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ENGENHEIROS

## 57th ECCE General Meeting Changes in Civil Engineering

May 30, 2013 / Carlos Matias Ramos



**ECCE Conference “Changes in Civil Engineering”**

**Lisbon, May 30, 2013**



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## WHAT MEANS CIVIL ENGINEERING?

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Is the **Science-Arts** that supported by :  
**Mathematics, Physics** and **good sense** solve problems  
relative with **well-fair** in favour of the **Dignity of The  
Persons**.

**Civil Engineering transforms and adapts the nature with  
the goal of optimizing the life quality.**



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### ASPECTS CONSIDERED IN THE PRESENTATION

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**Civil  
Engineering  
Demands**

**Engineering  
and  
Society**

**Regulation  
of  
Professional  
activity**

**Civil  
Engineering.  
What future?**



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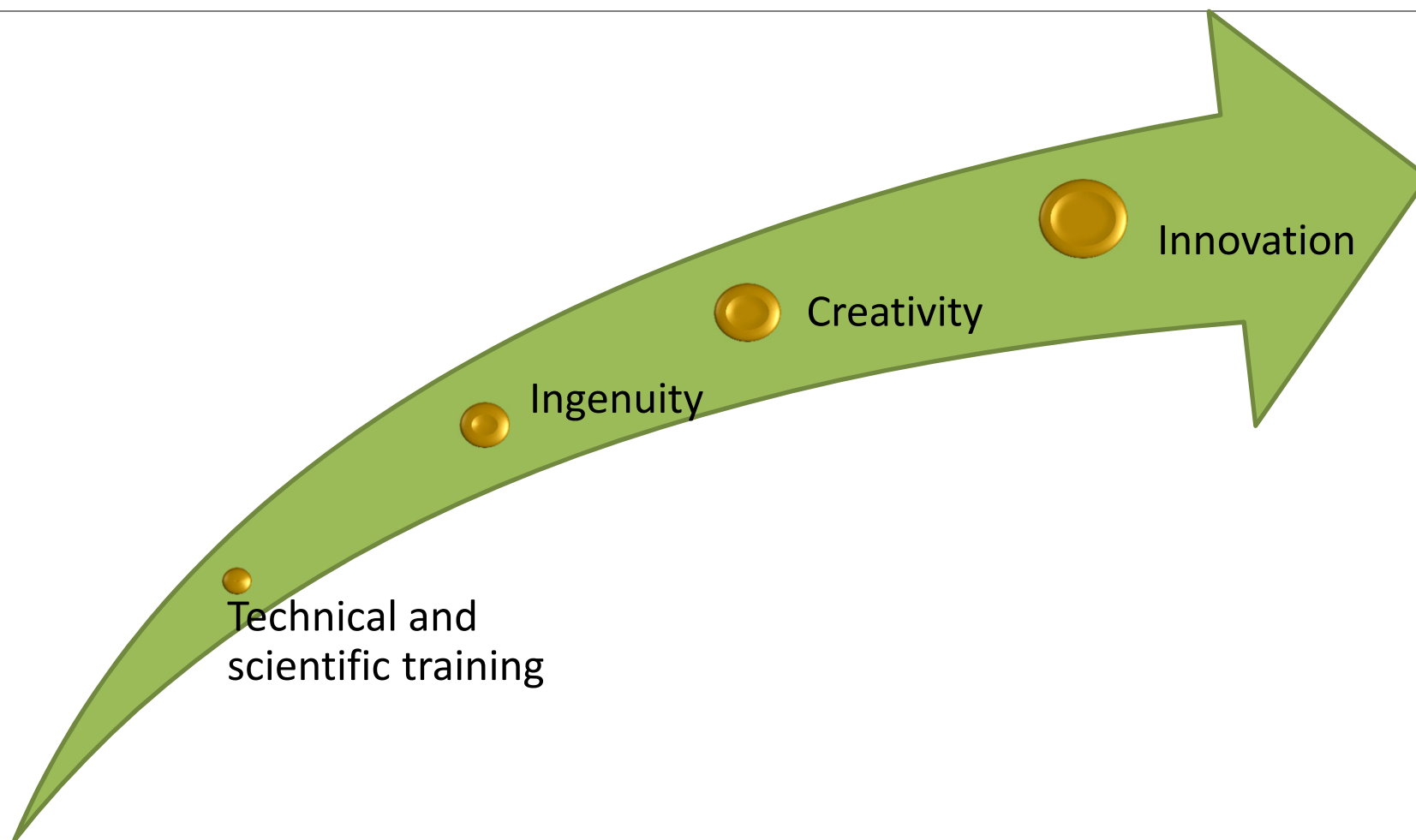


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### CIVIL ENGINEERS





## **CIVIL ENGINEERS**

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The civil engineers are ideally placed to provide the lead in cross-disciplinary working:

- They recognize and embrace all of the aspects in delivering new sustainability paradigm producing sustainable structures;
- The profession is itself multidisciplinary;
- Civil engineers can work effectively in the languages and cultures of other design professionals.



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## CIVIL ENGINEERING PRACTICE

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Practicing civil engineers recognize its professional activity as “**a complex, multi-disciplinary that requires making difficult compromises to achieve a balance between competing objectives**”.

That is, a need for a holistic consideration of design and context.

