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# THE CASE FOR QUALITY IN THE PROCUREMENT OF CONSULTING ENGINEERING SERVICES

# CONTENTS

**DEFINITION OF QUALITY**

**DEFINITION OF ENGINEERING**

**HOW ARE WE DOING**

**HOW TO ACHIEVE QUALITY**

**CONCLUSIONS**

# ISO 9001: QUALITY

- The *quality* of something can be determined by comparing a set of inherent characteristics with a set of requirements.
- If those inherent characteristics meet all requirements, high or excellent quality is achieved. If those characteristics do not meet all requirements, a low or poor level of quality is achieved.
- *Quality* is, therefore, a question of degree. As a result, the central quality question is: How well does this set of inherent characteristics comply with this set of requirements?
- *Quality* is always *relative to* a set of requirements and cannot be established in a vacuum.

# Types of Quality

- **Internal quality**
  - Improving internal operation
  - Beneficiaries - company's management and employees
- **External quality**
  - Clients Satisfaction
  - Beneficiaries - clients and external stakeholders
  - Listening to clients and also allow for implicit needs that are not expressed by clients

# Purpose of Quality

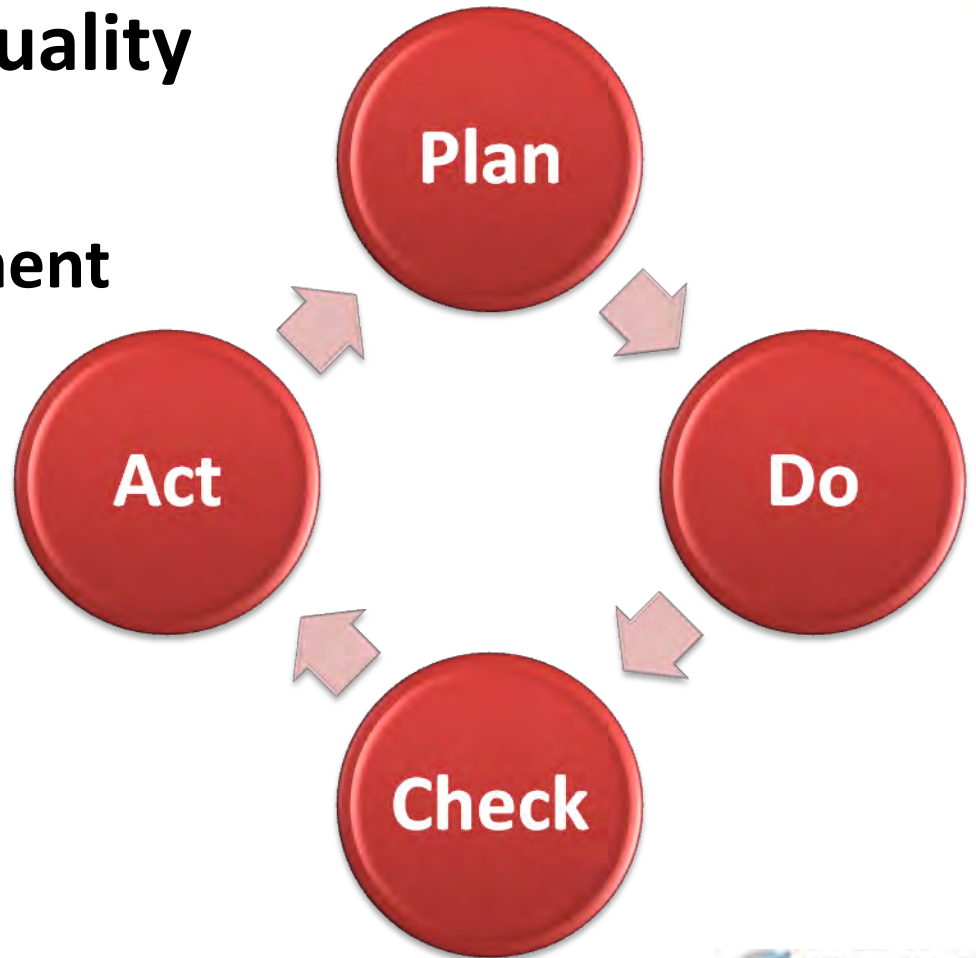
- To provide a suitable offer at a reasonable price
- While improved quality does not always mean a higher cost, the closer you get to perfection, the higher the costs reach
- It is not really a question of "zero defects" but rather of meeting the requirements better than the competition
- In the public sector, quality reveals whether public funds are being used expertly in providing a service that is adapted to citizens' expectations

