ΤΟ ΕΠΑΓΓΕΛΜΑ & ΟΙ ΣΠΟΥΔΕΣ ΤΩΝ ΠΟΛΙΤΙΚΩΝ ΜΗΧΑΝΙΚΩΝ ΤΟΥ ΑΥΡΙΟ

ΚΩΝ/ΝΟΣ ΜΕΜΟΣ
Executive Committee, ASCE

Στρογγυλό Τραπέζι, ΤΕΕ, 5/4/2016

Εξελίξεις στο διεθνές περιβάλλον αναφορικά με την εκπαίδευση και την άσκηση του επαγγέλματος των Αρχιτεκτόνων και των Πολιτικών Μηχανικών

LAYOUT

- GLOBAL ISSUES IN CIVIL ENGINEERING PROFESSION
- ASCE's VISION
- IMPACT ON C.E. EDUCATION
- WHERE GREECE STANDS NOW
- SUMMARY & SUGGESTIONS

GLOBAL ISSUES IN C.ENG **PROFESSION**

- «Τα πάντα ρει και ουδέν μένει»
  Ηράκλειτος (544 -484 π.Χ.)

- "Change is constant, but, on an absolute basis,
  our world has changed more in the last
  one hundred years than in all those preceding."

Educating the Engineer of 2020
U.S. National Academy of Engineering

GLOBAL ISSUES IN C.ENG **PROFESSION**

- C.ENG profession cannot escape from changing with time
- Rate of change linked with societal evolution
- Currently, issues like
  - Globalization
  - Urban people inflow
  - Persisting poverty
  - Inequalities in opportunities
  - Environmental degradation etc.

triggered the adoption of Goals by Institutions that will drive reforming of engineering in the near future.

GLOBAL ISSUES IN C.ENG **PROFESSION**

Thus, the UN 2015-2030 Sustainable Development Goals, effective 1.1.2016, provide a framework where areas of significant evolution and focus on the C.ENG profession can be identified, e.g.:

Goal 6 Water & Sanitation

Ensure availability and sustainable management of water and sanitation for all

Goal 7 Sustainable Energy

Ensure access to affordable, reliable, sustainable and modern energy for all

ΤΕΕ GLOBAL ISSUES IN C.ENG **PROFESSION**

Goal 9 Resilient infrastructure

Build resilient infrastructure, promote inclusive (για όλους) and sustainable industrialization and foster innovation

Goal 11 Resilient and Sustainable Cities

Make cities and human settlements inclusive, safe, resilient and sustainable

Note: all 4 above Goals require truly transdisciplinary approach!

GLOBAL ISSUES IN C.ENG **PROFESSION**

The United Nations receive input from the
World Federation of Engineering Organizations (WFEO)
addressing issues associated to Engineering, including C.ENG

Similar strategic plans to that of the UN originate from national Institutions, for example:
The US National Academy of Engineering (NAE)
They put forward *14 Grand challenges for Engineering*.
Of broader scope, not focused only on sustainability (UN)

GLOBAL ISSUES IN C.ENG **PROFESSION**

The following NAE Challenges link to C.ENG profession:

- Make solar energy economical
- Enhance virtual reality (simulations)
- Restore and improve urban infrastructure
- Provide access to clean water
- Prevent nuclear terror
- Engineer the tools of scientific discovery

GLOBAL ISSUES IN C.ENG **PROFESSION**

Also, the **American Association** of **Engineering Societies** (AAES) provides input to the WFEO, hence to the United Nations.

the **American Society** of **Civil Engineers** (ASCE) holds one Board seat (out of 10) in AAES and contributes significantly to the policy-making, being the oldest engineering Society of US.

ASCE's VISION

In June 2006, some 60 civil engineer and non-engineer leaders gathered…

ASCE-Hosted Summit, Lansdowne, Virginia

ASCE's VISION

…to look over the horizon.

