FINAL REPORT

Erasmus+ Project:

"Confronting Wicked Problems: Adapting Architectural Education to the New Situation in Europe"

Chief Editor:

Ivan Cabrera i Fausto

Erasmus + Programme

KA-2: Innovation and good practices

Strategic partnerships

From September 1, 2014 through August 31, 2017

Agreement number: 2014-1-NO01-KA203-000366

Project specific data:

Programme:

Erasmus+

Key action:

KA-2: Innovation and good practices

Action:

Strategic partnerships

Field:

Strategic partnerships for higher education

Call:

2014

National Agency:

Norwegian Centre for International Cooperation in Education

Title:

"Confronting Wicked Problems: Adapting Architectural Education to the New Situation in Europe"

Coordinating Institution:

Arkitektur- og designhøgskolen i Oslo
Maridalsveien 29, 0175 Oslo, Norway
Telephone +47 22997000 / Fax +47 22997189
www.aho.no

Start date:

September 1, 2014

End date:

August 31, 2017

Agreement number:

2014-1-NO01-KA203-000366

Erasmus+ funding:

284.815 €

Project leader:

Karl Otto Ellefsen (from September 1, 2014 to August 30, 2016)

Ivan Cabrera i Fausto (from August 30, 2016 to August 31, 2017)

Project administrative coordinator:

Erling Rognes Solbu (from September 1, 2014 to October 15, 2014)

Anne Marie Øveraas (from October 15, 2014 to August 31, 2017)

Project secretary for EAAE affairs:

Inge Lens

Executive quality assurance group:

EAAE Council

0. INDEX

1. GENERAL INTRODUCTION

Author:

IVAN CABRERA i FAUSTO

European Association for Architectural Education

1.1. Actors and legal framework

1.1.1. European Association for Architectural Education

The European Association for Architectural Education (EAAE), also known by its name and acronym in French *Association Européenne pour l'Enseignement de l'Architecture (AEEA)*, is a non-profit organisation founded in 1975. Its fundamental purpose is to progress in the quality of architectural education by means of providing a forum where information on aspects of architectural education and research are generated and exchanged. Aiming at improving the knowledge base and quality of architectural and urban design education within the Old Continent, EAAE's mission has been historically to build a network of European Schools of Architecture in order to promote the discussion, exchange and common policy in Europe to advance the quality of architectural education. So as to accomplish its objectives, the association pledges all its efforts to:

- organise an annual General Assembly where network opportunities and discussion of the general policy of the association are the main topics;
- establish relations with governmental, international and professional organisations and authorities;
- coordinate and promote the dialogue among its member schools;
- promote the organisations of thematic networks on any aspect related to architecture by means of conferences and workshops;
- articulate critical issues in the context of both architectural education and architectural research;
- and finally and at most, strive for academic excellence.

Nowadays the association is composed by over 130 members from 32 different European countries (figure 1), holding a unique position among any other institution of its kind. Members are distributed in three different categories. Full membership is available for European schools or institutions delivering a degree of architect that is recognized either by the state or by the professional organisation ruling the access to profession in the home country. Associated membership is available in two different modalities. Associated institutional membership is scheduled for institutions that not fulfil all the requirements that full members must meet. Associated individual membership is available for individuals who are involved in teaching architecture either through their profession or in their duties, in Europe or abroad, who do not register on behalf of a school or an institution. Finally, honorary membership is available uniquely by appointment of the General Assembly for a lifetime, being so far mostly devoted to former EAAE Presidents. Any kind of membership is easily requested by means of addressing a request to the association secretariat that would forward the query to the Council and to

the General Assembly ultimately which will grant the status through voting at the suggestion of the Council.

Figure 1. Geographic distribution of EAAE full members in 2017

The association is governed by the aforementioned General Assembly which is composed by all members, despite of the fact that only full members have voting right. It meets at least once annually, usually during the celebration of the association annual event held traditionally in late August or early September. These meetings and EAAE everyday tasks are managed by the association Council which includes a President, Vice President, Treasurer, and up to eight Counsellors. Administrative tasks are executed by a formal Secretary which mandatorily has to be based in Belgian territory, since the association is registered in Belgium and is subjected to its laws. Currently the secretariat is located in the University of Hasselt (Parelius, 2014).

1.1.2. Architects' Council of Europe

The Architects' Council of Europe (ACE) also known by its name and acronym in French *Conseil des Architectes d'Europe (CAE)*, is a non-profit organisation founded in 1990 which merged the former Liaison Committee of the Architects of the United Europe (CLAEU) and the former Council of European Architects (CEA). Being the representative organisation for the architectural profession at European level, among its missions and objectives can be found:

- promoting architecture in Europe, by enhancing the appreciation of architecture as matter of public interest and as an essential element in the creation of quality in the built environment;

- advancing architectural quality in the built environment, by encouraging, developing and promoting its quality;
- supporting sustainable development of the built environment, by promoting the use of sustainable criteria in architectural design and planning and encouraging the adoption of holistic approaches to complex issues;
- ensuring high standards of qualification for architects, in order to ensure the highest levels of lifelong skill and competence within the profession;
- advocating quality in architectural practice, by providing guidance to architects on how to provide high quality architectural services to customers and working to ensure that the regulatory environment for architectural practice enables this achievement, and by affirming the role of the architect within the project team as an expert in the responsible development of integrated approaches to design and construction;
- fostering cross-border cooperation and facilitating European practice, in order to support the free movement of architects and architectural services throughout the European Union;
- and finally, acting as the single voice for architects in Europe, so as to stimulate fruitful cooperation among the member organisations that compose ACE within the context and values of the European Treaty.

Figure 2. Geographic distribution of ACE members in 2017

Nowadays the Architects' Council of Europe is composed by 43 member organisations which are the governmental regulatory and professional representative bodies in all the EU member states, the accession countries, Switzerland and Norway (figure 2). That involves representing the interests of over 565.000 architects from 31 European countries.

ACE's supreme body is its General Assembly which meeting twice yearly and being composed by all member organisations, formulates and adopts the association policy in all matters arising from its objectives. It elects the President of the organisation as well as five members of the Executive Board. This cabinet manages and administers the daily business of the association and implements the agreements and policies established by the General Assembly. The executive board is assisted in its mission by the General Secretariat, located in Brussels, which constitutes the headquarters of the institution (Architects' Council of Europe, 2014).

1.1.3. Erasmus+ Programme

Initiated in January 2014, Erasmus+ is the European Union programme for education, training, youth and sport. With a budget of 14.7 billion of Euros for a period of seven years, the Erasmus+ Programme is focused on promoting skills, employability and supporting the modernisation of education, training and youth systems. Two-thirds of this budget are scheduled to learning opportunities abroad for individuals, within the European Union and beyond; the remaining third provides funding for partnerships between educational institutions, enterprises and non-profit organisations, as well as for reforms to modernise education and training to promote innovation, entrepreneurship and employability.

The Erasmus+ Programme was launched in a period with high percentages of unemployment within the European Union, especially in certain Southern countries. Acquainted with that fact, the programme aims to solve occasional but significant skills gaps reported by employers when recruiting staff, by means of providing opportunities for people to study, train or gain experience abroad. Simultaneously, improving the quality and relevance of Europe's education, training and youth systems becomes a must. In order to do so, the programme supports the professional development of education staff and youth workers and the cooperation between the educational and professional spheres (European Commission, 2013c).

The European Commission handles the overall management of the programme, while the Education, Audiovisual, and Culture Executive Agency (EACEA) of the Commission is responsible for managing the centralised elements which include promoting the programme and opportunities, launching calls for proposals, reviewing grant requests, contracting and monitoring projects and, finally, communicating on results. In the EU countries, the Commission entrusts much of the management of

Erasmus+ to National Agencies. Outside the Union, and especially in the field of higher education, this role is played by the National Erasmus+ Offices (European Commission, 2013a)

Organisations wanting to participate in Erasmus+ can enrol in a number of networking and development activities, including strategic improvement of the professional skills of their staff, organisational capacity building, and creating transnational cooperative partnerships with organisations from other countries so as to exchange best practices or produce innovative outputs. Proposals have to be formalized as projects which should be included in one of these categories:

- Key Action 1: Learning mobility for individuals, intended for fostering the mobility of students, staff, volunteers, youth workers, and young people.
- Key Action 2: Innovation and good practices, aimed to develop education, training, and youth sectors through five main activities:
  - Strategic partnerships, to support innovation within the sector as well as join initiatives to promote cooperation, peer-learning, and the sharing of experience.
  - Knowledge alliances, to foster innovation in and through higher education with business.
  - Sector skills alliances, to tackle skills gap and ensure an improved alignment of education and training with labour market needs.
  - Capacity-building for higher education, to support its modernisation, accessibility, an internationalisation of these institutions in partner countries.
  - Capacity-building for youth, to support the development of young people work, non-formal learning and volunteer work.
- Key Action 3: Support for policy reform, intended to increase the participation of youth in democratic life.
- Jean Monnet, provides opportunities for teaching, research, and policy debate on the European Union and its policies.
- Sport, designed to develop and implement joint activities to promote sport and physical activity.

Strategic partnerships, within Key Action 2, provide opportunities for a wide variety of public, private, and non-governmental organisations to implement a great number of activities which may include the stronger cooperation and networking between organisations; the development, testing, and implementation of innovative practices; the recognition and validation of knowledge, skills and competences; and many more. Strategic partnerships can differ in size and conduct different activities depending on the objective of the project or the typology of organisations involved and other elements (European Commission, 2013b).

1.1.4. The application for this project

The European Association for Architectural Education has ambitions to play an important strategic role in developing architectural education and linking the academia with the professional practice. These tasks are indeed in line with EAAE's mission statement. This wish of remaining in the position of the leading association for architectural education in Europe along with the will to increase the attractiveness of its annual conference were behind EAAE's motivation for initiating this project.

The discussion on the convenience of carrying out a major project on the main topics included in the association's mission began in September 2013 in Chania (Greece) during the EAAE Council meetings held jointly with the 16th Meeting of Heads of European Schools of Architecture. Those first desires and comments crystallised in a truly solid project draft that was debated in Hasselt (Belgium) on March 29, 2014 during a monographic afternoon session held the day after a General Assembly of the association that had summoned a significant number of attendees.

Figure 3. Karl Otto Ellefsen presenting the draft of the project in Hasselt on March 29, 2014

The initiative was widely celebrated among the membership which barely suggested minor changes to the text presented by EAAE President Karl Otto Ellefsen. Having agreed on the project approach, contents and working arrangements, the only issue left was selecting those entities that would be formally involved in the project, since according to the Erasmus+ Programme regulations the maximum number of participants on this kind of project susceptible to apply for funding was limited to ten.

The capacity of the European Association for Architectural Education for facing a project whose intentions were to tackle the wicked problems that architectural education was facing by then and was going to face in the near future was beyond any doubt. The association constitutes an already established network of architecture schools which not only are the subjects that will have to confront these wicked problems but also are the best agents when it comes to design strategies in order to confront them successfully. Moreover EAAE ensures wide dissemination of the results and might even track and analyse the implementation of most of the suggestions. The Council and project leaders, consisting of distinguished academics representing leading schools of architecture from across Europe, would take an active part in this project. That participation would take shape not only through the fact that some of the Council members would become active researchers within the think tanks of the project, but also with the Council itself becoming the formal executive quality assurance group in the application submitted to the European Commission. Thus, members of the Council such as Adalberto Del Bo, Koenraad van Cleempoel, Susanne Komossa and Ivan Cabrera i Fausto have participated in the activities that are described in this report, and the Council meetings during these three years, along with specific meetings designed for tracking the process, have served as arenas for quality assurance and follow-up of these activities.

With both the commitment and the right tools, EAAE was in the best position for carrying out a project whose underlying reason was providing European schools of architecture with the right recommendations and tools to take up the challenge of educating students that would become architects working for the future. That task should be undertaken in a context which was not only freshly and significantly changed, but still aimlessly changing. That new cultural, societal and economic context which had received the name of "New Normal" seemed – and still seems – that came to stay. Even three years later, the lack of certainties seems to be its most relevant characteristic despite the first symptoms of the recovery from the economic and financial crisis have showed up.

