Role of Professional Societies in addressing 21st Century Global Grand Challenges

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2012
THE AWARDS
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- "Applying the rules of reason, the findings of science, the aesthetics of art, and the spark of creative imagination:

  Engineers will continue the tradition of forging a better future".

Grand Challenge

- A specific barrier that, if removed, would help to solve an important world-wide problem.
- If successfully implemented, the solution would have a high likelihood of feasibility for scaling up and world – wide impact.

Ranking of Challenges

- Ability to reduce burden on humanity
- Impact on equity
- Immediacy of impact
- Feasibility

All the challenges emphasize:

- Need for global cooperation
- Creation of shared access to data,
- Expertise and capacity-building opportunities.

14 Engineering Grand Challenges

Make Solar Energy Economical

Engineer the Tools of Scientific Discovery

Provide Energy From Fusion

Develop Carbon Sequestration Methods

Manage the Nitrogen Cycle

Provide Access to Clean Water

Improve Urban Infrastructure

Advance Health Informatics

Source: http://www.ni.com/company/corporate-responsibility/empower/improve/grand-challenges.htm

14 Engineering Grand Challenges

Engineer Better Medicines

Reverse-Engineer the Brain

Prevent Nuclear Terror

Secure Cyberspace

Enhance Virtual Reality

Advance Personalized Learning

Source: http://www.ni.com/company/corporate-responsibility/empower/improve/grand-challenges.htm

UN Millennium Development Goals -Eight Goals for 2015

Eradicate extreme poverty and hunger

Achieve universal primary education

Promote gender equality and empower women

Reduce child mortality

Improve maternal health

Combat HIV/AIDS, malaria and other diseases

Ensure environmental sustainability

Develop a global partnership for development

Source: United Nations Development Programme

UK Chief Scientist – 9 Global Challenges

⇑ Urbanisation

⇑ Population

Alleviating poverty

⇑ Energy demand

Climate Change

⇑ Water demand

⇑ Food demand

Biodiversity

Infectious diseases

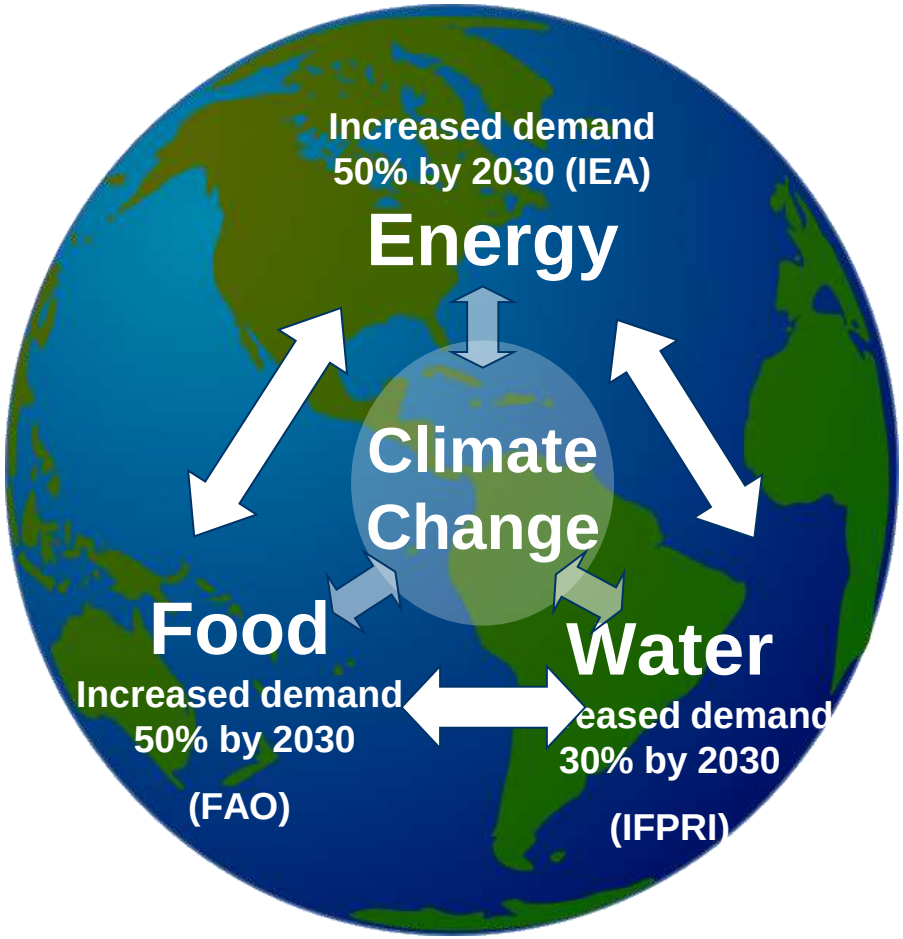
Source : Sir John Beddington UK Chief Scientist

Conditions of a Perfect Storm

- By 2030 "a whole series of events come together":
- The world's population will rise from 6bn to 8bn (33%)
- Demand for food will increase by 50%
- Demand for water will increase by 30%
- Demand for energy will increase by 50%

Source -Sir John Beddington –Chief Scientist

Sir John Beddington – Perfect Storm?



