the baseline.
- <https://www.imf.org/en/Publications/CR/Issues/2018/07/30/South-Africa-2018>

Staff training and availability can be improved further.

Skills and Education Quality



UN: Human Development Report

What skills are required for 4IR or the Digital economy?

21st century skills

Ways of thinking

Creativity
Critical thinking
Problemsolving
Decisionmaking
Learning

Tools for working

Information and
communication
technology
Information literacy

Ways of working

Communication
Collaboration

Skills for living in the world

Citizenship
Life and career
Personal and social
responsibility

Source: Human Development Report Office.

Fourth Industrial Revolution



**A new mindset
for jobs is
required**



Production technologies:
3D printing; Drones;
Advanced materials;
Internet of Things;
Block-chain; etc.



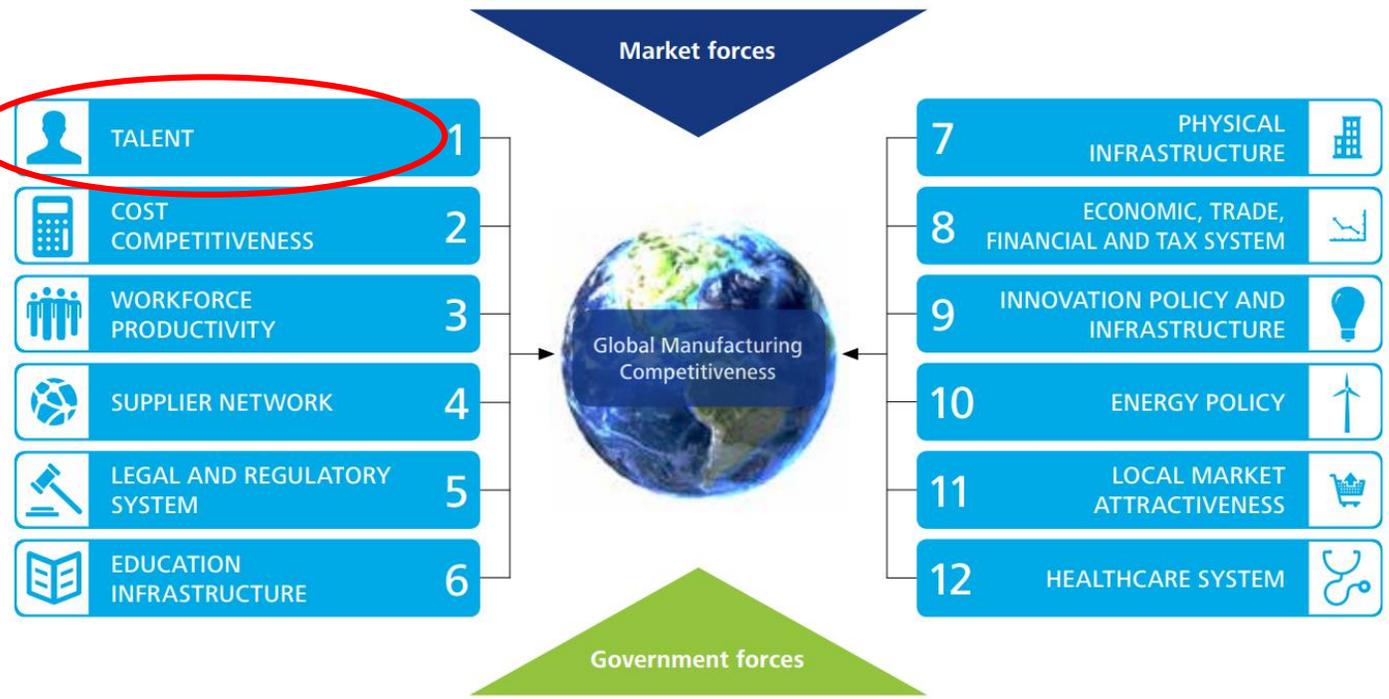
**New ways of working: Co-
bots; Data management;
Software; Digital
management & Business
strategies**



**Skills & Employment for
the future:
Digital skills and high-
end technical training**

Talent drives manufacturing competitiveness

Drivers of Global Manufacturing Competitiveness



Source: Deloitte Touche Tohmatsu Limited and US Council on Competitiveness, 2016 Global Manufacturing Competitiveness Index

Talent-driven innovation has been identified as one of the most important drivers of a country's ability to compete.

Key to talent-driven innovation is the quality and availability of scientists, researchers, and engineers and the quality and availability of skilled labour.