Born as a term in business and economics to refer to financial conditions following the 2007 financial crisis, "New Normal" has been thoroughly used by those that fought the lack of trust and immobility that followed the outbreak of the crisis. When addressed to consumers and investors, the constant repetition of this expression looked mainly for a revitalization of the markets. But when employed in cultural and educational contexts, the expression urged the different agents to react rapidly in order to act properly with no delay. In the case of architecture education, this "New Normal" implies that the acknowledgement basis, teaching methods and role models transferred in architectural education have to be adapted to a new reality.

For architectural education and professional practice, that new reality encompasses many facets such as the need of improving architects' employability and social impact, the proper preparation for a strong demand for diversification, and the increasingly relevant role of sustainability and heritage management in the time ahead.

Therefore the project raised the question of how to teach architecture in that context in Europe, and especially how curriculum and teaching should be adapted to the new societal and professional situation so called "New Normal". Providing insights in teaching and curriculum structures by means of the document that would be finally debated and disseminated became the main goal. Having fixed the point of arrival, the project's point of departure was the acknowledgement that architecture as a discipline which comprises education, research and practice has to redefine and release its potential for problem solving and innovation within the new economic and societal context.

Since the very beginning the project involved the Architects' Council of Europe (ACE) active participation with a clear intention of including not only local universities but also European organisations participating in global networks and with an unbeatable expertise in architecture daily practice. Anyhow, it is important to underline that most of the researchers provided by the academic participant institutions are not only docents but also very experienced practitioners.

Hosting the current President of the EAAE, the Oslo School of Architecture and Design (AHO) took the role of applicant organisation inasmuch as the Erasmus+ Programme regulations didn't consider EAAE eligible for applying for funding for the project. EAAE and ACE occupied consequently two positions as participants, leaving space for seven more formal partners. Candidacies were presented right after the aforementioned meeting in Hasselt and a final selection was made based on expertise on the three main topics to be worked, geographical representativeness and support received by other fellow schools.

Having completed the list of ten participants, the application was submitted to the European Commission with the valuable help of Constantin Spiridonidis, Coordinator of the European Network of Heads of Schools of Architecture. The project was approved for funding in the summer of 2014, subsidising an amount of 284.815 € and the grant agreement was finally signed on November 24 with number 2014-1-NO01-KA203-000366. Running from September 1, 2014 to August 31, 2017, Karl Otto Ellefsen was the project leader since the beginning of the works until August 30, 2016. That day that position was transferred to Ivan Cabrera i Fausto during a follow-up meeting held in Delft. Cabrera has held this post until the project completion and is the chief editor of this report.

1.2. Problem statement

1.2.1. Architectural education as a context

Architecture is unquestionably about culture. It is a spatial manifestation of our lives, views, understandings and aspirations. Architecture shows historically speaking a very strong significance in European culture.

According to the modernization agenda of higher education systems in Europe, few of our institutions devoted to higher education are recognised as world class in the global research-oriented university rankings. However, there are fields and disciplines within the European educational and research system that not only are extremely compatible, but also hold a substantial innovation potential in terms of achieving smart, sustainable and inclusive growth. Architecture represents one of these disciplines. The actors of the architecture scene have been progressively becoming aware of their potential and capabilities and more than significant steps have been taken.

The different national cultures of architectural education in Europe, during the last two decades have implemented a modernization agenda that has affected not only their scope and curriculum, but also the way that they operate. Today it is possible to find an international system for collaboration between European institutions in the field of architecture, as well as well-functioning institutions for exchange of experiences, evaluations of qualities in architectural education, and dissemination of new knowledge, being the European Association for Architectural Education the most relevant one. Architecture also finds a historically based strong connection between education, research and professional practice, demonstrated both on local and national level and on a European level in the cooperation between EAAE and the Architect's Council of Europe.

That increasingly global and well-connected scenario becomes the perfect background for discussion of matters such as architecture education. The potential results when investigating on this field have, not only a lot of beneficiaries if we take into account all people linked to schools of architecture within Europe and beyond, but also relevant affection to its neighbouring fields like research and professional practice. Finally and considering architects' critical role in everyday life, proper results turning in meaningful advances in architectural education would have an optimal impact on a significant number of stakeholders within society.

1.2.2. Architectural education as a goal

Learning could be defined as a process that, by means of practice and experience, increases the potential for improved performance and future apprenticeship, leading definitely to a real change. That transformation is not immediate. On the contrary, it develops over time ensuring a lasting impact on how students think and act. Therefore, the way that we educate our students will have a serious and enduring influence on how our current students will perform in their professional practice in the future.

Educators must succeed in the laborious job of providing their pupils with the tools that they will need once they become practitioners in the future. That knowledge should be transferred with the focus on a global and unique target, which is that these students become great architects, which means good professionals that provide the society with good works while enjoying what they are doing.

Nowadays the principals of architectural education are very much in accordance with contemporary views on qualities in higher education. Being creativity one of the main abilities that architectural education should transfer, the system is based on studio and project work directed towards solving problems. Teamwork and multidisciplinary work are given priority (figure 4) and the creative process and evaluation of alternatives is at the centre of the learning process.

Figure 4. Workgroup and debate during a course on urban planning at the Valencia School of Architecture (Spain)

This modus operandi has produced fruitful results and many generations of architects with a good education, reportable and verifiable through a vast range of successful practicing architects. But simultaneously there is a need for further modernization of architectural education in order to strengthen the social relevance and the potential for social impact, and to develop entrepreneurial skills. If schools of architecture are capable of increasing their students' expertise on these newly arrived aspects, that fact will strengthen candidates' employability and their abilities for a good performance within the profession at any context. But the positions for practicing architects are constantly changing and lead to different professional roles depending on the European country. Hence architectural education is definitely a complex challenge.

In order to face this challenge we should learn some basics such as knowing which type of students we have in our classrooms. Students in this generation have grown up surrounded by fast-paced, interactive, media-based, and constantly changing activities. Sitting and paying attention quietly is not their style while being active in other active environments that make them act and think such as discussions indeed is. To sum it up, docents have to educate in architecture a generation of students that are changing, for a world that is rapidly changing and in a context where global recommendations are rather difficult since local culture and legislation shape the courses followed in architectural education across Europe. But such a complex scenario shouldn't discourage us. The present situation regarding pedagogical methods, curriculum structure and continuous professional development could be improved and that endeavour constitutes the core of this Erasmus+ project.

1.2.3. The New Normal

Along with many other sectors, the architectural profession continues to suffer from the economic crisis. In our particular case, the crisis has impacted our workload, salaries and profits; and has leaded to higher unemployment rates, especially in Southern European countries, to an increasing percentage of architects working part time, and to a growing erosion of roles within the building sector which has favoured other professionals, especially in Northern European countries. But surprisingly more architects than ever are being educated in Europe nowadays and that means that the pressure on employed architects is increasing in this context that has received the name of "New Normal".

Undoubtedly that situation deserves all our attention, but at the same time we should find out if these factors will be permanent, if this so-called new normal does exist indeed. Our findings easily begin

when discovering that the situation and context are still changing, and the frames for practicing architecture differ geographically. This undisputed new normal, understood as a still-photograph doesn't exist. Without an accurate and exact prognosis, no diagnosis is possible and any treatment and recommendations might seem useless. But this uncertainty is an answer in itself and with a deeper observation certain trends can be intuited. Drawing meaningful results regarding architecture education and disseminating them conveniently within Europe is EAAE's responsibility. The association by means of this project intends to foresee the near future in order to provide European architecture schools with good advice to rethink their teaching methods and redesign their curricula.

One of the aforementioned certain trends within the European architectural context is the increasing relevance of heritage. We live in a continent that was mainly built in the past. Many European regions have a large old building stock which makes possible new construction in rare cases, being refurbishment the type of task which takes the biggest percentage. Here lies a great challenge of comfort, universal accessibility, energy use and resource efficiency that might require new expertise for our students. Graduates require to be prepared to assume a fitting, competent, responsible and effective role within the sector of heritage.

Another of the aforementioned trends that can be distinguished in the near future is sustainability. Not concerning exclusively energy aspects, sustainable thinking might change completely the way that architects perform and possibly offer alternative possibilities regarding their employability.

1.2.4. Wicked problems

Despite of the fact that the immediate horizon for architecture has been thoroughly described as changing and rather unpredictable, so far three aspects have been identified as important and rather widely mentioned issues: the adequate professional knowledge required for reconquering roles and making graduates employable, the proper expertise in heritage in order to work in a continent which is mostly already built and the spreading of the sustainable thinking not only regarding the classical energy-related affairs. But having perfectly determined the object of our research will not make it easier, since even the lightest research reveals them as rather wicked problems.

Wicked problems rapidly shift. The parameters that define or have influence on them are usually unclear over almost any aspect. Being impossible to definitively describe them, it will be impossible too to provide any objective definition and further solution for them. Hence, the alternative solutions

to a wicked problem are neither right nor wrong. The concept of the wicked problem is not strange within the discipline of architecture since most of architectural problems are often considered as wicked problems. This peculiarity of architecture of tackling these problems in a natural way and solving them predominantly on a design basis should be considered a remarkable strength.

In the case of professional knowledge, when it comes to establish both the relationship with the right architectural design education and the contents of both terms, a rich and complex discussion is served and no absolute solutions exist. One of the most relevant setbacks that researchers devoted to this issue have faced within this project has been the proper definition of professional knowledge, meaning that the need to distinguish separate types of knowledge that an architect should possess.

Figure 5. Project researchers working on the proper definition of professional knowledge at the Oslo School of Architecture

After long discussions and several debates, they agreed on the existence of three types of knowledge within architectural education: knowledge of the discipline, knowledge of the practicality, and knowledge of the profession or professional knowledge, which was described as the one related to the activities and relationships with customers and government entities, which depends largely on the cultural and social context and the field of specialization, and it is mostly learnt in the context of the professional activity, seeming occasionally intractable on campus.

When it comes to deal with heritage, the topic turns into a wicked problem easily as well. It is impossible to generalize or propose exportable solution that could apply to architectural education

across Europe since national and regional intricacies demand specific and adapted approaches. In extreme cases, preservation, conservation or restoration of some historic environments could be considered impossible when certain contemporary societal demands are taken into account. Heritage thus manifests itself as a magnificent and maybe very distinct category of wicked problem. As a concept is susceptible to change and interpretation as professional knowledge is, but always taking into account the responsibility of those that become the heirs on what they have received from the past and on what they want to transmit to future generations.

Finally, searching for scientific basis to confront sustainability reveals as a wicked problem as well. Designing smart buildings cannot be seen only as a universal solution to decrease the carbon footprint of the built environment. By definition, sustainability is much more. It means working with certain limitations that become possibilities. As a topic is has many more facets than expected and is quite complex. Sustainability issues can only be met by taking into account cultural, physical and socio-political structures, economy and technology in an iterative process where questions and redefinitions are posed continuously. In addition to this, possible design-responses for situations have to be questioned and tested on different scales which range from detail to city and territory in order to verify any single variable.

1.2.5. Architecture's potential for problem solving and innovation

Departing from a present situation where a profound reduction in building activity plays a major role, having seen that the immediate future is rather unpredictable, and after verifying that event those aspects that are rather constant have turned into wicked problems, it seems that our research is seriously endangered. But in the light of a situation where the challenges and priorities of societies have changed, we have to acknowledge that architecture as an education, a discipline and a profession is maybe the best discipline to redefine and release its potential for problem-solving and innovation within a new and economic and societal context. This "New Normal" implies that the knowledge basis, teaching methods and role models transferred in architectural education have to be adapted to a new reality. That project aims to guide schools in this process focusing on the three issues that have revealed themselves as rather predominant –despite being wicked problems –in the near future of the European architecture.

