

2018 SARF/IRF/PIARC

REGIONAL CONFERENCE FOR AFRICA

“Roads to Social and Economic Growth”



9 - 11 OCT 2018 | DURBAN ICC

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ALLYSON LAWLESS

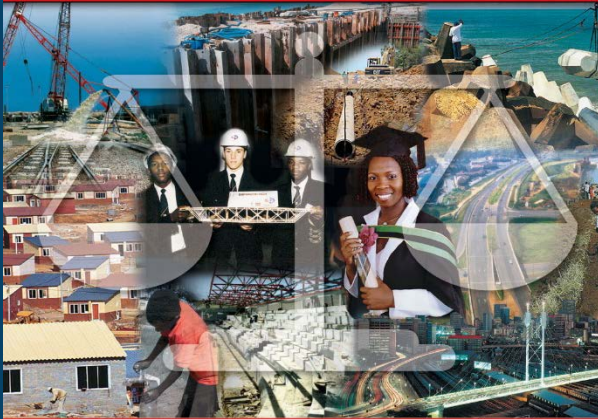
SAICE PROFESSIONAL DEVELOPMENT & PROJECTS

ENGINEERING NUMBERS & NEEDS IN SADC

WHY THE STUDY?

NUMBERS & NEEDS

Addressing imbalances in the civil engineering profession



Allyson Lawless



NUMBERS & NEEDS IN LOCAL GOVERNMENT

Civil engineering – the critical profession for service delivery



Allyson Lawless

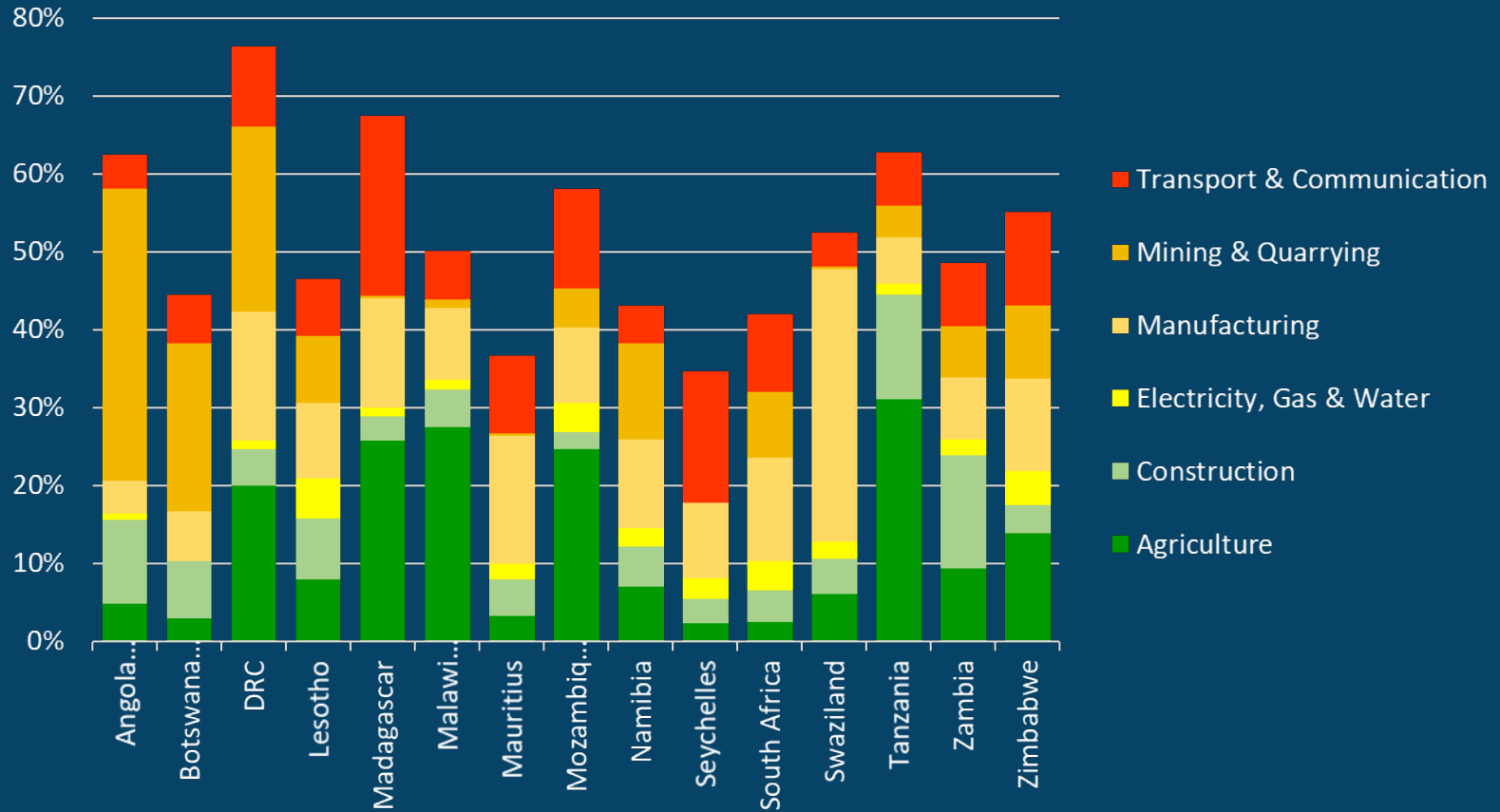
WHY THE STUDY?

- **SADC 2063 Industrialisation Strategy** – do we have enough engineering skills?
- **Infrastructure** – do we have enough economic infrastructure to support industrialisation – how do we deliver?
- **Backlogs** – how do we address backlogs in service delivery to address industrialisation?
- **Assets** – once developed, how do we maintain infrastructure to support industrialisation?
- **Engineering students** – are they being adequately educated?
- **Engineering graduates** – are they being adequately trained to plan, deliver and maintain infrastructure?
- **Engineering experts** – are we using their skills to develop skills, and carry out long-term planning?