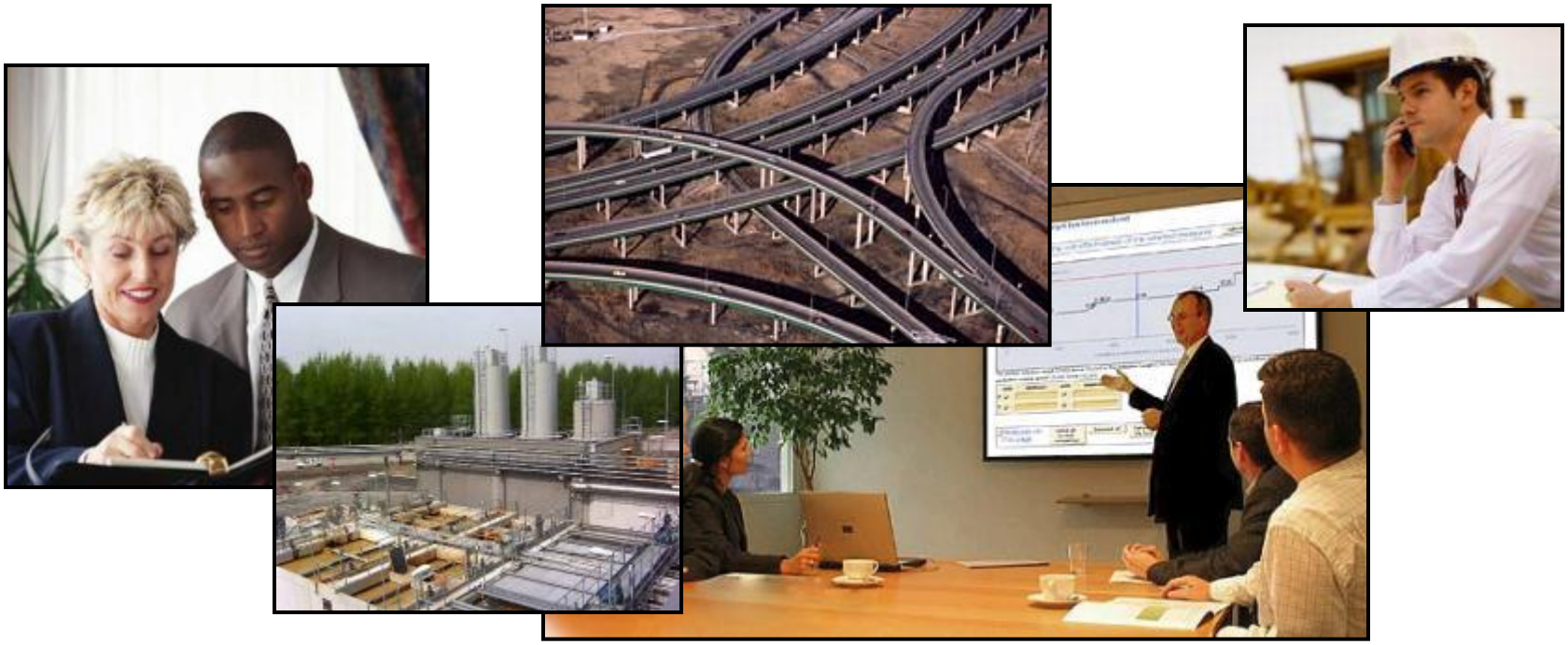
ASCE's VISION

- Created a picture of the world in 2025
- Forged an aspirational **Vision**

Entrusted by society
to create a sustainable world and
enhance the global quality of life,
civil engineers
serve competently, collaboratively, and
ethically as:

ASCE's VISION

- Master planners, designers, constructors, and operators of society's economic and social engine—the built environment