1.3. Three think tanks

New knowledge for handling our selected wicked problems has been operated having organised the project in three different think tanks: "Teaching Architectural Design and Professional Knowledge" that will be often referred by means of its acronym "TADPK", "Heritage" and "Sustainability". Each think tank has been composed by representatives of both the European Association for Architectural Education (EAAE) and the Architects' Council of Europe (ACE) in addition to the representatives from the Oslo School of Architecture and Design (AHO) and the other seven schools finally selected because of their academic relevance and expertise.

Participating as representatives of all European schools of architecture and of the profession respectively, EAAE and ACE have been active partners in the project, but also have served as infrastructures for dissemination of the project results to relevant stakeholders in academia and profession. But additionally the project should consider the variety in approaches and traditions in European architecture a noticeable strength and working towards standardisation in any aspect of the academic content would have been a mistake. To strengthen the European architectural education area by means of this project has been thus about maintaining variety and difference and promoting the awareness of different approaches both academically and pedagogically, but also facilitating the exchange of best practices and the access to occasional global conclusions. Schools of architecture have been employed not only as suppliers of experts, but also as laboratories where the good ideas are created. Education and profession have worked together on architectural design and professional knowledge, European architectural heritage, and sustainability and sensible re-use of architecture, aiming to provide useful insights that hopefully will place these concepts at the centre of the decision-making in the near future of architecture.

Think Tank on "Teaching Architectural Design and Professional Knowledge" has been composed by one EAAE representative, two ACE representatives and four representatives from two schools, one from Northern Europe and another one from Southern Europe in order to cover the differences in both education and traditions, and in professional practice, special regarding the current employment situation. The Oslo School of Architecture and Design (AHO) represents the Scandinavian tradition in architectural education, closely linked to the profession of architecture and located in a strong economy. AHO plays an important role in the discussions on architectural education through its role in the Nordic Academy of Architecture and mainly through EAAE, whose presidency is held by its professor and former rector, Karl Otto Ellefsen. The Higher Technical School of Architecture of

Barcelona (ETSAB) constitutes an expert hub for teaching methods in architecture, with several ongoing projects such as on e-learning 3.0, and teaching innovation in the discipline. Representing the Spanish tradition of architects not only educated in building design and humanities but also with a strong urban planning and technical background, ETSAB leans also on the interfaculty resources for research and innovation in learning methodologies provided by the Polytechnic University of Catalonia. The choice of these schools is based on the distinguished fact that both schools have full competences in licensing architects on education completion. That means that the professional or governmental bodies in either Norway or Spain do not require an external and additional examination or process in order to register the degree beholders as full practicing architects. Another important fact has been that students' internship, during their education or later on, is not mandatory as it is in 21 out of 28 states or federal regions in Europe, which require from 1 to 3 years of post-study practice before registration. These facts made these schools interesting targets inasmuch as they have to face seriously how to teach the basic contents of practical and professional knowledge to train their students, so they are able to undertake their professional practice with proficiency.

Think Tank on "Heritage" has been integrated by one EAAE representative, two ACE representatives and six representatives from three different schools of architecture, which contributed with two experts each and which represent three noticeable different ways of focusing on heritage. The Faculty of Architecture and Arts at Hasselt University (UHasselt) represents a European region with strong traditions in researching and handling heritage challenges. Its projects, on doctoral and postdoctoral level, address problem issues, document best practices, develop real cases and elaborate theory on adaptive reuse. Hasselt University recently has begun teaching an international Master in Adaptive Reuse, frequently supported by ArcK, a research group devoted to this topic and based in the faculty. The Faculty of Architecture of the Czech Technical University in Prague (CTU) is the major school of architecture in Prague and hosts the Research Centre for Industrial Heritage which during the last seven years of activity has focused mainly on the a project about industrial topography of the Czech Republic. Simultaneously, the University of Prague has a research and documentation centre for industrial heritage where students document not only buildings but also oral stories. In addition to these specificities, CTU plays a fundamental role within the network by representing the Central European schools of architecture. Finally, the Department of Sciences for Architecture at the University of Genoa (UniGe) hosts one of the five specialization schools for architectural and landscape heritage in Italy, being one of the seven Italian institutions offering an advanced diploma in conservation which is mandatory for graduates in order to be eligible by the Italian Ministry of Culture for certain works. As a result of a workshop held in Genoa in 2007, the EAAE Conservation Network

was established within EAAE. Always based in the Genoese school and supported by the leadership of both Stefano Musso and Loughlin Kealy, this thematic network has given access to schools of architecture across the continent that were engaged in heritage-related teaching, to more than four major international conferences and workshops in the field.

Finally, Think Tank on "Sustainability" comprised one EAAE representative, two ACE representatives and six representatives from three different schools of architectures, which contributed with two experts each. Along with the two schools that integrated the TADPK Think Tank and the three schools that composed the Heritage Think Tank, these three schools complete the set of eight educational institutions that have worked along with EAAE and ACE in the project. The school partners chosen for the Sustainability Think Tank have established mature discussions on architecture and sustainability and represent differences not only geographically speaking but also in traditions in architectural education. The Faculty of Architecture at the *Politecnico di Milano* (PoliMi) is a major research and educational institution especially in the field of urban morphology, urban design and urban sustainability. Their curricula regarding sustainability issues date back to the 70s during the energy crisis. Over time, the Polytechnic has been configured as an active part of a series of consortia and research centres performing consulting activities in many sectors related to building. Programmes developed by PoliMi departments had therefore energy issues as main target addressed through the study of the technological components of architectural design with specific interest on the building performance. The Faculty of Architecture and the Built Environment at the Delft University of Technology (TUDelft) hosts master programmes in architecture and urbanism, and has established seven different research groups that allow a broad approach to issues of sustainability, building and cities, ranging from design innovation to technical solutions. Their curricula include sustainability in various dimensions in all design, research, and practice levels taught. The Ion Mincu University of Architecture and Urbanism in Bucharest (UAUIM) is a leading institution in sustainability in Eastern South-Eastern Europe. With more than a decade of experience in the field of sustainability through two postgraduate programmes, UAUIM includes in their curricula tools for analysing and designing particular cases of areas under the risk of depopulation that might still preserve a heritage value. Their systemic approach enables their graduates not only to deal with building aspects, but also to develop strategies for revitalizing localities and territories, for linking them with neighbouring consolidated areas and to the network transportation while avoiding the risk of loss of inhabitants without risking the built historic heritage and culture.

1.4. Participants and stakeholders

The project leadership was initially responsibility of EAAE's President, Karl Otto Ellefsen, who withdraw during the first project monitoring meeting held in Delft on August 30, 2016 and named Ivan Cabrera i Fausto new project leader upon its completion and responsible for the final report writing. Both have been assisted in professional and organisational matters by Tarald Lundevall, Professor at the Oslo School of Architecture and Design and TADPK think tank member.

KARL OTTO ELLEFSEN
Arkitektur- og designhøgskolen i Oslo
karl.o.ellefsen@aho.no

President of the European Association for Architectural Education
Project Leader (from September 1, 2014 to August 30, 2016)

IVAN CABRERA i FAUSTO
Escola Tècnica Superior d'Arquitectura de la Universitat Politècnica de València
ivcabfau@mes.upv.es

Project Leader at the European Association for Architectural Education
Project Leader (from August 30, 2016 to August 31, 2017)

Being AHO the applicant organisation, their research administration staff enrolled gently in the tasks of providing administrative support to the project. This responsibility was initially entrusted to Erling Rognes Solbu who was taken over by Anne Marie Øveraas on October 15, 2014.

ERLING ROGNES SOLBU
Arkitektur- og designhøgskolen i Oslo
erling.solbu@adm.aho.no

Research Administration Officer at the Oslo School of Architecture and Design
Project Administrative Coordinator (from September 1, 2014 to October 15, 2014)

ANNE MARIE ØVERAAS
Arkitektur- og designhøgskolen i Oslo
Anne.Marie.Overaas@adm.aho.no

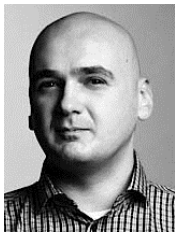
Research Administration Officer at the Oslo School of Architecture and Design
Project Administrative Coordinator (from October 15, 2014 to August 31, 2017)

EAAE's role as the institution which promoted and leaded the project has required an active participation of Inge Lens, EAAE's secretary, in many dissemination and administration affairs during the three years of the project's duration.

INGE LENS
Universiteit Hasselt, Faculteit Architectuur en Kunst
Inge.Lens@uhasselt.be

Secretary of the European Association for Architectural Education
Project Secretary for EAAE Affairs

Think Tank on "Teaching Architectural Design and Professional Knowledge" has been composed by seven researchers whose affiliation has been mentioned in the previous chapter and is individually described down below. EAAE's representative has been Ivan Cabrera i Fausto, from the Valencia School of Architecture, who was by then EAAE Council member and became later on project leader upon the request of Karl Otto Ellefsen.



DUBRAVKO BAČIĆ
Arhitektonski fakultet u Zagrebu
dbacic@arhitekt.hr

Board Member of the Architects' Council of Europe
TADPK Think Tank Member representing ACE

ROGER RIEWE
Technische Universität Graz
riewe@rieglerriewe.co.at

Delegate of the Architects' Council of Europe
TADPK Think Tank Member representing ACE

TARALD LUNDEVALL
Arkitektur- og designhøgskolen i Oslo (AHO)
Tarald.Lundevall@aho.no

Professor at the Oslo School of Architecture and Design
TADPK Think Tank Member representing AHO & Project Leader Assistant

THOMAS McQUILLAN
Arkitektur- og designhøgskolen i Oslo (AHO)
thomas.mcquillan@aho.no

Head of the Institute of Architecture at the Oslo School of Architecture and Design
TADPK Think Tank Member representing AHO

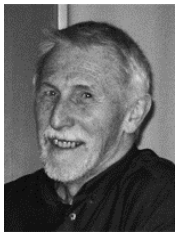
JORDI FRANQUESA SÁNCHEZ
Escola Tècnica Superior d'Arquitectura de Barcelona (ETSAB)
Jordi.Franquesa@upc.edu

Academic Advisor at the Escola Tècnica Superior d'Arquitectura de Barcelona
TADPK Think Tank Member representing ETSAB

ANNA RAMOS SANZ
Escola Tècnica Superior d'Arquitectura de Barcelona (ETSAB)
anna.ramos-sanz@upc.edu

Professor at the Escola Tècnica Superior d'Arquitectura de Barcelona
TADPK Think Tank Member representing ETSAB

Think Tank on "Heritage" has been composed by nine researchers whose affiliation has been mentioned in the previous chapter and is individually described down below along with additional data for information purposes.



LOUGHLIN KEALY
University College Dublin
loughlin.kealy@ucd.ie

Project Leader of the EAAE Conservation Network
Heritage Think Tank Member representing EAAE

EUGEN PĂNESCU
Universitatea Tehnică din Cluj-Napoca
eugen.panescu@planwerkcluj.org

Board Member of the Architects' Council of Europe
Heritage Think Tank Member representing ACE

SARA VAN ROMPAEY
E²ARC Energy Efficient Architecture Renovation Cities, European Commission
sara.vanrompaey@skynet.be

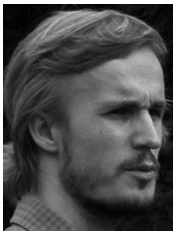
Board Member of the Architects' Council of Europe
Heritage Think Tank Member representing ACE

BIE PLEVOETS
Universiteit Hasselt, Faculteit Architectuur en Kunst
bie.plevoets@uhasselt.be

Lecturer at the Faculty of Architecture and Art of the University of Hasselt
Heritage Think Tank Member representing the University of Hasselt

KOENRAAD VAN CLEEMPOEL
Universiteit Hasselt, Faculteit Architectuur en Kunst
Koenraad.Vancleempoel@uhasselt.be

Treasurer of the European Association for Architectural Education
Heritage Think Tank Member representing the University of Hasselt



TOMÁŠ EFLER
České vysoké učení technické v Praze
eflerus@seznam.cz

Professor at the Faculty of Architecture of the Czech Technical University in Prague
Heritage Think Tank Member representing the CTUP

PETR VORLÍK
České vysoké učení technické v Praze
vorlik@fa.cvut.cz

Professor at the Faculty of Architecture of the Czech Technical University in Prague
Heritage Think Tank Member representing the CTUP

STEFANO FRANCESCO MUSSO
Università degli Studi di Genova, Dipartimento di Scienze per l'Architettura
etienne@arch.unige.it

Project Leader of the EAAE Conservation Network
Heritage Think Tank Member representing University of the Studies of Genoa

GIOVANNA FRANCO
Università degli Studi di Genova, Dipartimento di Scienze per l'Architettura
francog@arch.unige.it

Professor at the Department of Sciences for Architecture
Heritage Think Tank Member representing University of the Studies of Genoa

Finally, Think Tank on "Sustainability" has been also integrated by nine researchers whose affiliation has been mentioned previously and is individually described down below along with additional data for information purposes.