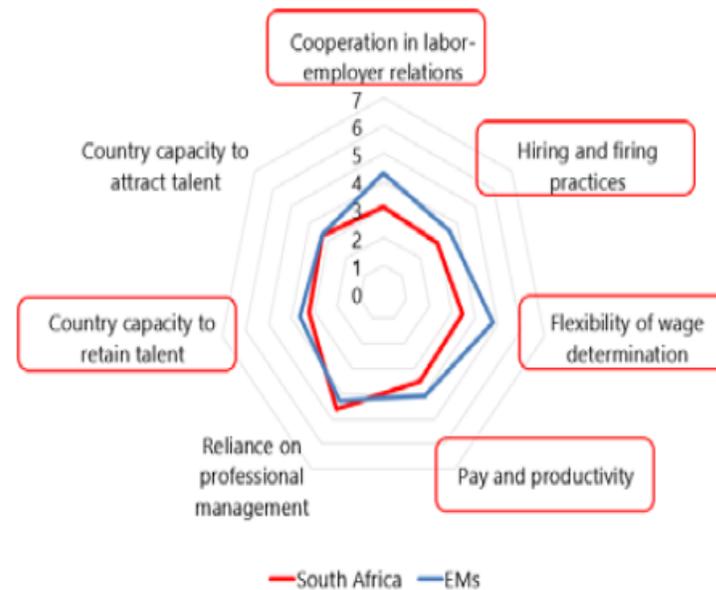
“Talent is defined as quality and availability of highly skilled workers which facilitate a shift towards innovation and advanced manufacturing strategies.”



South Africa: Key labour issues

Labor relations, hiring/firing practices, and flexibility of wage determination are among the key issues South Africa needs to address.

Labor Related Scores



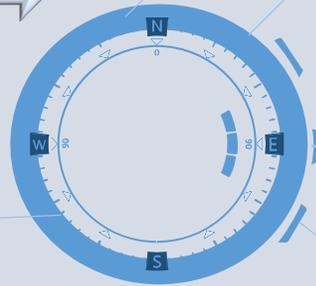
COUNTRY CAPACITY TO ATTRACT & RETAIN TALENT

Sources: Africa Competitiveness Report 2017, World Economic Forum Executive Opinion Survey, World Economic Global Competitiveness Report 2016–17, and IMF staff calculations.



Talent-driven Innovation Model

PILOT SUCCESS -
DEMONSTRATED
CONCEPT



Talent Identification & recruitment

Skills & Competency development

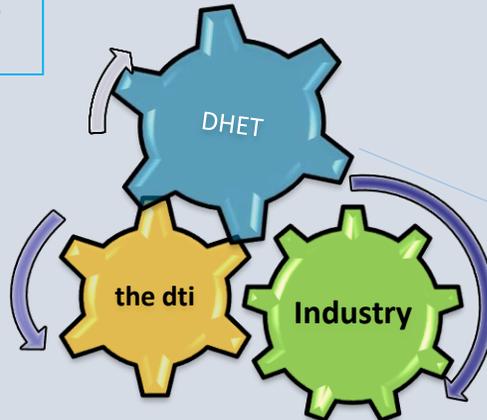
Benchmarked internationally

Focus on the Advanced Manufacturing sector (4IR)

