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+ João Quaresmac + Manuela Fernandesb + Sofia  
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# LOCAL+GLOBAL

innovative symbioses in  
architectural education

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## ABSTRACT

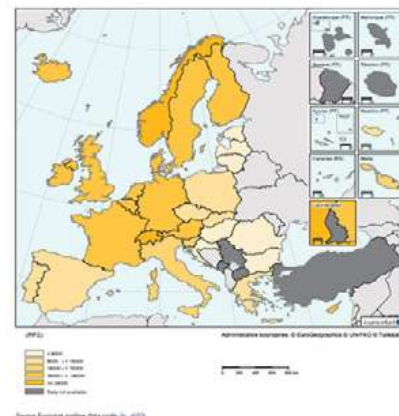
Europe faces huge challenges in next future in what concerns to the energy efficiency and the reduction of consumptions in buildings, the condition of housing stock and the needs of ageing people. However, due to the diversity of European countries, that reveals a variable geometry in their continental distribution, based on the economic and financial situation, urban and rural settlements, geographical features and very different cultural realities from country to country, the strategies to implement need to be different and adjusted to the reality of each geographic area. The architectural education must follow this logic of identity and be adjusted to regional reality instead of being equal across Europe.

A young architect educated to design only new buildings, in schools supported by public investments in weaker economies, can be easily hired to work, sometimes with low salary, in stronger economies but he will not intervene to turn its community more strong, efficient and sustainable to the future, returning the investment made in his education. This communication intends at first to present information about the condition of existing buildings in south of Europe, especially in Portugal, in comparison with the average of European situation and also discuss the investments in new construction and renovation of existing buildings. The new challenges for the renovation of existing buildings require new skills and different strategies for the training of future actors in the design process. Knowledge about statistical reality based on national/regional census and economic reports can drive the training and design needs. Knowledge about the traditional construction techniques, the inspection and diagnosis methods for the existing situation, new thinking and design processes and interaction between different specialities are some of the essential features to implement in architectural studies.

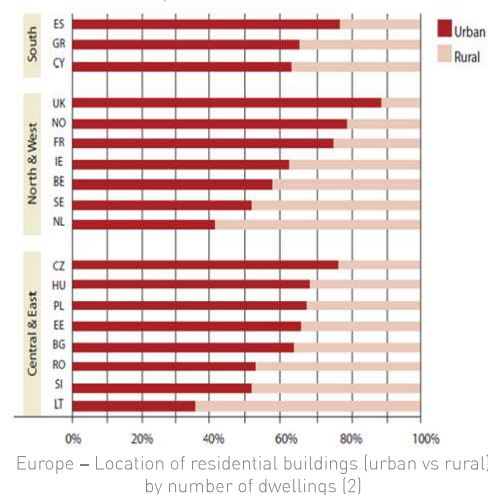
## 01 Introduction

Europe faces huge challenges in a near future in what concerns to energy efficiency and consumptions reduction in buildings, housing stock condition and ageing people needs. However, due to the diversity between European countries, strategies to be implemented need to be different and adjusted to reality of each geographic area. This diversity, reveals a variable geometry in continental distribution, based on:

- economic and financial situation
- urban / rural settlements
- geographical features



Europe Median Income 2012 (1)



Europe – Location of residential buildings (urban vs rural) by number of dwellings [2]

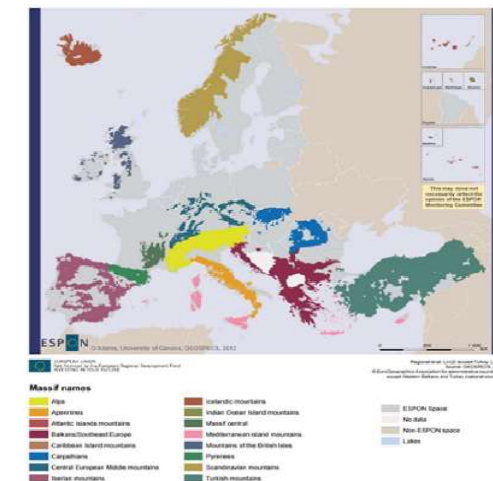
[1] Eurostat - Living conditions in Europe 2014 Edition in <http://ec.europa.eu/eurostat/web/products-statistical-books/-/KS-DZ-14-001>, accessed in 2016.10.20

