

# The Status, Challenges, Opportunities and Strategies to Grow Agricultural Engineering: Southern\* African Perspective

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# Overview of Presentation

- Status
- Challenges
- Opportunities
- Strategies
- Conclusions

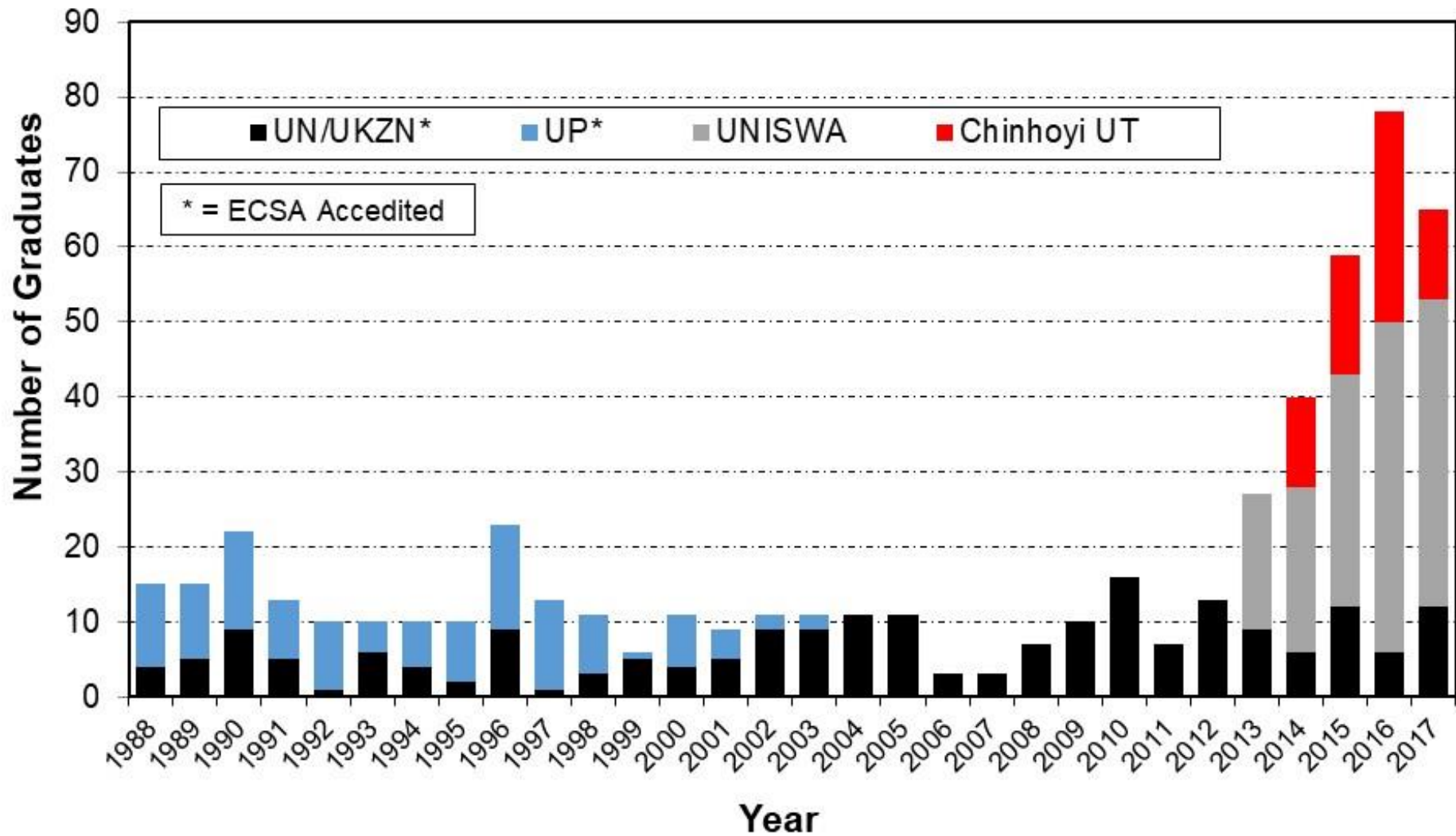
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  - Supply
  - Demand
  - Institutions
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# Supply - Education and Training

