

A night-time aerial view of Lisbon, Portugal, with city lights and a bridge visible in the background. The sky is dark blue with some clouds, and tree branches are visible in the top corners.A logo consisting of three overlapping triangles in shades of blue and white, forming a stylized 'L' or 'X' shape.

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Guiding Principles for the Future of Civil Engineering
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Brave new world

Engineers have faced rapidly changing, complex and increasingly demanding solutions in an environmentally sensitive world.

- Our world faces the challenge of climate change and an unstoppable process of urbanization and population growth. Climate change is one of the biggest challenges of our time and its adverse effects undermine the potential of all countries to achieve sustainable development.
- Social and economic development relies upon the sustainable management of the world's natural resources.

Brave new world

- The pace of technological innovation will continue to be rapid and will be deployed in a globally interconnected world.
- New materials, updated data analysis and expert systems together with new construction processes will demand new skills to its workforce and will change our work environment substantially.
- the 4th industrial revolution, artificial intelligence and digital technology create a completely new professional environment and business opportunities

Brave new world

- New software facilities make routine calculations easier for engineers giving time for engineering synthesis. In the same time these facilities introduce the risk of creating the illusion that anyone can master them.
- Design will pass from two to three dimensions. This great innovation will change the way engineers have structured their way of thinking and their problem solving abilities.
- Globalization of the construction market will bring new pressure on working conditions on the engineers of developed countries face to their colleagues of developing ones. New ethical issues will arise.

Our professional environment will be more and more digital

- Traditional building design was largely reliant upon two-dimensional technical drawings (plans, elevations, sections, etc.). Building information modeling extends this beyond 3D, augmenting the three primary spatial dimensions (width, height and depth) with time as the fourth dimension (4D) and cost as the fifth (5D). BIM therefore covers more than just geometry. It also covers spatial relationships, light analysis, geographic information, and quantities and properties of building components (for example, manufacturers' details).

Team work

- The global and complex reality will demand a multidisciplinary approach of engineering problems. A deep knowledge of principles of mechanics, many years of experience and a whole team with designers and analysts will be needed to keep engineering excellence on our professional status. Continuing education has always been a necessity to our profession.
- In any case, in this demanding environment engineering design will be a team work but a team needs also a leader that is the engineering talent. BIM facilitates team work.

Engineering excellence

- Engineering excellence requires the ability to draw upon a broad and comprehensive body of knowledge to make focused discretionary judgments about optimal solutions to unique, complex problems in the interest of enhancing public health, safety, and welfare, supported by its corresponding available data.
- A holistic approach which will require, through both education and training, a broad background of humanities, social sciences, and economics to understand and manage the impact of engineering solutions in a global, economic, environmental, and societal (i.e., sustainable) context while remaining well grounded in the basics of mathematics and science is necessary.

Engineering excellence

- This holistic decision-making approach demands collaboration with non-engineers and will require better communication, management, leadership, and other professional practice skills on the part of engineers, in order to showcase the critical contribution of engineering to society.
- Leadership in the ethical practice of engineering and the need to hold paramount public health, safety, and welfare wherever engineering is practiced, independent of its origin and destination.

Engineering excellence

- Professional practice requires compliance to each country's applicable laws, regulations, standards, and codes specific to each engineering discipline and area of practice. Efficient public procurement processes are key to deliver proper engineering and core to project success.
- Last but not least, the rapid and accelerating pace of technological innovation will require all stakeholders to enhance continuing professional development and lifelong learning schemes for engineering professionals

Tradition and innovation

- The professions of engineers have a complex history, evolution and characteristics linked to country specifics. They constitute a substantial element of the European civilization, shaping the modern world and its traditions which have become part of our heritage. Innovation must be built in this sound tradition. A sound knowledge of the history of construction and engineering science as well as the history of our profession is essential for future engineers.