EDUCATING THE FUTURE ENGINEERS

Prof. Dr. Hasan AMCA

Dean Of Engineering Faculty
Eastern Mediterranean University

7th ARCHENG International Architecture and Engineering Symposium

The European University of Lefke

29-30 November 2012

AGENDA

- The World in the Future (in 2030)
- Major Economic, Social, Cultural Challenges
- New Engineering Areas and Jobs
- The Engineering Perspective for 2030’s
- How Different Nations Prepare for the Future
- Where Do We Stand and What Can We Do?

WHAT IS ENGINEERING?

IS A PROFESSION OF SATISFYING OUR UNLIMITED DEMANDS W/ LIMITED RESOURCES USING TECH. TOOLS AND TECHNIQUES

LIMITED RESOURCES

TECHNOLOGY, TOOLS AND TECHNIQUES

UNLIMITED DEMANDS

THE WORLD IN 2030

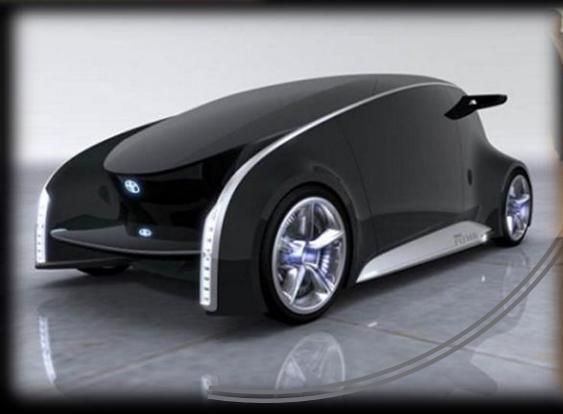
Source: cosmosmagazine.com

Source: luiswillumsen.com

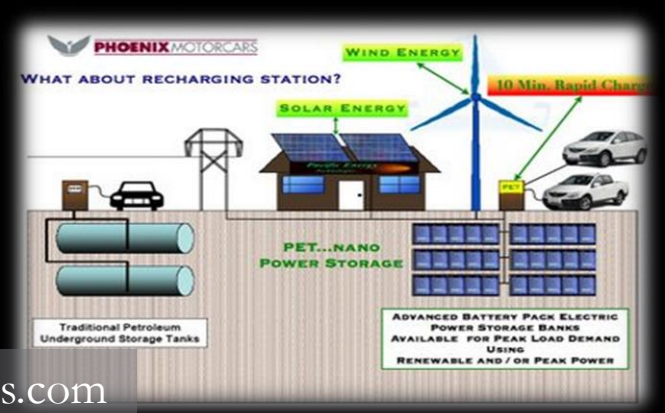
THE WORLD IN 2030

Source: domusweb.it

THE WORLD IN 2030



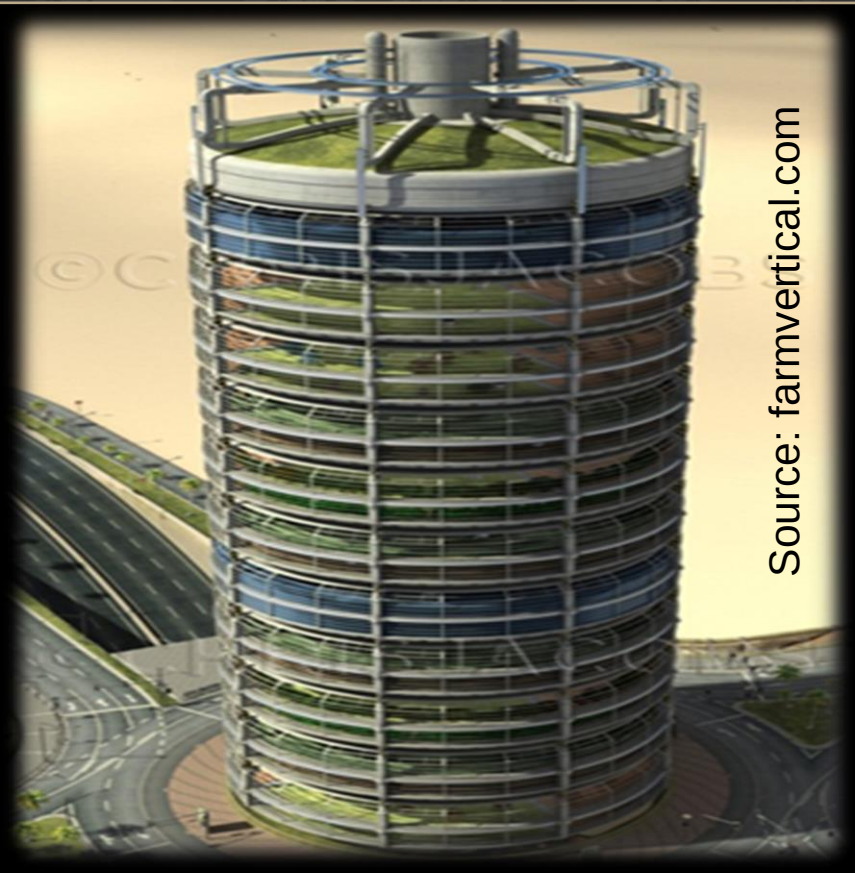
THE WORLD IN 2030



Source: phoenixmotorcars.com

THE WORLD IN 2030

Source: shutterstock.com



Source: farmvertical.com

Key Global Trends in 2030's

Technology, Environment, Economy, International Relations

- Robots physically and mentally superior to humans
- İntelligence, Biomedical/Genetic Enhancmnt by external means
- Learning superseded by transparent interface to smart computers
- 80% of world population living in cities (50% today)
- More Than 83% of World Will Have Electricity (50% today)
- Everything you say and do will be recorded (!!!)
