



INCOSE SA

International Council on Systems Engineering South Africa Chapter

Jörg Lalk PrEng PhD
2019/2020 INCOSE SA President
Snr Lecturer: Graduate School of Technology Management, University of
Pretoria

Overview

- Comparisons between South Africa and Tunisia
- South Africa is different in some ways
- SE in South Africa
- History of INCOSE in South Africa
- Some INCOSE SA highlights
- Supporting industries and academia
- Threats to a chapter's sustainability
- IS2020 feedback



SOUTH AFRICA

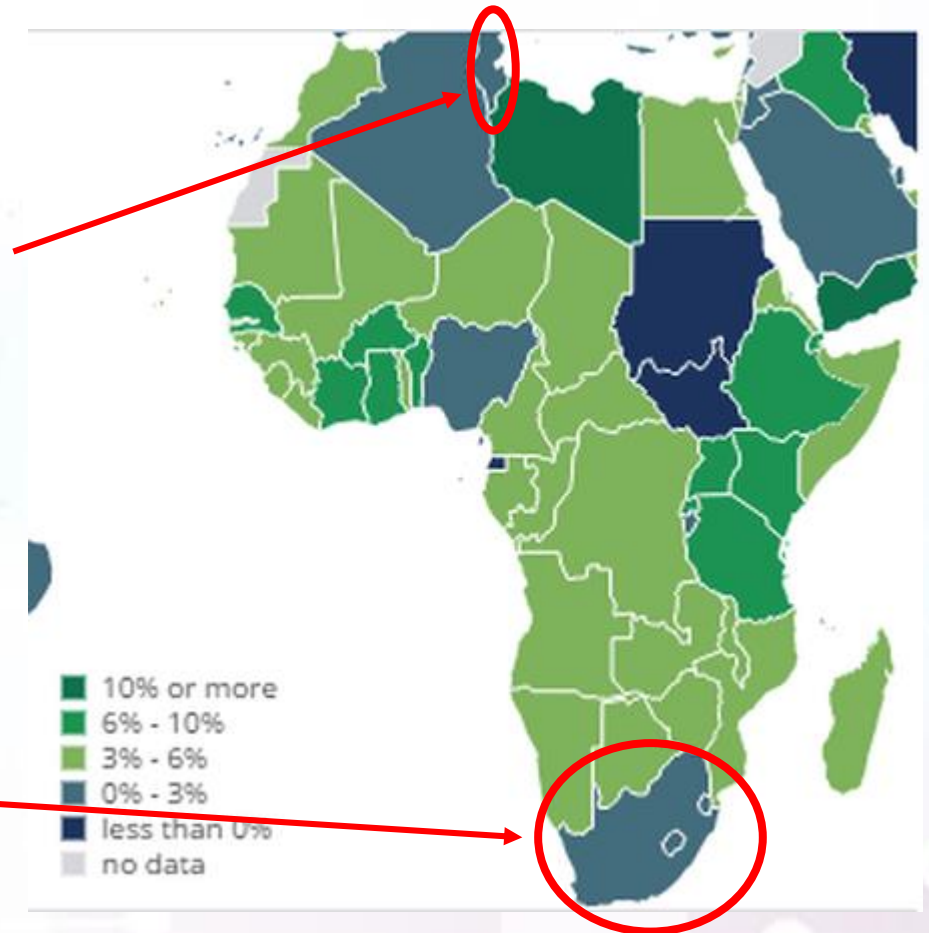
Comparing Tunisia and South Africa....

Tunisia

- Population: 11.5m
- Size: 163 626 km²
- Energy: 19 TWh
- Industry: Petroleum
Mining (phosphate, iron ore)
Tourism
Textiles
Agribusiness
Automotive parts

South Africa

- Population: 58m
- Size: 1 219 009 km²
- Energy: 237 TWh
- Industry: Mining (platinum, gold, chromium, iron ore)
Automobile manufacturing
Metalworking
Technology
Machinery
Textiles
Iron and steel
IT
Chemicals
Fertiliser
Foodstuffs
Manufacturing
Commercial ship repair.
Military systems (only 10% now compared to 1990)





South Africa is different in some ways....