OBJECTIVES

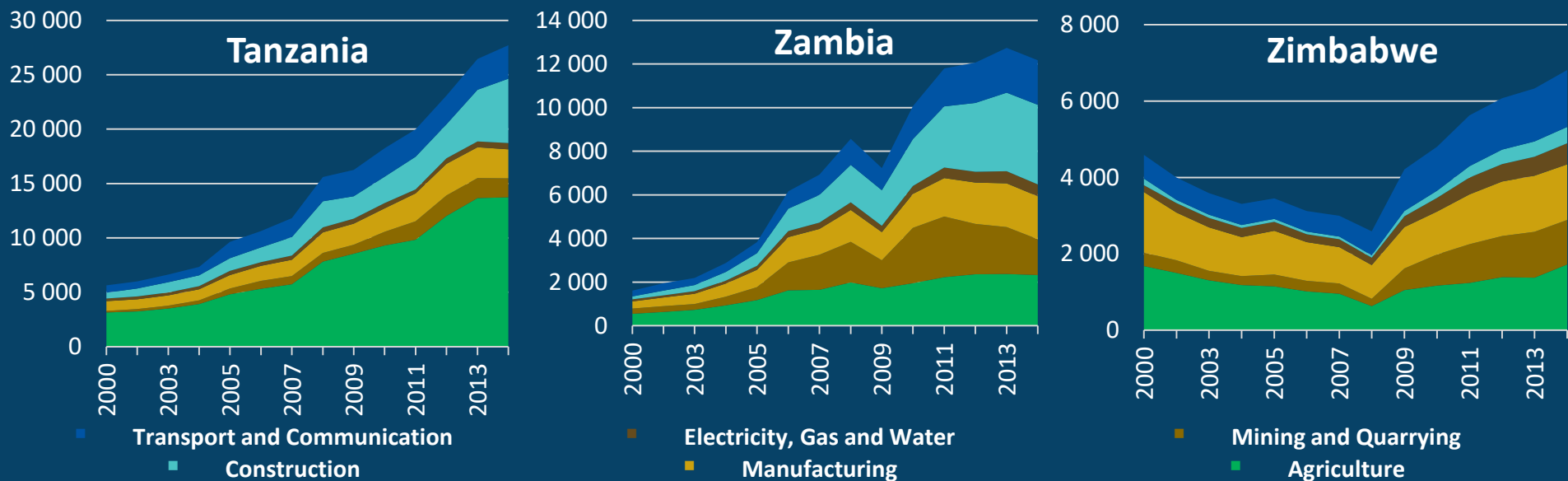
- The overall objective is to get a better understanding of Engineer, Technologist and Technician capacities in SADC to allow for better & implementation of infrastructure programmes to support the SADC Industrialisation Strategy 2063
- The SADC Industrialisation Strategy identifies lack of adequate infrastructure and lack of **adequate skills and capacities** in science, **technology, engineering** and mathematics as among the binding constraints for industrial development
- The outcomes of the study will serve as input towards implementation of key policies and frameworks such as the SADC:
 - Master Plan on Infrastructure Development
 - Protocol on Education and Training
 - Protocol on Science, Technology and Innovation.