- Space solar power stations, wave energy provide 50% of UK en.
- Carbon dioxide fixation technolgy for environment protection
- Artificial precipitation induction and control
- Nanotechnology plants & bacteria enhancement to fertilization

Ref: OUTLOOK 2009 report by World Future Society

Major Challenges for 2030…

Economic, Social, Cultural Issues

- Population Growth and Demographic Shift (7.1 to 8.3 billion)
- Coping with Increasing Life Span (80 to 85 years old)
- Increasing Needs & Economic Turbulence (food, energy …)
- Diversity of Life Styles and Generation Crossroads (…)
- Societies in Transition and Complex Politics (local, global…)
- Changing Modes Of Transportation (drive, fly, tele…)
- Global Expansion of Electronic Media (virtual reality + reality)
- Reshaping education and training (new skills required ?)
- Challenges on Natural Resources (energy, water…)

Source: www.fastfuture.com

Engineering Issues for 2030’s

- Nano-medicine, Human Enhancement, Quarantine Experts, Cloning & Ethics, Old Age Wellness (Equipment Producers),
- Human Body Enhancement, Cloning, Synthetic Life Engineers
- Artificial Climate Regulators, Quarantine Enforcers
- Space Pilots, Space Engineers/Architects
- Intelligent Materials/Equipment, Memory Materials, Robotics
- Product/Food Design: Genetically Modified Crops & Livestock Eng.'s
- Enhanced Virtual Life: Virtual Polis & Lawyers
- Social Net Advisors, Personal Brand Makers, Social Eng.'s
- QUANTUM Computing Engineers, Waste Data Processors
- Energy, Multimode Communication, Leisure Engineers