- Swaziland
  - UNISWA: BSc (Agricultural and Biosystems Engineering)
- Mozambique
  - Zambezi University: Agronomic Engineering and Forest Engineering
- Zambia
  - University of Zambia: BEng (Agricultural Engineering)
- Malawi
  - Lilongwe University of Agriculture & Natural Resources
    - BSc Eng (Agricultural Engineering)
    - BSc Eng (Irrigation Engineering)
- Zimbabwe
  - Chinhoyi University of Technology: BSc Hons (Ag. Eng) (M/I)
  - University of Zimbabwe
    - BSc Hons (Agricultural Engineering)
    - BSc Hons (Biosystems and Agricultural Engineering)
- South Africa
  - University of Pretoria: B. Eng (Agric) - up to 2003
  - University of Natal/KwaZulu-Natal: BSc Eng (Agric) 1956 -

# B/BSc Agricultural Engineering Graduates in Southern Africa



# Supply - Quality Control

- Accreditation of educational institutions
- Professional registration
  - Candidate Engineer → Pr Eng
- South Africa
  - ECSA
- Zimbabwe Institution of Engineers
  - Engineering degree (+ 3 years experience) → Corporate Member of ZIE
- .....

# Demand - South Africa

- All Engineers
  - 3-5% growth in GDP = 2 x consulting engineers
  - Change in age distribution of engineers
- Agricultural Engineering
  - Identified as scarce skill
  - 50% vacancy rate in DAFF (AgriSETA, 2010)
  - Many advertisements for AE not filled

# Demand - South Africa

- Agricultural Engineering Needs and Numbers Survey
  - 29% of respondents have vacancies for Engineers
  - 14% of respondents have vacancies for Technologists
  - 29% of respondents have vacancies for Technicians
  - 43% difficulty in sourcing Agricultural Engineering staff
  - 25% of respondents do not outsource for Agricultural Engineering skills
  - 48% use expertise from non-Agricultural Engineering disciplines



# Institutions

- South African Institute of Agricultural Engineers (SAIAE)
  - Founded 1964
  - "to serve and promote the Agricultural Engineering profession in South Africa"
  - Recognised learned society of ECSA
- Engineering Council of South Africa
  - Qualification accreditation
  - Professional registration
- Zimbabwe Institution of Engineers
  - .....

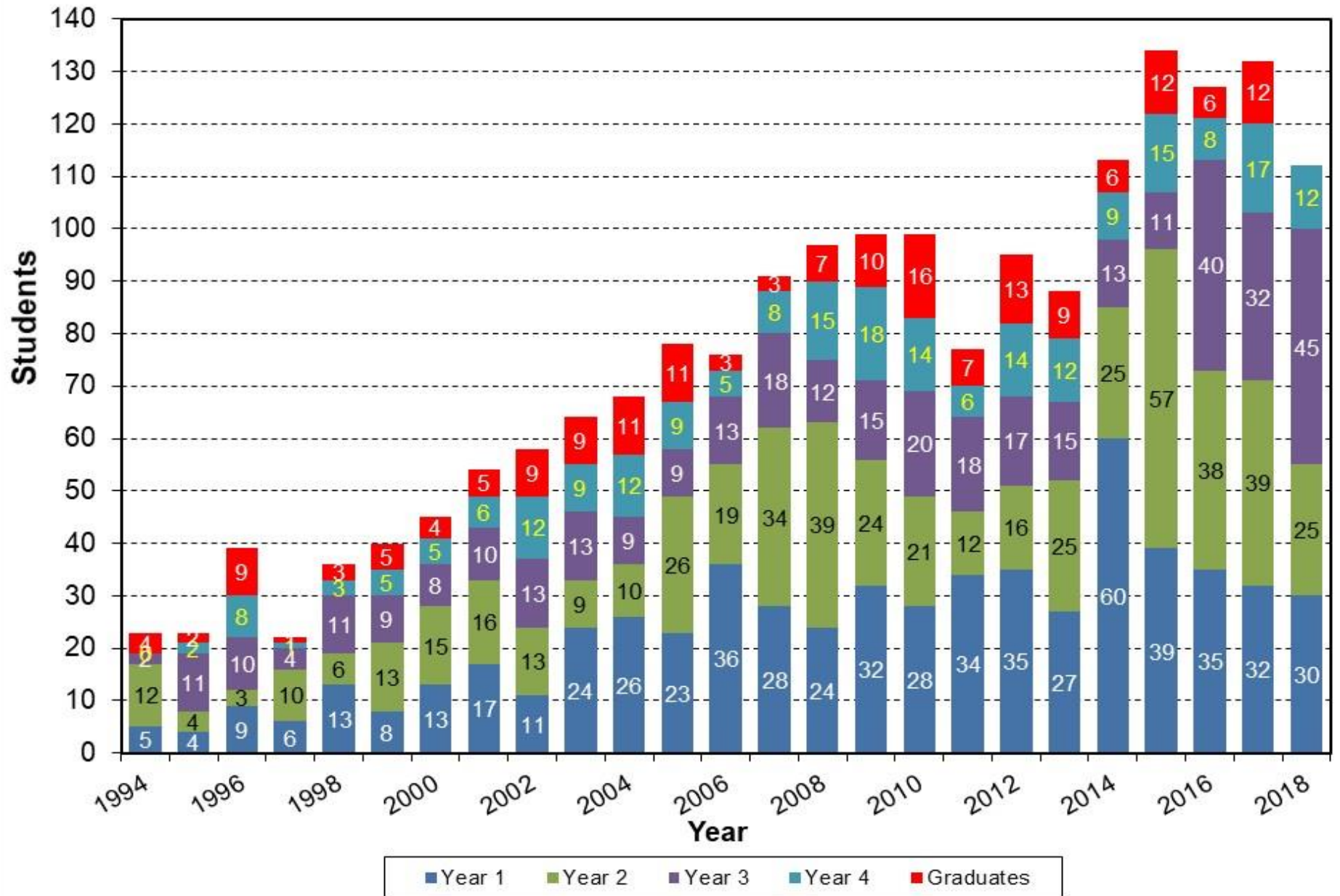
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  - Education and training
  - Public knowledge - supply
  - Industry knowledge - demand
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# Challenges: Education and Training

