Taller de Solucions Constructives Arquitectòniques
an experience for innovation in architecture

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ABSTRACT

The theme of this paper is to present an experience of knowledge transfer between universities and business, aimed at product innovation in the construction sector.

The experience is located at ETS Architecture del Vallès, Universitat Politecnica de Catalunya (UPC) and is an optional subject, intensive, which develops every year during the period of one week (40 hours). The subject is under the format of the workshop on innovation.

In each edition the subject is sponsored by a company in the construction sector that has a problem that can be an innovative technical solution. Students studying architecture degree enrol in this course and work with the help of a teacher and invited experts in the development of possible new innovative product profiles. The experience has been three years and sponsored the experience companies Hydro, Uralita, Technal and Lubrizol.

TEXT

The profession of architecture has traditionally been an engine of technological innovation in the construction industry. But as the name of Paxton, Perret or Guastavino denote the existence of designers with technical concerns. It is true, but who have had to develop on their own, even troubled by this directly to builders.

At university architect receives a huge training geared almost exclusively toward formal innovation (design), which gives a large capacity:
- Creative (new forms, textures, colors)
- Synthesis and (group multiple requirements under a single solution)

but not on technological innovation, which sees as its input. In addition the construction sector is building a cross-industrial sectors of our planet:

- Is everywhere, in different climatic environments, cultural, economic and social.
- Fits many requirements that are constantly evolving over time
- Is one of the most active in product innovation, materials and process
- Is one of the higher number of SMEs and hence proximity between prescriber and manufacturer.
- Is one of the technological sector where is most difficult to consolidate and implement the innovation.
- A sector with many technological barriers when providing innovative travel products.

The products of the construction industry that are put on service for architects are most fitted to the interests of other agents that for the architect profile. User and architect are two agents that are absent in the processes of product innovation. The architect, and also the prescribers, occupies a central place in the process of project work but not in the previous industrial design processes.

The construction sector in Europe is very much needed off innovation to survive. But most of the opportunities for innovation are no longer central to every technology, but precisely the boundaries between the various technologies. This puts the architect again at the center of innovation. For academic training, the architect has a general view that allows it to be aware of border problems.

One assumes that in the coming years architects will work together in multidisciplinary teams for innovation in the construction sector, along with engineering or science graduates, the industry will need to incorporate the views of the prescriber.

This profile of a professional architect interested in the product innovation does not exist today as consolidated. It is not because the architects do not have that profile before going to university but because this profile is not recognized or
encouraged at the university.

This situation is also inserted into the process of searching for new career opportunities for the architects, given the social densification of the profession. At this time the ratio of architects is 600 inhabitants / arq in Madrid and 800 inhabitants / arq in Barcelona.

To our university we were raised and these challenges, and professor Joan Lluís Zamora i Mestre, who is also part of the UPC INNOVA team, was offered to promote an alternative. The fact that the Spanish architect meets the professional responsibilities of architects in Europe and the engineers building provided also an extra chance..

**PROFILE OF THE SUBJECT ToSCA**

ToSCA was initially proposed as a innovative subject profile to attract the attention of students of architecture degree:

- ToSCA was introduced at ETSAV, a school of the UPC with a profile of architect training more concerned with the construction technique.
- The ETSAV curriculum allows the modifying optional subjects offer each year.
- It can teach intensive courses (1 week = 8 hours per day = 40 hours = 2 ECTS).
- Could be taught in the rest period between the two semi-annual periods.
- The possibility to implement a new teaching methodology: studio of product innovation.
- The attractive combination of a stable teaching method combined with a target variable in each edition.
- Joint participation of specialists from the department and specialists guests.
- The possibility of teaching for a foreign partner, the customer, it would be a sponsor.

The course was launched in January 2007 and already had three editions (January 2007 - January 2008 - January 2009).
Fact sheet summary for the registration of students
Poster broadcast that was hanging around the school

ACADEMIC RESOURCES

To facilitate contact with students, we ask the support of 3 teaching juniors (pre-graduate) who had been the previous year’s winners of a national architecture award for students: Pablo Twose ptwose@hotmail.com, Maria Pancorbo mariapancorbo@hotmail.com, Alberto Rosal 647485695 barp00@hotmail.com. These juniors facilitate teacher interaction with students. In return they received a certificate in teaching beginners.
The first year was chosen, as an object of the subject, a national competition for students raised by a company.

The 40 hours period of joint work was organized to maintain a reflective tension conducive to innovation. An attempt was made to limit the innate tendency of architects to not reflexive innovation.

There were a total of 20 students (appreciable for a school of 1000 students) and was presented a total of 11 jobs. The papers were deposited in the platform web UPCommons and since then it is every year.
OpenCourseWare UPC Tosca 2007
The final assessment of the work was done by a panel made by the teacher and the student. It was evaluated rigor, originality and communication rated on a scale of 1 to 3.

By next year, and for our convenience, we normalize the final presentation of three slides that must contain:

SLIDE 1: ANALYSIS DESCRIPTION
name of work submitted
architectural field of application
objectives
analysis d.a.f.o.(swat)
demands

SLIDE 2: CONCEPTUAL DESCRIPTION OF PROPOSAL
user interaction
interaction with the forward architecture
interaction with other elements

SLIDE 3: DESCRIPTION OF THE PROPOSED TECHNOLOGY
materials
technology used
trade references
It was adopted the International VELUX Award as external reference work to develop

We began to use the platform ATENEA as communication tool with students. We deposited the program, conferences, resources (books, websites, etc.)

The 2008 edition was presented a total of 12 purposes from 26 students. The Jury was joined by a technician for a multinational company and a member of the management team of ETSAV. Finally in 2009 it reached the stable cooperation of two companies: The first was focused on the development of systems that are both sun protection and solar profit energy. The second was interested in a broader issue involving finding new opportunities for use of polymers in the
construction.
This latest edition 2009 has increased the enrolment to 44 students (8 were not Spanish). There were 11 papers submitted to the jury.

The design process that finally is adopted after 3 years is:

- Presentation of topic
- Inaugural lecture from the company staff
- Set the stage list of requirements (formal and informal), the rank-and interrelate them.
- Phase of training and equipment for affinity definition of roles: architect, builder, etc.. developer, user, etc. to develop cooperative work.
- Benchmarking Phase
- Phase “hunters” solutions on to the street
- Brainstorming Phase
- Phase partnership proposals, grouping and selection via SWAT
- Central Conference of professional expert
- Phase of the teams working on a workshop: validation and feasibility of their own purposes
- Phase preparation of Communication
- Public presentation
- Assessment by the jury’s collective body

CONCLUSIONS

- The students of architecture had been responding to this proposal.
- For them the formula is academically and professionally refreshing and suggestive.
- The willingness of companies is taking advantage of young students to interact with their teams of R & D.
- For the university also represents an opportunity to break their traditional teaching schemes.
- It must enter in the future a user validator
- They return the schools of architecture in the role of innovation.
- Open to suggestions to repeat this experience as part of meetings or proceedings of the CIB in academic frameworks, at the same university or different between.