[2] Europe's building under the microscope, BOIE – Building Performance Institute Europe in <http://bpie.eu/publication/europes-buildings-under-the-microscope/>, accessed in 2016.10.20

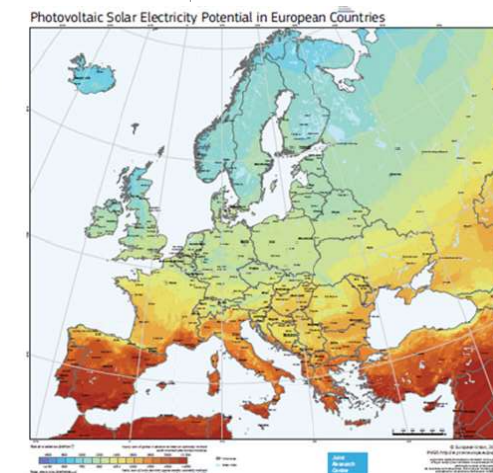
- very different cultural realities from country to country

Even in the distribution of architecture and design schools, Europe have an uneven geographical distribution.

This communication intends at first to present information about the construction reality in Europe, existing buildings condition in southern



Europe - Mountain Areas [3]

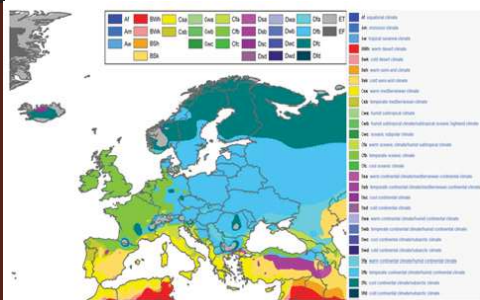


Europe – Photovoltaic Solar Electricity Potential [4]

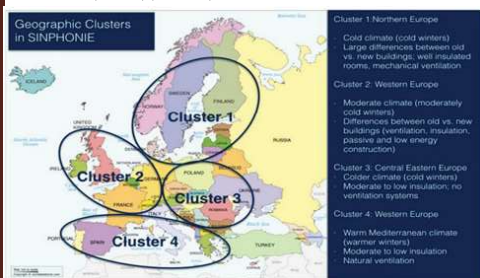
[3] Delineation of mountain areas in the ESPON GEO-SPECS project in <http://www.geospece.eu/Del-Mountains.pdf>, accessed in 2016.10.20

[4] Europe Photovoltaic Solar Electricity Potential in European Countries in [http://re.jrc.ec.europa.eu/pvgis/cmmaps/eu\\_cmsaf\\_opt/PVGIS-EuropeSolarPotential.pdf](http://re.jrc.ec.europa.eu/pvgis/cmmaps/eu_cmsaf_opt/PVGIS-EuropeSolarPotential.pdf), accessed in 2016.10.20





Europe Koppenmap - climate classification [5]



Geographic clusters in SINPHONIE Project [6]



Europe's Top 100 Schools of Architecture and Design 2016 [7]

[5] Europe Koppen map - climate classification  
[https://upload.wikimedia.org/wikipedia/commons/b/bf/Europe\\_Koppen\\_Map.png](https://upload.wikimedia.org/wikipedia/commons/b/bf/Europe_Koppen_Map.png),  
accessed in 2016.10.20

[6] Cara Maesano, Isabella Annesi-Maesano, Impact of Lighting on School Performance in European Classrooms in [http://www.velux.com/-/media/com/articles/pdf/light%20and%20performance\\_whitepaperfinal%201.pdf](http://www.velux.com/-/media/com/articles/pdf/light%20and%20performance_whitepaperfinal%201.pdf),  
accessed in 2016.10.20