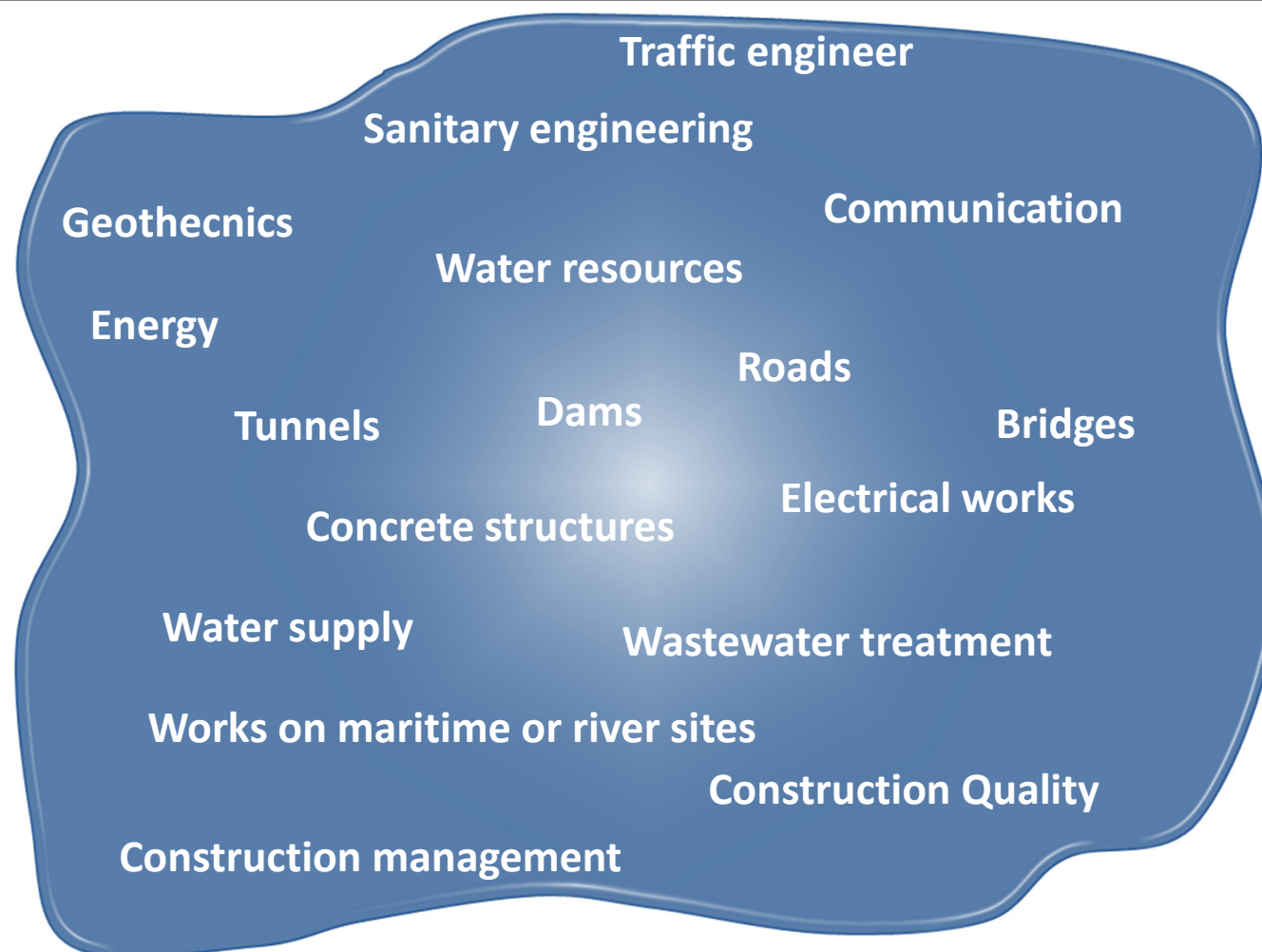


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### MAIN ACTIVITIES IN CIVIL ENGINEERING