MARIA FARAONE
Oxford Brookes University, School of the Built Environment
mfaraone@brookes.ac.uk

Lecturer at the Oxfor Brookes University
Sustainability Think Tank Member representing EAAE

MARIA DO CARMO CALDEIRA
Atelier Blaanc
carmo.caldeira@ordemdosarquitectos.pt

Delegate of the Architects' Council of Europe
Sustainability Think Tank Member representing ACE

VERONIKA SCHRÖPFER
Architects' Council of Europe
veronika.schropfer@ace-cae.eu

Project Officer of the Architects' Council of Europe
Sustainability Think Tank Member representing ACE

MARIA VITTORIA CARDINALE
Politecnico di Milano, Dipartimento di Architettura
mariavittoria.cardinale@polimi.it

PhD Student at the Politecnico di Milano, Dipartimento di Architettura
Sustainability Think Tank Member representing Politecnico di Milano

ADALBERTO DEL BO
Politecnico di Milano, Dipartimento di Architettura
adalberto.delbo@polimi.it

Vicepresident of the European Association for Architectural Education
Sustainability Think Tank Member representing Politecnico di Milano

SUSANNE KOMOSSA
Technische Universiteit Delft
S.Komossa@tudelft.nl

Chair of Architectural Composition and Public Building at TU Delft
Sustainability Think Tank Member representing TU Delft

NEGAR SANAAN BENSI
Technische Universiteit Delft
N.SanaanBensi@tudelft.nl

Lecturer of Architectural Composition and Public Building at TU Delft
Sustainability Think Tank Member representing TU Delft

ZENO BOGDANESCU
Universitatea de Arhitectură şi Urbanism Ion Mincu din Bucureşti
zenobogdan@yahoo.com

Rector of the University of Architecture and Urbanism "Ion Mincu" (UAUIM)
Sustainability Think Tank Member representing UAUIM

ANA MARIA DABIJA
Universitatea de Arhitectură şi Urbanism Ion Mincu din Bucureşti
am.dabija@yahoo.com

Professor at the University of Architecture and Urbanism "Ion Mincu" (UAUIM)
Sustainability Think Tank Member representing UAUIM

In addition to these twenty-nine people directly involved in the project as leaders, administrators and researchers, it is important now to devote some lines to other stakeholders whose participation constitutes a fundamental part of this project. From EAAE we would like to thank the collaboration of

students, faculty and administration staff of all institutions involved, as well as our ACE colleagues and a vast range of professional studios, governmental entities, authorities and citizens whose participation has meant not only helping us in our research but also hopefully taking advantage of the results when disseminated.

1.5. Challenges

1.5.1. Priorities and main objectives of the project

The most relevant priority addressed by the project is contributing to the modernization of Europe's higher education systems as outlined in the 2011 Modernization Agenda with focus on three specific issues:

- New innovative curricula and educational methods and development of training courses
- Entrepreneurial learning and entrepreneurial education
- And finally, labour market issues including career guidance and youth employment

Within this frame, the project established two main objectives which have guided researchers' interests during their work in the three think tanks established:

- To strengthen the architectural graduate's ability to face the wicked problems, and thus improve his or her social impact and employability. To achieve this, the content and methods of architectural education have to be reconsidered and developed. The strengthening of cooperation and exchange of good ideas and best practices within the European architectural education area is a vehicle to transfer of knowledge and the dissemination of ideas, and to ensure innovation. Simultaneously, the strengthening of the bonds between the educational sphere and the professional sphere is needed both to gain an understanding of the challenges and to adapt education and professional practice to the New Normal.
- By means of the new knowledge gained, educational institutions will be able to develop their curriculum for life-long learning. Hence, this project will provide insights for Continuous Professional Development (CPD) in an attempt to reach other target groups that might benefit from the knowledge dissemination, such as young professional and practice through chambers and professional organisations.

1.5.2. General challenges

Having fixed priorities and main objectives is the moment for specifying the endeavours and ambitions of the project. But prior to this detailing, it is important to put some effort in an intermediate stage which corresponds with the formulation of some general challenges whose fulfilment would solve most of the current difficulties in the architectural professional practice, not only in the three issues that have finally focused our attention:

- How to strengthen students' and architects' research expertise in order to tackle complex problems and to improve their capacity to communicate their knowledge, may it be explicit or tacit, within multidisciplinary teams?
- How to develop design processes in order to be able to contribute to the complexity, sustainability and by nature long-lasting character of the urban and territorial transformation process?
- Which is, for example, the proper way to balance and integrate cross-professionalism, creativity and flexibility in the curricula and teaching methods to better lay the ground for entrepreneurship and employability?
- And in the long run, how can adjustments in architectural education better foster god ideas for implementation in "the real world", and endow architectural graduates with leadership by empowering them to define the future of European transformation of built environment?

Complexity, multidisciplinarity, sustainability, transformation, creativity, flexibility, entrepreneurship, employability, leadership and empowerment compose a set of concepts which appears once and again whenever we talk about the future of the discipline of architecture, despite it is widely agree that everything is happening in a context led by change and uncertainty. These general challenges assumed by the project as intermediate challenges have been the key for a proper research and many times have become the answers themselves. A deeper detailing of these challenges requires classifying them according to different criteria.

1.5.3. Specific challenges according to purpose

In the case of pedagogical methods and assuming that there are no exact responses to remember and repeat when questions and dilemmas are posed in architecture, several specific challenges can be mentioned such as:

- Implementing new ways of teaching which imply more active learning and strategy-oriented teaching, in order to succeed with increasing the critical thinking of architecture students
- Devoting special attention to methodologies for learning in order to produce both a proper oriented stimulation and a successful maturation of the student's ability to create. Empirical knowledge transfer from teachers to students doesn't require specific attention so far inasmuch as it is quite well developed through successful strategies such as cooperative and active learning activities
- Encouraging new technologies and methodologies to improve the student's ability to reach a comprehensive and accurate reading of the problem
- Proposing perspectives and examples of good practice that could prompt innovative response or support existing endeavours
- Promoting research-based architectural education, since it encourages the formulation of relevant questions and building of hypothesis, operationalizes definitions, includes data gathering, and enhances interpretation to be able to propose possible design solutions and draw conclusions

Before implementing a new strategy in teaching, is even more important to make clear the contents to be taught, hence detailing specific challenges for designing an adequate curriculum structure becomes interesting. Curricula and programme contents across Europe are affected by very different cultural, institutional and professional contexts. The variety of schools gathered in each think tank opens the door for opportunities such as:

- Investigating the commonalities and differences in approaches to teaching and how these are related to curriculum structure and educational outcomes expected in the professional world
- Providing advice of the right location of certain matters within the curricula and about their mandatory or elective nature
- Boosting certain already ongoing shifts like integrating heritage or sustainability into curricula not only with a humanistic or a technical approach respectively but also with a multivalence approach

Finally, when our students graduate and become full practising architects on the completion of their national or regional requirements, they don't know everything about the discipline. Architectural practice is too vast to embrace it all. Furthermore, we must accept that the formation of an architect is always in evolution. Therefore, in the case of continuous professional development is important to focus on:

- Discovering which features do employers appreciate the most when hiring new employees
- Defining which type of knowledge is acceptable to be learnt after education completion

- Previewing those contents which are emerging now and might become fundamental in the near future and possibly were not worked enough in previous curricula, producing knowledge scarcity among aged architects that might turn into lack of opportunities
- Providing advice about the appropriate hub for each type of CPD and the role that architecture schools, chambers of architects and other institutions might play

1.5.4. Specific challenges according to subtopic under investigation

The project has identified three subtopics or wicked problems that have undergone investigation.

"Architectural Design and Professional Knowledge" think tank has established a platform for the overall consideration of architectural education with a special focus on its direct connection with the professional practice. Specific challenges have included:

- Studying the new roles and tasks of the architectural profession and discussing their impact on education including the revision of knowledge and skills
- Determining which professional knowledge should be included in school curricula
- Quantifying the period that employers find acceptable for a recently graduated architect to become a full practising architect or that those that decide to run their own office think that is acceptable not to endanger the success of the project

"Heritage" think tank and "Sustainability" think tank have departed from the understanding that their topics are not considered as separated domains of knowledge, but as emerging design domain both require to be updated and amalgamated with creative processes and new technologies. Some specific challenges in the case of the "Heritage" think tank include:

- Identifying the range of issues that impinge on curricula and pedagogy in the field of heritage
- Educating architects for the maintenance and management of heritage relics within an increasing stock of objects with heritage value susceptible of a wide range of interpretations, despite the old European tradition of thought concerning the conservation of buildings and sites
- Seeking appropriate pedagogical methods and integrating this transdisciplinary nature into the curriculum in order to train future professionals in applying their creativity to existing historical material which could then survive if appropriately adapted to new demands.
- Exploring new directions of adaptive use, related to conservation of building, sites and landscapes across Europe.

Lastly, "Sustainability" think tank has departed from the fact that sustainability affects architectural education not only in building design, but also in urban transformation. Sustainability is fundamentally the building sector worldwide, as the nature of the product demanded by costumers, designed by architects, constructed by contractors, promoted by developers, required by government and favoured by capital providers is changing. Therefore some of the most obvious challenges in sustainability are:

- Defining the role of the architect in this new setting and new normality
- Acknowledging that architecture plays an important role in achieving the cultural transformation required to create a sustainable built environment
- Identifying schools of architecture as repositories of knowledge and skills that have contributed to the growth of knowledge on architecture and the city, ways of understanding, ideas, proposals and projects
- Developing mutual understanding among architects, technical experts and building managers and combining skills in order to achieve optimal nearly zero energy buildings (NZEB) and retrofitting in terms of quality, energy efficiency and cost effectiveness. This is a gap that still exists and may be has to be addressed through continuous professional development of the current workforce.

1.6. Activities

The first activity of the project was held in early September 2014. All participant institutions in the strategic partnership attended a first joint meeting which took place at an already planned EAAE conference in Chania (Greece). As for communication with relevant stakeholders that were not project partners, a description of the strategic partnership including the project design, wicked problems, addresses and participating institutions was published on the EAAE website.

After that first joint meeting and as stated in the agreement, each of the three seasons that composed the project was designed with a similar scheme. Each think tank would arrange two Transnational Project Meetings (TPM) per season that would be hosted in turn by the schools belonging to this think tank. The purposes of TPM would be the discussion and evaluation of relevant topics; planning, management and evaluation of the teaching/training/learning events (TE); coordination of the production of the intellectual outputs; and detailed planning and adjustment of the road ahead. After each decentralized TNP, think tanks would send a progress report to EAAE through the coordination institution, AHO, for monitoring. TNP should be attended by all think tank researcher members. In addition to TNP, think tanks organised the aforementioned teaching/training/learning events (TE).