1.Can 9 billion people be fed equitably, healthily and sustainably?

2.Can we cope with the future demands on water?

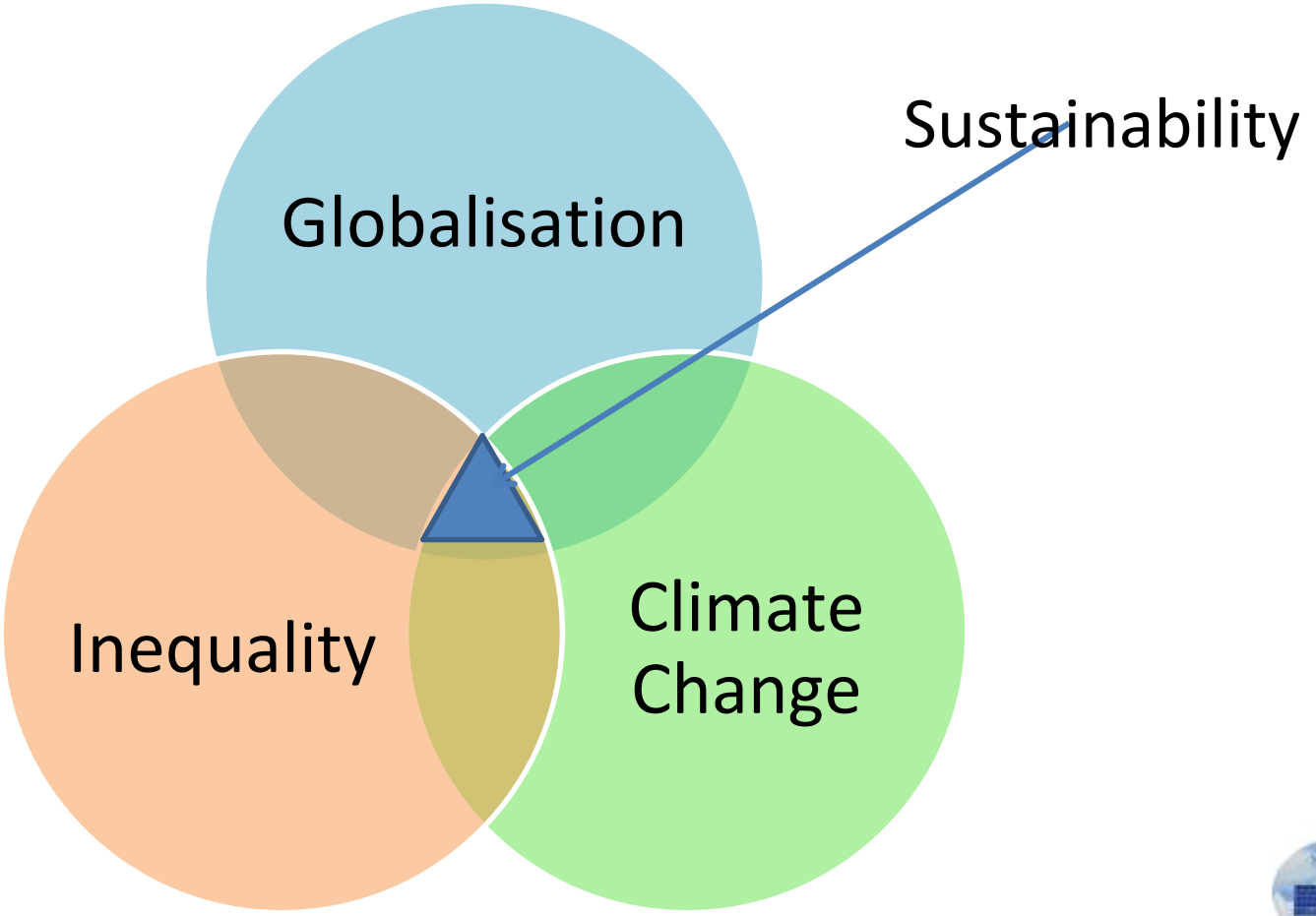
3.Can we provide enough energy to supply the growing population coming out of poverty?

4.Can we mitigate and adapt to climate change?

5.Can we do all this in the context of redressing the decline in biodiversity and preserving ecosystems?