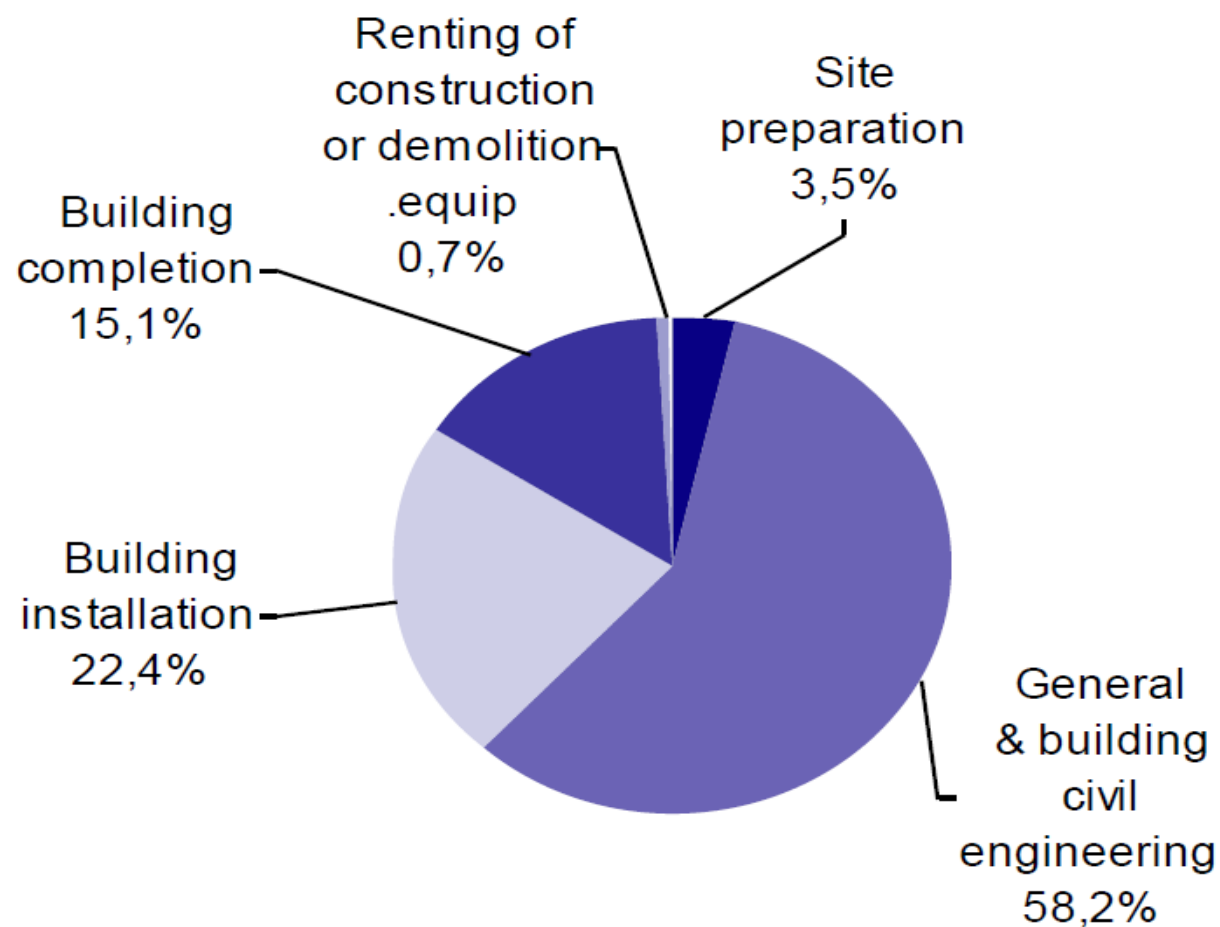






**CONSTRUCTION'S VALUE ADDED BY ACTIVITY**

(EUROSTAT, 2009)





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### CIVIL ENGINEERING AND SOCIETY

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## MAIN OBJECTIVES OF CIVIL ENGINEERING

I

- Practice acts that require public trust

II

Contribution to the country's development

**Society**



## PERCEPTION OF THE PUBLIC CONCERNING MAIN OF OUR DAILY FLUIDS

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Where comes the electricity from?



- From the switch.

Where comes the water from?



- From the tap.

Where comes the money from?



- From the bank.



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## ASPECTS TO BE TAKEN INTO ACCOUNT IN THE ENGINEERING PROFESSION

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As the civil engineering has transformed the outcome of its application in products increasingly easy to use, visibility was lost, becoming considered as a ***commodity***, that is, without great difficulty to be obtained.



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## CIVIL ENGINEERING AND MEDIA

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Engineering has always had difficulty dealing with the media.



**The achievements of success are not news.**

Example:

The inauguration of the Alqueva dam received the following highlighted :



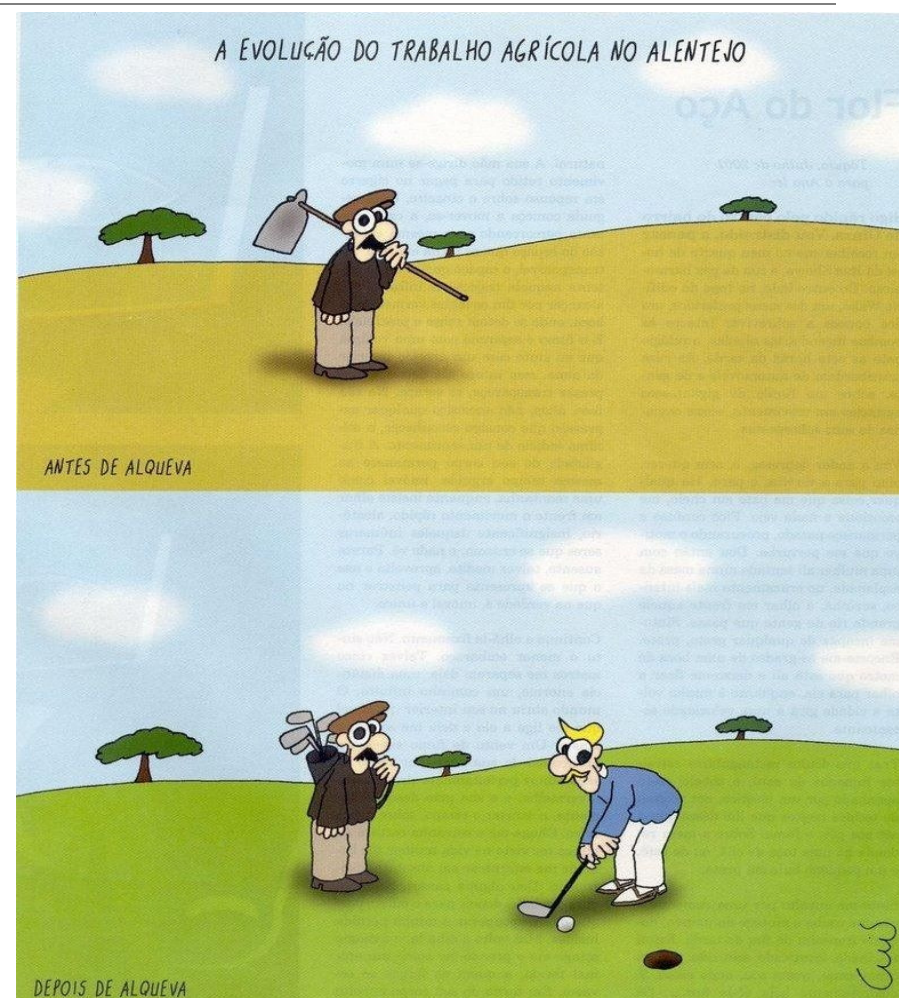
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### CIVIL ENGINEERING AND MEDIA

On the opening day of the Alqueva dam the press published the following cartoon:







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**Alqueva DAM**





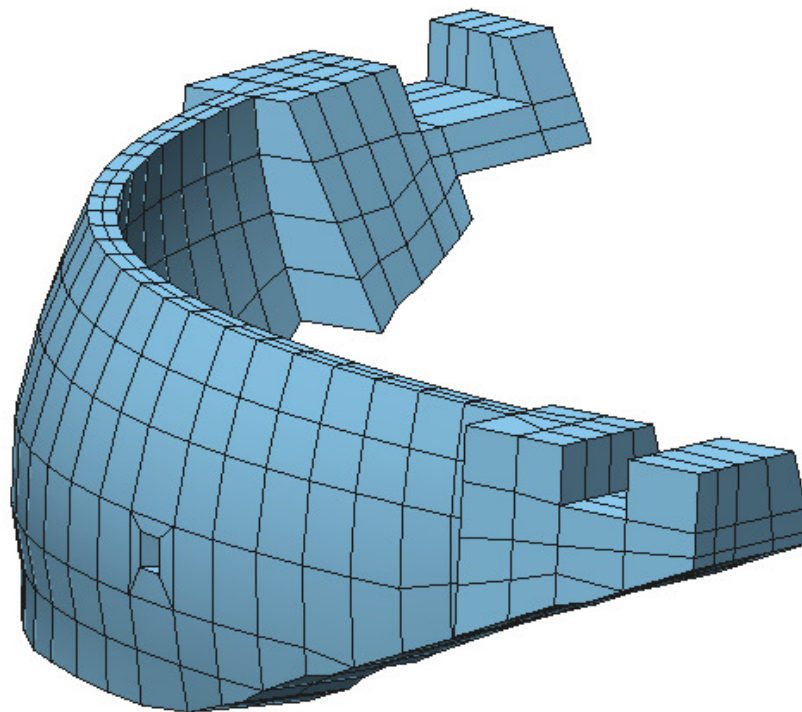
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### ALQUEVA DAM. MULTI-PURPOSE USE

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## ENGINEERING AND MEDIA

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**The Civil Engineering is almost recognized by its quality.**

Why is almost never appears in the media as a factor of success and relevance to the development of a country?

The media refer to civil engineering arises mainly when a disaster or a failure happen.



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### **BUILDING THAT COLLAPSED IN SHANGHAI**

27/06/2009)







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## RESPONSABILITY IN THE CIVIL ENGINEERING PROFESSION

There is a belief in society that civil engineers are responsible for any accident and always look for someone to condemn.





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## **LEADERSHIP AND MANAGEMENT**

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Civil engineers need skills beyond technical mastery.

Civil engineers need to be good communicators capable of leading people, projects and our society forward.

Strengthening the demand for the disclosed information through a dissemination program is essential to stimulating the public interest and holding procuring entities and government to account.

(in: Civil Engineering, ICE, Vol.165, May 2012)



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## PRINCIPLES TO BE CONSIDERED

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Is relevant to adopt in civil engineering activities the principles of **transparency** in the relationship with multi-stakeholders.

This aspect is particularly relevant **in public sector projects** where transparency and accountability are relevant, particularly in the construction sector.



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### REGULATION OF PROFESSIONAL ACTIVITY

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Civil  
Engineering.  
The future



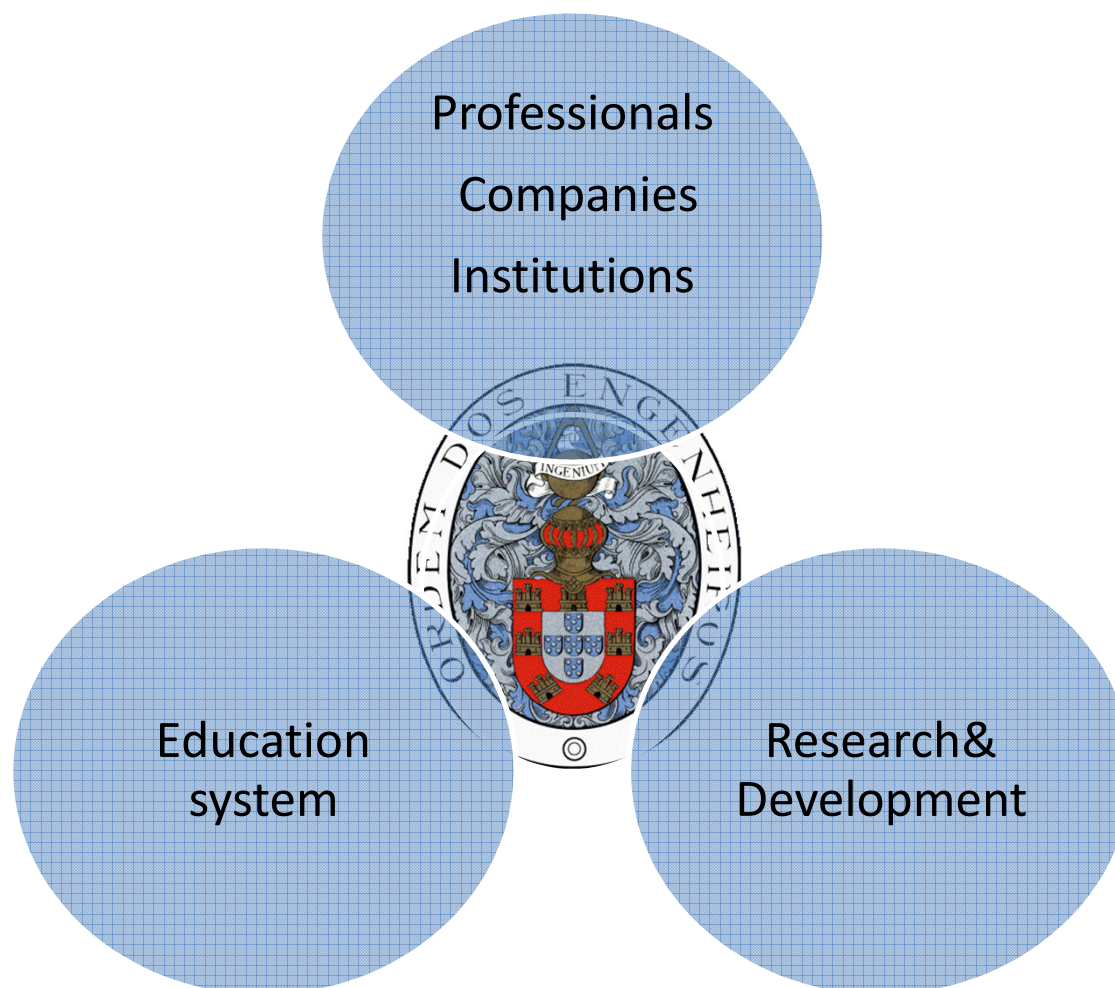
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### THE PORTUGUESE ASSOCIATION AND SOCIETY