These events have been crucial for testing and implementing good practices in teaching, for the development of architectural curricula, and for the reflection upon the appropriate continuous professional development within professional knowledge, heritage and sustainability. Due to their four-days agenda and hence longer duration, TE have provided opportunities for interaction among students, teachers and professionals and have created conditions for sharing approaches, experiences, working methods, theories and didactics. TE have been fundamental for the intellectual outputs of the project by constituting a substantial part of the empirical basis of the teaching wicked problems reports (TWPR) that have been presented at each multiplier event at the end of each season in late August. During TE think tanks have gone directly into relevant architectural studios taking place at the participating schools which have served as local teaching laboratories where innovative practices have been tested and developed. Each TE has been organised as a short term intensive programme and hosted by one participating school each season. For matters of feasibility, and to reduce travel costs, spring semester TNP, which had just a day of duration, have been held the day following the last day of the TE corresponding to this season.

During the project period any TNP has been documented by means of minutes and each TE has been recounted by means of preliminary reports that have made available on the EAAE website. Annual EAAE conferences held traditionally in late August have played an important role in the ongoing process publicising, and the intermediate and final results presentation, evaluation and discussion in specific sessions scheduled for the project. TWPR based on the work and findings in the preceding year have been presented in Milan and Delft and the final report will be presented, discussed and disseminated in Bordeaux on September 1, 2017.

During all this process, all minutes and reports have been forwarded to the EAAE Council which has stimulated and motivated the proper progress, providing an opportunity for the association to intervene that only materialized when in late August 2016 in Delft and about to start the third and last season of the project, the creation of a final report working group and the implementation of a calendar of meetings in order to guarantee its quality and punctuality was approved.

Figure 6 depicts the sequence of activities that the project has gone through until its current completion. Most of the project's budget has been dedicated to funding the trips, accommodation and stay of the researchers whenever they had to attend TNP, TE and coordination or dissemination meetings.

	TADPK Think Tank	Heritage Think Tank	Sustainability Think Tank	EAAE Council
Season #1 (01/09/2014 - 31/08/2015)	**Joint Meeting #01**, Chania (Greece), 01/09/2014			
	TADPK TNP #1 Oslo (Norway) Autumn 2014 Minutes TADPK.TNP #1	**Heritage TNP #1** Prague (Czech Republic) Autumn 2014 Minutes HERTG.TNP #1	**Sustainability TNP #1** Bucharest (Romania) Autumn 2014 Minutes STBLT.TNP #1	**Minutes gathering** Hasselt (Belgium) Autumn 2014
	TADPK TE #1 Barcelona (Spain) Spring 2015 TWP Report TADPK #1	**Heritage TE #1** Genoa (Italy) Spring 2015 TWP Report HERTG #1	**Sustainability TE #1** Delft (Netherlands) Spring 2015 TWP Report STBLT #1	**TWP Reports gathering** Hasselt (Belgium) Spring 2015 Introductory Report #1
	TADPK TNP#2 Barcelona (Spain) Spring 2015 Minutes TADPK.TNP #2	**Heritage TNP#2** Genoa (Italy) Spring 2015 Minutes HERTG.TNP #2	**Sustainability TNP#2** Delft (Netherlands) Spring 2015 Minutes STBLT.TNP #2	**Minutes gathering** Hasselt (Belgium) Spring 2015
	Documentation upload, EAAE website, 10/08/2015			
	Major dissemination event, Milan (Italy), 30/08/2015			
Season #2 (01/09/2015 - 31/08/2016)	**TADPK TNP #3** Oslo (Norway) Autumn 2015 Minutes TADPK.TNP #3	**Heritage TNP #3** Hasselt (Belgium) Autumn 2015 Minutes HERTG.TNP #3	**Sustainability TNP #3** Milan (Italy) Autumn 2015 Minutes STBLT.TNP #3	**Minutes gathering** Hasselt (Belgium) Autumn 2015
	TADPK TE #2 Oslo (Norway) Spring 2016 TWP Report TADPK #2	**Heritage TE #2** Prague (Czech Republic) Spring 2016 TWP Report HERTG #2	**Sustainability TE #2** Bucharest (Romania) Spring 2016 TWP Report STBLT #2	**TWP Reports gathering** Hasselt (Belgium) Spring 2016 Introductory Report #2
	TADPK TNP#4 Oslo (Norway) Spring 2016 Minutes TADPK.TNP #4	**Heritage TNP#4** Prague (Czech Republic) Spring 2016 Minutes HERTG.TNP #4	**Sustainability TNP#4** Bucharest (Romania) Spring 2016 Minutes STBLT.TNP #4	**Minutes gathering** Hasselt (Belgium) Spring 2016
	Documentation upload, EAAE website, 12/08/2016			
	Joint Meeting #02, Delft (Netherlands), 30/08/2016			
	Major dissemination event, Delft (Netherlands), 02/09/2016			
Season #3 (01/09/2016 - 31/08/2017)	**TADPK TNP #5** Barcelona (Spain) Autumn 2016 Minutes TADPK.TNP #5	**Heritage TNP #5** Genoa (Italy) Autumn 2016 Minutes HERTG.TNP #5	**Sustainability TNP #5** Delft (Netherlands) Autumn 2016 Minutes STBLT.TNP #5	**Minutes gathering** Hasselt (Belgium) Autumn 2016
	Final Report Working Group Meeting #01, Valencia (Spain), 27/02/2017			
	TADPK TE #3 Barcelona (Spain) Spring 2017 TWP Report TADPK #3	**Heritage TE #3** Hasselt (Belgium) Spring 2017 TWP Report HERTG #3	**Sustainability TE #3** Milan (Italy) Spring 2017 TWP Report STBLT #3	**TWP Reports gathering** Hasselt (Belgium) Spring 2016
	TADPK TNP#6 Barcelona (Spain) Spring 2017 Minutes TADPK.TNP #6	**Heritage TNP#4** Hasselt (Belgium) Spring 2017 Minutes HERTG.TNP #6	**Sustainability TNP#4** Milan (Italy) Spring 2017 Minutes STBLT.TNP #6	**Minutes gathering** Hasselt (Belgium) Spring 2016
	Final Report Working Group Meeting #02, Rome (Italy), 05/05/2017			
	Final Report Working Group Meeting #03, Valencia (Spain), 19/06/2017			
	TWP Final Report writing, Valencia (Spain), 15/08/2017			
	Documentation upload, EAAE website, 18/08/2017			
	Major dissemination event, Bordeaux (France), 01/09/2017			

Figure 6. Sequence of activities of the project along its three seasons of duration

1.7. Tools

This section contains a description of the set of research tools employed by the different think tanks of the project during the activities previously described. It is not conceived as an exhaustive description of these tools; on the contrary, it is just a light overview of these tools in order to provide the reader with an insight of the different possibilities for research accompanied by some allusions to the moments when they have been employed by the different think tanks.

1.7.1. Surveys and questionnaires

Surveys and questionnaires are lists of questions addressed to a particular population whose object is to extract specific data. These methodologies are often used to increase knowledge on definite matters specially when studying the state of the art of a certain topic or when subjects' opinion needs to be polled.

During the first steps of their work, researchers belonging to TADPK and Heritage think tanks decided that in order to define properly the state of play of their wicked problem, a survey of questionnaire would provide them with valuable information.

TADPK think tank launched an international survey about professional knowledge included in the curricula of European schools of architecture during autumn 2015 and spring 2016. It was addressed to a limited number of schools but with a fair cultural and geographical representativeness. Eighteen responses were received. Statistically the limited number of responses and possible misunderstandings of terms used since it was conducted via email might question the accuracy of the results. However, that was not a serious problem for TADPK think tank members whose primordial objective was to have a broader understanding of the situation in different contexts and always labelled the survey with the title "Picture of Europe". Nevertheless the information obtained was essential in order to redirect properly the research process and introduced interesting new topics (figure 7).

Similarly the Heritage think tank adopted a questionnaire as a supplementary method in autumn 2015 in order to get an overview of the weight given to conservation and restoration in different curricula across Europe. The questionnaire was prepared in Hasselt and firstly tested with the participants in an

international workshop organised by the EAAE Conservation Network. Later on it was circulated to more schools taking advantage of the EAAE network.

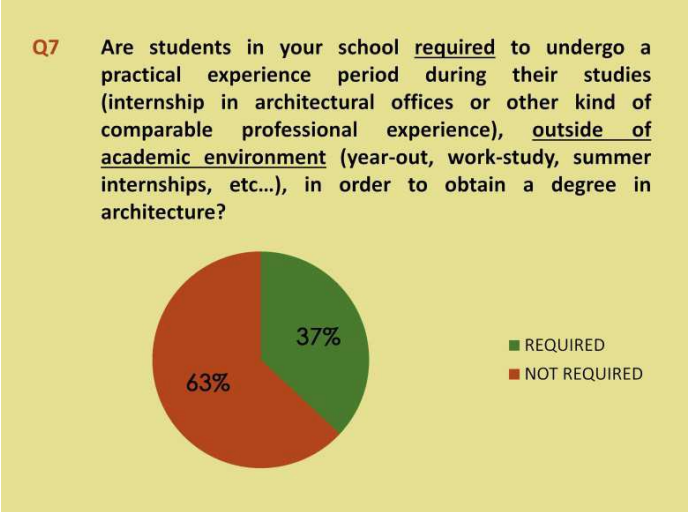


Figure 7. Results of Question #7 of the TADPK survey which was composed by eleven questions

Results confirmed their first impressions of heritage-related teaching not being singular and with an identifiable profile applied across the board in architecture schools, and significant differences among European schools in terms of the weight given to restoration and conservation were observed. Once again, the reduced amount of responses provides a questionable reliability in statistical terms. But the questionnaire did provide a very useful snapshot picture depicting a provisional measure that made more concrete the range of cases encountered.

1.7.2. Interviews

Defining an interview could be as simple as saying that it is a conversation between two or more people where questions are posed and answers are given. Actors within an interview play different roles, the interviewer asks the questions since he or she is interested in getting some information. The interviewee provides this information by means of his or her answers. An interview always involves a transfer of information which usually is intended for being disseminated.

TADPK think tank members devoted the first season of the project to define the state of play and to outline a strategy to get the proper results for their research based on establishing a set of hypothesis that should be tested. The plan for the second and third season consisted of a series of meeting with

architectural practices, public offices employing architects, senior students, recently graduated architects and docents in order to interview them so as to test the aforementioned hypothesis and maybe get unexpected information.

Figure 8. TADPK think tank members interviewing architects at the Snøhetta headquarters in Oslo

1.7.3. Relationship matrices

Matrices are rectangular arrays of numbers, symbols or expressions arranged in rows and columns. Each individual term of a matrix is easily and usually identified by means of referring to the row and to the column where it is placed. Matrices constitute an unbeatable way of storing data that depends exclusively on two variables such as a circumstance to be verified and the context where it might occur.

When facing the complexity in which heritage related teaching and professional activity, Heritage think tank researchers decided to build and use a relationship matrix as a supplementary tool in order to contextualize the input of the different stakeholders. The building of this relationship matrix constitutes one of the most remarkable contributions of this think tank, not only to the project results but also for future employment in heritage research and managing.