SOUTH AFRICA

- 1st & 3rd world in one country
- Well-developed infrastructure (mostly)
- Large number of public universities (26), with 11 ranked among the world's top universities (Times Higher Education)
- Of these, 7 have fully fledged Faculties of Engineering with degrees accepted internationally under the Washington Accord



SE in South Africa

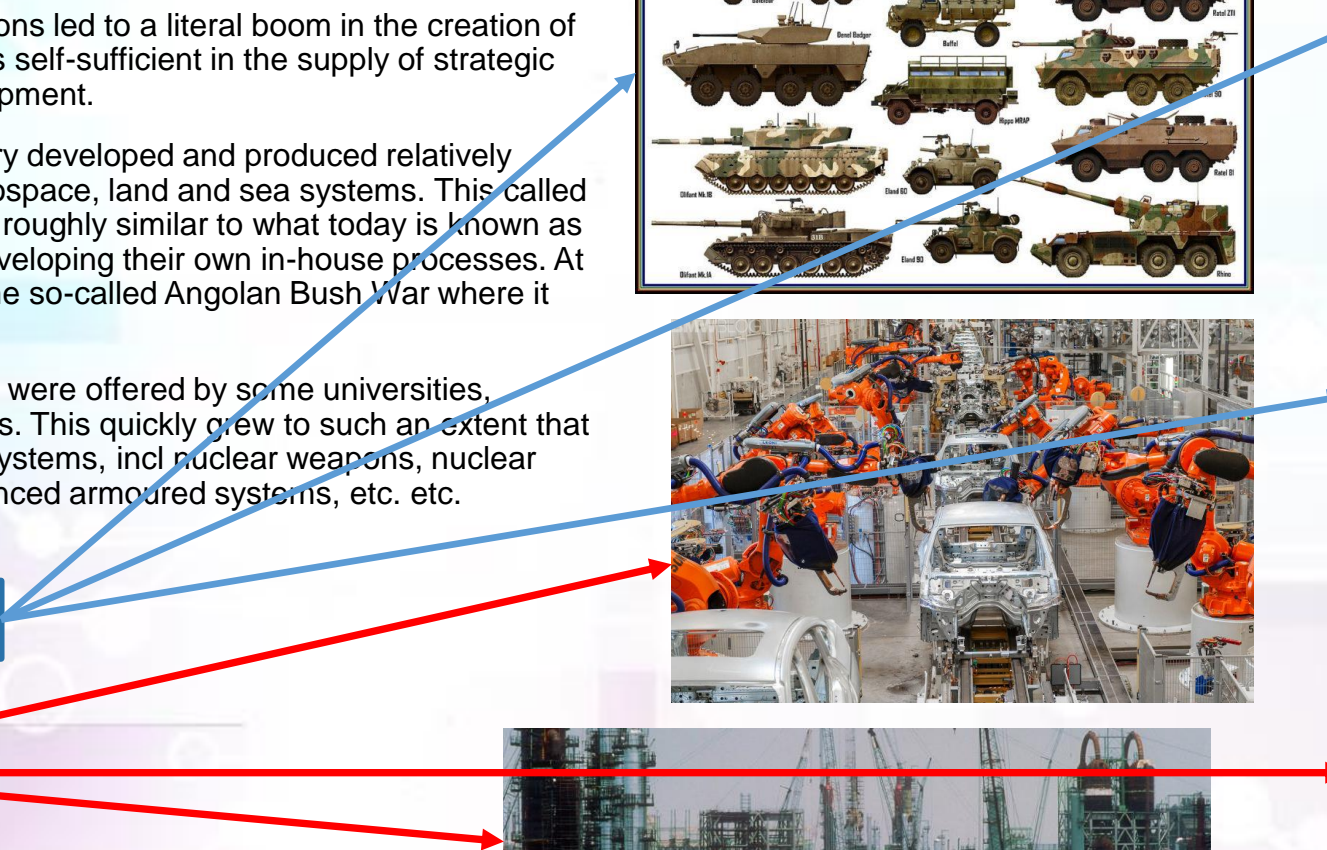
SOUTH AFRICA

- Common knowledge that the country was under UN sanctions due to its pre-1994 racial policies.
- An unintended consequence of sanctions led to a literal boom in the creation of new industries to ensure the country is self-sufficient in the supply of strategic products, technology and military equipment.
- From about 1977 until 1985 the country developed and produced relatively advanced weapon systems in the aerospace, land and sea systems. This called for the use of development processes roughly similar to what today is known as SE with most high-tech companies developing their own in-house processes. At the time the country was involved in the so-called Angolan Bush War where it faced Cuban and Soviet forces
- During early 1985 the first SE courses were offered by some universities, initially based on US Mil-Std processes. This quickly grew to such an extent that the country could develop advanced systems, incl nuclear weapons, nuclear enrichment, combat helicopters, advanced armoured systems, etc. etc.