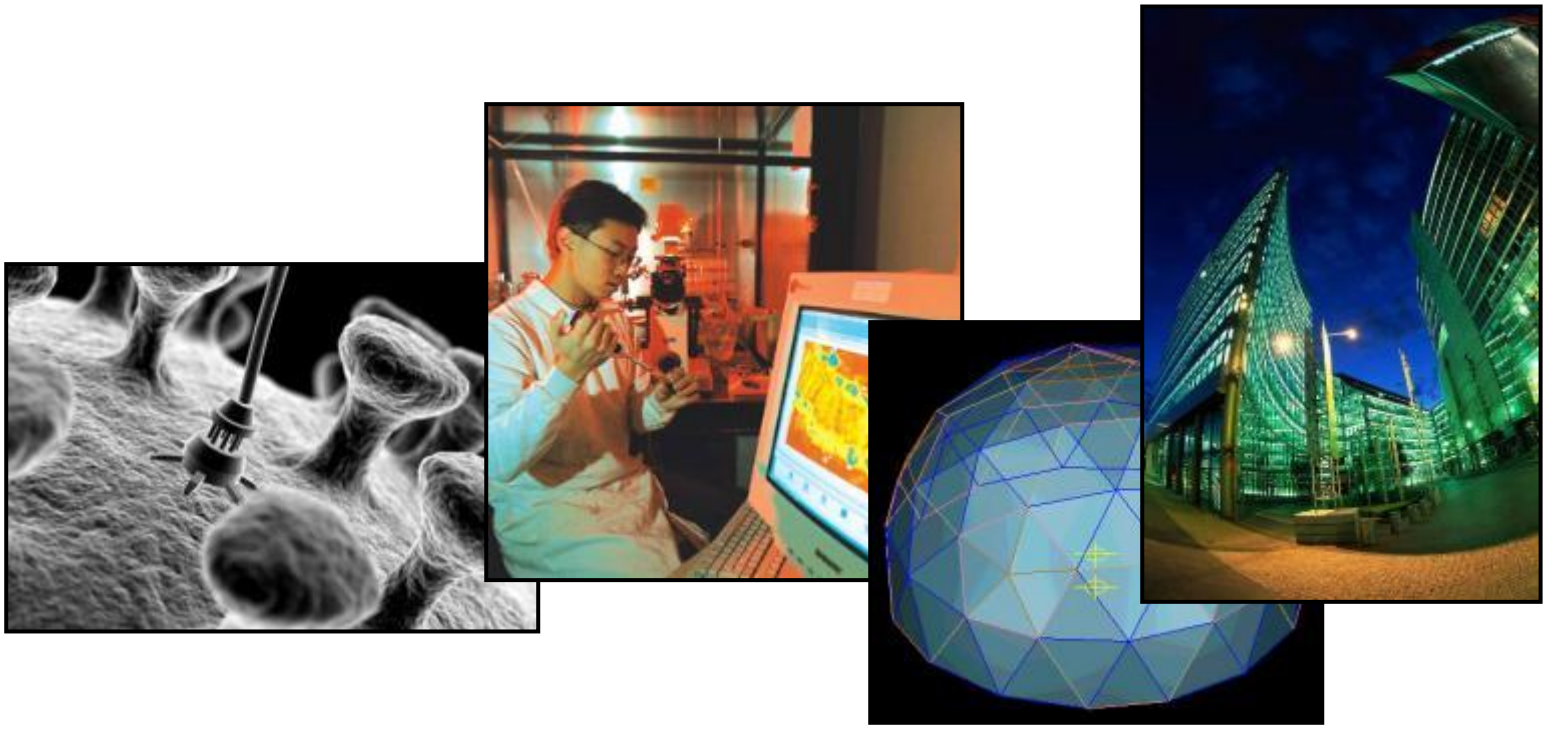


ASCE's VISION

- Master stewards of the natural environment and its resources

ASCE's VISION

- Master innovators and integrators of ideas and technology across the public, private, and academic sectors



ASCE's VISION

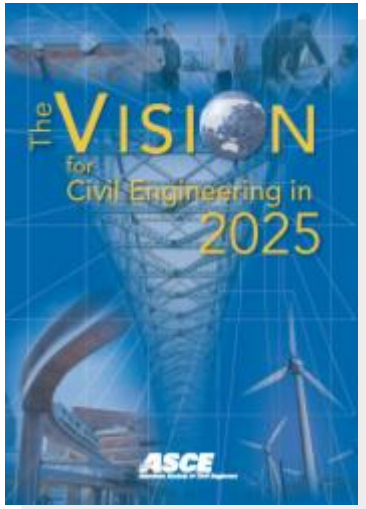
- Managers of risk and uncertainty caused by natural events, accidents, and other threats

ASCE's VISION

- Leaders in discussions and decisions shaping public environmental and infrastructure policy.

ASCE's VISION

- Sets an aspirational target for a new global state of affairs:
  - The role of civil engineers in the economy of the future…
    …where civil engineers are:
    - Entrusted
    - Leaders
    - Ethical role models
    - Innovative thinkers – opportunity finders