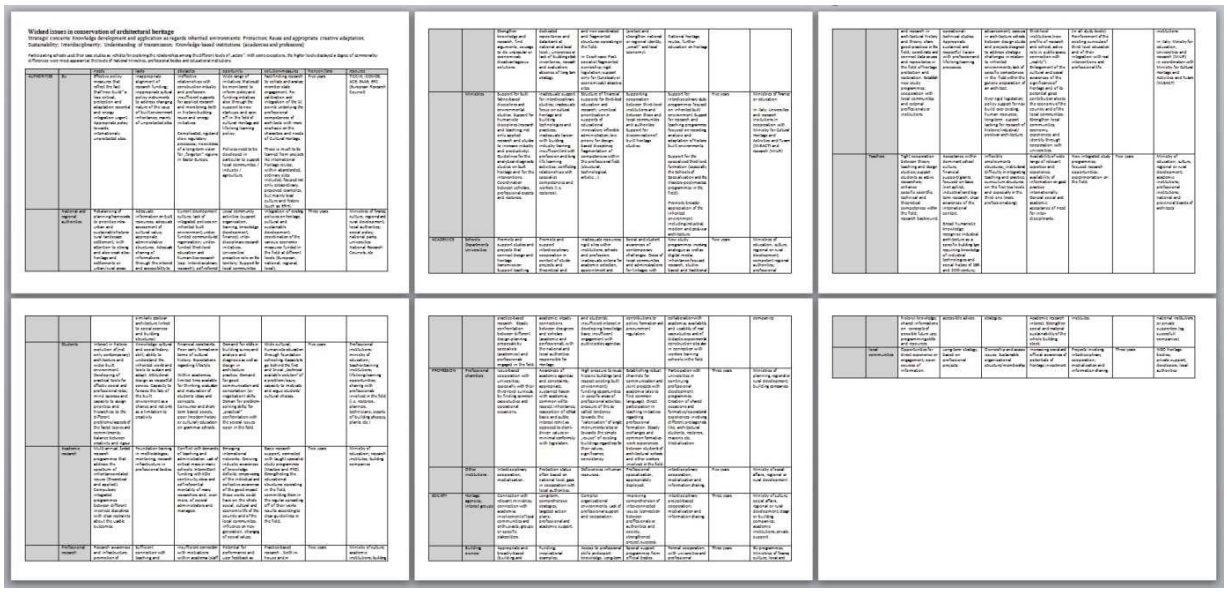


Figure 9. Heritage think tank relationship matrix hosting the data collected by researchers

1.7.4. Case studies

A case study is a report about a subject, matter or situation that hasn't been studied yet. It is an informal methodology employed by researchers when a deeper knowledge of a topic is more easily reachable by means of a practical example instead of by means of pure theory or abstract ideas . Case studies are the most usual research methodologies in many sciences such as sociology, medicine or psychology. Despite available literature about their definition and proper development is scarce, authors refer that a study case must be employed when we have little or even no knowledge about how and why a series of current events are going on (Yin, 1984). When assessing comparable objects by means of a study case, we might not just know how and why, but also which one is the best (Kitchenham et al., 1995).

Heritage think tank members have employed study cases as one of their primary tools during their research. During the first season, the teaching/training/learning event (TE) held in Genoa evolved around Palazzo Belimbau, a building representing the demands of significant architecture subject to change; during the second season, the TE held in Prague dealt with different cases with a special focus on the Zbůch Industrial Coalmine Area in the Pilsen Region, representing the reclamation of redundant industrial buildings and areas; and finally, during the third season TE held in Hasselt, most

of the attention was focused on the Gruuthuse Palace in Bruges and on the Zwartzusterklooster, a monastic site in Antwerp which along with the aforementioned palace represent the question of adaptive reuse of historic buildings.

Similarly, sustainability think tank members have employed study cases as well during their research. The first season TE held in Delft focused on the so-called "Cinerama block", a typical Dutch urban block from the 1950's which exemplified the important after war reconstruction period; the second season TE held in Bucharest chose a Transylvanian village of Dealu Frumos (figure 10) as a good case of rural context characterized by a growing phenomenon of depopulation; lastly, the third season TE held in Milan focused in the Bovisa Drop Area, a brownfield site in the north of the city dating from the late 19th and the beginning of the 20th century.

Figure 10. Aerial view of the Transylvanian village of Dealu Frumos, worked by the Sustainability think tank

1.7.5. Visits

Architecture as physical phenomenon needs to be lived in order to get a good understanding. Traditional documentation and nowadays media allows us to get a fair idea of the building or urban space that we are studying, but nothing can provide us a better comprehension of our object of interest than visiting it personally.

The study cases set out in the section above all have in common that Heritage think tank and Sustainability think tank always included visits to the buildings and areas under study. These visits were carried out not only by the think tank researchers but also by other people involved in the different activities organised such as students, local authorities and citizens and other stakeholders (figure 11).

Figure 11. Heritage think tank members visiting an abandoned building in the Zbůch Industrial Coalmine Area in the Pilsen Region during the TE held in Prague

The Sustainability think tank employed visits not only for the cases under study. Each TE's introduction in the host country's culture, heritage, building technology was made in the first day by means of a visit in the city where the hosting university of the event was located.

1.7.6. Lectures

A lecture is an oral presentation with the purpose of presenting and transferring information to a usually present audience about a particular subject. Lectures are possibly the teaching methodology which permits to transfer information in a the fastest and most efficient way since the lecturer has usually gathered and arranged in a hierarchical sequence all the data in advance and is not usually interrupted by the lecture addressees.

All think tanks members have used lectures at some point during their research when they have involved in their activities other collectives with a more reduced knowledge of the background of the topic to be worked, such as students that have collaborated in workshops and charrettes.

Figure 12. Heritage Lecture by Nico Tillie during the charrette held in Delft by the Sustainability think tank

TADPK think tanks lectured the students enrolled in the workshop organised in Barcelona during the TE of the first season in order to provide them with a view of the contents and challenges of the project. Sustainability charrettes during the three seasons were usually based on a combination of lectures on topics related to the study case handled and studio activity. The position within the agenda differed from TE edition to another but lectures always played a significant role in the dynamics of the Sustainability activities by developing the given topics with theoretical elements and examples of practice.

1.7.7. Workshops

A workshop is a teaching, research and working methodology which consists on the statement of a problem whose solution is not obvious and usually has to be solved on a design basis within a defined lapse of time. Participants in workshops are usually arranged in groups that simultaneously work on the same topic in order to make final proposals comparable. In the workshops, participants have not only designed or assessed designs, but also taken part in teaching and reviews of relevant classes and courses at the host institutions, and based on this, they have discussed pedagogical methods and structure of the curriculum.

TADPK think tank members organised a workshop as the main activity of the first season TE held in Barcelona in May 2015. Up to sixteen Bachelor in Architecture senior students from ETSAB enrolled in a workshop focused on the electronic portfolio that these students were elaborating for their minor thesis and which connections does it establish with the academia and the professional world. During the second and third seasons TEs, workshops consisted on a series of meetings arranged with different parties closely related to the linkage between academia and professional world such as Master students, docents and employers in order to interview them and document their opinion on several matters related to the topic under research.

Figure 13. Student presentations during the workshop held in Genoa by the Heritage think tank

Workshops organised by the Heritage think tank enrolled students from the university which hosted the event. Workshop activities included presentation by staff and students of case studies in progress at each school, visits to the worked building and sites, engagement of students by means of interactive sessions and small group work, presentations (figure 13) and summary discussions including final reflections.

1.7.8. Charrettes

The term charrette refers to an intense collaborative session where a group of designers draft a solution to a design problem. Charrettes could be also defined as a specific kind of workshop where the time limitation, the concentration of participants in a concrete place and a certain level of development of the final proposals play a significant role. The term comes directly from the French word *charrette* with reference to the cart that participants might need in order to transport all the necessary tools for developing a certain task, since they will not be able to come back home again until the work is done.

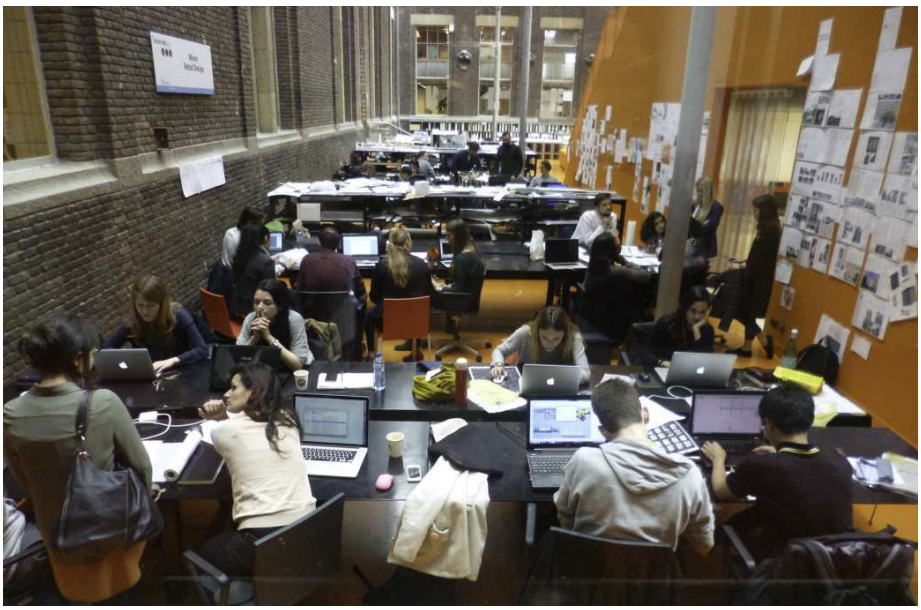


Figure 14. Students working in groups during the charrette held in Delft by the Sustainability think tank

Sustainability think tank researchers found in charrettes a fantastic possibility for a short, time-limited, intensive exercise performed by students and docents from different educational, geographical and societal backgrounds mixed in groups. All three charrettes organised by this think tank has included five students from each participating school in addition to all the think tank researchers (figure 14).

Although the location and topics of the charrettes has been different each year as it has been described in the above section devoted to case studies, all the series has been carried out under the same title which has been "Wicked Workshop on Architectural and Urban Sustainability". Each charrette has provided the think tank members with indicators of the notions on sustainability existing in very specific context at each university.

1.7.9. Debates

We can understand debate as a conversation of at least two people where each interlocutor expresses his or her opinion occasionally including in an attempt to make the audience think in the same way. Debates are usually driven by a moderator which states the topic, poses the first questions and gives the floor by in shifts to the participants. The biggest difference with interviews consist on the participants freedom for interpellating other partners, disagree with points of view expressed and move the conversation to other topics which were not initially previewed but might reveal themselves as much more interesting ones.

Figure 15. Students and TADPK researchers during a debate organised as the first workshop closing in Barcelona

Debates have been a research tool used by all think tank researchers since TNP sessions usually consisted on that typology and most of the TE sessions ended with a meeting of the think tank members where the evaluation of the project's progress was conducted. This methodology often

provided freedom enough to suggest ideas which might guide the next steps to follow in the research. However specific debates with other stakeholders apart from thin tank members have been scheduled and performed during these three years of works.

TADPK think tank ended with an explicit debate where all researchers and students involved in the first workshop commented their point of view about what they have learned and what could be done in the future to improve the situation (figure 15).

1.7.10. Reports

A report is a usually written document elaborated with the objective of relaying information or recounting certain events in a presentable, understandable and well explained manner. Using this tool was not a choice for think tank researchers and project leaders since the Erasmus+ regulations request their presentation according to a concrete calendar and procedures. However the exercise of reporting the intellectual output of each year with order and concision has emerged as a fruitful tool for catalysing the research progress and scheduling the road ahead.

Project partners have produced at the end of each intensive teaching/training/learning event (TE) the so-called "Teaching Wicked Problems Reports" which are based on the work and findings of the corresponding season. Reports were published on the EAAE website in order to facilitate its dissemination and individual reflections prior to the debates held in the course of the annual EAAE events during specific seminars scheduled. EAAE has had the overall responsibility for their production, in cooperation with the school that hosted the latest TE of each think tank.

After the first and second season, reports elaborated by the different think tank authors cover exclusively the approach, events and results of the corresponding season, and were individually uploaded to the website and exposed during the dissemination events held in Milan and Delft respectively. However, the reports elaborated after the third season encompass all three seasons research and thus constitute –along with a variable number of annexes –the final and unique output of each think tank. Despite the fact that the project requires them only to provide information for the global final report to be elaborated by the project leader, the members of the final report working group considered that this global final report should be designed in such a way that allowed the inclusion of each think tank final report explicitly.

1.8. Introducing the think tank reports and the annexes

As can be seen from the index, this project final report has been structured in five major chapters. The first chapter which concludes with the present section has provided the reader with a comprehensive background of the project as whole with frequent references to the specificities of the performance of each think tank, in order to exemplify the different concepts used, but without providing too detailed information.

