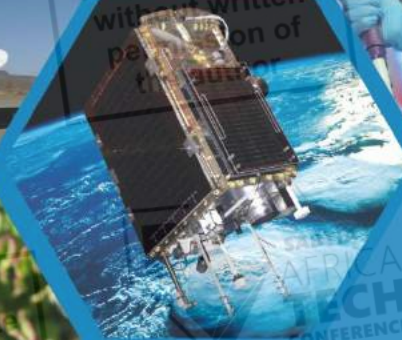


# SCIENCE AND TECHNOLOGY IN THE 4<sup>TH</sup> INDUSTRIAL REVOLUTION



Presenter: Cecil Masoka (Mr)  
Occasion: SABTIA TECH CAMP 2018  
Date: 25 September 2018



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Department:  
Science and Technology  
REPUBLIC OF SOUTH AFRICA

# PRESENTATION OUTLINE

- ❑ Science and Technology Landscape
- ❑ Who is leading who?
- ❑ Revolutions-Evolutions-Transformations
- ❑ Waves of Tech-Economic Paradigms
- ❑ Kondratieff Waves of Capitalist Expansion
- ❑ Periodising WEF's 4IR & WEF's Tipping Points
- ❑ Convergence of Technologies
- ❑ Five Enormous Transformations

# POLICY LANDSCAPE

- 1994: Green Paper on S&T
- 1996: White Paper on S&T
- 2002: National Research and Development Strategy
- 2008: Ten Year Innovation Plan
- 2012: Ministerial Review
- 2018: Draft White Paper on S&T open for **COMMENT**

# WHO'S LEADING OR WHO SHOULD LEAD THE 4<sup>TH</sup> IR AGENDA IN SA

- **Government**

- DTSPS; the dti; DST; Presidency; etc.?

- **Industry**

- Telkom (BCX); Telecoms; StartUps; Venture Capitalists; etc.