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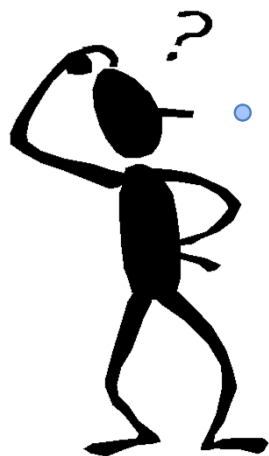
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## PROFESSIONAL REGULATION

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How to regulate the engineering profession?





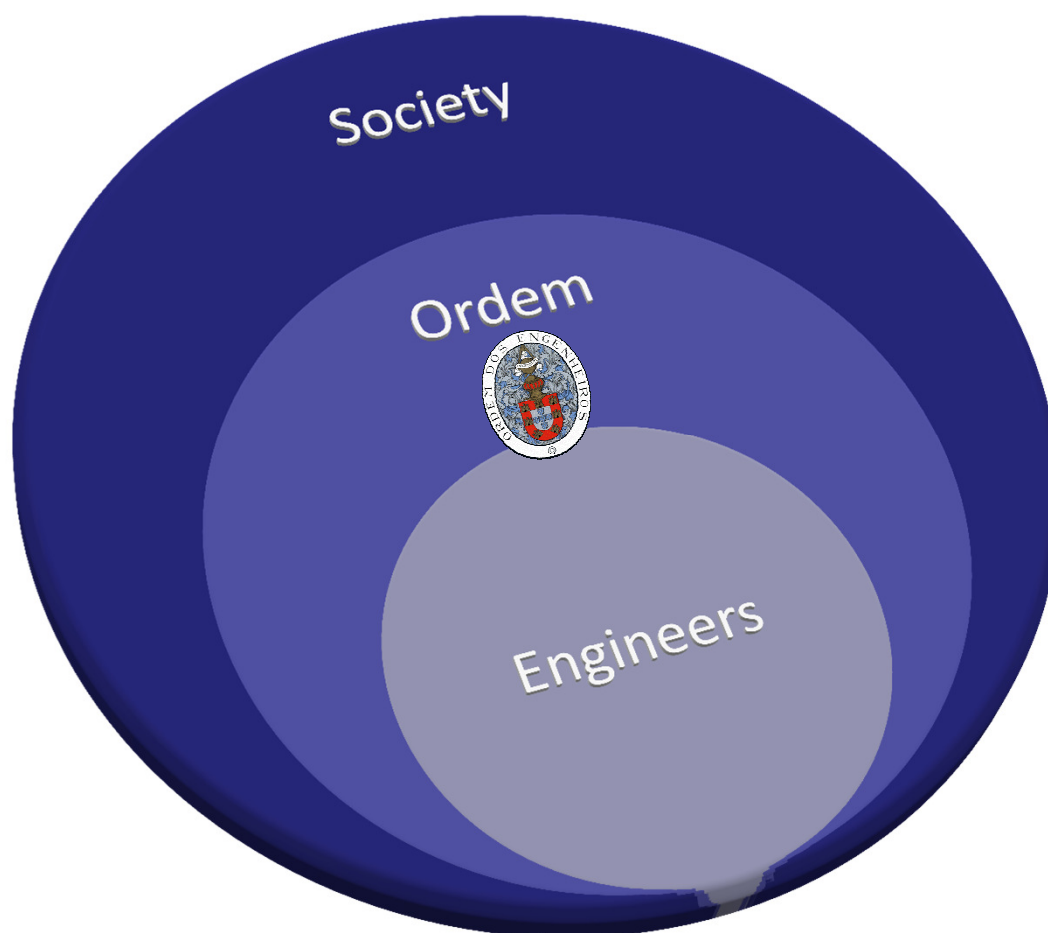
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## PROFESSIONAL REGULATION. THE PORTUGUESE SITUATION