[7] Europe's top 100 schools of architecture and design 2016, Domus in <http://digitaledition.domusweb.it/domus/books/151201domus/index.html#/217/>, accessed in 2016.10.20

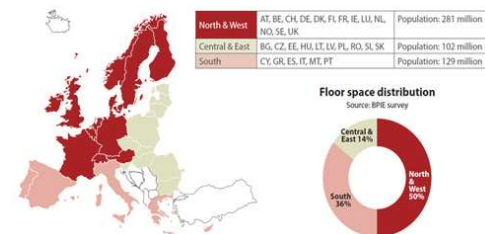
[8] Tarja Hakkinen, Sustainable refurbishment of exterior walls and building facades, Final report, Part A - Methods and recommendations, VTT Technical Research Centre of Finland in <http://www.vtt.fi/inf/pdf/technology/2012/T30.pdf>, accessed in 2016.10.20

Europe, especially in Portugal, in comparison with the average of European situation. The investments in new construction and renovation of existing buildings are also important issues under discussion to define new ways that can lead future activities of training. Finally, architectural education, young architects training, new tendencies and skills, are object of reflexion.

## 02 Knowledge about construction reality in europe

While we reflect about the modalities of architectural teaching to implement in practice and knowledge to forward to the students, is fundamental to be aware and have information about constructive reality and the expected changes. This reality can be easily based on statistical reality contained in national/regional census or economic reports.

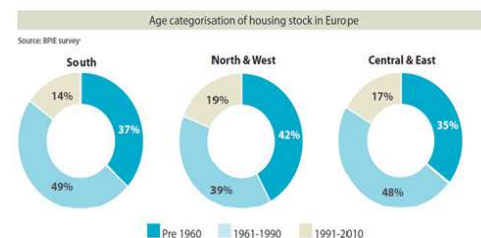
As an example, is fundamental to get information about the population and floor space distribution, the building stock, the existing buildings age and their condition, the housing Deprivation / Overcrowding Rates, segmentation of European countries construction economies or about different volumes of investments in new construction and renovation or refurbishment of existing buildings.



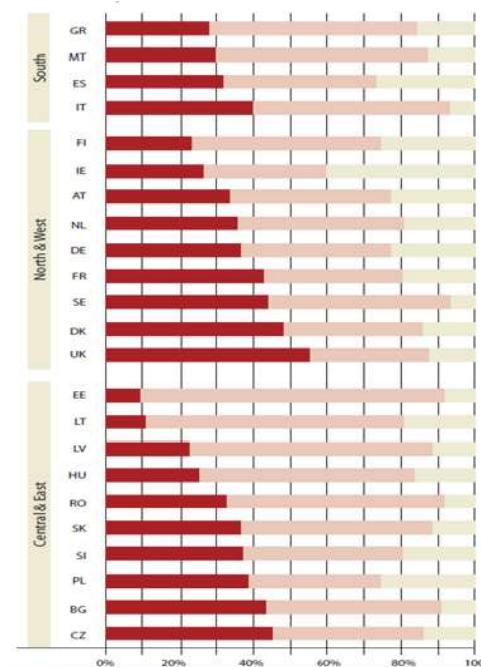
Europe - population and floor space distribution [2]