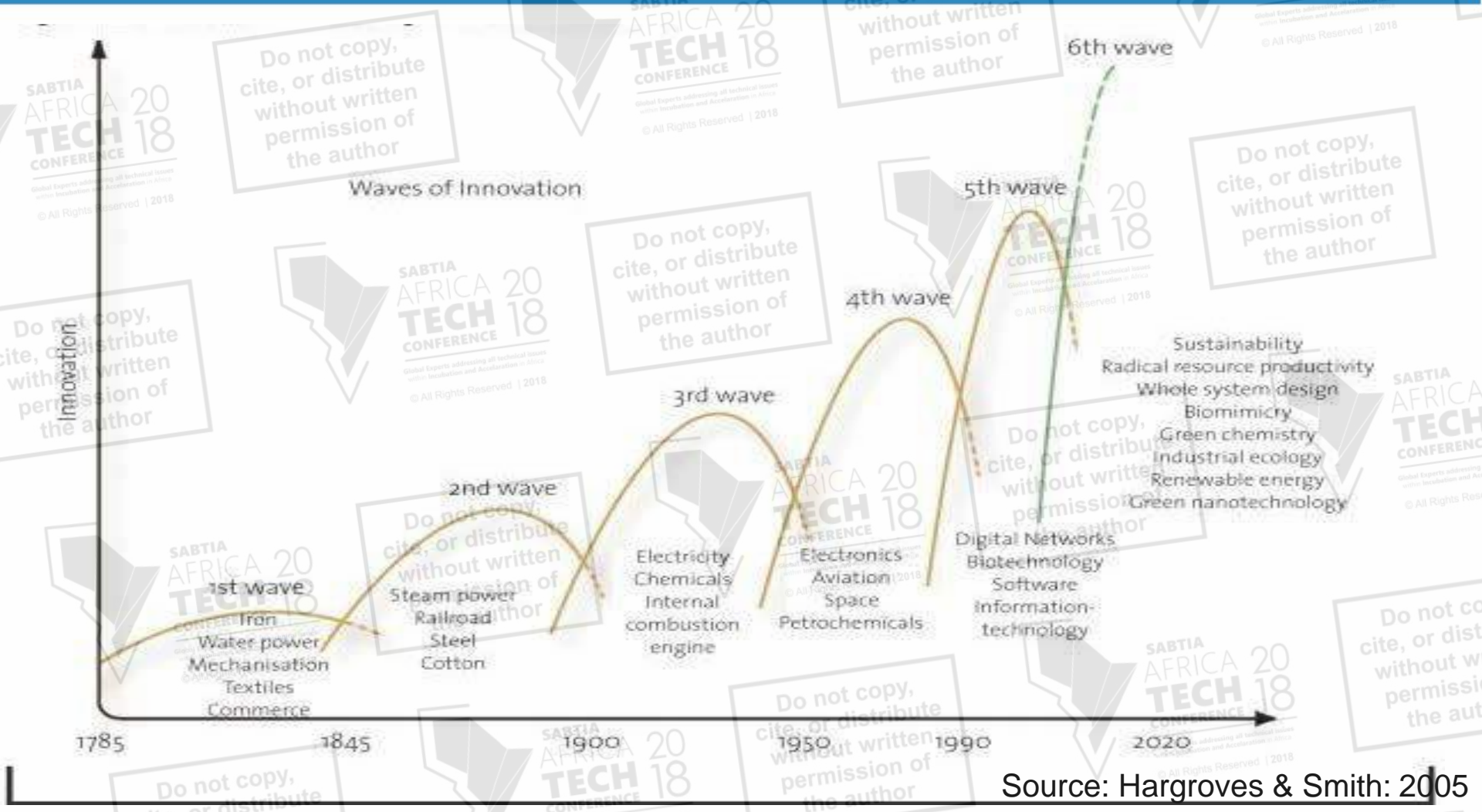
- **Academia**

- University of Stellenbosch; UJ (Soweto Campus); etc.

# INDUSTRIAL REVOLUTIONS – EVOLUTIONS – TRANSFORMATIONS DEFINED

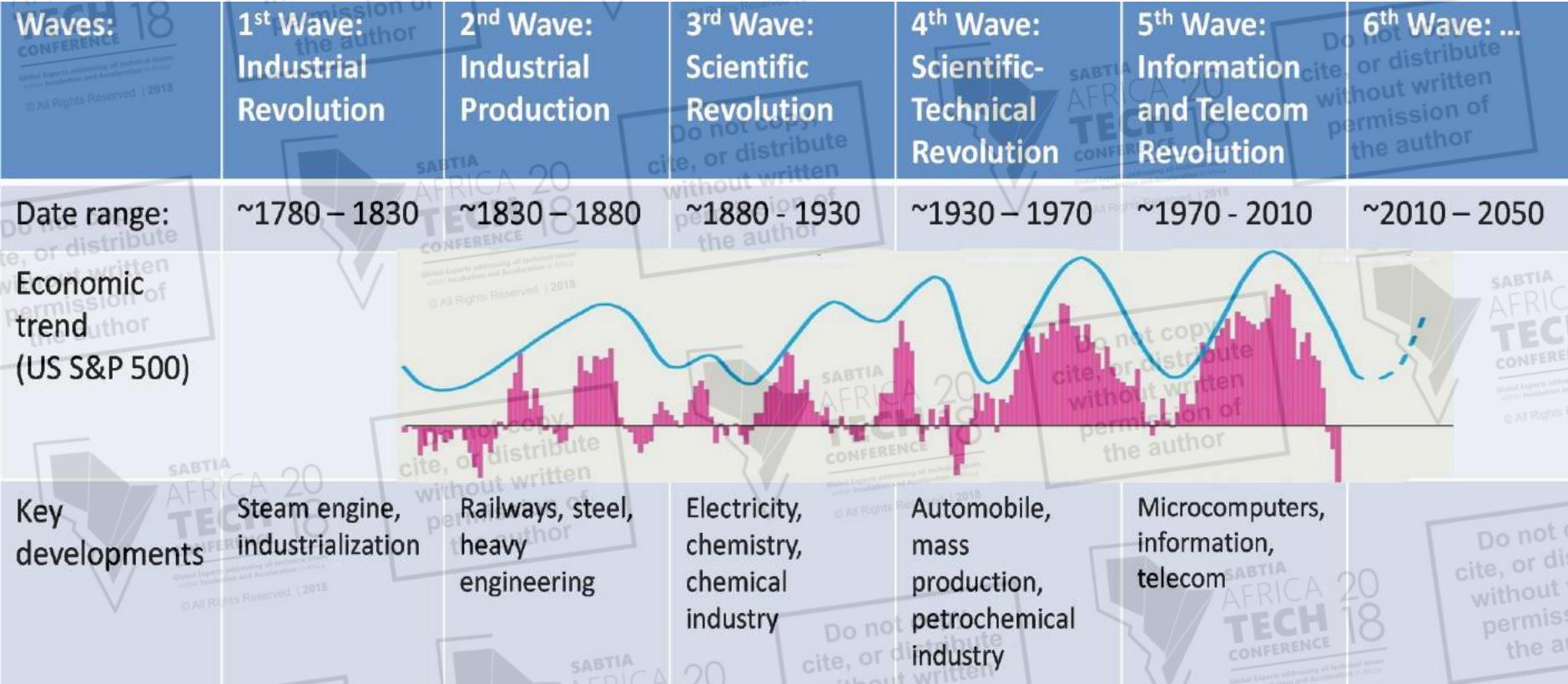
- Germany: Industrie 4.0
- Japan: Society 5.0
- Russia: Education Foresight
- **South Africa???**

