



World Federation of Engineering Organizations  
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# Exploring Engineering Regulatory Policies for Engineering Professions in Africa

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# Constraints and Issues

- No. of Graduates in Engineering
  - Several Countries have a low number of Graduates
  - Sub-Saharan Africa (1 Engineer to 6000 persons vs countries that have 1 Engineer to 200 – 800 persons)
  - Some Countries have Surplus / and deficiencies in certain area of Specialisation
- Recognition of Professional Standards and Educational Standards - Inconsistent Quality Standards of Graduates Around the World
- And hence the Lack of Acceptance for Mobility
- Lack of Regulatory Intuitional Capacity to Regulate the Engineering Profession



# Understanding the Flow

1. The role of Engineering in Socio-Economic Transformation
2. Building Engineering Capacity and Capability
3. Transforming Engineering Capacity into Products and Services with Impact
4. The need for Policy



# The Need for Policy

- Every Nation or Country plans for what it believes is in the best interest of its developmental context, and its national positioning in the world, for national economic growth
  - Mainly based on the positioning of its human capital and natural resources
- Is this the best way to plan for Human Capacity
  - Eg. Smaller Countries Vs Larger Countries (population) – Can we afford to build human capacity in all areas of specialization
  - Solution is to development capacity utilising the network of specialization capacity building model, combined with the centres of excellence model
  - The need for partnerships
- Human Capacity Building has to be linked to the strategy and plans of a nation and policy makers. Is there a world strategy accepted and supported by all nations – The UN Sustainable Development Goals?



# Why Regulation

- Protection of Public Health and Safety
- Trust in the Professionals and quality of Work
- Ethical Considerations Monitored and evaluated
- Mobility



# Regulation by Whom

- Self-Regulation
  - Regulated by the Profession / Industry
- Government / State Regulation
  - Regulated by the Government