Systemic solution to Industry demand for talent - 4IR

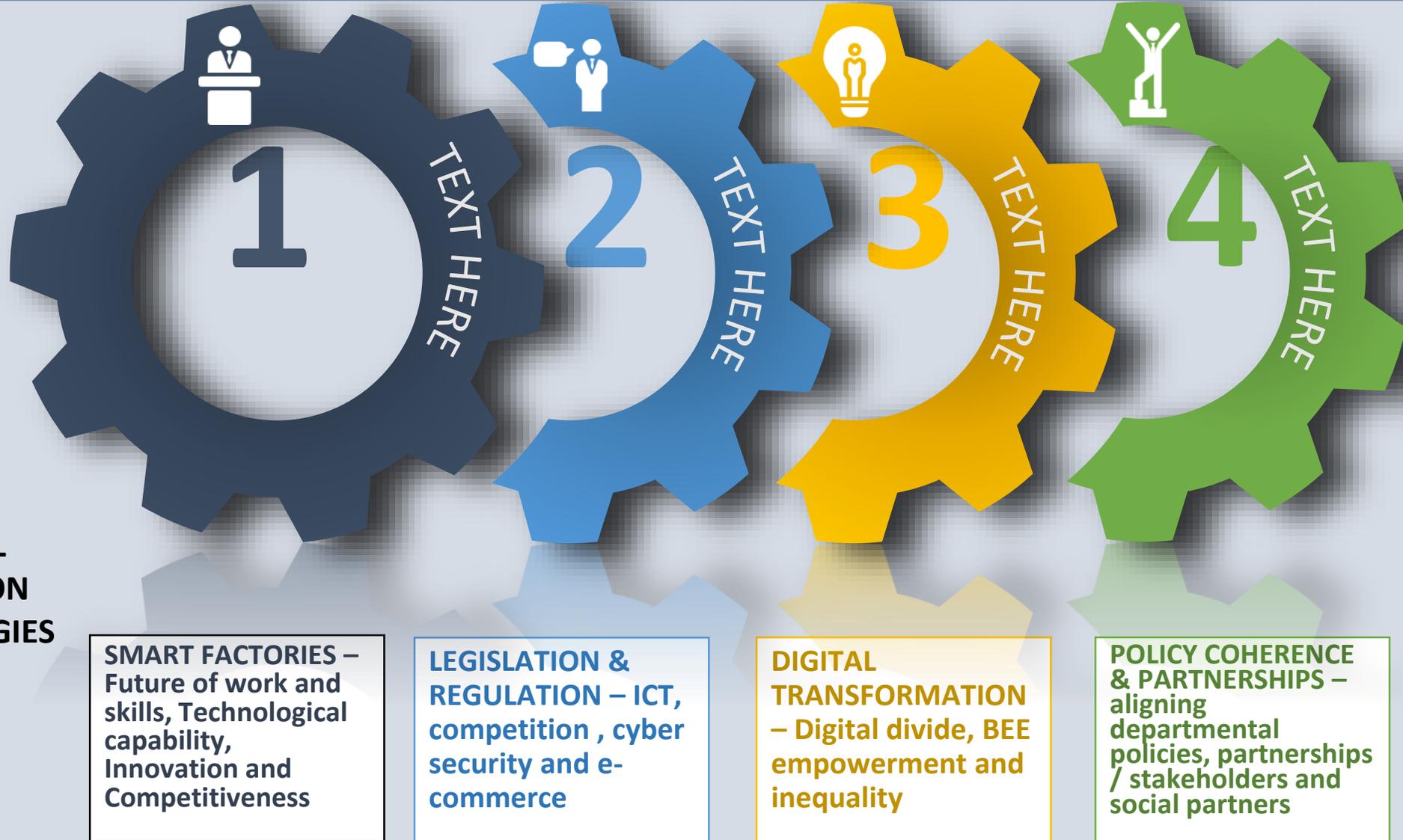


INTSIMBI FUTURE
PRODUCTION
TECHNOLOGIES
INITIATIVE



PARTNERSHIP BETWEEN GOVERNMENT AND INDUSTRY

Digital Industrial Policy Framework



FUTURE INDUSTRIAL PRODUCTION TECHNOLOGIES (4IR) UNIT

4IR PARTNERSHIPS



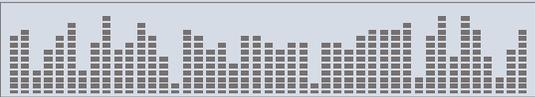
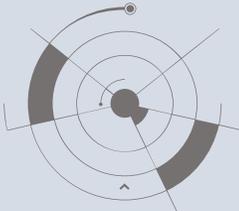
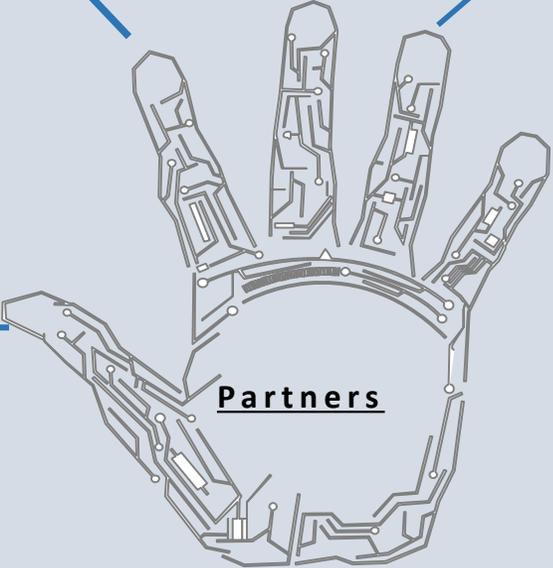

GOVERNMENT


INDUSTRY


CIVIL SOCIETY


**AFRICA &
INTERNATIONAL
COMMUNITY**


LABOUR



Questions? Comments?



Presenter: Ilse Karg

CD: Future Industrial Production Technologies

the dti

South Africa

http://www.thedti.gov.za/industrial_development/fipt.jsp