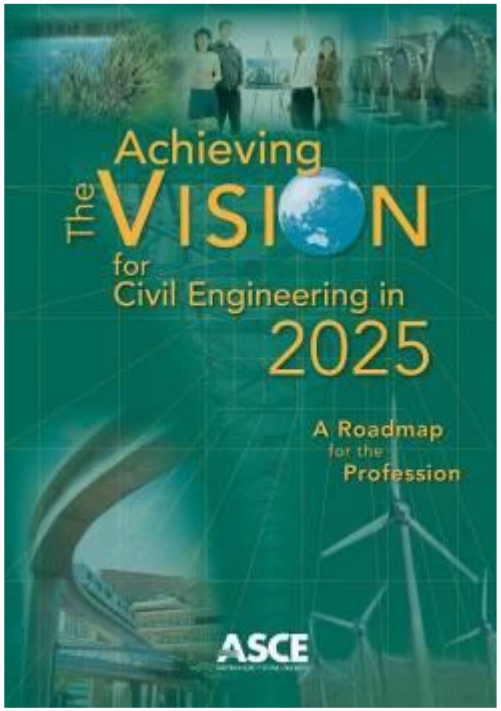
ASCE's VISION

- Embracing the Vision
  - Spanish, Chinese and Turkish CE societies translated the Vision documents
    - An Arabic translation is in final review

ASCE's VISION

Achieving the Vision for Civil Engineering in 2025: *A Roadmap for the Profession*

- Produced by an ASCE task committee
- Provides focused outcome statements, lists of tactics



ASCE's VISION

Help your profession take its rightful place among leaders in society

"By achieving the Vision, we as civil engineers will have reshaped our professional stature and remained the force behind our own destiny, discovering a practical reality in what was once just imagined."

– *Achieving the Vision for Civil Engineering in 2025: A Roadmap for the Profession*

ASCE's VISION

Vision 2025 vs. Strategic Initiatives

Vision Outcomes

- Master Builders
- Stewards of the Environment
- Innovators
- Managers of Risk
- Leaders in Public Policy

Strategic Initiatives

- **Sustainable Infrastructures**
- **Grand Challenge**
- **Raise the Bar**

ASCE's Strategic Initiatives

1. **Sustainable Infrastructures** C.E. to serve as leaders in fostering a more environmentally, economically, and socially sustainable natural and built environment including infrastructure renewal.

2. **Grand Challenge** Reduce the life-cycle cost of new infrastructure by 50% by 2025 and foster the optimization of infrastructure investments for society.

3. **Raise the Bar** Advance the profession and the public welfare by actively supporting the movement to raise educational requirements for licensure of future professional engineers, attracting at the same time youth to C.E. careers.

IMPACT ON ENGN **EDUCATION**

UN on the Core Subject of Sustainable Development

By 2030 ensure that all learners acquire the knowledge and skills needed to promote sustainable development:

University education to ensure working knowledge and understanding of sustainable development, particularly in its social aspect.

IMPACT ON ENGN **EDUCATION**

NAE Grand Challenges for Engineering

+

UN Millennium Development Goals

+

White House Strategy for American Innovation

GRAND CHALLENGES

IMPACT ON ENGN **EDUCATION**

In March 2015: "Letter of Commitment" by
122 US Engineering Schools to Educate 20.000 students
until 2025 to lead the way in tackling the Grand Challenges

Program that integrates

- A creative learning experience connected to the Grand Challenges
- Authentic experiential learning with clients and mentors that includes interdisciplinary experience
- Entrepreneurship and innovation experience
- Global and cross-cultural perspectives
- Development of social consciousness through service-learning

IMPACT ON ENGN **EDUCATION**

Letter: "*These 20,000-plus formally recognized 'Grand Challenge Engineers' will produce a 'halo effect' that benefits the education of all students, engineers and non-engineers alike, and ultimately all people. Like "the 300" of ancient Sparta, whose special training and motivation saved a civilization, we envision the power of the 20,000 Grand Challenge Engineers to change the course of our civilization.*"

Initiative by: Tom Katsouleas, Dean of the Duke University's Pratt School of Engineering

Yiannis Yortsos, Dean of the University of Southern California Viterbi School of Engineering

Richard Miller, President of the Franklin W. Olin College of Engineering

IMPACT ON ENGN EDUCATION

Focusing on CIVIL ENGN

ASCE's Raise the Bar (RtB) Initiative

associated with

Civil Engineering Body of Knowledge
for the 21st Century:

Preparing the Civil Engineer for the Future (BoK)

IMPACT ON ENGN **EDUCATION**

What is “Raise the Bar”?

An initiative:

- To help the development of **technical excellence**
- Needed for increased **professional leadership**
- For the **protection of the public**
- About the **future** of the engineering industry

What is "Raise the Bar"?