As agreed during the final report working group meeting held in Valencia on June 19, 2017 (figure 16) each think tank final report has been preserved in its integrity and included in the present project final report as an individual chapter. Hence, TADPK think tank final report is hosted in the second chapter, Heritage think tank is in the third chapter, and Sustainability think tank final report is contained in the fourth chapter. Then, the fifth chapter recovers a global point of view again and offers to the reader a selection of the most relevant findings and recommendations with many interesting transversal reflections. This chapter also includes general comments about the deliverables produced by the project researchers as well as information and suggestions about dissemination of results. Finally, new research lines that have arisen during the project development are pointed in order to promote future investigations hopefully framed in future projects.

Figure 16. Third and last final report working group meeting at the Valencia School of Architecture on June 19, 2017

Regarding authorship, it is obvious that the contents that have made possible this report have been produced by the twenty-five researchers which have composed the three think tanks, along with students, faculty and staff of the involved institutions and many other stakeholders. In any case, Ivan Cabrera, Project Leader, is the author of the first chapter and chief editor of the whole document; Jordi Franquesa and Tarald Lundevall, from the TADPK think tank, are the main editors of the second chapter; Loughlin Kealy and Koenraad Van Cleempoel, from the Heritage think tank, are the main editors of the third chapter; Susanne Komossa and Negar Sanaan Bensi, from the Sustainability think tank, are the main editors of the fourth chapter; and finally, Tarald Lundevall, who as previously mentioned has acted as Project Leader Assistant, has added to his responsibilities within the final report writing group, those related to the elaboration of the fifth and last chapter.

The amount of information produced during these three years of work is more than considerable and any single document has its relevance. Nevertheless, including it all in this project final report might have endangered its adequacy and success since it would have meant a too extensive document. Thereby final report working group members agreed to pack in different annexes all the accessory data which hasn't been considered indispensable for a fine project understanding and a fruitful dissemination of results. These annexes have been uploaded to the EAAE website (http://www.eaae.be/) and are available for scholars and experts who wish to learn more about the project.

2. THINK TANK ON "TEACHING ARCHITECTURAL DESIGN AND PROFESSIONAL KNOWLEDGE" REPORT

Main editors:

JORDI FRANQUESA SÁNCHEZ.
Escola Tècnica Superior d'Arquitectura de Barcelona

TARALD LUNDEVALL
Arkitektur- og designhøgskolen i Oslo

Collaborators:

DUBRAVKO BAČIĆ
Architects' Council of Europe

IVAN CABRERA i FAUSTO
European Association for Architectural Education

THOMAS McQUILLAN
Arkitektur- og designhøgskolen i Oslo

ANNA RAMOS SANZ
Escola Tècnica Superior d'Arquitectura de Barcelona

ROGER RIEWE
Architects' Council of Europe

2.1. Introduction

A "*Wicked Problem*" is rapidly shifting. The parameters that define or have influence on the problem are unclear over time, socio-economic and geographic borders. The alternative solutions to a wicked problem are neither right nor wrong.

Both the contents of the terms Architectural Design/Professional Knowledge and the relationship that can be established between them lead to a rich and complex discussion, where absolute solutions do not exist, where a wide field of debate and reflections can provide advantage and enrich our views.

What has been discussed throughout the TADPK-meetings and workshops is related with learning and implementation of acquired knowledge, both in the academic period and in later professional practice, and the relationship between the two areas.

We could define learning as a process that leads to a real change, which occurs as a result of practice and experience and increases the potential for improved performance and future learning. Learning is not a product – it is a process. Or in other words, the knowledge is not received, but performed. Learning implies a change, a change in our knowledge, but also in our beliefs, in our behaviours and in our attitudes. In fact it implies a transformation on the ways of looking at the surrounding reality. This change develops over time, and has a lasting impact on how students think and act. It has a serious influence on what the students are going to do in their professional activities in the future.

Learning is not something *done* to students, but rather something students do themselves. That means the most important is what the students *do* – more important that what the teacher does. In fact, the change is a direct result from how students interpret and respond to their experiences. The students must learn when and how to apply the skills and the knowledge they obtain. To develop professional abilities, students must acquire fundamental skills, practice by using them, and know *when* to apply *what* they have learned. This means that the students must also combine and integrate different skills to develop greater autonomy. There are different levels of complexity in the learning process. Bloom's Taxonomy, created in 1956, defined six levels of a learning process, in an increasing order of complexity: remembering, understanding, applying, analysing, evaluating and creating. The most complex one, creating, means to be able to make new connections, identify new relationships and design something new. This means to build a structure or pattern with elements from a wide diversity, which is to say to put parts together to form a whole, with emphasis on creating a new meaning or structure. Creativity is one of the main aims that Architectural education should foster.

We, as trainers, must succeed in the difficult task of giving our students the tools they will need in their voyage to the professional world. We have to strive for the goal that these students will be great architects, good professionals. And they will be good professionals if they are able to create a new environment in our cities that responds to a mature, critical reasoning on it.

2.2. Problem statement

2.2.1. The "New normal" in architectural practice

As a backdrop for our work, the challenging complexity of architectural education described before is a vivid reality. And at the same time, positions for a practicing architect are constantly changing, and lead to different professional roles in European countries. The huge level of unemployment in some European countries, especially in the southern region, is lasting. And at the same time, the roles for a practicing architect in northern European countries are eroding, compared to what was regarded as normal roles earlier. We should pay attention to this new situation, but at the same time we should ask ourselves and investigate if these factors will be permanent – if a New Normal really exists. Anyway, what is clear: the situation and the context is changing constantly, and the frames for practicing architecture are not the same everywhere.

Therefore, the main objective pursued by the TADPK think-tank is to clarify the relationship, complicity and coherence between teaching and professional activity within the discipline of architecture, in the European context. Under this general objective we can find other parallel questions about the contents of the discipline, the role of the architect in society, on the type of relevant teaching to adequately train future architects, about the skills students must demonstrate they have when they end their studies, among other issues.

2.2.2. Architecture's potential for problem-solving and innovation

Architecture is a discipline that evolves simultaneously with the transformation of our society, in sociological terms but also in technological terms. Its flexibility in attending the different problems that this society delivers gives it a great potential for its own reinvention, and for related innovation as well. This capacity of adaption to the real problems brands its evolution, but this doesn't mean that the

questions we raised three years ago have to be changed, especially if what we call the New Normal also is changing constantly.

2.2.3. Teaching architecture today

The present situation regarding pedagogical methods, curriculum structure and professional development could clearly be improved. Our students are very different from those who studied in European schools only ten years ago. We must be aware of this, because our students will be the future architects to define our urban environment.

First, this group of students values very much active learning. The students in this generation have grown up surrounded by fast-paced, interactive, and constantly changing media-based activities. To sit just listening is not their style. And on the other hand, discussion allows them to be active. The discussion allows them to develop a deeper understanding of what they were learning for themselves, not having to accept the authorities' versions of everything, and they have a strong sense of self-confidence. They believe that all perspectives should be honoured in the discussion.

Taking for granted that all the generalizations are really dangerous, these students are hard-working, very socialized, active in service and interested in social problems, and team oriented with high confidence in their own futures. In addition, and with their heavy mass media exposure, that made them self-confident, extremely social, technologically sophisticated, goal oriented, and accustomed to functioning as part of a team. We, as teachers, we must try to make the most of these abilities, and to achieve our most important aim: to provide the best architects to our society.

But, on the flip side, and with so much activity in their lives as well as frequent interaction with friends, they have little time or inclination for reflection and self-examination. Through constant exposure to video and computer games, the brains of today's young people have been trained to pick up and process new information at much faster speeds. When these students come into traditional classrooms, they are easily bored and have difficulty maintaining attention. Engaging students doesn't mean entertaining them, but means making them think.

And that's the point. We, as trainers, must succeed in the difficult task of giving our students the tools they will need to use in their voyage to the professional world. We have to foster how to achieve that these students will be great architects, good professionals, and they will be good professionals if they

are able to create a new environment in our cities that responds to a well formed critical reasoning on it. That means obviously that we have to implement new ways of teaching according to these questions.

2.2.4. Terminology

In order to go further and be precise at the same time, in our different debates and reflections through these 3 years of work, the TADPK think-tank has discussed in detail the term *knowledge* related to architectural education. Is it fruitful or possible to distinguish separate types of knowledge that an architect should possess? After a long discussion and several debates, we concluded with these three types of knowledge:

2.2.4.1. Knowledge of the discipline

This knowledge is the core content of curriculums today: architectural theory, history and broad architectural design training. It is linked to the learning that prepares students throughout their studies. Variations in this knowledge mostly depend on the slightly different capacities of the architects in each country, and therefore the curriculum that each school applies. Disciplinary knowledge is mostly learned in established schools for architectural education.

2.2.4.2. Knowledge of the practicality

This knowledge is related to the technical and legal aspects of professional practice. It has to do with building codes, constructions and detailing, with planning and edification regulations as well as basic economic frame-conditions for management of a firm, budget execution and measurements, and the development of administrative documentation and management of architectural projects. All this knowledge depends fundamentally on the professional activity, but is also the subject of learning in universities and is part of the various curricula, especially in the higher grades.

2.2.4.3. Knowledge of the profession

This knowledge has to do with the activities and relationships with customers and government entities, negotiating contracts, the exchange of knowledge with other professionals, working cooperatively with other disciplines involved in the design process and executive, timing issues in the development of the projects and operation of the necessary logistics to carry out a particular project. Such knowledge depends largely on the cultural and social context and the field of specialization in which the architect is moving and therefore varies depending on the country or region in which the activity is exercised. This knowledge is learned exclusively in the context of professional activity, and seems intractable on campus.

The basic knowledge of the discipline is a wide and voluminous field, continually debated within all institutions for architectural education in their curriculums. In the TADPK think-tank we therefore decided to focus our general work on the spheres of knowledge described under the points 2 and 3 above, presuming that these fields are the most relevant for our task, and in some way – hopefully – possible to "cover" within our time and budget limits (figure 17).

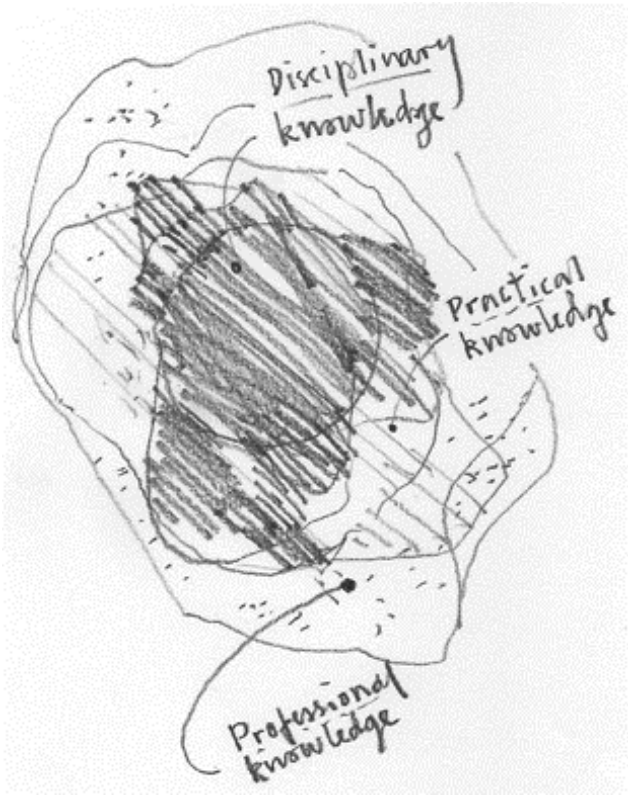


Figure 17. Drawing by Tarald Lundevall depicting the nature and relationship of the different types of knowledge within architecture education

2.3. Challenges

2.3.1. Pedagogical methods

Taking into account what we have described earlier, it is quite obvious that we must implement new ways of teaching: more active learning and strategy-oriented teaching, to succeed with increasing the critical thinking for our students. That doesn't imply that we should change our way of teaching completely, but is evident that we should make some changes. Anyway, before implementing a new strategy, it is even more important to make clear the contents we have to deal with. We must go deeper into the relationship between the academic and the professional world.