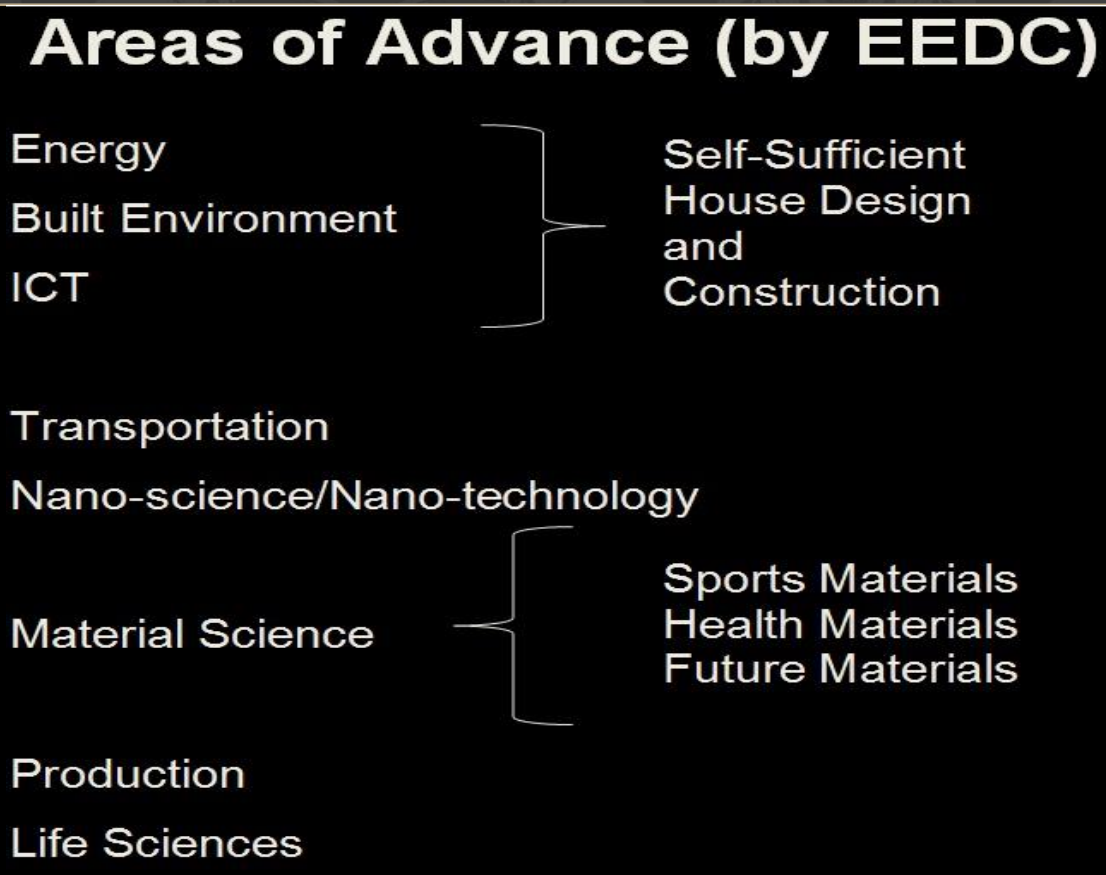
Educational Issues in 2030's

- Professional Knowledge Become Obsolete Rapidly: Retraining
- Carriers & Univ. Majors to Prepare for Carriers be more specialized
- Students will explore niche majors such as
  - sustainable business, strategic intelligence, entrepreneurship
- In Engineering, Specialization in
  - Biomedical Eng, Biomechanics,
  - New Houses & Work Environment, neuroscience, nanotechnology
  - security, sustainability,
  - computer & digital applications in forensics & legal issues

Ref: World Trends & Forecasts, Sep-Oct 2008

European Way Of Looking To The Future of Engineering Education

AREAS OF ADVANCE (BY EEDC)