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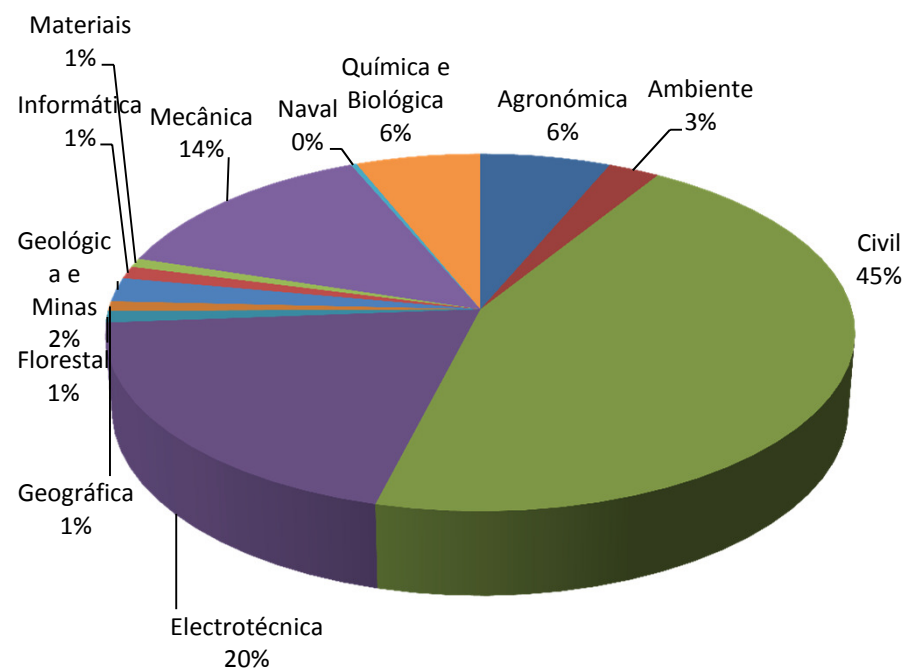
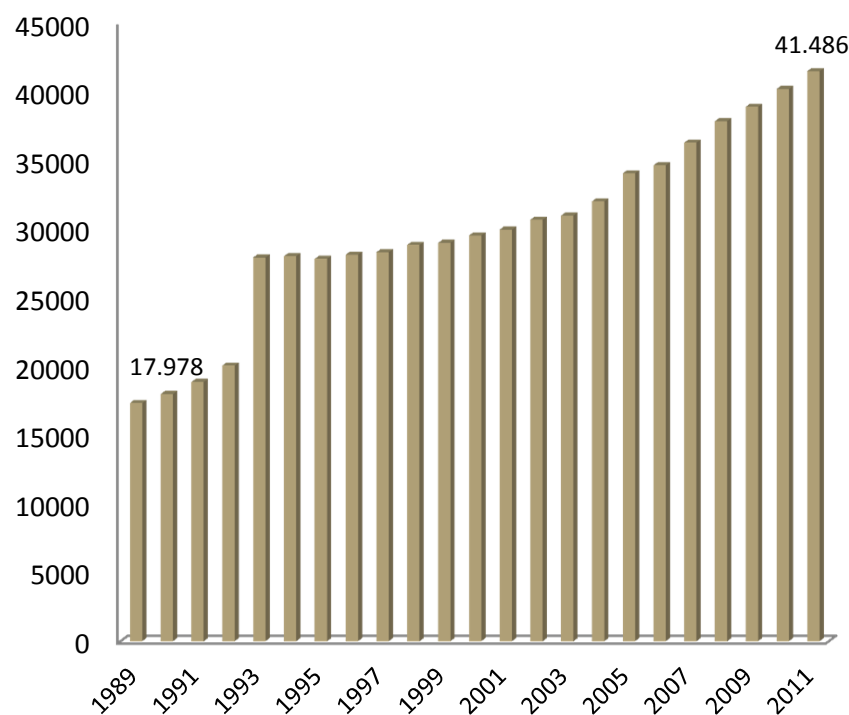
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### MEMBERS

Since 1990 the number of Engineers has grown about 131%.





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## **OBLIGATIONS OF MEMBERS**

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All the members are obliged to obtain success in a course dealing with “Ethics and Deonthodology”.

Ethics is the cornerstone of our practice as engineers.

A member who fails the rules included in the codes is at risk of disciplinary proceedings if this comes to light.

We have an informative column in our bimensal magazine “Ingenium” devoted to disciplinary cases.



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## **ADMISSION RULES**

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### **Degree in Engineering:**

- Bachelor (1st cycle);
- Master (Master or 2nd cycle, 1st cycle with Engineering);
- PhD (with prior academic record in Engineering).

### **Provide evidence of admission:**

- Individual curriculum evaluation;
- Providing any evidence, to decide on curriculum evaluation.

### **Traineeship:**

- Providing of replacing a public proof stage;
- Compulsory attendance of course Ethics and Professional Conduct;
- Frequency of any other training actions (in particular for knowledge of legislation).



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## DIFFERENTIATION IN DECLARATIONS FOR ACTS

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### **Differentiation among members:**

- **with limited exercise in the acts as engineer;**
- **full exercise members, depending on the basic academic and professional skills.**



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## ENGINEERING EDUCATION. ACCREDITATION

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OE ensures engineering education in Portugal by participating in EUR-ACE® system.



This system incorporates the views and perspectives of the main stakeholders (students, higher education institutions, employers, professional organisations and accreditation agencies).





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### CIVIL ENGINEERING. THE FUTURE

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### CIVIL ENGINEERING IN PAST



O AQUEDUTO DAS ÁGUAS LIVRES NO VAL DE ALCÁNTARA, EM 1808. Aquarela do REY WILLIAM BRADFORD (1811)