ENGINEERING SECTORS' CONTRIBUTION TO THE GDP

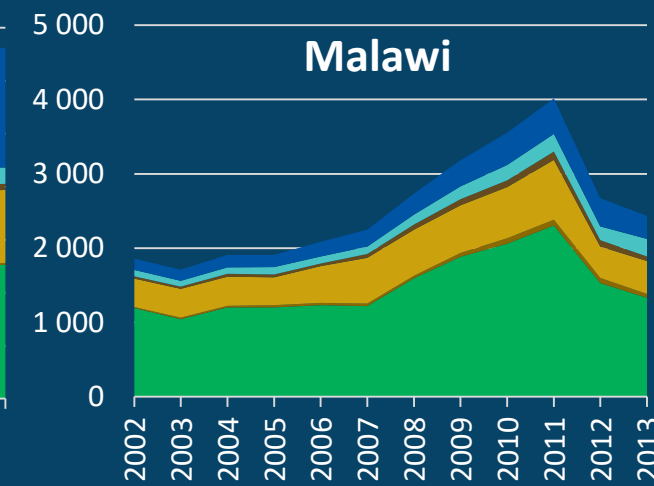
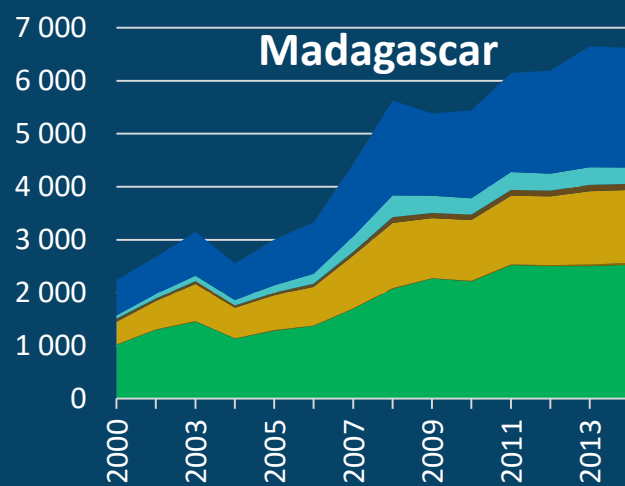
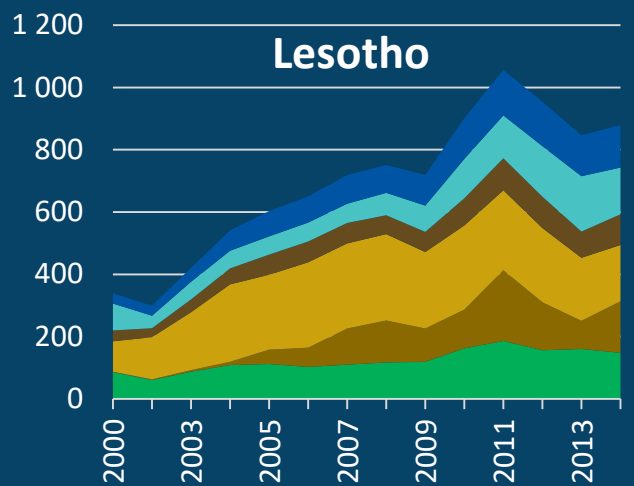
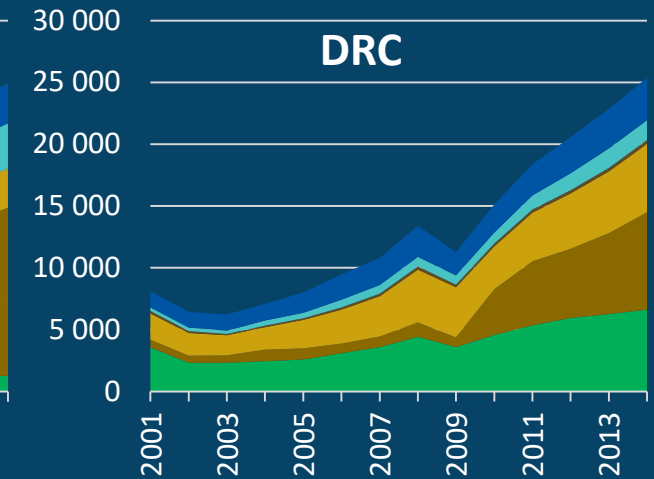
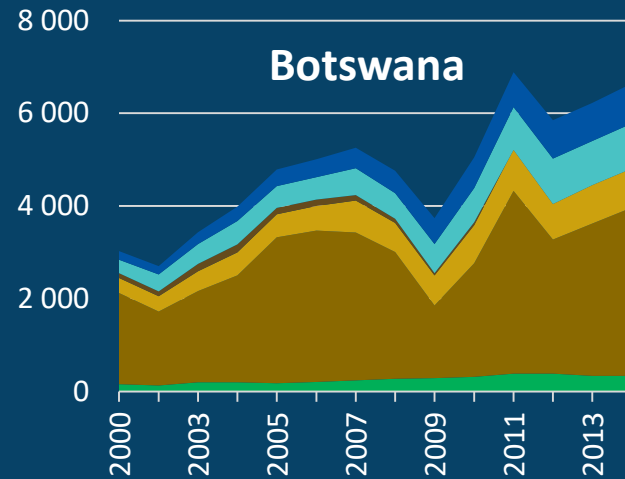
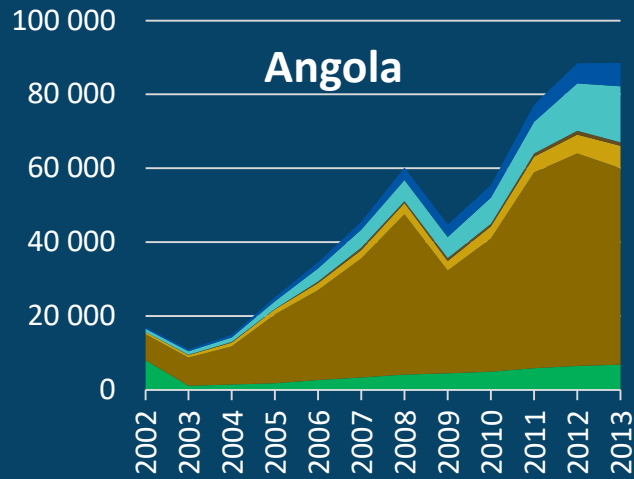


GDP CONTRIBUTIONS MILLION US\$ VARIES PER SECTOR PER COUNTRY

- Note different mix of GDP contributions per country
- Must determine which engineers needed to strengthen, expand or improve efficiency per sector