The Future Path for Licensure

(as defined by Raise the Bar & ASCE Policy 465)

- An accredited bachelor's of engineering degree
- *A master's in engineering degree – OR – additional 30 semester credits of advanced education*
- Three to four years of experience
- Passing the FE and PE exams

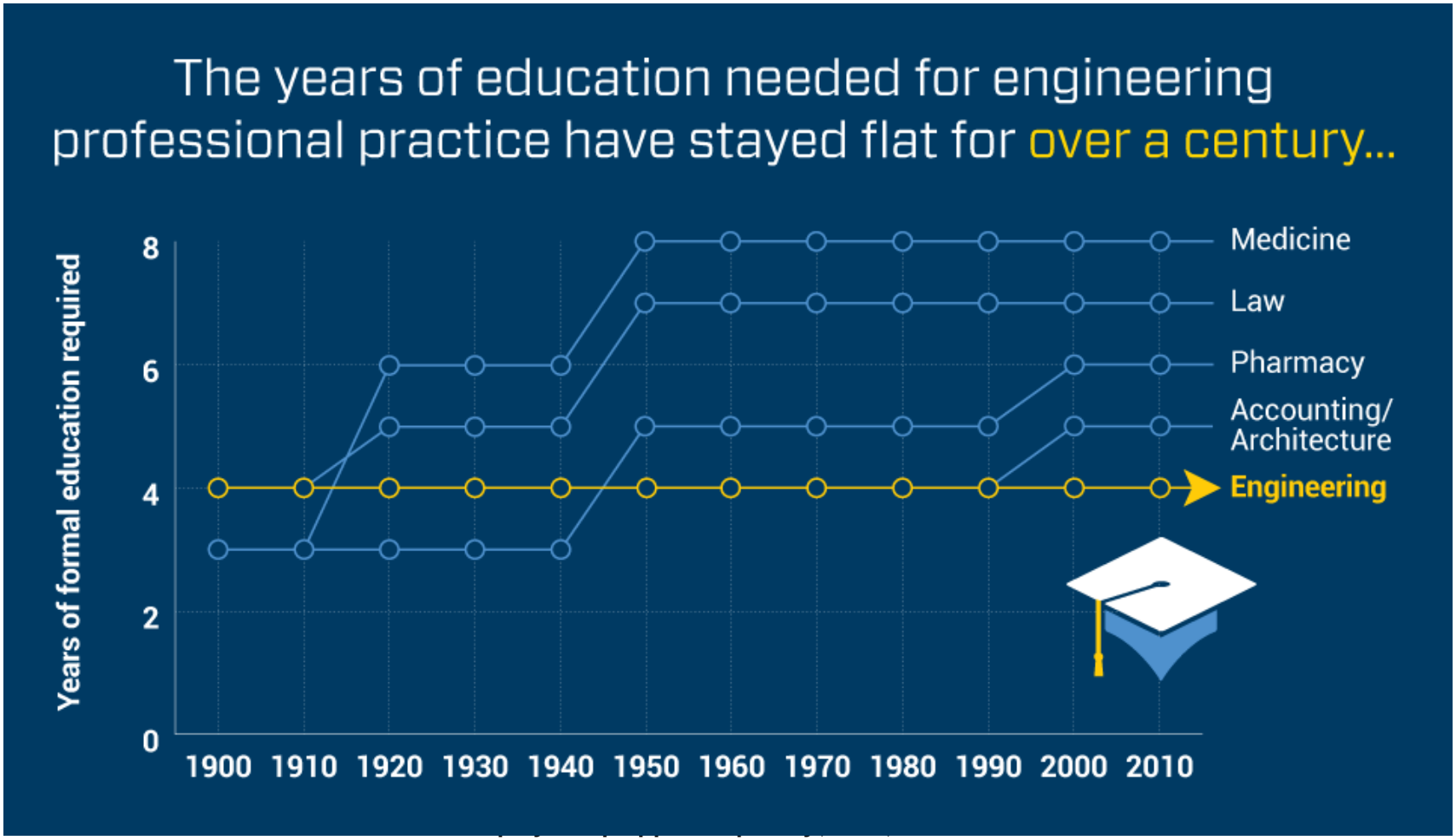
Why "Raise the Bar"?