Zone	Country	HDD	Population in 2003 (million)	Building stock (million m <sup>2</sup> )
Zone 1: Southern European Countries (564 to 2 500 HDD (1 269 HDD))	Malta	564	0.40	11
	Cyprus	787	10.41	337
	Portugal	1302	10.41	337
	Greece	1698	11.01	351
	Spain	1856	41.55	1 454
	Italy	2085	57.32	2 076
	France	2494	59.64	2 109
Zone 2: Central European Countries (2 501 to 4 000 HDD (3 272 HDD))	Belgium	2882	10.36	359
	The Netherlands	2905	16.19	561
	Ireland	2916	3.96	125
	Hungary	2917	10.14	221
	Slovenia	3044	2.0	45
	Luxembourg	3216	0.45	21
	Germany	3244	82.54	3 463
	United Kingdom	3354	59.33	1 567
	Slovakia	3440	5.38	82
	Denmark	3479	5.38	330
	Czech Republic	3559	10.20	237
Zone 3: Northern European Countries (4 000 to 5 83000 HDD (4 513 HDD))	Austria	3569	8.10	292
	Poland	3605	38.22	706
	Lithuania	4071	3.48	62
	Latvia	4243	2.33	45
	Estonia	4420	1.36	28
	Sweden	5423	8.94	338
	Finland	5823	5.21	151

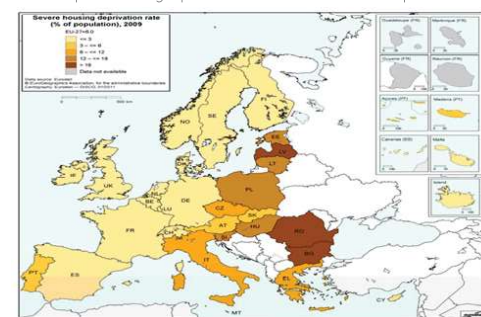
Europe - population and building stock [8]



Europe - the age categorization of housing stock [2]



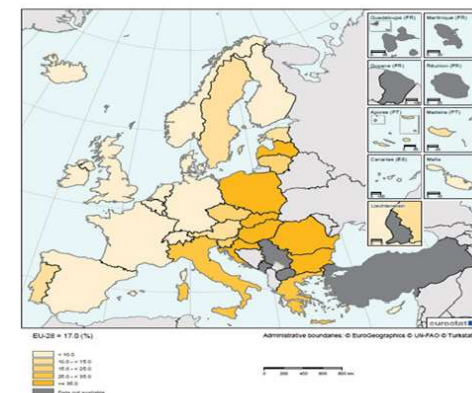
Europe - the age profile of residential floor space [2]



Europe - Housing Deprivation Rate [9]

[9] Anna Rybkowska, Micha Schneider, Eurostat - Population and social conditions, Statistics in focus in <http://ec.europa.eu/eurostat/documents/3433488/5578396/KS-SF-11-004-EN.PDF/2ef3ac6a-9d13-4911-8808-20145b2a125a>, accessed in 2016.10.20

Map 3.1: Overcrowding rate, 2012 (%)



Source: Eurostat online data code: eu\_ahod01a

Europe - Overcrowding Rate 2012 (%) [1]

The investments in new construction / renovation of existing buildings are also important indicators about the realities and tendencies that the construction interveners have to know to assure that the training of future architects is according with future needs.

Report of FIEC - EUROPEAN CONSTRUCTION INDUSTRY FEDERATION titled "Key Figures - Activity 2015 - Construction in Europe" (10) public informs that in 2015 the main activities in Europe construction sector had the following distribution:

- Non-residential (offices, hospitals, hotels, schools, industrial buildings) - 31,8%
- Rehabilitation and Maintenance (in housing) - 27,7%
- New house buildings (individual dwellings, apartment blocks, social housing, schemes) - 21,3%