# Waves of Techno-Economic Paradigms



Source: Hargroves & Smith: 2005

# Kondratieff Waves of Capitalist Expansion



Source: Saskatchewan Research Council, 2014

# PERIODISING WEF's 4IR

## First Industrial Revolution

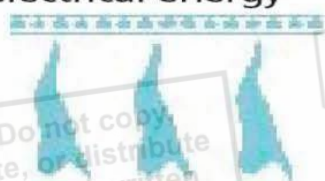
through the introduction of mechanical production facilities with the help of water and steam power



First mechanical loom, 1784

## Second Industrial Revolution

through the introduction of a division of labor and mass production with the help of electrical energy



First assembly line  
Cincinnati slaughter houses, 1870

## Third Industrial Revolution

through the use of electronic and IT systems that further automate production



First programmable logic controller (PLC), Modicon 084, 1969

## Fourth Industrial Revolution

through the use of cyber-physical systems



Degree of complexity



Source: WEF, 2015

1800

1900

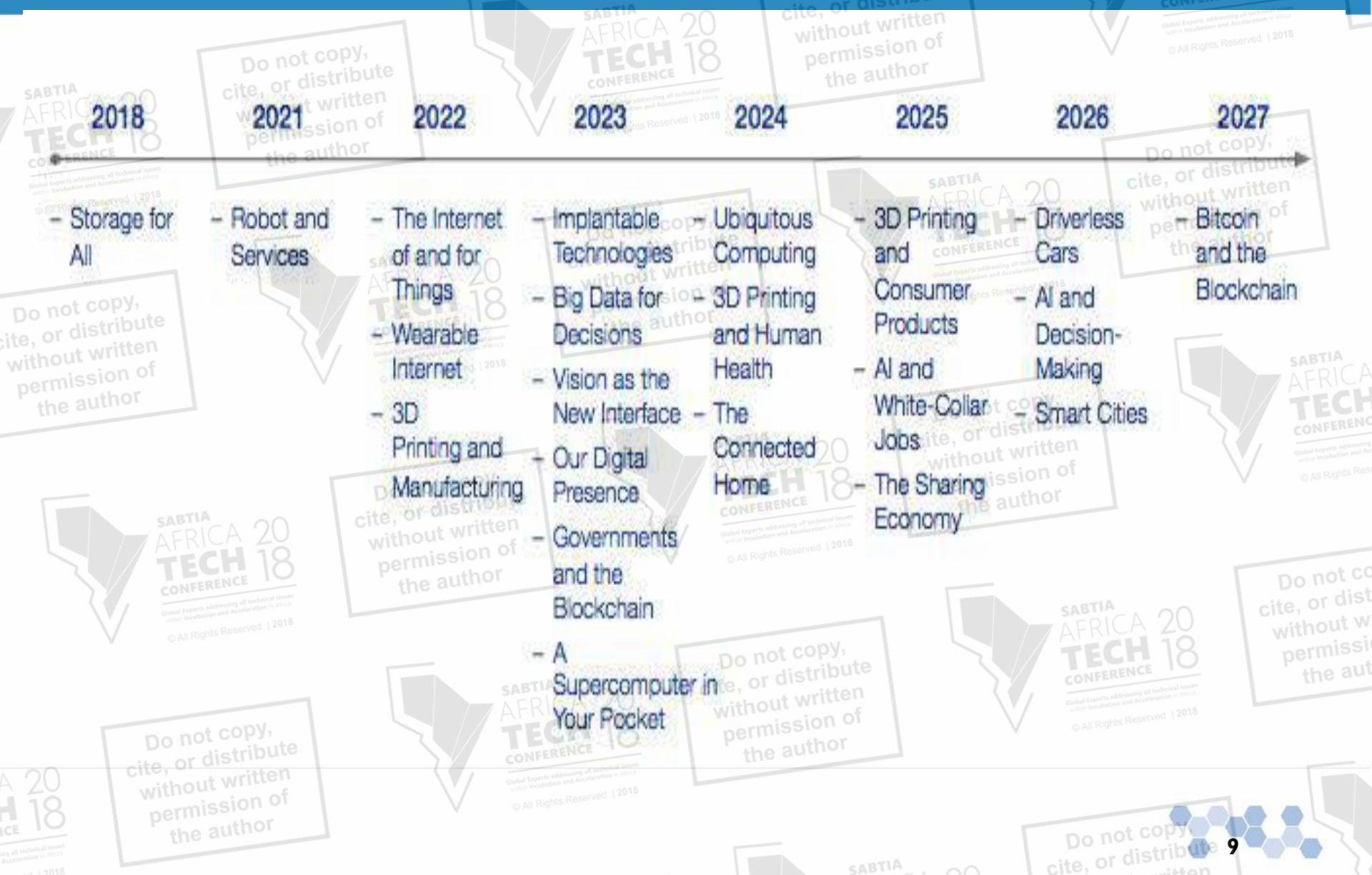
2000

Today

Time



# WEF's 21 TIPPING POINTS



# CONVERGENCE OF TECHNOLOGIES

- **Inter-disciplinary**
  - Biology + Tech [biotech]

- **Trans-disciplinary**
  - Biology + Photonics [bio-photonics]

- **Pluri-disciplinary**
  - Biology + info. + nano + tech [BINT]

# AFRICAN REALITIES

- African Science is relatively backward on a global scale
- Africa is huge, fragmented and many small countries are very poor and unable to have competitive science systems
- The gap between those who have capacity and those who don't is large and growing

# FIVE ENORMOUS TRANSFORMATIONS

## by Prof. Ismael Serageldin

- The New Knowledge Revolution
- Big Data and Internet Explosion
- Social Connectivity
- Evolutionary Programming
- Artificial Intelligence (AI)

# DST INITIATIVE

- South African National Research Network (SANReN) – European Bioinformatics Institute
  - Meraka Institute @ the CSIR
  - National Integrated Cyberinfrastructure System (NICIS)
  - Centre for High Performance Computing (CHPC)
  - Data Intensive Research Initiative of South Africa (DIRISA)
- Infrastructure Roadmap
- ICT Roadmap

**Dankie**

**Enkosi**

**Ha khensa**

**Re a leboga**

**Ro livhuwa**

**Siyabonga**

**Siyathokoza**

**Thank you**