Lots of SE

No or little SE



History of INCOSE SA

- A number of public meetings held between 2000 and 2001 to gauge interest – most of these meetings were well attended despite only 2 South African INCOSE members at the time (both still remain members today!).
- Most people attending these meetings supported the establishment of an INCOSE chapter
- The South Africa chapter was formally established in September 2002 with 34 founding members (15 of these still remain as members)
- During September 2003 the 1st INCOSE SA Conference was held in Pretoria; since then the chapter held its annual conference each year until 2018 without fail.

Some INCOSE SA Highlights

- Some noteworthy highlights since 2002: (it takes a dedicated and sustainable membership!)
 - INCOSE Chapter Awards
 - 2002: Bronze Circle Award (its first year of existence!)
 - 2003 & 2004: Silver Circle Award
 - 2005 – 2011: Gold Circle Award
 - 2011: President’s Award for Outstanding Chapter
 - 2012 – 2014: Gold Circle Award
 - 2015 – 2017: Platinum Circle Award
 - 2018: Gold Circle Award
 - Co-hosted a joint conference (ISEM2011) with the South African Institute of Industrial Engineers in Stellenbosch
 - Hosted the 2014 EMEASEC conference in Somerset West in 2014 (this acted as a dry run for IS2020)
 - Admitted as a “Voluntary Association” with the Engineering Council of South Africa (ECSA), a statutory body under the SA Professional Engineering Act managing the legal registration and professional standing of all South African Professional Engineers (similar to Chartered Engineer in the UK)
 - Admitted as ECSA Licensed CPD Body allowing the chapter to accredit relevant CPD points for professional persons on behalf of ECSA (September 2020)

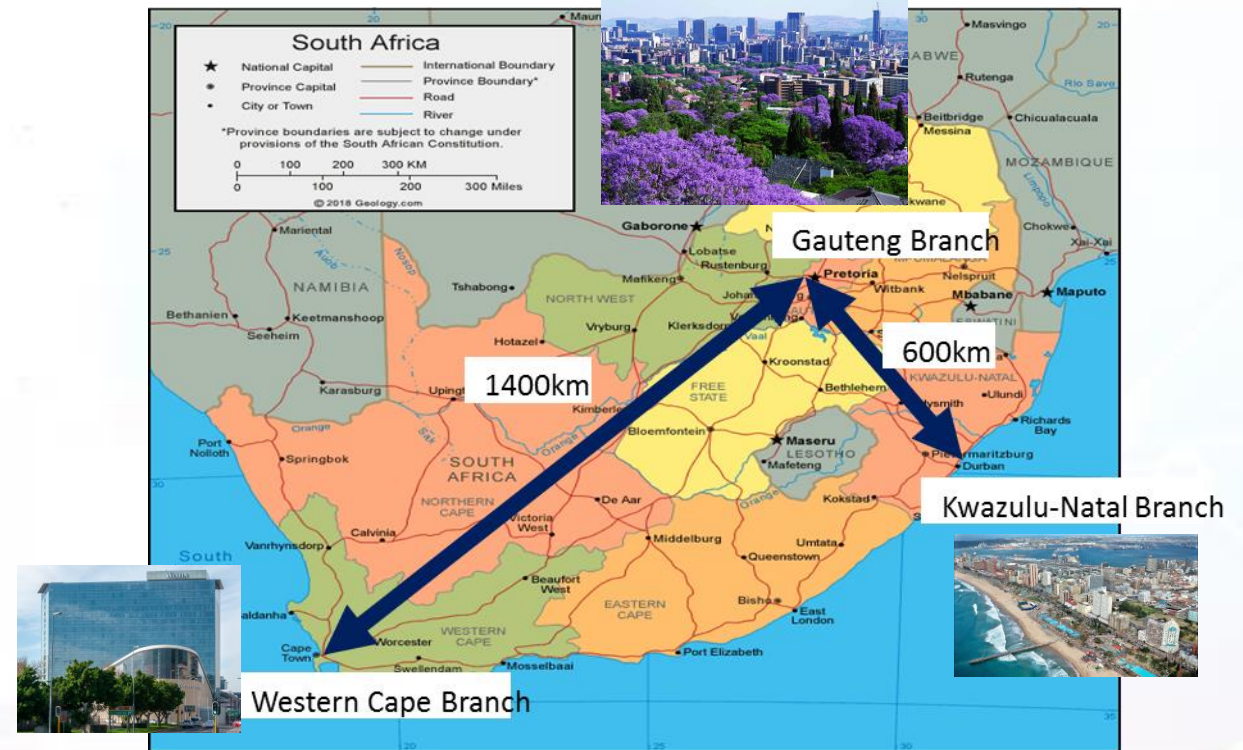




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Chapter growth in a large country...