# Cost of Defects

- The opposite of quality - defects have a cost
- It is generally more costly to correct defects or errors than to "do it right" from the beginning.
- The later the quality defect is detected the higher the cost
  - Producer cost to rectify
  - Client and stakeholder cost to live with the defect or repair it

# Continual Improvement

- **Basic principles of quality**
  - Prevention and
  - Continual improvement
- **PDCA model:**
  - Plan
  - Do
  - Check
  - Act



# What is Engineering

- **Engineering is the science, skill, and profession of acquiring and applying scientific, economic, social, and practical knowledge, in order to design and also build structures, machines, devices, systems, materials and processes.**



# Wikipedia on Engineering

- Engineers use their knowledge and appropriate experience or tacit knowledge to find suitable solutions to a problem.
- Creating an appropriate mathematical model of a problem allows them to analyze it (sometimes definitively), and to test potential solutions.
- Usually multiple reasonable solutions exist, so engineers must evaluate the different design choices on their merits and choose the solution that best meets the requirements.
- Engineers typically attempt to predict how well their designs will perform to their specifications prior to full-scale production. They use, among other things: prototypes, scale models, simulations, destructive tests, non-destructive tests, and stress tests.
- Testing ensures that products will perform as expected.
- Engineers take on the responsibility of producing designs that will perform as well as expected and will not cause unintended harm to the public at large. Engineers typically include a factor of safety in their designs to reduce the risk of unexpected failure. However, the greater the safety factor, the less efficient the design may be.

# **Act 46 of 2000**

## **The Engineering Profession Act**

- **“Professional” means a person who is registered in terms of the Act**
- **Disciplinary Procedure**
- **Identification of work**
- **Code of conduct**
- **Code of practice.**

# Two important concepts

- **Quality**
- **Engineering**
- **Why do we want quality engineering?**
- **Do we need local capacity?**

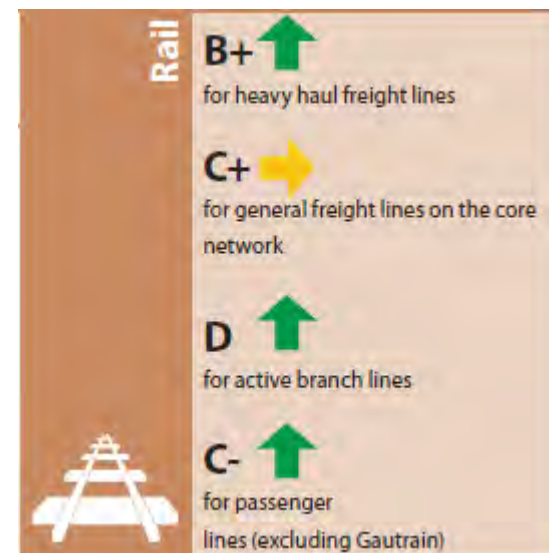
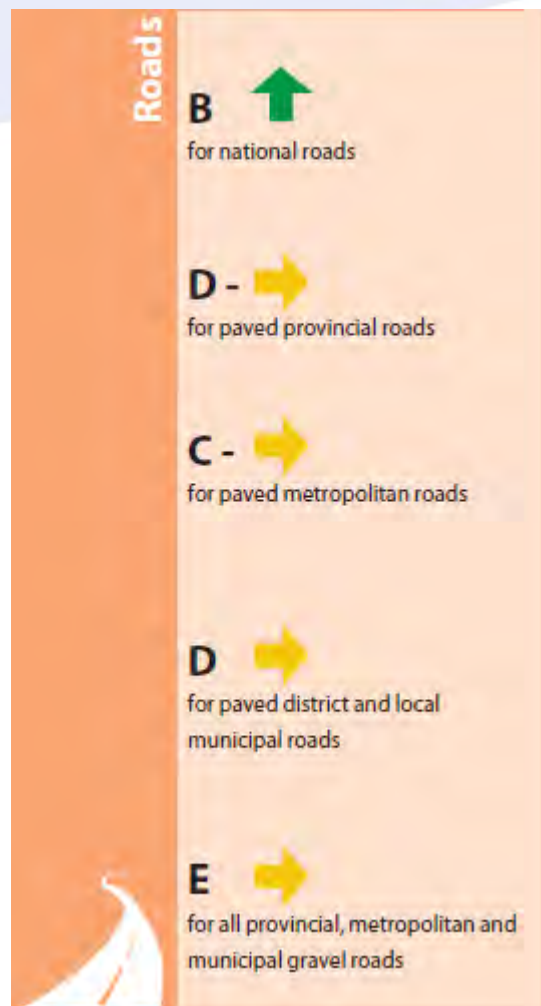
# **Benefits of Good Local Engineering**