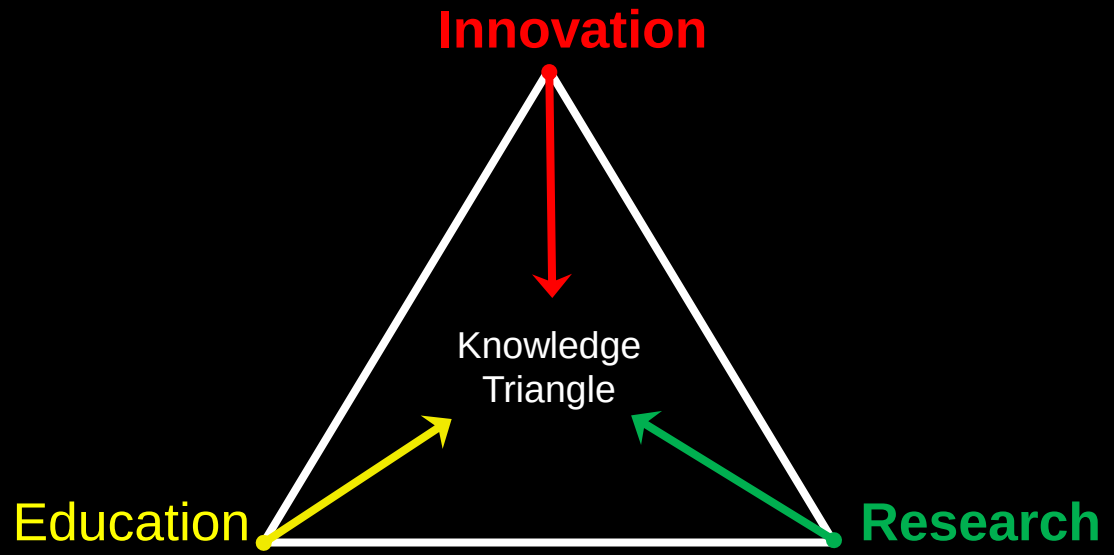
European Way Of Looking To The Future of Engineering Education

DRIVING FORCES OF THE KNOWLEDGE TRIANGLE

Entrepreneurship Innovation Sustainable Future

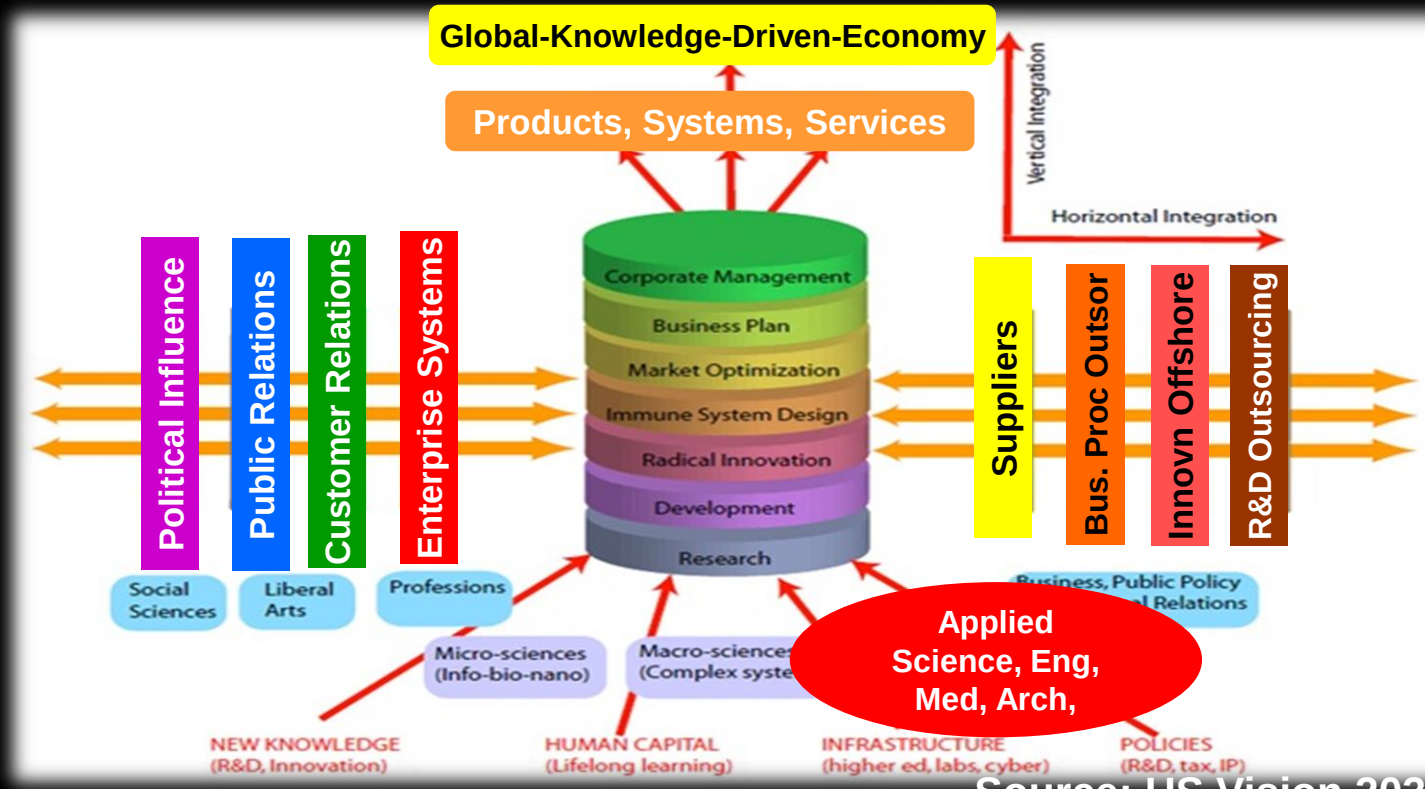
EU R&D Perspective: Support any investment if it will result in economic growth and new job opportunities