# Self-Regulation Vs State Regulation

- Influence
- Co-regulation?
- Ethics
- How



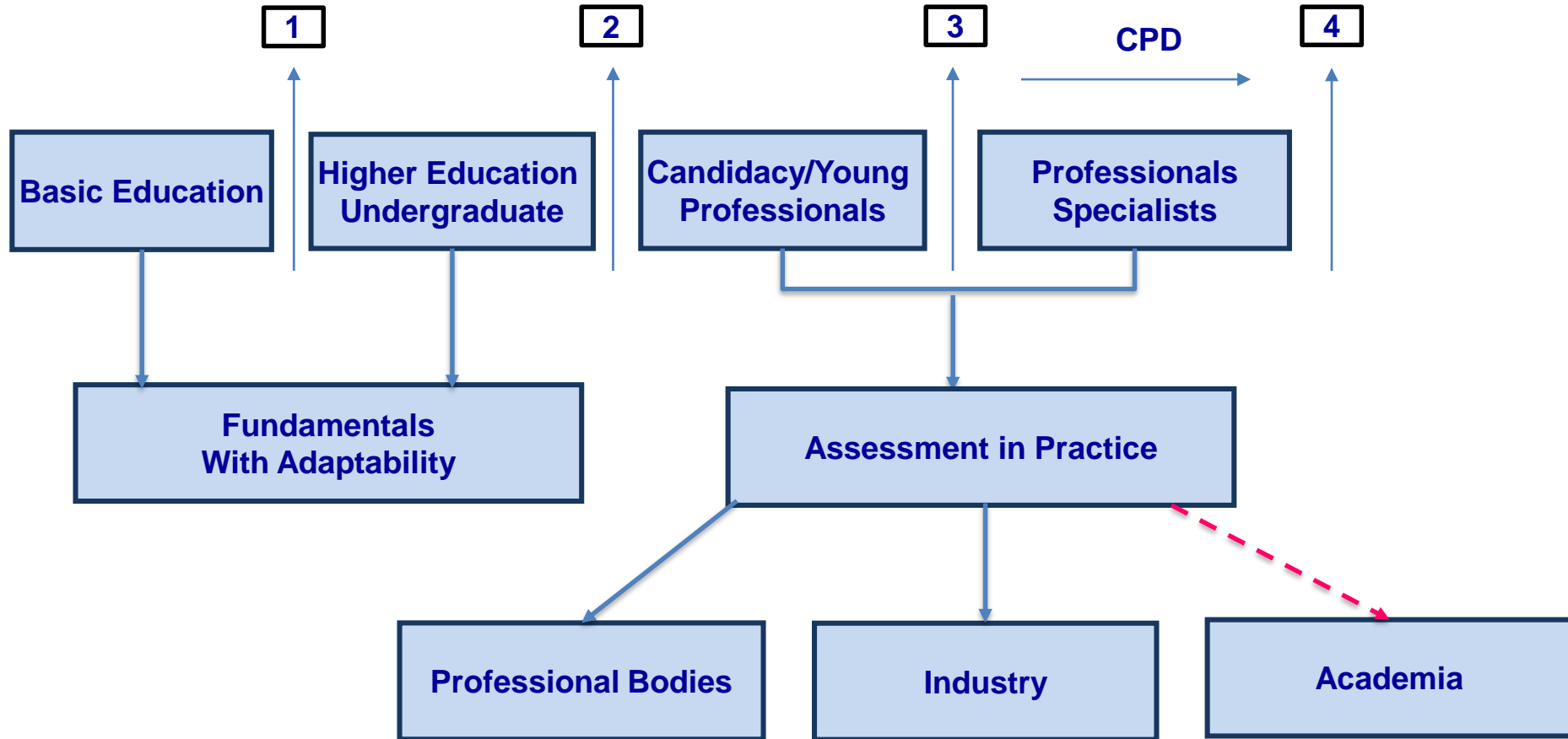
# How to Regulate

- Individual Regulation
  - Development and Acceptance of Competency Standards for the Profession for all levels of Professionals
  - Assess the individual professional against competency standards or
- Organisational Regulation:
  - development of appropriate standards and regulatory requirements
  - Assess the organizations capacity to and regulatory systems to manage engineering outputs through licensing – and allow self regulation





# Stages of Individual Regulation





# How are Standards Created and Developed

- Most countries who regulate – regulate the competency in two stages
  - Regulate the Graduates – Undergraduate studies
  - Regulate the competency of the individuals
- Another method is to regulate the at organizational / company level – license to organisations – who regulate the individuals



# Rationale for Standards

- Internal regulation
- Mobility across nations



# How to Regulate Standards- Philosophies

- Regulation of the profession in terms of Scope (Attributes, eg, complexity,...)
- Regulation of Type – At Technology level, or below – Whether individual can make applications within a specialized area eg Nuclear
- Reservation of Work



# International Engineering Alliance: Graduate Attributes

- Washington Accord
- Sydney Accord
- Dublin Accord



# Professional Competence Profiles

1. Comprehend and apply universal knowledge
2. Comprehend and apply local knowledge
3. Problem Analysis
4. Design and Development of Solutions
5. Evaluation
6. Protection of Society (Social, Cultural, Environmental)
7. Legal and Regulatory



# Reservation of Work

- If Scope is used, it means the matters of ethics apply, where a professional self-determines whether he can apply himself in a specific area or technology in terms of scope and depth
- If Type is used– The individual can only apply himself within a certain area, or technology – if the regulation system determines that



# Reservation of Work

## For Scope –

Pros: Easier to implement – Less costly

Disadvantage: Ethics, and dependency on individual decisions and discretion, Unable to determine precisely reservation of work

## For Type

- Pros: Better indication of reservation of work per technology area. Does not depend solely on individual discretion
- Disadvantages: Expensive, limits scope of work





# The Changing Context

- Timing
  - Do we really know what we need now?
    - Where do we get this information from?
    - How do we get to ask the right questions to attain this?
  - Do we know what we need in the future?
- Building Human Capacity takes time and we need to pace what we need to address in the short, medium, and long term



# The Changing Context

- Technology Explosion
- Interconnected World
- New Reality
- New Opportunities
- Required Competencies
- How do we prepare for this



# Capacity Building Disrupters

- Human Positioning with Technology
  - What we do? – New Skills
  - How we do things? New competencies
- What competencies do we develop?
- How we develop these competencies?
- How do we prepare for this development?



# Alignment to International Standards: International Engineering Alliance

- Mobility
- Education Accords and Professional Competence Agreements



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# Align Assessments to Professional Competency Profiles