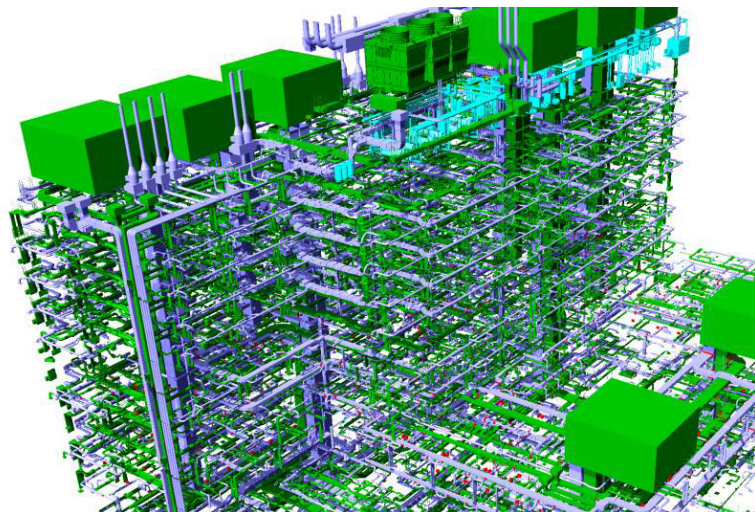


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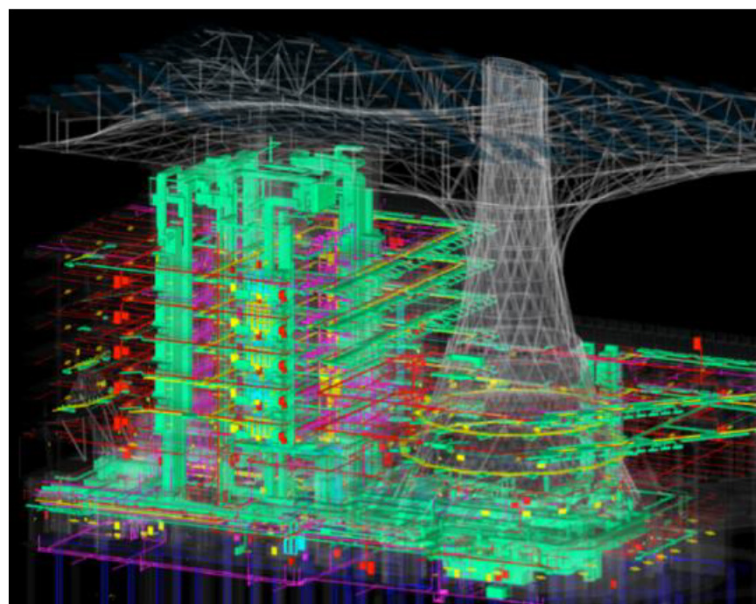
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THE FUTURE



# BIM

BUILDING INFORMATION  
MODELLING





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### CIVIL ENGINEERING. THE FUTURE

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## CIVIL ENGINEER. WHAT FUTURE?

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### “The Decision Book”

As actors or we have a passive attitude, and let the various forces interact, or have a **proactive attitude**.

In this case **we have to start by defining the future we want and then act on existing strengths, seeking that they lead us to the chosen future.**

This was the model that we can adopt to make predictions of the future and therefore we call "**Crystal Ball**".



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## CIVIL ENGINEER. WHAT FUTURE?

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### **Scenario 1 - Change in type of professional activity**

Correspond to a reduction in a comprehensive technology training and an increase in management activities.

- Forces to be developed: **increased specialization** (maintenance, expertise, rehabilitation, new materials, etc...).
- Increased formation of the management area.



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## **CIVIL ENGINEER. WHAT FUTURE?**

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### **Scenario 2 - Change in type of employment**

Correspond to greater business activity and a very low employment for others.

Forces to be developed:

- innovation
- entrepreneurship
- management.



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## CIVIL ENGINEER. WHAT FUTURE?

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### **Scenario 3 - Change in the geography of labor**

Corresponds to a higher activity abroad.

Forces to be developed:

- support network;
- logistics;
- foreign regulations.





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## THE KNOWLEDGE. ROLE OF THE UNIVERSITY