- As the chapter grew it also grew in membership in other parts of the country
- This necessitated adding two branches (Western Cape and Kwazulu-Natal) to the Chapter
- Each of the two new branches regularly host their own smaller events



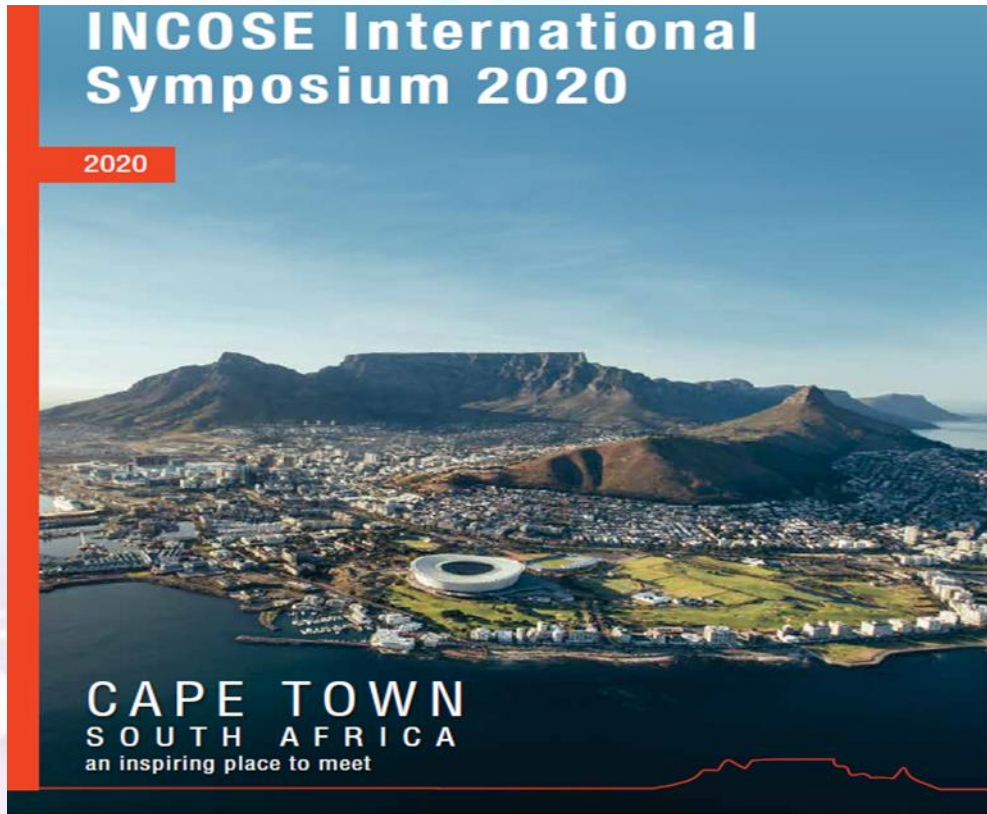
No supporting industries/academia = No chapter....

- Without an industry that both supports SE and provides systems engineers with employment no INCOSE chapter can exist:
 - Traditionally the defence industry was a big supporter of the chapter. But this is fast changing with ever decreasing defence budgets....
 - Since 2002 repeated efforts to reach out to other industries such as automotive, mining, energy, petro-chemicals, etc. only met with mixed success. Some (minor) successes but sustainable support still remains a challenge...
- Academia, notably the University of Pretoria, University of Johannesburg, University of the Witwatersrand, North West University and the University of Stellenbosch has been solid supporters of the chapter.

Key threats to a chapter's sustainability

- State of the national economy. E.g in South Africa the support of the defence industry is fast disappearing (the industry is today showing a turn-over of some 10% of what it was in 1990). Throwing in Covid-19 together with a recession makes for a perfect storm
- Relying on a single industry sector is risky
- Retention of members after the chapter honeymoon phase is challenging (from 2002 until 2020 the South Africa Chapter had a total of some 2 400 members – of these some 200 remain active, in itself down from about 474 in 2019 – result of a recession and Covid-19)
- Lots of enthusiasm during a chapter's establishment quickly disappears once people realise that its all about volunteering one's time – availability of sufficient people willing to support the chapter in a leadership role is especially challenging.
- During economic downturns its mostly academia that helps a chapter to survive
- **IMPORTANT:** It takes time to build a chapter...above all it takes volunteers who stay the course....it takes lots of after-hours time.