INTERACTION AROUND THE KNOWLEDGE TRIANGLE



American Way Of Looking To The Future of Engineering Education

US LOOK AT ENGINEERING PRACTICE, RESEARCH AND EDUCATION AS PART OF A MORE COMPLICATED SYSTEM

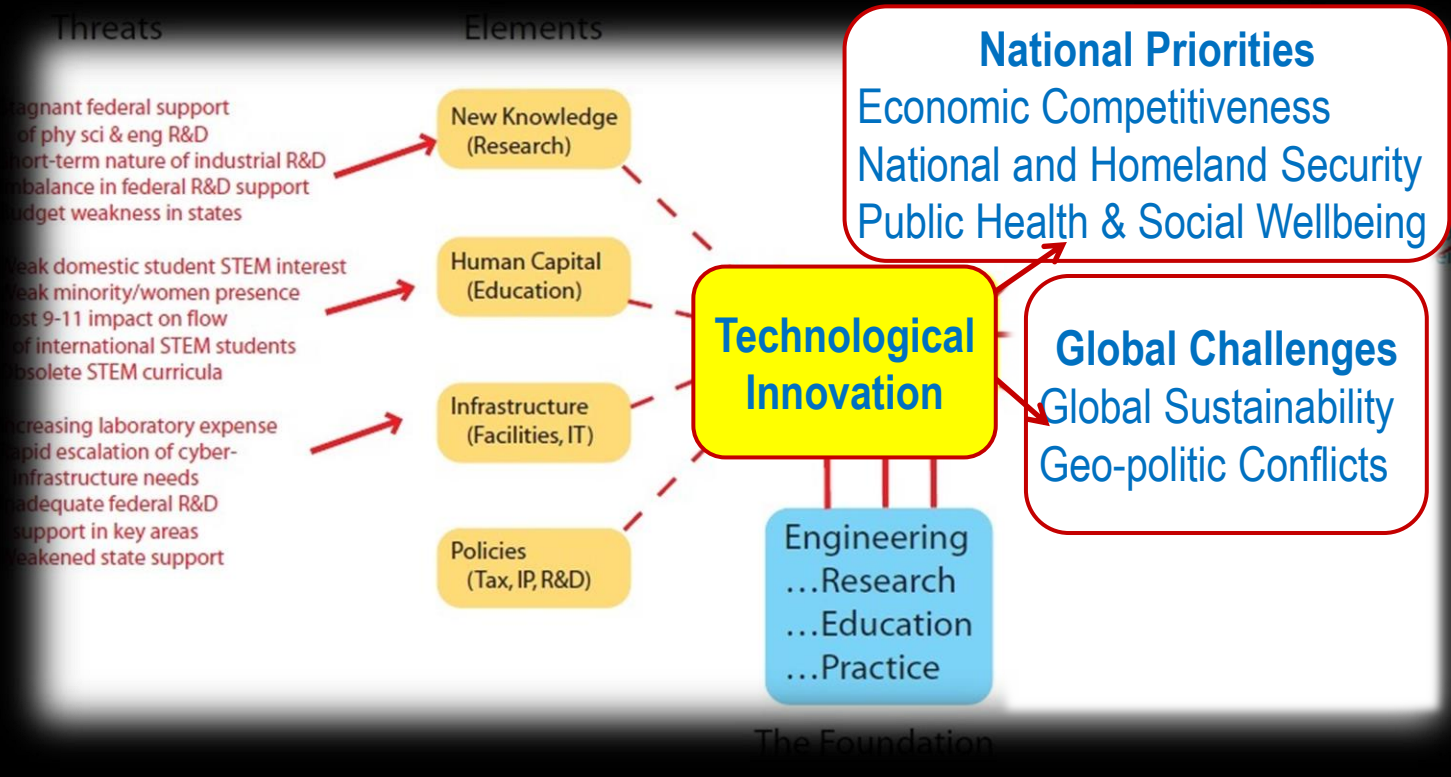


Source: US Vision 2030

American Way Of Looking To The Future of Engineering Education

A ROADMAP TO THE FUTURE OF ENGINEERING PRACTICE RESEARCH AND EDUCATION

Security **Environment** **Sustainability**



Source: US Vision 2030

CHINA 2030: BUILDING A MODERN, HARMONIOUS, AND CREATIVE HIGH-INCOME SOCIETY

Source: China 2030

CHINA 2030 VISION MILESTONES

1) **Implement Structural Reforms To Strengthen The Foundations For A Market based Economy**

2) **Accelerate pace of innovation & create an open innovation system**
   - competitive pressures to encourage Chinese firms to engage in product and process innovation
   - by participating in global research and development networks
   - priority to increase both quality and quantity of R&D

CHINA 2030: BUILDING A MODERN, HARMONIOUS, AND CREATIVE HIGH-INCOME SOCIETY

Source: China 2030

CHINA 2030 VISION MILESTONES

3) Seize The Opportunity To "Go Green"

4) Expand Opportunities And Promote Social Security For All

5) Strengthen The Fiscal System

6) Seek Mutually Beneficial Relations With The World

TRNC Way Of Looking To The Future of Engineering Education

WHERE DO WE STAND?

- In 1992, Prof. Dr. Özay Oral started an initiative to **attract high quality academicians** to Cyprus
- A # of Turkish Cypriots are educated in top universities around world and they **are inclined to return home**
- Hence, we have one of the **highest academician/km2** environment suitable for academic studies and research
- We have to use this advantage to do the thing we could do better than our rivals: **Quality Education and Research**
- To achieve this, we have to develop an **Academic Merit System** where success is encouraged and awarded
- **Competition** should start at **leading universities** and spread
- We have all the know how and necessary legal background

TRNC Way Of Looking To The Future of Engineering Education

TO ENSURE CONTINUOUS IMPROVEMENT

- The rules of entering, advancing, retarding and exiting the academic system should be manifested clearly
  - and applied justly
- Benefits should be gained and lost depending on the individuals performance
- The new entries in the academic system should always be better than the existing ones
- There shall be a place for every academic staff at different success levels

TRNC Way Of Looking To The Future of Engineering Education

TO ENSURE CONTINUOUS IMPROVEMENT

- Universities will be ranked with reference to a published set of criteria, such as:
  - Quality of Education Confirmed by Accreditations
  - # International Full-Time students
  - # Articles published
  - Economic Success
- There should be an independent professional body for examination / audition of univ.s local ranking
- Government will subsidize universities based on the above criteria