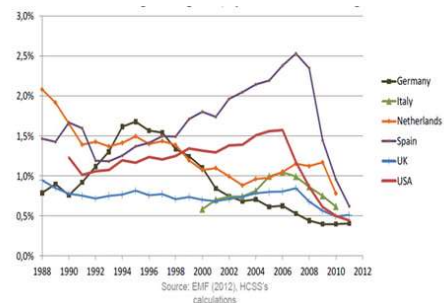
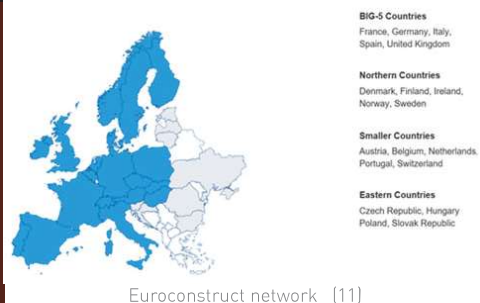
- Civil Engineering (roads, railways, bridges, tunnels, concrete structures, special foundations, electrical, works, water supply, wastewater treatment, works on maritime or river sites) - 19,2% Euroconstruct reports (11) also define different areas of regional coverage for Europe countries (Big 5 countries, Northern Europe, smaller European countries and Eastern Europe countries) and reveal that renovation investments dominates housing output in Western countries while civil engineering and non-residential investments lead in Eastern Europe.

The information on housing completions for

[10] Key Figures - Activity 2015 - Construction in Europe, FIEC - EUROPEAN CONSTRUCTION INDUSTRY FEDERATION in file:///C:/Users/FE/Downloads/FIEC\_KEY\_FIGURES\_edition\_2016\_-\_FINAL.pdf, accessed in 2016.10.20

[11] Euroconstruct network - areas of regional coverage in [http://www.euroconstruct.org/ec/publications?utm\\_source=2016\\_10\\_Newsletter&utm\\_medium=Newsletter&utm\\_term=New\\_Website&utm\\_campaign=2016\\_October](http://www.euroconstruct.org/ec/publications?utm_source=2016_10_Newsletter&utm_medium=Newsletter&utm_term=New_Website&utm_campaign=2016_October), accessed in 2016.10.20





Annual housing completions as % of age of existing dwellings stock, by number of buildings [13]

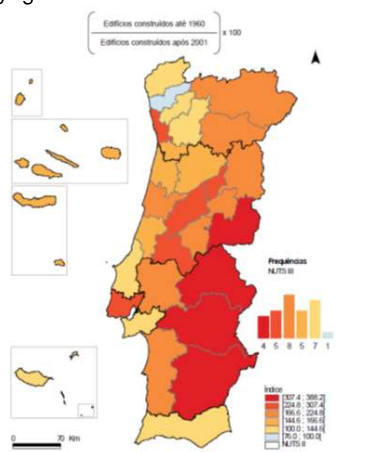
some of European countries as % of age of existing dwellings stock, by number of buildings, is shown in figure 17 and was collected from Hypostat publications by the European Mortgage Federation.

### 03 Knowledge about construction reality in Portugal

Statistical data related to the age of buildings usually gives quality information about their physical characteristics, since buildings are the result of common building techniques applied at the time of their construction.

Recently Portugal was subjected to a great constructive outbreak. From 1999 until 2002 were concluded an average of 106.000 houses per year in Portugal, which means 290 houses/day, 12 houses/hour or 1 house every 5 minutes.

According to Census 2011 and 5th General Housing Census, percentage of buildings over 50 years in Portugal was 25,4%. More detailed information about index of building ageing and its distribution can be seen more detailed in the following figure.

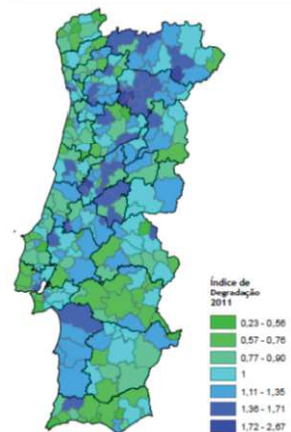


Index of building ageing – Portugal (Census 2011) [14]

In what concerns to repair needs, statistical information reveals that 29% of Portuguese buildings (more than 1 million!) needed repair works. If analyse is refined, 55,52% (≈500.000 buildings) of so called “ancient buildings” (built before 1960 decade) have repair needs, 13,43% (≈120.000) need major works or are too much degraded and 5,51% (≈50.000) are very much degraded.