IS2020 Feedback



- After the success of EMEASEC 2014 in South Africa efforts began to convince INCOSE to select Cape Town for the first IS event on the African continent
- In May 2018 it was confirmed that IS2020, INCOSE's 30th anniversary, will be in to Cape Town
- The October 2019 INCOSE Board meeting was held in Cape Town – an important event to swing any lingering doubt towards Cape Town

Paper submissions per country (in rank order):

USA: 46 (29%)

South Africa: 25 (must be an all time record!) (16%)

Norway: 21 (keep in mind this is one of the smallest chapters!) (13%)

France: 9 (6%)

Sweden: 7 (4%)

India, UK and Australia: 5 each (3%)

China: 4 (2.5%)

Tunisia, Turkey and Mongolia: 3 each (2%)

Germany, New Zealand, Singapore, Netherlands, Lithuania and Italy: 2 each (1.3%)

Spain, Canada, Kenya, Nigeria, Thailand, Japan, Argentina, Czechia and Finland: 1 each (0.6%)

IS2020 Statistics

Tutorial submissions per country (in rank order):

USA: 22

France: 2

Norway, Australia, Mongolia, **South Africa**, UK and India: 1 each

#Panel submissions per country (in rank order):

USA: 7

UK, **South Africa:** 1 each

IS2016-2019

vs.

IS2020

Some statistics....

1. IS2016 (Edinburgh)

- Papers = 223
- Tutorials = 41
- Panels = 38

2. IS2017 (Adelaide)

- Papers = 182
- Tutorials = 33
- Panels = 21

3. IS2018 (Washington DC)

- Papers = 179
- Tutorials = 33
- Panels = 26

4. IS2019 (Orlando)

- Papers = 113
- Tutorials = 37
- Panels = 14
- Presentations = 66

5. IS2020 (Cape Town)

- Papers = 161
- Tutorials = 30
- Panels = 10
- Presentations = 71



Submissions received

Program Overview (3 // tracks over 3 days) (Note: A reduced virtual event..)

• Day 1

- Needs & Requirements
- Technical Leadership 1
- Systems Design/AI
- SE Processes
- Systems Engineering 1
- Risk Management
- Systems Architecture
- Verification & Validation

• Day 2

- Systems thinking
- Diversity & Training
- Modeling
- SoS Engineering
- Systems Engineering 2
- Product Line Engineering
- Manufacturing systems & Operational aspects
- Technical Leadership 2

• Day 3

- System security & safety
- Environmental systems
- Ontology
- Infrastructure
- Technical Leadership 3
- Digital Engineering
- Integration
- Needs & Requirements 2

Impact on chapter

- Costly impact on the activities of the South Africa Chapter
 - The local conference scheduled for September 2019 was cancelled in an effort to convince as many South African authors as possible to hold back their papers for IS2020 – but this also had a financial impact on the chapter as it depends for most of its income from its annual conference. The local 2020 conference also was forfeited to allow IS2020 to take place. (= local income loss of 2 events)
 - A dedicated person was co-opted into the chapter leadership to focus on marketing IS2020 internationally to help attract as many international visitors to the country as possible (useful but costly & for the chapter's account; but no direct benefit for the chapter)
- Did this all pay off for the chapter? Yes and no...
 - Of 161 paper submissions received, 25 were from South Africa – an all-time high (10/10)
 - No direct benefit to the chapter from marketing to international visitors, but chapter visibility benefitted (5/10)
 - A local chapter is not really made part of the event's organizing – it remains largely with Central (but the chapter managed to get 1 person into the IS2020 TRC and also provided the Technical Program Chair (5/10)
 - Financial benefit (2/10 compared to what the chapter forfeited in not hosting its two annual conferences in 2019 and 2020)
 - Nobody could foresee the Covid-19 pandemic leading to the IS2020 event reverting to a scaled-down fully virtual event (0/10)
- Due to the risk of losing the deposit paid for the IS2020 Cape Town venue, IS2022 will now be hosted in Cape Town....but Covid-19 remains a massive risk...

Things to keep in mind when hosting an IS event....

- Understand the benefits (mainly chapter visibility) but also understand the (negative) financial impact on the hosting chapter
- The local chapter knows its home environment but that knowledge seems to be rarely called upon. This led to some silly tourist suggestions e.g. a safari in Zambia, two countries and almost 3000 km away from Cape Town venue!
- Expect the best....but plan for the worst! Covid-19 really messed up everybody's planning ...still does....and will continue to do so for the next few years (work the numbers, anybody that thinks our events will return to normal within the next year or two does not work the numbers!).

Thank you

Enkosi

Ngiyathokoza

Ke a leboha

Ro liyhuwa

Dankie

Ngiyabonga

Inkomu

Ke itumetsi

Re a leboga

Siyabonga