GDP CONTRIBUTIONS MILLION US\$

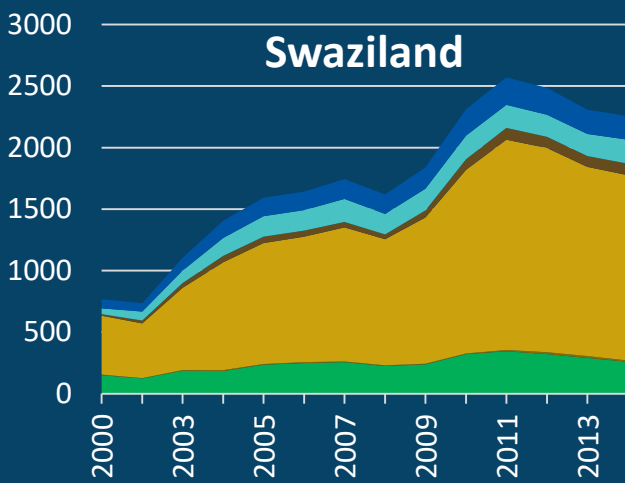
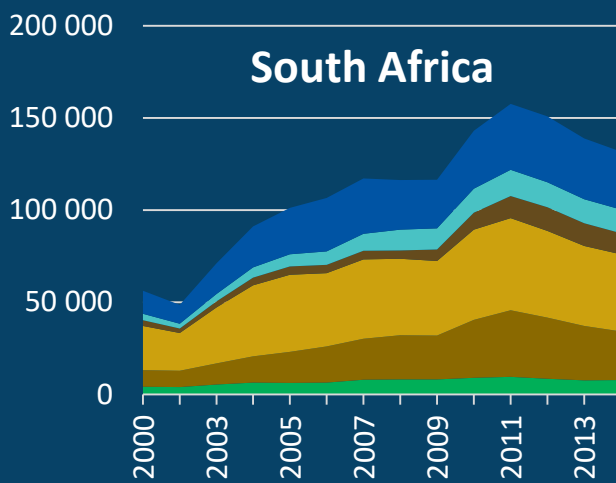
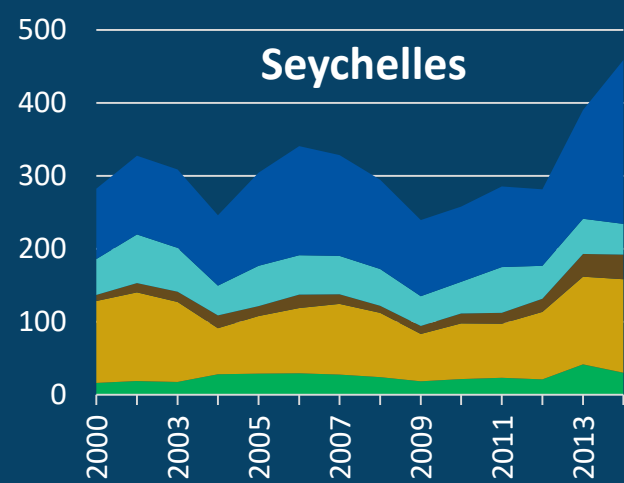
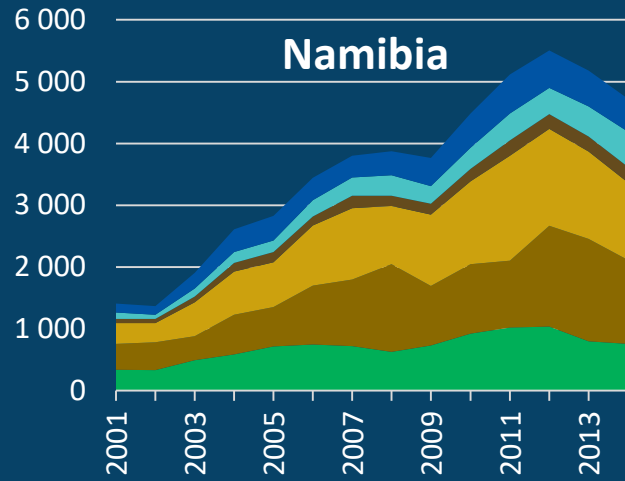
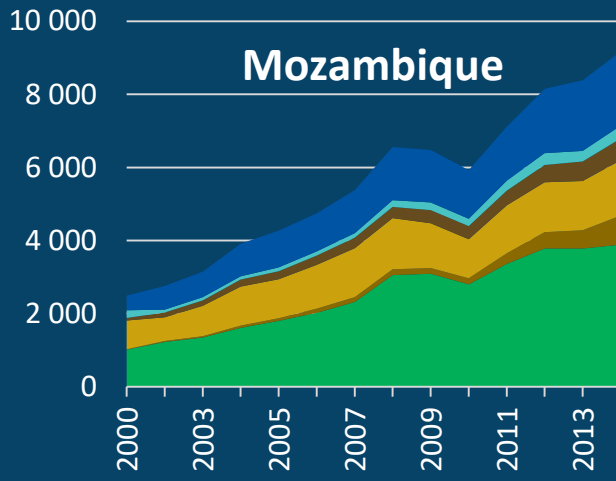
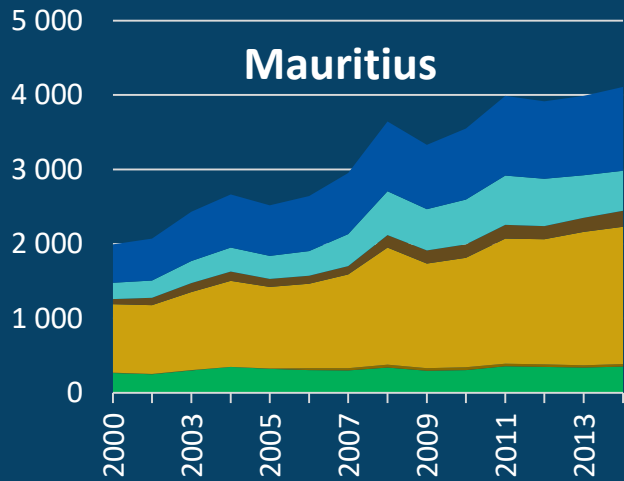