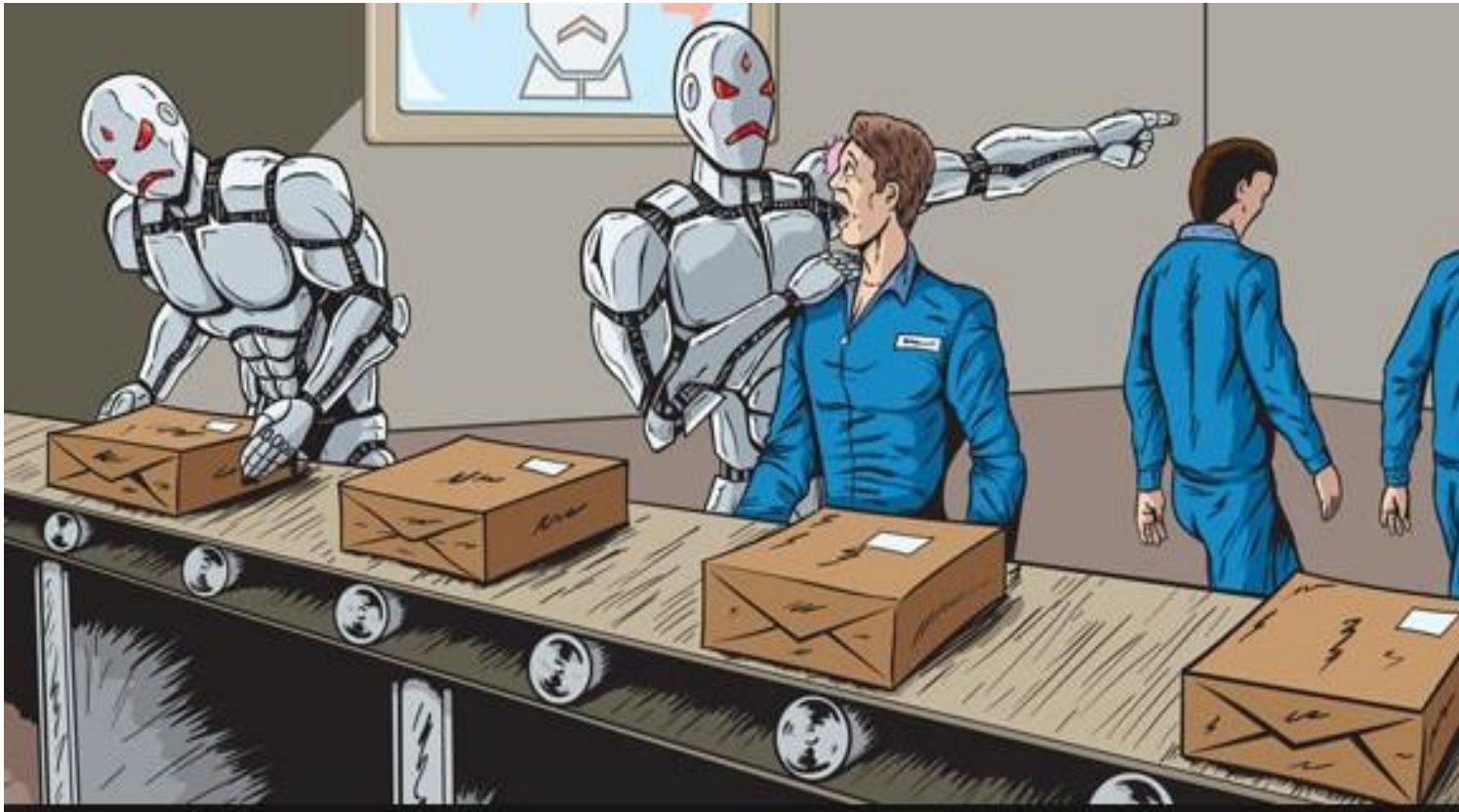


42% of normal jobs can be automated,

Only 12% hybrid (inter/trans disciplinary and pervasive skills) jobs can be automated

Hybrid and Complex Jobs: 20 to 40% higher pay

# New Roles for Humans in the Future World of Work





# Emerging Skills/Competence Areas

- **Creativity, Innovation, and Entrepreneurship**
- Design / Engineering Thinking (across professions)
- Interpretation / Reflection
- Problem Identification Solution Creation
- Systems Thinking
- **Intercultural Competence**
- Ethics and Responsibility
- Resourcing, and Aligned Networking
- **Design for Sustainability** (Environment and society)  
**Understanding Complexity and Value, Leverage  
Diversity**





# **Socio-Economic Development: The Role of Academia and Industry**

Prepare People for Job Employment

Vs

People for Job Creation with Value

Competencies to increase Employability

**Innovation, Incubation and Entrepreneurship**



# **Technology Evolution challenges the Engineering Roles and Current Definitions**

Technology Tools: AI, Robotics, and Communication

1. Engineers
2. Technologists
3. Technicians
4. Artisans

And increasingly used across professions



# Transforming the Landscape

- Alignment to Policy, and Influence of Policy
- Focus on new competencies eg intercultural competence
- Reviewing Global Engineering Professional Attributes and Outcomes
- Reviewing Global Standards on Pedagogy to improve learning effectiveness and develop competencies (simulators, mobile laboratories)
- Recognition and Mobility Agreements

# **African Proverb**

**If you want to go fast, go  
alone**

**If you want to go far, go  
together**

# **Materials used from several sources and origins**

**WFEO**

**IIE MSA**

**University of Pretoria**

**UNESCO**

**FAEO**

**Conferences and Workshops**

**GEDC**

**IEA**

**World Economic Forum Documents**