- **Quality of Life – Our responsibility**

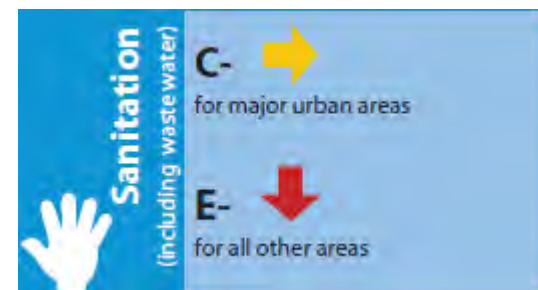
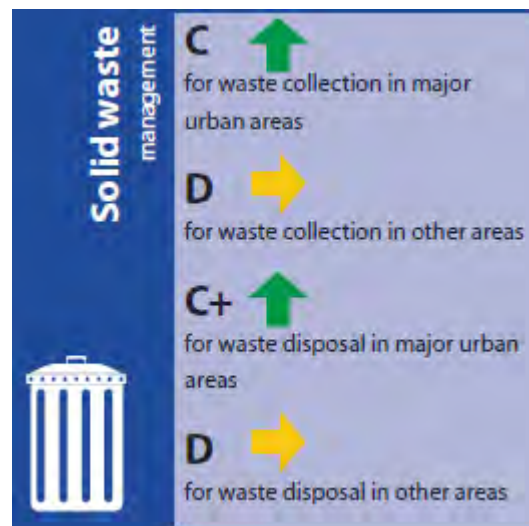
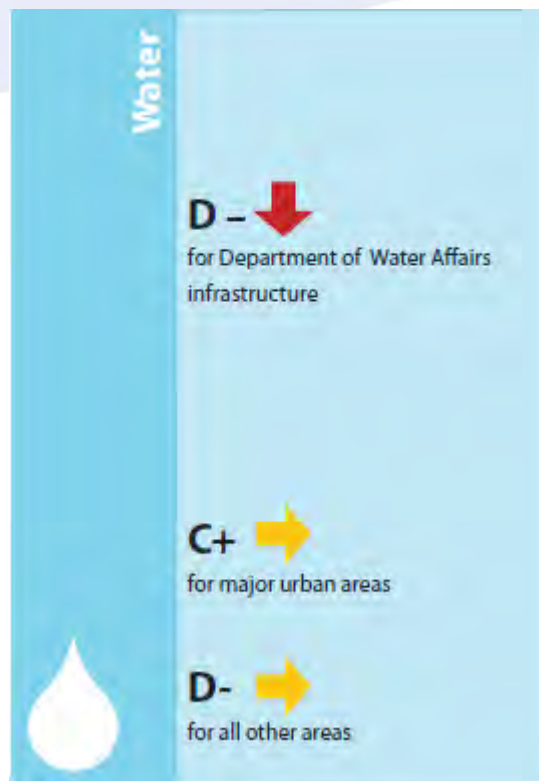
# Quality of RSA Infrastructure