■ Transport and Communication
■ Construction

■ Electricity, Gas and Water
■ Manufacturing

■ Mining and Quarrying
■ Agriculture

GDP CONTRIBUTIONS MILLION US\$



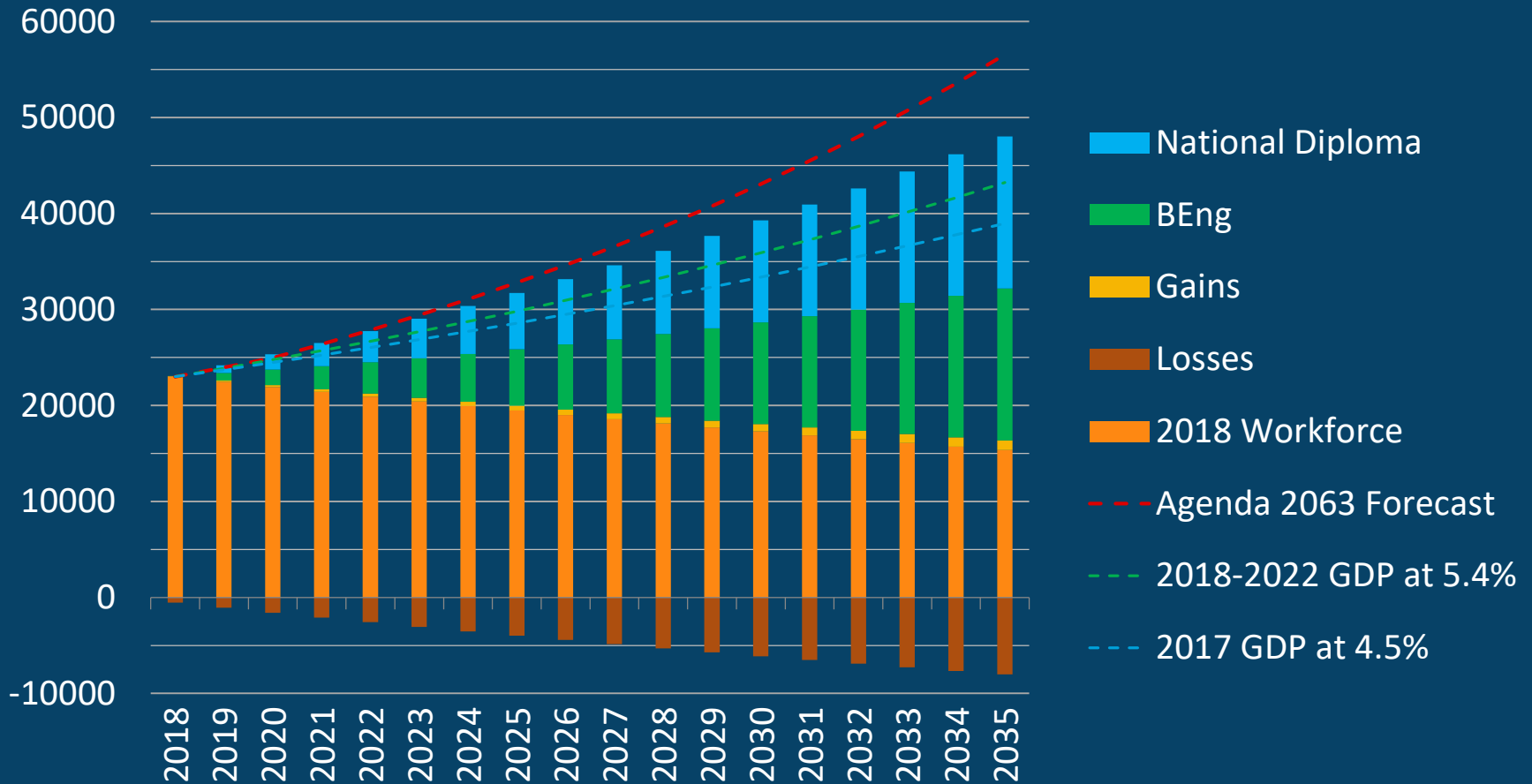
■ Transport and Communication
■ Construction

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■ Agriculture



FLOW OF SKILLS



GDP GROWTH FOR SADC REGION



ELEMENTS OF THE STUDY

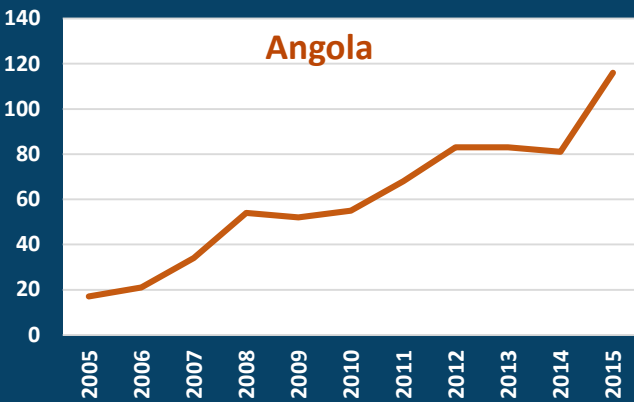
- Determine numbers in the workforce
- Determine needs based on current workload, demands of policies and planned projects
- Determine inflows from higher education and immigration
- Identify successful initiatives in place and understand lessons learned
- Determine gaps and how to address them by following existing successful models, and/or developing innovative solutions