Analysing data related to very recent buildings condition (built in last 10 years), about 5% (25.270) already need repair actions and 1.656 buildings (0,32%) are very degraded or need major works. This information allows to deduce that within 10 years Portugal will have new problems to solve!...

More detailed information gives data about degradation rate of buildings by municipality (Degradation index = d (Municipality) / d (Country), where d is the % of buildings with medium and major needs of repair or very much degraded) the basis for geographical intervention can be better detailed and strategies of action better defined.



Portugal – Degradation index by Municipality (2011) [15]

This information is an important working tool that drives to a better evaluation of the situation and define actions to implement. It also reveals the huge needs of building renovation/refurbishment investments in Portugal and can drive the definition of real needs for training new actors in design and project processes, construction techniques and implementation of real estate developments.

### 04 Architectural education, young architects and new tendencies

Architectural education must follow this logic of identity, statistical information about building condition and also be adjusted to regional reality

instead of being equal across Europe. A young architect educated only in new buildings design, trained in schools supported by public funds in weaker economies, can be easily hired to work in stronger economies, sometimes with low salary. Consequently, this professional will never intervene to turn his community stronger, efficient and sustainable to the future, returning the investment made on his own education.

New challenges for existing buildings renovation require new skills and different strategies for the future actors training in the design process. As referred above, the knowledge about statistical reality based on national/regional census and economic reports, can better define training and design needs.

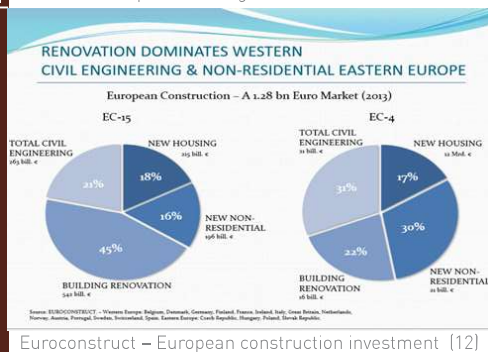
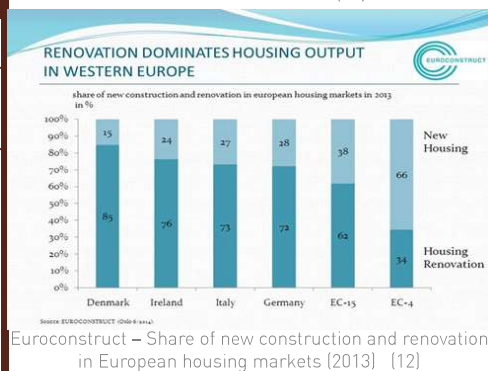
In my opinion, the knowledge about...

- traditional construction techniques,
  - building's anatomy
  - inspection and diagnosis methods for the existing situation,
  - space's flexibility
  - the needs of ageing people/“silver hair users”
  - building materials, indoor air quality and health
  - building's pathology
  - new thinking and design processes
  - construction management
  - financial, quality and deadlines optimization
  - interaction between different specialities
- ... are some of essential features to implement in architectural studies.

For example, if an efficient final energy consumption of a building is intended to obtain, different components must be analysed to guarantee an efficient design process. The design process must integrate trilogy of shelter, identity and comfort. It means that spatial, functional and aesthetic aspects are fundamental but special attention on building envelope (different constructive elements and solar orientation), installations (providing renewable energy devices) and indoor air quality has to be taken, in parallel with the study of user needs and behaviour.

In another way if is intended to rehabilitate or adapt an existing building for actual exigencies, maintaining architectural characteristics and façade elements, without previous elements of design, it is fundamental to proceed to a comprehensive survey of building. However, to perform this kind of work, the responsible must have survey techniques skills, inspection and diagnosis methods knowledge and also has to dominate traditional construction techniques to evaluate the possibilities of including new constructive elements compatible with existing ones.