More complexity for engineers:

- Sustainability requirements
- Expanded codes/standards
- New materials and construction methods
- Utilization of alternative project delivery methods
- Legislative/policy involvement

Greater overall responsibilities for professional engineers

Educational Requirements



Transcript Comparison; Changes over 40 years

	1971	2011
Course Category	**Credits**	**Credits**
Basic Science	16	15
Mathematics	16	15
Communication Skills	6	8
Arts & Humanities	17	15
Fitness	3	2
Engineering & Technical Courses	71	65
Electives	7	0
	0	0
Total	**136**	**120**

Who Supports Raising the Bar?

- NCEES through its strategic plan
  - Those representing engineering licensure in many states agree—the future requires Raising the Bar
  - A position statement calling for master's or equivalent is being developed.

NCEES
advancing licensure for engineers and surveyors

NCEES = National Council of Examiners for Engineering and Surveying

Who Supports Raising the Bar?

- The National Society of Professional Engineers
  - —Representing licensed engineers of all disciplines
  - —Through their Professional Policy 168

National Society of Professional Engineers®

Who Supports Raising the Bar?

- The American Society of Civil Engineers
  - —Discipline with the most licensed engineers
  - —Cogent Policy Statement 465
  - —Nearly 20 year effort in advancing the educational requirements for licensure

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

IMPACT ON ENGN **EDUCATION**

Policy Statement 465

Some recent opposition to RtB

Παρέμβαση ΚΜ

Replace Master's Requirements by its substantial content, e.g. 5 yr duration, etc (see BoK)

→ Globalization of RtB

→ More allies

IMPACT ON ENGN **EDUCATION**

2nd Edition of BoK (2008)

Foundational outcomes

4) Breadth in basic science

5) Humanities

6) Social Sciences

IMPACT ON ENGN **EDUCATION**

2nd Edition of BoK (2008)

Technical outcomes

9) Breadth in civil engineering areas	14) Contemporary issues and their relationship to engineering
11) Engineering problem recognition and problem solving	15) Risk and uncertainty
13) Social Sciences	16) Sustainability
	17) Project management

IMPACT ON ENGN **EDUCATION**

2nd Edition of BoK (2008)

Professional outcomes

19) Communication	24) Business and public administration
20) History and heritage	25) Teamwork
21) Globalization	26) Leadership
22) Professional and ethical responsibility	27) Lifelong learning
23) Public Policy	28) Attitudes

GREECE

Global developments channelled to Greece through EU, ECCE, EUCEET, etc.

C.E. Education should promote

not only pure Knowledge,

but also Skills

& Competences

Εθνικό Πλαίσιο Προσόντων
_____επίπεδο 7 _____

Any individual graduate:

- Has **highly specialized knowledge**, some of which is cutting-edge knowledge in a field of work or study and which is the basis for original thinking; has a critical **awareness of knowledge issues** in a field and at the interface of different fields.
- Holds **specialized problem-solving skills required in research and/or innovation in order to develop new knowledge** and procedures and to integrate knowledge from different fields.
- Can **manage and transform** work or study contexts that are complex, unpredictable and **require new strategic approaches**; can take responsibility for contributing to professional knowledge and practices and/or for the performance evaluation of strategy groups.

The previous requirements lead
to the following graduates' attributes

1. team working
2. ethics
3. sustainability appraisal
4. public engagement and leadership
5. addressing societal issues
6. facing complex technical problems
7. applying innovation
8. leading applied research

Do we provide these?

5 Departments of **C**ivil **E**ngineering

External Evaluations Findings

Need for:

- Priority research and teaching in climate, resilient infrastructure, energy, sustainability, new materials, civil systems, construction management, law
- Practical training & technical visits
- Capstone design and team work
- Consultation with stakeholders
- Entrepreneurship, Innovation
- Ethics

SUMMARY & SUGGESTIONS

- **C.E.** are entrusted by society to create a sustainable world and enhance the global quality of life
- A changing world affects inevitably the Profession and C.E. Studies
- Hence, strong licensure process is required

For Example: 5 yr accredited studies +
1yr experience + professional exams

OR

4 yr accredited studies +
3yr experience + professional exams

ΤΕΕ

SUGGESTIONS

- **ΤΕΕ/ΣΠΜΕ**

  Develop Vision/Strategy Plan, then:

  (a) Engage in Un. curricula/technical training

  (b) Engage in accreditation of studies

  (c) Upgrade PE exams

- **CE University departments**

  Develop Vision/Strategy Plan, then:

  (a) Listen to stakeholders

  (b) Update their curricula
  to meet future requirements

Thank you
for your patience!