EMERGING TRENDS

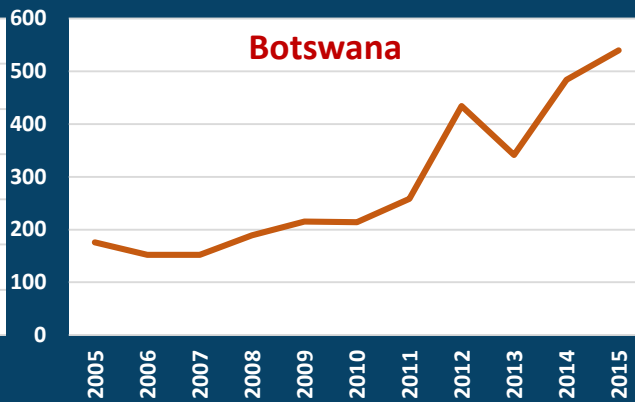


GRADUATIONS ON THE INCREASE

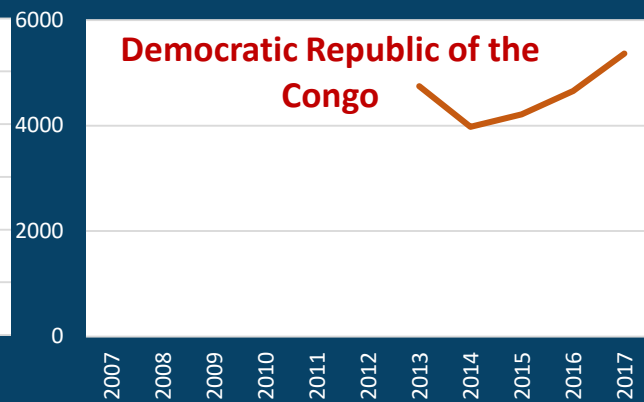
2005-2015



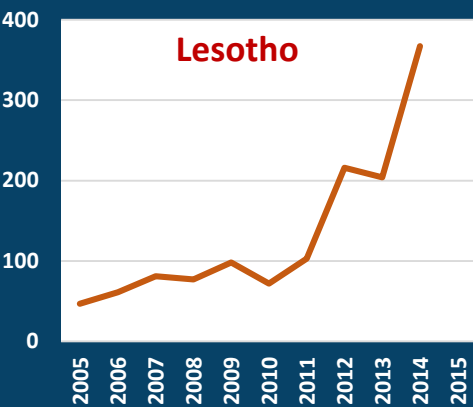
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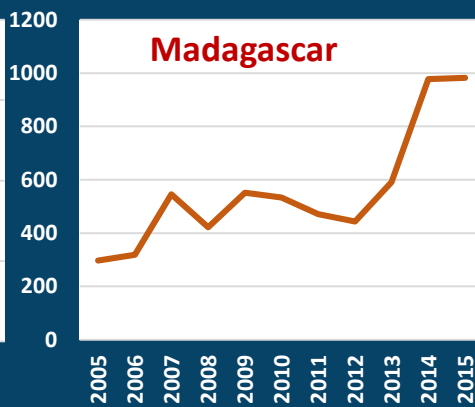
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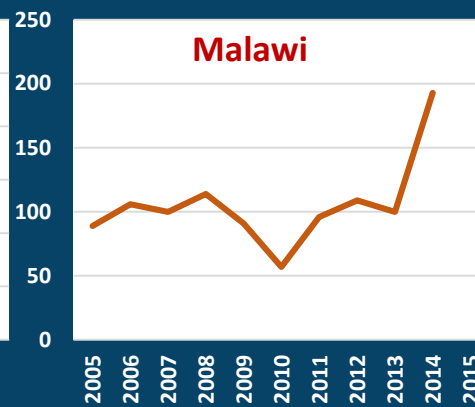
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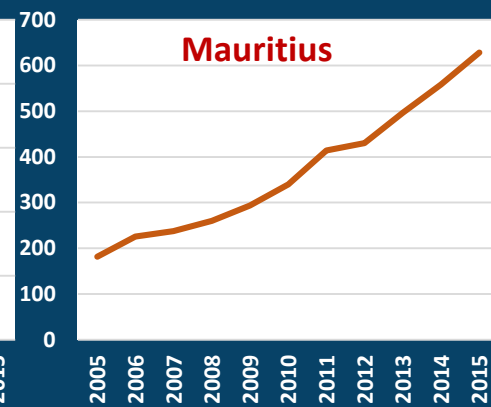
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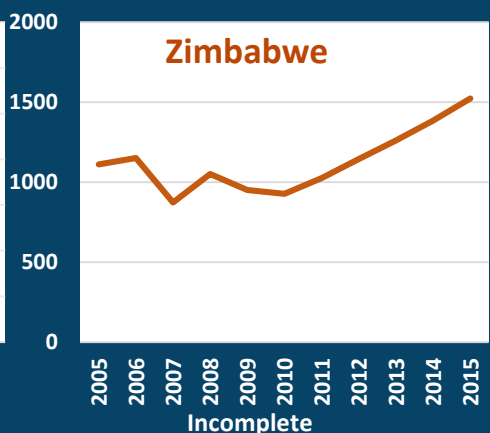
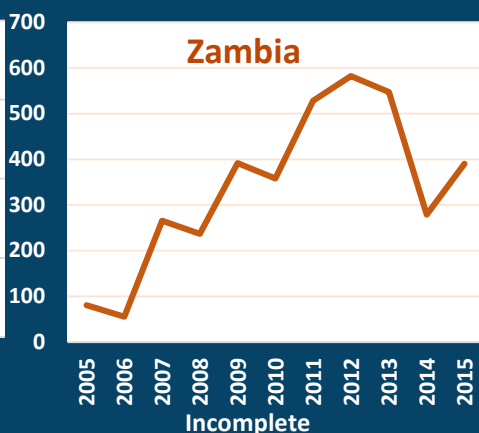
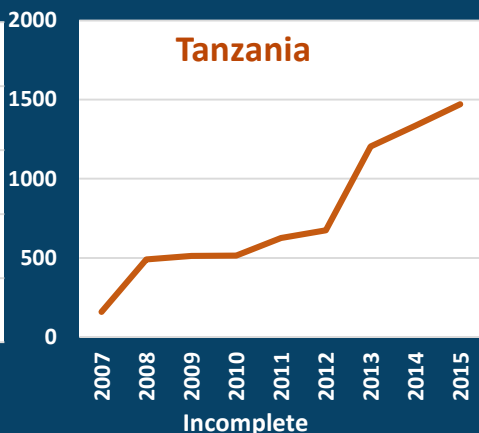
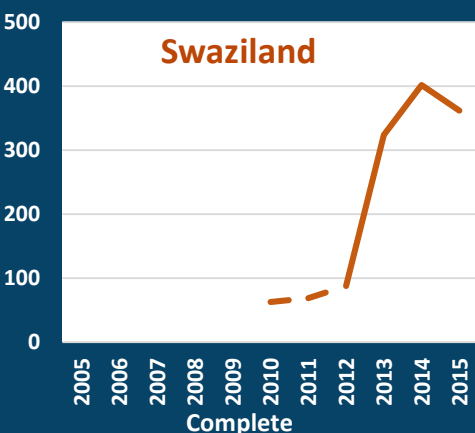
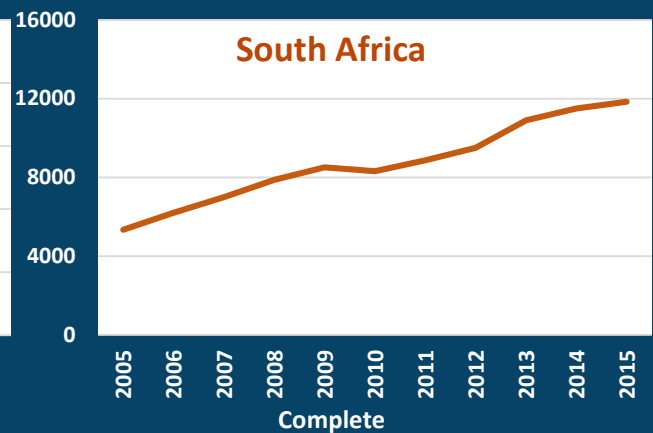
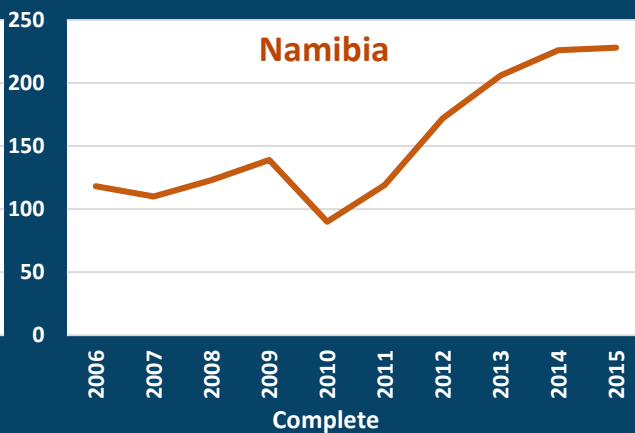
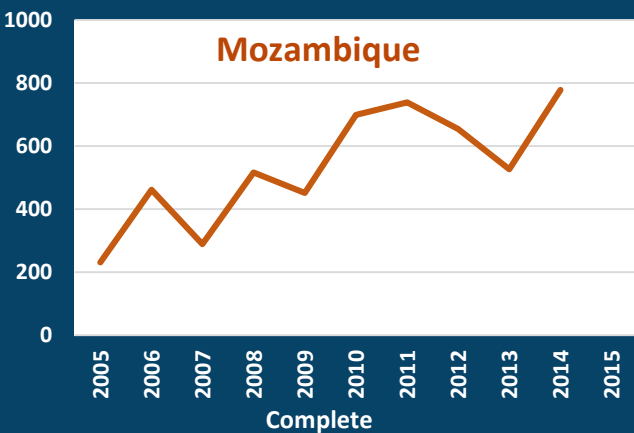