- **SAICE Report Card 2011**
- **Ours is a developing nation, and our engagement in the global economy is constrained by our infrastructural capabilities.**
- **The challenges posed in this report are no less acute because they are chronic, but they can be overcome given the same dedication and ingenuity that we applied to the challenge of the World Cup.**
- **We hope that this report and discussions arising out of it will provide impetus for such action.**

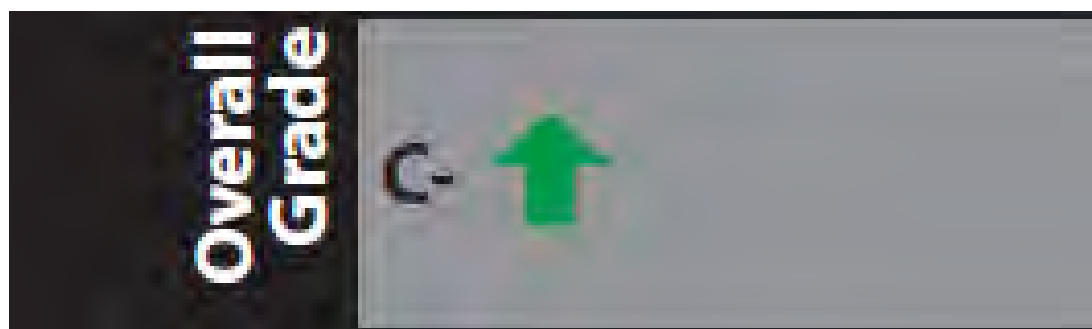
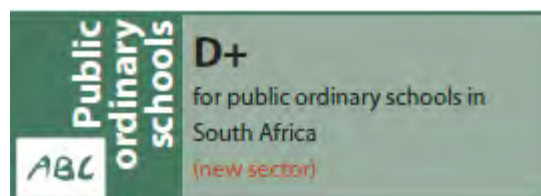
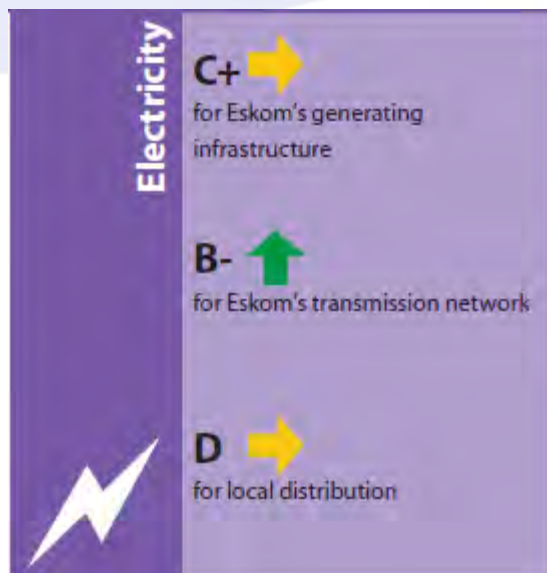
A	B	C	D	E
WORLD-CLASS	FIT FOR THE FUTURE	SATISFACTORY FOR NOW	AT RISK	UNFIT FOR PURPOSE