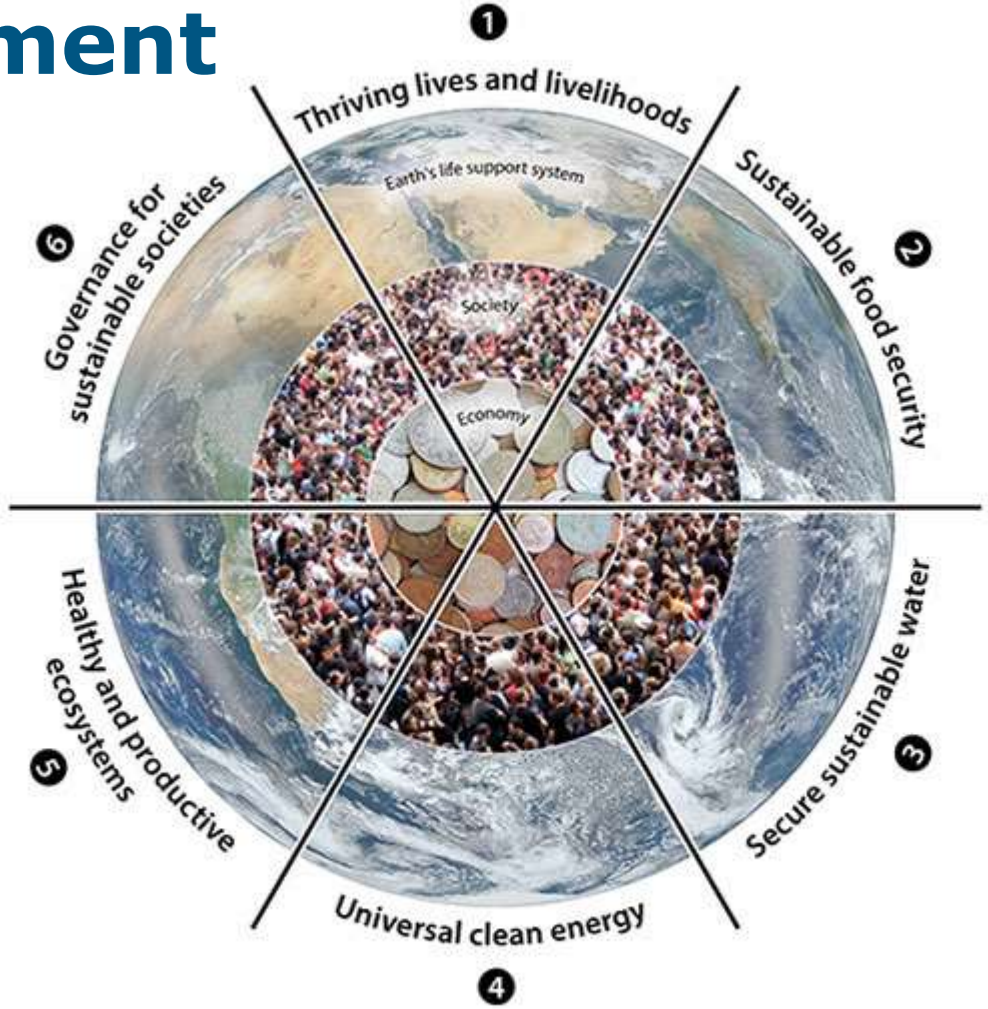
Global trends till 2030

(UK Royal Academy of Engineering Report)



THE ROYAL SOCIETY OF EDINBURGH

Six Goals for Sustainable Development



(Credit: Sustainable Development Goals for people and planet, Nature, Griggs et al (2013))

Six Goals for Sustainable Development

- Thriving lives and livelihoods
- Food security,
- Water security,
- Clean energy,
- Healthy and Productive Ecosystems
- Governance for sustainable societies —

The targets beneath each goal include updates - ending poverty and hunger, combating HIV/aids, and improving maternal and child health.

Tomorrow's World: Eight great technologies (D.Willetts –UK Govt.)

- Big data revolution and energy-efficient computing
- Satellites and commercial applications of space
- Robotics and Autonomous Systems
- Life sciences, Genomics and Synthetic Biology
- Regenerative medicine
- Agri-science
- Advanced materials and Nano-technology
- Energy and its storage

What has this got to do with Professional Organizations?

- Global problems in need of global partnerships
- Global problems in need of a highly skilled workforce
- Real world focus with demonstrable pathway to impact
- Multi-disciplinary approaches

Approaches

- Science and technology, when applied appropriately, can have transformational effects;
- Need to seek solutions to achieve breakthrough progress.

Approaches

- Define problems, identify constraints, complemented by evidence based analysis.
- This require creation and support of self-perpetuating systems, rather than one-off inventions or interventions.
- Are professional organisations able to meet these criteria?
- http://www.usaid.gov/grandchallenges

Role of professional organisations

1. Need for a common platform for discussion, future directions – Biennial conferences to chart progress:

   E.g. NAE -Royal Academy of Engg –Global Grand Challenges Summit –London, March 2013

   IEEE Global Humanitarian Technology Conferences –Seattle Oct 2012

Role of professional organisations

2. Encouraging professional development
   - Establishing training needs for international development
   - E.g. UNESCO Chairs in International Development
   - IEEE Humanitarian effort

Role of professional organisations

3. Education

- Identifying curriculum for engineering education to meet emerging demand

- Several universities introducing Sustainable Development courses in Engineering degree Programs

- The T-shaped Engineer

T-Shaped Engineer

Understanding & valuing competencies outwith Engineering

Business; People competencies

Courtesy W.Murphy IBM)

Role of professional organisations

4. Working with international bodies e.g. UN, UNESCO, USAID

   - Initiating projects

5. Funding sources and cooperative bodies

   e.g. Bill & Melinda Gates Foundation supporting Grand Challenges in Global Health

University College London

Global Health
Sustainable Cities
Intercultural Interaction
Human Wellbeing.

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Thank you

Q & A.

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