Efficient design has to consider new perspectives of space's flexibility for new kind users or new family's standards and also consider the evolution of European population and needs for



[12] Michael Weingärtler, State of play - Forecasts for European construction, European Builders Confederation, Annual Meeting 2014, Palermo, Italy in [http://www.eubuilders.org/DOC/misc/European\\_Construction\\_Weingartner\\_European\\_Construction\\_Outlook%20SENT.pdf](http://www.eubuilders.org/DOC/misc/European_Construction_Weingartner_European_Construction_Outlook%20SENT.pdf), accessed in 2016.10.20

[13] Artur Usanov et al, Sustainable (Re)Construction, Annotate Briefing, The Hague center for strategic studies (HCSS) and TNO, Dec, 2013 in file:///C:/Users/FE/Downloads/Sustainable%20(Re)Construction.%20The%20Potential%20of%20the%20Renovation%20Market.pdf, accessed in 2016.10.20

[14] Censos 2011, Resultados Definitivos – Portugal, INE, L.P., Lisboa, Portugal, 2012

[15] Isabel Vazquez, Paulo Conceição, Estudo Prospetivo do Mercado de Reabilitação Urbana e Guia de Boas Práticas, FEUP, 2014, in [http://reabilitacao.aiccopn.pt/archive/doc/Estudo\\_Prospetivo\\_RU\\_4.7.14.pdf](http://reabilitacao.aiccopn.pt/archive/doc/Estudo_Prospetivo_RU_4.7.14.pdf), accessed in 2016.10.20

ageing people of safety and good accessibilities, included in suitable internal organization.

When an overview of the traditional construction sector is performed, the continuous process of construction development phases can be segmented starting by extracting raw materials, continuing in product manufacturing, design and engineering, construction, operation and maintenance, renovation or demolition and restarting process considering demolition results as a raw materials or including it in new artificial products manufacturing.

Nowadays, in those traditional construction processes, architects usually act in design and construction segments. There exist some opportunities for young architects if they invest on acquiring new skills or they are trained in a new way based also in technical instruments and innovative approaches. They can work as energy experts on design or as aggregators at construction or even at operation and maintenance segments.

On design it is possible to bring new competences in product development to the market, based on services and ICT but also implementing marketing and organizational innovations. On construction segment, innovations can be obtained in processes, marketing and organization, guarantying financial, quality and deadlines advantages by optimizing planning of human and technical resources. Those new skills also can be used by young architects if operation and maintenance segment is taken in consideration as one of the fundamental elements for ensuring quality throughout whole life cycle of buildings.

## 05 In conclusion

The Habitat III, United Nations Conference on Housing and Sustainable Urban Development, to take place in Quito, Ecuador, next October 2016 includes, in its 109th proposal of work to be discussed and implemented in future, "We will include data disaggregation to allow a differentiated analysis of housing supply and demand considering the specific social, economic, and cultural dynamics on subnational levels. This will inform the implementation of housing and urban development programs, with housing at the center of the strategy and to the extent possible, situated at the center of the city".

The text clearly defines the need to disaggregate and study data information and consider subnational levels of social, economic and cultural dynamics as basis to define different strategies to implement development programs. This implies the need to be aware about differences of local and global knowledge implementing different approaches, respect for the difference and local tradition, the need to take care of existing build-

ings, to avoid new defects and new pathologies in interventions.

In resume, the design for the future need to be conscientious of the importance of Mankind evolution and related construction history.

As an "infiltrated agent" in an Architectural environment, during the colloquium and the related presentations and discussions about "how to do", I tried to learn a little more about but I still have more questions in my mind.

- The "grands travaux" of renowned architects are so fundamental for our evolution?

- Architecture can be global and also well contextualized in all cultural, local and climatic contexts?

- How to deal with and understand the local architecture? Shall we show some respect for the traditions of each country? Or impose our own criteria?

- Can we avoid pathologies while we choose particular materials that we think they are globally usable?

- What kind of new skills are needed?