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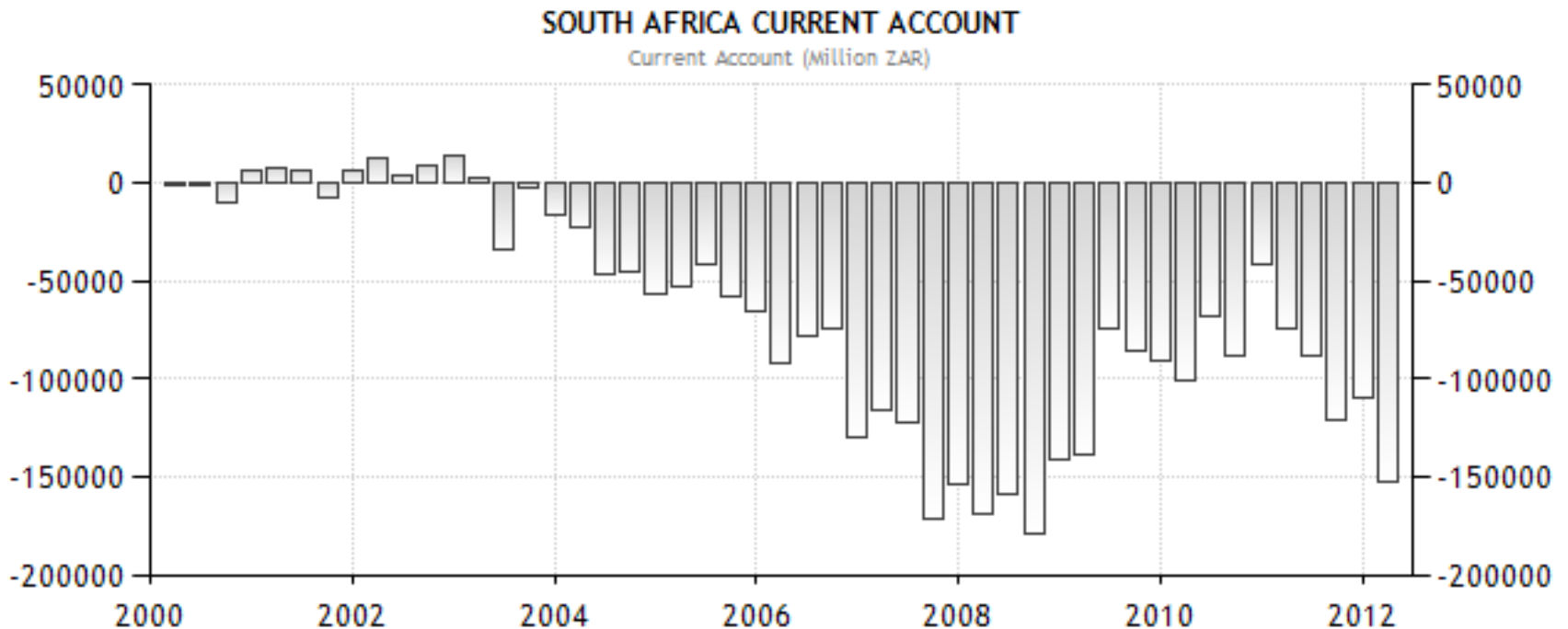
# National Development Plan

- Increase employment and raise per capita income
- Increase the share of national income of the lowest earners
- A competitive base of infrastructure, HR and regulatory frameworks.
- Skilled people better reflect demographics and broaden ownership
- Increase the quality of education and access to quality health care
- Establish effective, safe and affordable public transport.
- Energy at competitive prices while reducing carbon emissions by one third.
- Ensure access to clean running water
- Broadband internet universally available at competitive prices.
- A food trade surplus, of which 1/3 produced by small-scale farmers
- A social security system and realise a developmental, capable and ethical state
- All people live safely - independent and fair criminal justice system.
- Broaden social cohesion
- A leading role in continental development, economic integration and human rights.

# National Development Plan

- **Public infrastructure investment at 10 percent of GDP, financed through tariffs, public-private partnerships, taxes and loans**
- **Focused on transport, energy, water and freight.**
- **Interventions to ensure environmental sustainability and resilience to future shocks.**
- **New spatial norms and standards - densifying cities, improving transport, locating jobs where people live, upgrading informal settlements and fixing housing market gaps.**

# BALANCE of PAYMENTS



SOURCE: [WWW.TRADINGECONOMICS.COM](http://WWW.TRADINGECONOMICS.COM) | SOUTH AFRICAN RESERVE BANK

# Conclusion

- It is obvious that we need good quality engineering and extensive local participation to ensure
  - that local solutions are created to improve infrastructure and
  - to assist in the creation of local jobs and
  - retaining money in our economy

# **Therefore: What is quality in the context of consulting engineering in South Africa.**

- **To develop local engineering knowledge and experience that enables us to implement, operate and maintain local infrastructure that will improve the well being of our citizens through:**
  - **Ensuring appropriate, cost-effective works**
  - **Maximising use of local resources**
  - **Driving direct and indirect job creation**

# How do we do this

- **Create procurement systems and procedures that encourage the development and implementation of quality consulting engineering**
- **If you want a certain type of behaviour – no matter how professional we purport to be – build a system that rewards the type of behaviour you want**