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GRADUATIONS ON THE INCREASE 2005-2015



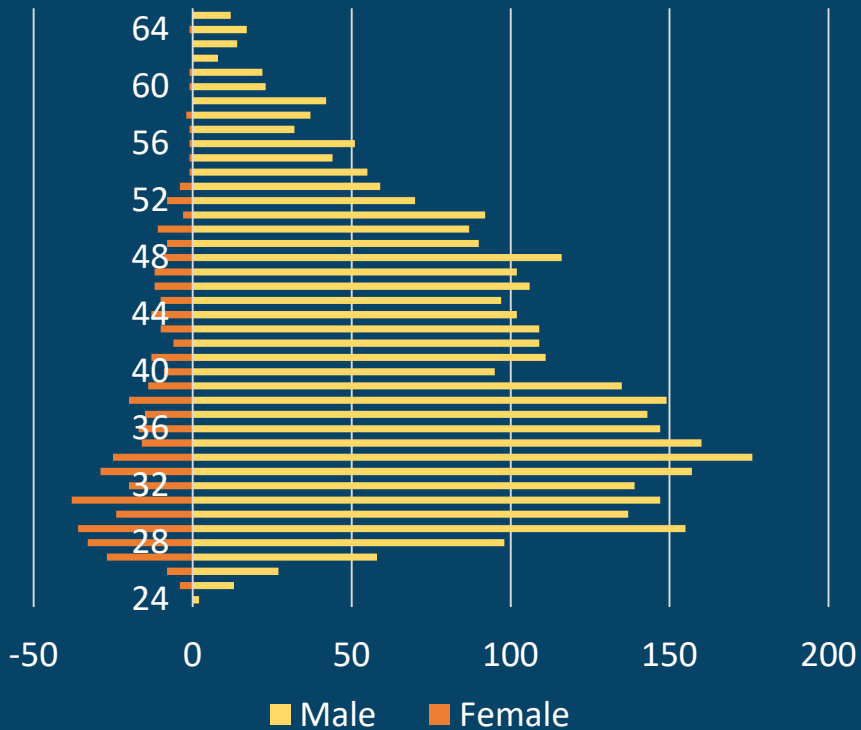
HIGHER EDUCATION – MANY NEW UNIVERSITIES

- In most countries, the number of universities have gone from one or two established universities to 10 or more
- In some countries, colleges have become polytechnics and polytechnics have become universities, so many engineers are being trained but no longer enough technicians
- The number and limited resources and poor quality of graduates has become a problem in terms of employability