- Ag Eng programmes
  - Basic principles and engineering knowledge
  - Integration of technologies across disciplines
  - Wide scope, short time period
  - Limited resources for teaching
- Staffing
  - Limited - constraint to breadth of programme
  - Relatively small staff number
- Equip graduates to practice
  - Wide range of fields
  - Low to high technology applications
  - Limited resources and support
- Student intake and performance
- Graduate mentorship

# Agricultural Engineering Students at UN/UKZN



# Challenges

- Public knowledge of Ag Eng
  - Lack of knowledge
  - Impacts student demand and applications
- Industry demand for Ag Eng
  - Lack of knowledge
  - Graduation rates and quality limit demand
  - Poor economic climate
    - Frozen posts
    - Limited infrastructural expenditure

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# Challenges Facing Humanity

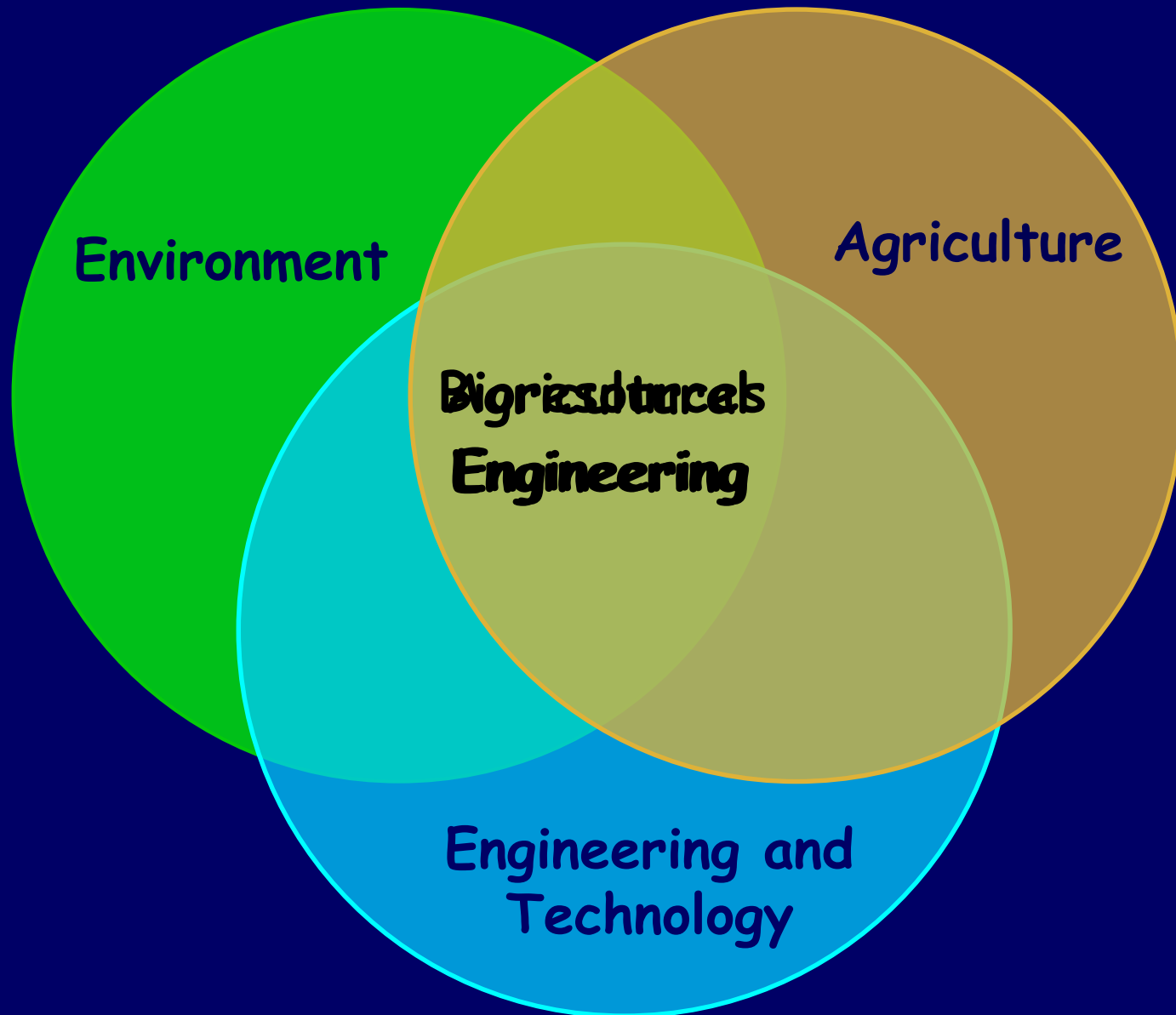
- Growing global population requires food, feed, fibre, and energy (Matlock, 2014)
  - 7 billion to 10 billion people by 2050
  - 40% of land used for agricultural production
  - 70% of human-appropriated water is used for agriculture
- Millennium Development Goals
  - Eradicate extreme poverty and hunger
  - Ensure environmental sustainability
  - .....
- Grand Challenges (Verma, 2014)
  - Climate change
  - World hunger
  - Sustainability
  - Security of food, water, energy

# Challenges Facing Southern Africa

- To feed and sustain a growing population under a variable and changing climate
  - Water security
  - Food security
  - Energy security
  - Environmental sustainability
- Constrained by politics and governance
  - Poor administration and management
  - Weak economies
  - Widespread corruption
  - Impacts of land reform
- .....