# Procurement Procedures

- **QCBS**
- **QBS**
- **Framework Contracts**
- **Time and Cost**
  
- **PDCA**

# Client Needs

- **Less work on procurement and more on managing the design development and construction monitoring and administration**



# Procurement Systems

- **How do we ensure that procurement advances quality**
- **Current systems do not advance quality – only recognise current levels of expertise and experience**
  - Requirements are not properly set out
  - Track record only requires details of work completed not quality of work
- **Current systems do not target the development of quality**

# Essential Elements

1. Fair, equitable, transparent and cost-effective
2. Quick and easy to apply
3. Registers of qualified and aspiring firms
4. Appropriate calls for tenders to minimize cost
  - a) Appoint from registers on a time and cost basis for all projects of <R2m and for non-quantifiable projects
  - b) Three bidders for Project Fees < R50m
  - c) Six bidders for >R50m
5. Monitor value received
6. Carry out merit evaluations on completion of all projects
7. Inform firms of merit rating
8. Monitor success of system as a whole in value received
9. Adapt systems to encourage desirable behaviour

# Essential Elements

- **Larger projects require**
  - **Clear scope of work and services required**
  - **Clear technical requirements or code of practice**
  - **Include developmental and training points**
  - **Set minimum qualifications and experience for the project**
  - **Merit scores taken into account**
  - **Indicate intangible requirements**
  - **Objective and subjective tender assessment**
  - **Client BM cost to assess offers**

# Benchmark Price Models

## ECOSA Latest Guidelines

- Time and Cost guidelines
- Guideline range for % fees per project type
- Adjustment for
  - General cost influencers
  - Project type cost influencers
- Assess and determine client BM price
- Assess prices offered and
  - Reject tenders where price <75% of client BM
  - Interview tenderers where price <85% of client BM

# Procurement of Cars



	<b>Toyota Hilux</b>	<b>Mahindra Genio</b>
Engine	2.5 Turbo Diesel	2.2 Turbo Diesel
Power	75 kW	88 kW
Warranty Distance	100000km	100000km
Service Plan Years	5	3
Price	R 207 000	R 150 000
Sales/Month	3724	238

# Merit Ranking

**Project  
Management (Time  
constraints HO  
Support etc)**

**Issue Identification  
and Resolution  
(Early ID,  
innovation)**

**Communication and  
Coordination  
(Proactive Client,  
Stakeholders)**

**Quality of Design,  
(Creativity etc)**

**Administration  
(Records, VO's etc)**

**Recognition of Cost**

# **Tender Evaluation**

- **The quality and capacity of evaluators is critical**
- **Not only a local problem**
- **Appoint one or two consultants from the register to prepare ToRs, assist in managing the process, for as long as desired, on a time and cost basis**

# Systems



# **Peter Senge – The Fifth Discipline**

- **The dimension that distinguishes learning organizations from more traditional organizations is the mastery of five basic disciplines or ‘component technologies’**
  - 1. Personal mastery**
  - 2. Mental models**
  - 3. Building shared vision**
  - 4. Team learning**
  - 5. Systems thinking**

# Systems Thinking

- **Simply put, a system is an organized collection of parts (or subsystems) that are highly integrated to accomplish an overall goal. The system has various inputs, which go through certain processes to produce certain outputs, which together, accomplish the overall desired goal for the system.**

# How do we improve quality?

## 1. Organisations' Internal Quality



# How do we improve quality?

## 2. External Quality or Client Requirements



# Improve Professionalism and Knowledge



## Professional Registration Boards

- Quality of education
- Registration Requirements
- Codes and Disciplinary Procedures



## Business Associations

- Criteria for Membership
- Voice of Industry
- Codes of Ethics



## Engineering Institutions

- Collate collective experiences
- Professional growth



# Incentives

- **Explicit requirements of quality**
- **Understanding of what is required to achieve quality**
- **Progression of quality**
- **Appreciation of quality of work**