**THE KNOWLEDGE IS INSIDE PEOPLE.  
THE TEACHER ONLY HELPS THE BIRTH OF THIS KNOWLEDGE. (SOCRATES)**

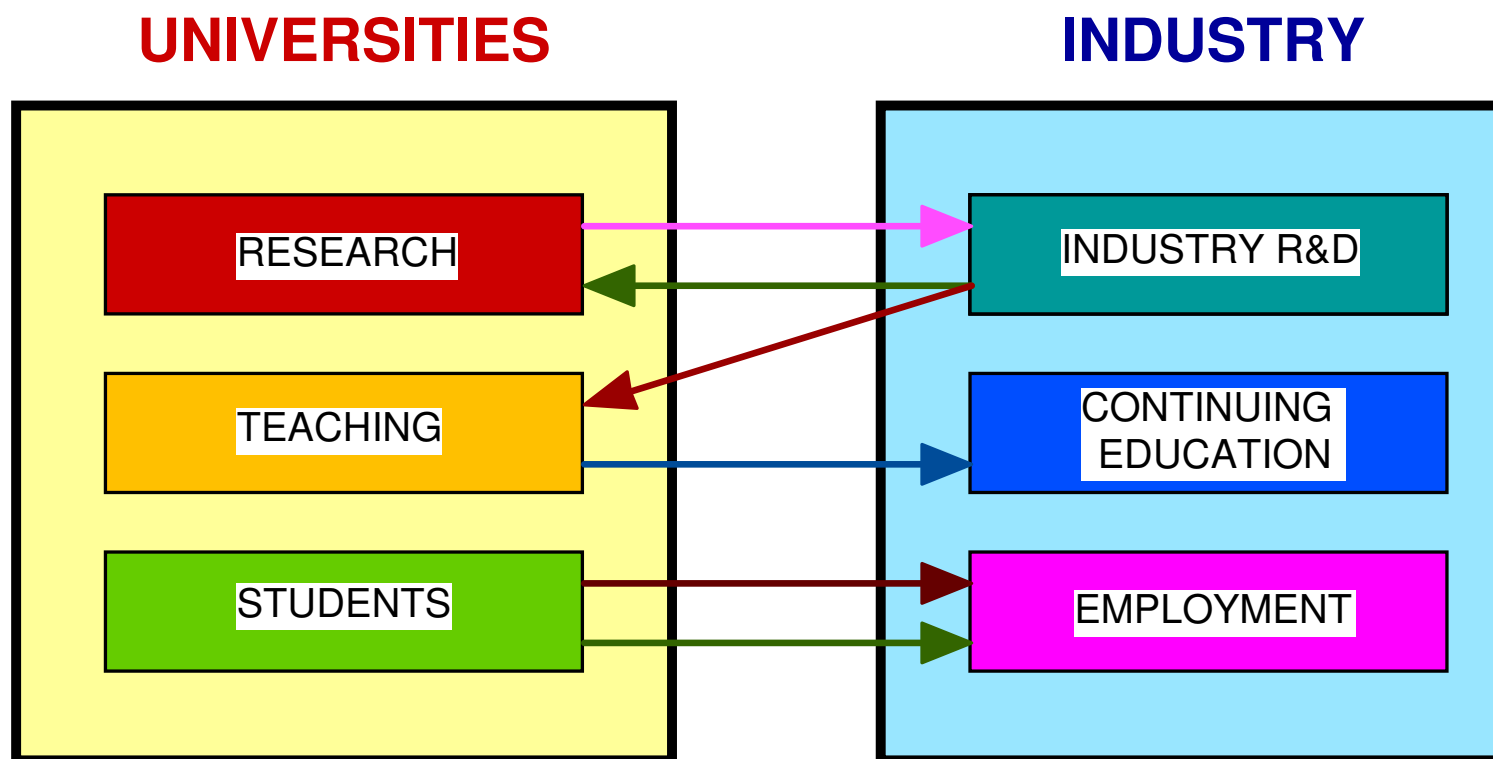


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### A PARTNERSHIP FOR PROGRESS



Source: **Michael Athans**, Professor of Electrical Engineering (emeritus), MIT



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THE KNOWLEDGE. EDUCATION AND TRAINING

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### **Scenario 1 - Continuing education**

Corresponds to an increase in the current training of engineers, updating them on all the innovations in the industry **(Education and training build the critical foundation for sustainable development).**

Forces to be developed: **Professional Associations connection, connecting business, practical teaching, web link and/or foreign location.**



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## THE KNOWLEDGE. EDUCATION AND TRAINING

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### **Scenario 2 - Change in the geography of work**

Corresponds to a performance of education abroad, the universities.

Forces to be developed:

- local sites,
- accelerated training,
- connecting local business.



## TRAINING OF CIVIL ENGINEERS. THE FUTURE

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### Change scenario - new solutions

Corresponds to the introduction of teaching solutions like:

- a) Forum for technical discussions;
- b) Techniques for oral presentations;
- c) Actual practice, with work placements in the disciplines;
- d) Being an entrepreneur, creating their own business and developing methodologies for the "idea to business";
- e) Technical solutions applying most modern IT technology of social networks.

Forces to be developed: **e-learning and web classes, BIM + IPAD technologies, business connection.**



## TRAINING OF CIVIL ENGINEERS. THE FUTURE

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Solid teaching in basic disciplines (physics, mathematics, etc.) to successfully face of ongoing scientific and technological developments that professionals can not alienate.

**Preparing for the "global engineer", a citizen of the world, with more learning in so-called "soft skills":**

- Economics and management;
- Creativity and entrepreneurship;
- Leadership and relationships lab marketing;
- Legislation;
- Cultural enrichment, etc.



## INNOVATION THEMES IN CONSTRUCTION (SCHARTINGER, 2010)

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- **Zero-emission and energy-producing** construction with materials of low embodied energy and energy-efficient applications.
- **Smart home technologies and intelligent houses:** Future applications will be related to green smart technologies, designed to reduce the consumption of energy over the lifetime.
- **Increasing use of decision support systems**, e.g. by means of building information modeling (BIM).
- **Increasing usage of prefabrication** of construction components and the **use of industrial robots and automation technology** in off-site manufacturing.
- **New business models** (in particular public-private partnerships) to finance, build and manage public buildings and infrastructures.
- **Educational and training programs** shall be planned and delivered at all levels, including higher education.



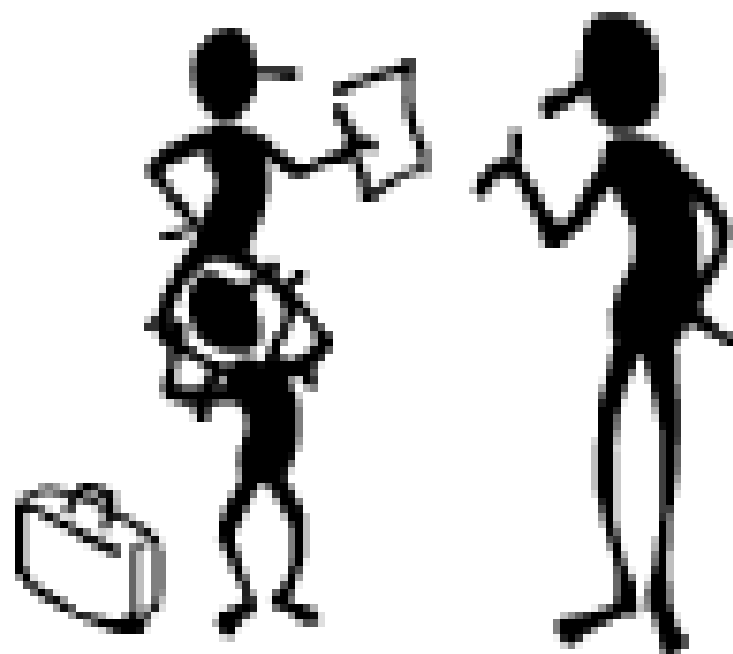


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### TEAMWORK. MULTIDISCIPLINARY STUDY TEAMS





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Do not ask WHAT IS THE  
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Ask WHAT YOU WANT TO BUILD  
THE FUTURE.








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### ENGINEER A PROFESSION OF PUBLIC TRUST

Thank you for your attention