# Agricultural Engineering Programme



# Agricultural Engineers

## ☀ Engineers who

- ☀ Connect the living world of plants, soil, water & animals with the
- ☀ Technology of engineering, i.e. systems, structures and machines



## ☀ Provide technology for

- ☀ Food and agricultural production and processing systems
- ☀ Sustainable environmental management



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# Some Strategies (1)

- Supply vs Demand Conundrum
- Marketing - information and awareness
  - Public - raise awareness
  - Engage with government ministers and departments
  - Engage with private industry
- Education system
  - Attract good quality and motivated students
  - Bursaries
  - Ensure high quality of degrees - international norms
  - Graduates must meet industry needs
  - Instill ethical principles in graduates
  - Partner with industry

# Some Strategies (2)

- Communication and collaboration
  - Collaboration between academic and research institutions
  - National, regional and continental
    - Professional institutions and societies
    - Accreditation bodies
- Champion
  - Promote and grow Agricultural Engineering in Africa
  - Facilitate collaboration between regional and national professional institutes and societies
  - Foster collaboration between academic institutes
  - Represent Africa on global stage
- PASAE - AfroAgEng

# Conclusions

- Need to grow Agricultural Engineering
- Grow awareness and demand
  - Public
  - Future students
  - Industry
  - Government
- Grow supply
  - Attract strong and motivated students
  - Quality programmes and graduates to meet industry needs
- Institutions
  - Sustainable
  - Collaboration for mutual benefit

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- Dr Aidan Senzanje - UKZN, RSA
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# Thank you for your attention



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