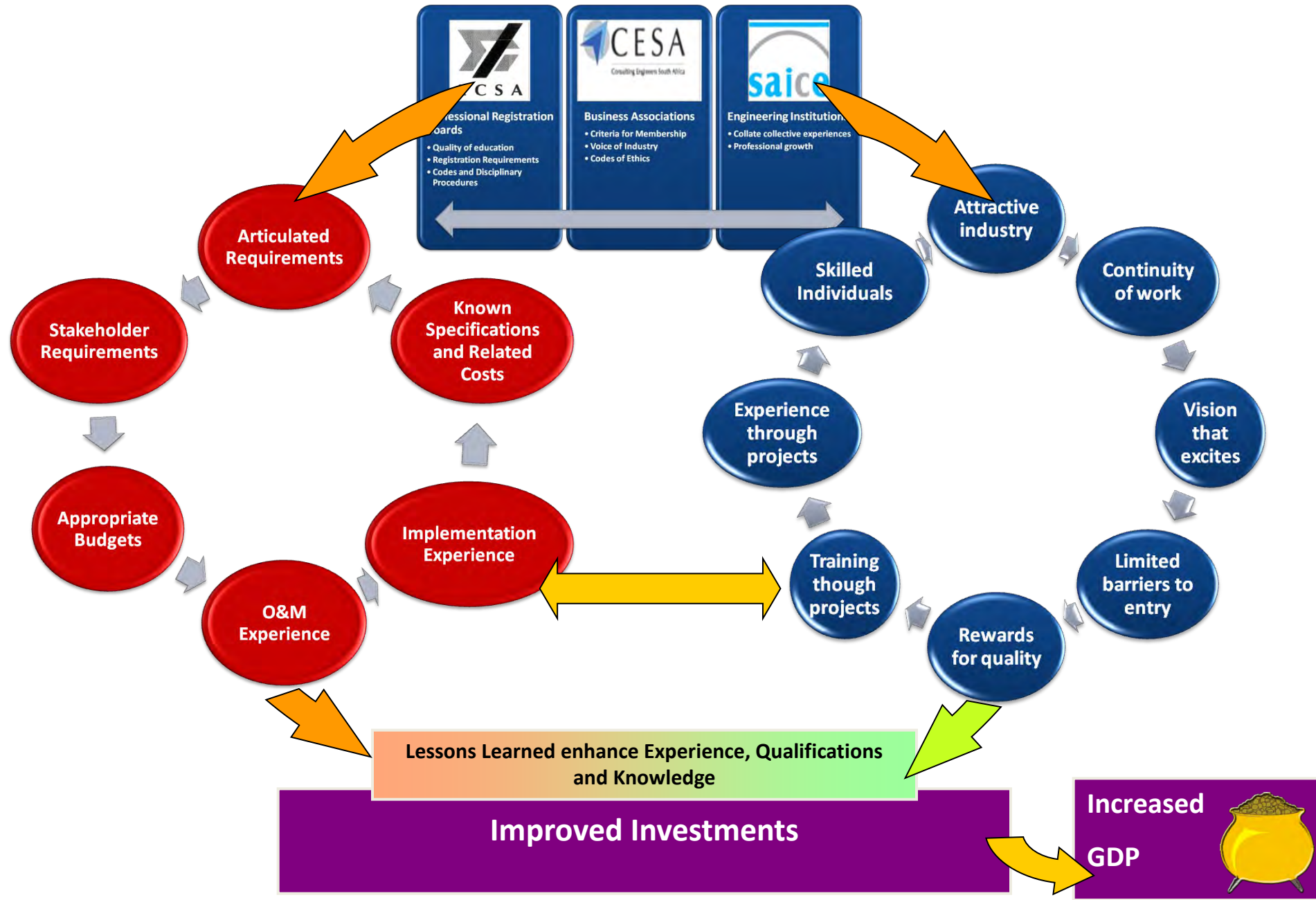
# Note

**The development of people and institutions comes before the development of infrastructure!**

**Competitiveness in Consulting Engineering is about the quality of work produced and not cost**



# Capacity Development Framework for Professional Engineering





# Conclusions

**Quality entails many things**

**Good engineering is essential for quality of life**

**We have not done too well in the recent past**

**Good quality procurement is the answer**

**Procurement is a complex system and needs to be handled with due care and attention**

- **Thank You**