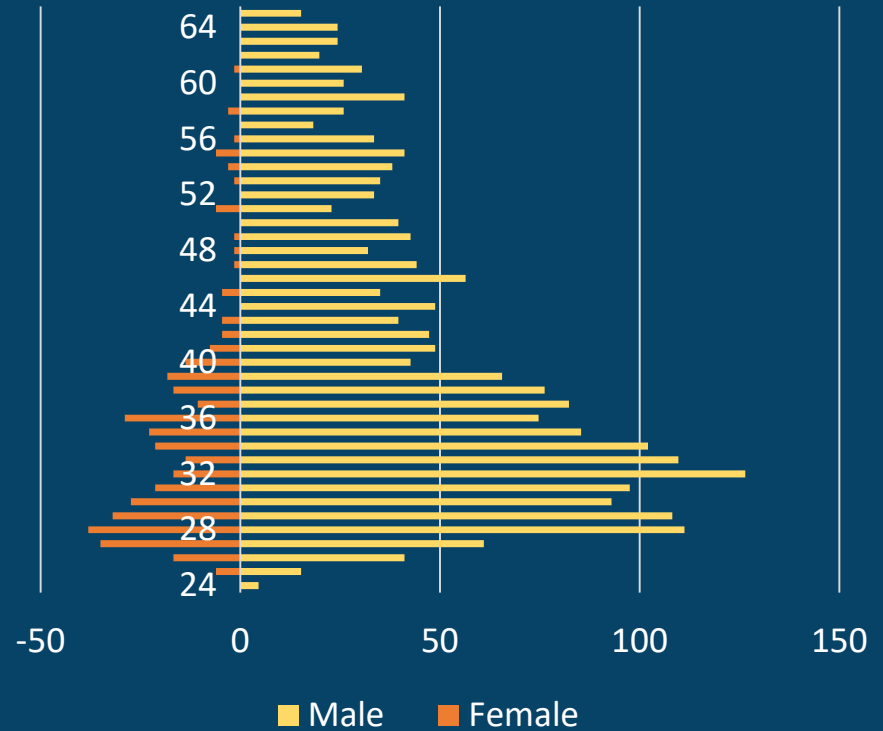
LEVEL & COMPLEXITY OF QUALIFICATIONS INCONSISTENT

- Recognition of qualifications around the region challenging
- Some qualifications not sufficiently complex to be recognised by neighbouring states
- Technician qualifications at different levels – some at ‘A’ level and others above ‘A’ level. Which should they be and what content?
- More applied approaches suggested for technician training
- Consider using guidelines from the International Engineering Alliance for all qualifications – *Washington, Sydney and Dublin Accords*

TOO FEW WITH EXPERIENCE TO DEVELOP GRADUATES



Botswana 2016



Namibia 2017

GRADUATE DEVELOPMENT

- Industry expects graduates to be experienced
- Limited workplace training programmes
- Too many graduates to train
- Funding and programmes needed
- Challenge for seniors to spend enough time with graduates
- Need group approaches to training graduates in the workplace

Ongoing training must be institutionalised – not ad hoc programmes. Apprenticeship and graduate training to become part of all public sector tenders

FORMAL GRADUATE SUPPORT URGENTLY REQUIRED

- **Tanzania** – Structured Engineers Apprenticeship Programme (SEAP)
- **Mauritius** – government funded two years after graduation (only introduced 2016)
- **South Africa** – training of graduates and apprentices to be quoted as part of all public sector projects
- **Angola** – oil industry to train as part of their licences with government
- **Mozambique** – private university offering employability workshops (£20 – 24 hours applied problem solving)
- **Electricity parastatals** – generally still developing graduates, but very procedural

Need more problem solving, challenging approaches to development!

REGISTRATIONS INCONSISTENT IN SADC

Country	Professionals	Contractors	Consultants	Engineers	Techno	Techni	Cert
Angola	After graduation - simply a licence to practice – based on passing an accredited degree	✓	X	3 656 OEA		100 APET	
Botswana	✓	X	X	1272	123	357	
DRC	X – wanting to implement a registration process – busy with documentation	X	X				
Lesotho	X – want to implement registration – busy with Bill which they hope will go through parliament this year for all 3 types of registration	X	X				
Madagascar	Graduation plus one year in practice – not competence based, only time in the workplace	X	X	1 000			
Malawi	✓	✓	✓	565	131	339	
Mauritius	✓	✓	✓	894			
Mozambique	✓	✓	X	1 586			
Namibia	✓	X	X	506	201	102	
Seychelles	X – only ~500 engineers and technicians in total - considering registration for alignment	X	X				
South Africa	✓	✓	X	16 526	5491	5214	1 076
Swaziland	2013 Act – now ~70 registered - going slowly as they develop all the material and criteria	✓	X	~70			
Tanzania	✓	✓	✓	5 389	284		455 (CE)
Zambia	✓	✓	✓	2 066	566	483	
Zimbabwe	✓	Under development	X	785		126	

LIMITED CONDITIONS IN SERVICE PROVIDER CONTRACTS

Conditions of contract need to be reviewed and enforced on contracts awarded to service providers

- In terms of international service providers, designs to be checked and approved by local engineers and calculations and operating manuals to be provided in official language
- Graduates, technicians and trades to be trained in structured manner on all contracts and training to be monitored
- Local labour and materials to be used
- Turnkey projects do not allow for local supervision and enforcement of quality solutions

Set resource & training requirements in ALL public sector projects

PUBLIC SECTOR CAPACITY CHALLENGES

- Most Ministries report vacancies
- Low salaries, and in some cases a moratorium on appointments are a challenge in terms of filling vacancies
- No capacity to plan or manage service providers, who have free reign which impacts on the quality delivered and final cost
- ‘Savings’ also cost countries a lot in terms of neglect of infrastructure
- Public sector staffing reducing, while number of graduates continue to increase

Reappoint and introduce graduate training programmes in ALL public sector structures

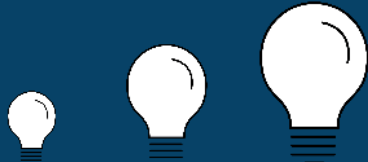
DEVELOPING SKILLS NOT NECESSARY IF NO INVESTMENT

- How to raise funds to develop economic infrastructure?
- Without roads, rail, energy, water, ports, manufacturing or mineral beneficiation cannot happen
- Maintenance must become part of the culture!
- Enforce payment for services – not popular but cannot continue to offer free services when many can afford to pay – what about tolls – a culture shift needed??!!
- Engineering professionals need to play a more substantial role in national leadership structures!

DATA REQUIRED

WHAT TARGETS ARE SET AND WHAT PROJECTS PLANNED?

24% 75% 100%



2013 2033 ???

Access to electricity

56% 90% 100%



2015 2025 ???

Access to water

16% 75% 100%



2015 2019 ???

Access to improved sanitation

Electrification targets

Year	2016	2020
Installed Generation Capacity	?? GW	?? GW
Transmission Infrastructure	?? km	?? km

Road and rail targets

Year	2016	2020
Roads	?? km	?? km
Rail	?? km	?? km

ICT

Year	2016	2020
Mobile connections	??	??
Internet users	??	??

Growth in the mining sector

Year	2016	2020
	\$??	\$??

Growth in agro-processing & the manufacturing sector

Year	2016	2020
	\$??	\$??



What about housing?

**Please come and share
your ideas, discuss your
country and assist with
outstanding data!**

(NB: moratorium on distribution of presentation)

THANK YOU FOR YOUR ATTENTION