2.3.2. Curriculum structures

As soon as we have made a more precise problem statement, the new challenge is really a wicked problem. The borderlines between the academic and the professional context are in fact quite blurred! The main challenge is to have a good answer to which professional knowledge should be included in school curriculums.

Our first and main hypothesis was that more and better practical and professional knowledge should be implemented in the syllabus of our universities. It should be given during the last years of education, in order to approach the professional world at the end of the studies, looking for a solid bridge between the academic and the professional issues.

Trying to hit the target, some of the most important and suggestive questions that we have been discussing during our research are:

- What does it mean being an architect? Which are the architect's primary roles in our society? What are the specifics of an architect's work?
- Does university teaching activities deal, in an effective way, with the problems related to professional practice? How could we improve teaching?
- What kind of activities or tasks should be offered to the students in order to get a wider number of skills and knowledge they will need to face the professional world?

These questions are simple and complex at the same time, creating interesting debates and discussions, foster collective reflection on the educational and professional activities, and provide some conclusions about what the general knowledge of the discipline of architecture is.

The next challenge is that when we specify what kind of Professional and Practical Knowledge that must be delivered in our schools, we must also answer how it should be implemented. As we say in the introduction, our students need new methodologies of learning, and to translate that Practical and Professional Knowledge into pure theoretical lessons is obviously a wrong track. Although there are some clear regional tendencies, we think there is no undisputed new normal claiming for absolute and specific changes.) The context is changing fast, and our students belong to another generation. We need new tools and strategies to define not only the new contents of the teaching, but also the way of teaching this content. The curriculum and also the way of teaching must change accordingly to the students and to the changing world.

2.3.3. Continuous professional development

We must accept that when our students end their studies and becomes full architects, they don't know the full picture of the discipline. The architect profession is so wide, and makes this absolutely impossible. Therefore, is obvious that the process of learning doesn't stop at this point, but has a non-ending development. That brings sense to the fact, as many architect's offices declared: one of the most appreciated items when hiring new employees has been the young architect's attitudes and ways of facing the problems – and not the quantity of knowledge the candidate expose. So, we could say that in a way is taken for granted that the formation of the architect is still in evolution when faces the professional world.

2.4. Tools

The main activities have been developed in the architecture Schools of Barcelona and Oslo, specifically the *Escola Tècnica Superior d'Arquitectura de Barcelona*, and the Oslo School of Architecture and Design. The main reason for working in these two schools has to do with the distinguished fact that both schools have the competences in assessing the students and decide

themselves if their students are "full architects" after final exam. The (local) professional or ministerial world doesn't need an external entity to validate it. Another important reason is that students' internship in practice – during the study-years or later – is not mandatory. These two simple facts makes the two schools an interesting target, because they have to face seriously how to teach at least basic contents of practical and professional knowledge to train their students, so they are ready to face their future activity as architects with low risk.

The methodology which we used to get on the track of our objectives can be summarized in three main parts:

- A first approach to the "wicked problem" through a **workshop 1** with students in the last year course of the bachelor prior to the Qualified Master in the ETSAB, just before their graduation as full architects. The workshop was arranged in May 2015.
- An international **survey** oriented towards the European architecture schools, about the professional knowledge they include in their curriculums. The survey was done in the autumn 2015 and spring 2016.
- A series of meetings during **workshop 2** in Oslo, April 2016 and **workshop 3** in Barcelona, April 2017, with debates and discussions. Meetings were arranged with different parties that are close linked to the bridge between the academic world and the professional one: master-students, recently graduated architects, teachers, small and big architect offices, public planning offices and postgraduate schools.

2.4.1. Workshop 1

In accordance with the study plan of *ETSAB - Barcelona School of Architecture*, and corresponding to the fundamental role of the "electronic portfolio", called the Minor Thesis Report document, ETSAB is carrying out a pioneer experience. The "electronic portfolio" is an essential tool in the relation between academic training and the professional career development. Given the role this document can play as a point of connection between two realities, it was considered appropriate to focus the TADPK Workshop on this document, analysing its potential to enrich the discussion on the links amongst Architectural Design and Professional Knowledge.

The main goal of the TADPK Workshop was the connection that can be made between academic learning and architect's professional activity through the e-Portfolio, regarding it as a real bridge between these two realities, enhancing the student's skills and knowledge.

The e-Portfolio (Minor Thesis Report) has three fundamental pillars: (1) the Degree's contents, (2) the student's work outside the classroom, and finally (3) the research process. The student e-Portfolio aims to help students develop skills that deal simultaneously with these three fundamental pillars:

- The Degree's content is related to all the activities and production that the student has been working with during 5 academic years.
- The second pillar is related to what we call Hidden Curricula, the different activities the student has been doing outside his regulated studies, for instance working on an architecture firm, participating in international workshops, travelling, student's competitions, and different activities related to the world of Architecture.
- The third pillar refers to a short Research Work developed by student, displaying ability to take self-control of his own learning, and therefore ability to become an autonomous professional.

This TADPK workshop was a starting point, and raised some general issues and important questions that we have investigated deeper in the last two years of the project.

Workshop 1, methodology:

The activities in the TADPK Workshop were 4 lectures of 90 minutes each, and 5 sessions as "sub-workshops" of 2h30' each. The activities took place between 25 and 29 of May 2015.

Opening lectures:

- Ideas and works – the problematic duality of architecture, by Tarald Lundevall, Partner in Snøhetta, Professor AHO, TADPK Leader.
- Research on Prototypes, Jaime Coll, Full Professor at ETSAB, Architectural Design Department.
- Architectural Education in Europe, Ivan Cabrera i Fausto, Architect, Professor and Academic Advisor at ETSAV-UPV, and EAAE Council Member.
- The architectural profession in Europe 2014 - ACE Sector Study, Dubravko Bacic, Architect, ACE Council Member.

The sessions (sub-workshops) were run by the TADPK think tank members and 16 ETSAB students, namely students that were developing their e-Portfolios (Minor Thesis Report) at that time. This made

it possible to focus the debate on their specific e-Portfolios and to go deep into the question of bridging between academics and professional practice (figure 18).

Figure 18. Students and TADPK think tank members during Workshop 1, held in Barcelona in May 2015

Before the sessions, the students were asked to answer three questions related to each of the three fundamental pillars of the e-Portfolio, and those answers were sent to the TADPK workshop trainers (TADPK think tank members), along with links to the student's e-Portfolios. Thus, the trainers were able to address the workshop knowing beforehand the material and reflections of students. The process was developed through 4 main sessions, plus 1 additional session that aimed to be a conclusion for the previous sessions. The themes of the 5 sessions were:

- Session 1: Selected Inventory

  This workshop's primary goal was to analyse how students select the information and works to be published in the e-Portfolio and what selection criterias they use.

- Session 2: Hidden Curricula

  The student work outside the school programmes and the knowledge adquired besides the university courses is an important ingredient for the formation of our students, and we call it the hidden curricula (workshops, temporary work in an office, travels, other courses, and self-experimentation), and allows the student to be responsible for his own learning process. The e-Portfolio can be a good tool to reap the benefits and demonstrate how the student completes the skills he has reached in the Degree. In this session the main goal was to know the ways students

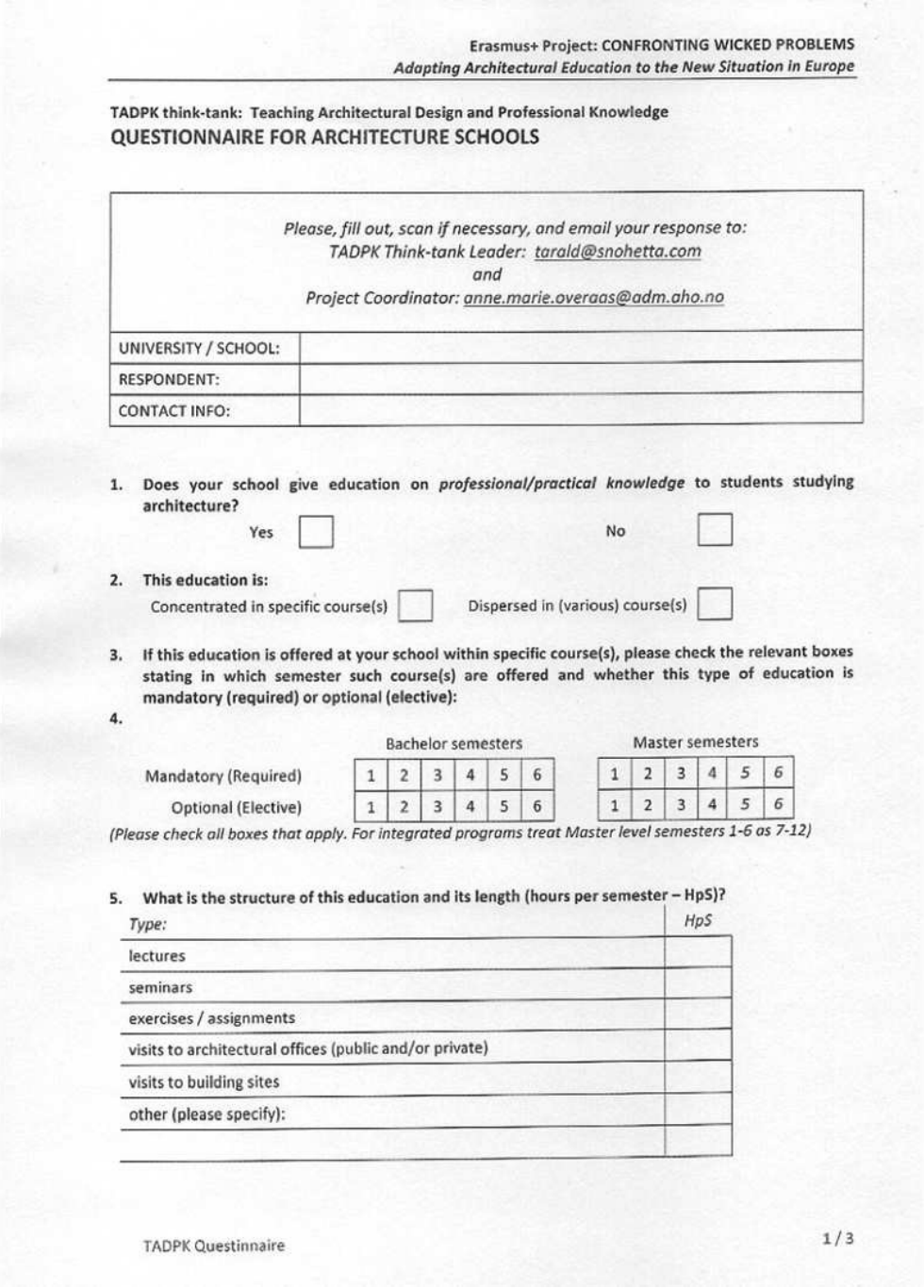
communicate their hidden curriculum and the importance of linking the hidden curricula with professional practice knowledge.

- Session 3: Research Work
  Research Work in the e-Portfolio must show how the student can deal with new information and completely new challenges by himself in an autonomous way, as an architect must demonstrate constantly in his professional activities. Besides that, research skills are used by students during the Degree, as part of studio design process development. The workshop focused on the way students use e-Portfolio to communicate research results and to explain the whole research processes.
- Session 4: Transversality
  The architecture discipline has a great complexity and inputs from very different subjects. The e-Portfolio gives the student the possibility of viewing different learning contents in a unique virtual space.
- Session 5: Debate and conclusions
  During the last session, each leader presented the discussions and conclusions of the sessions and an open debate with all the audience was developed.

Additional information about the 1st event agenda and the main issues discussed can be found in the report Annexes T.1 and T.4 respectively.

2.4.2. Survey

Before going further, we felt that it was necessary to learn more about how professional knowledge is dealt with in European architecture schools today. What content, when in the study progression and how is this knowledge conveyed to the students? We decided to launch a simple questionnaire, addressing a limited but culturally/geographically representative number of schools. The idea was presented to and acclaimed by the EAAE in the meeting in Milan late August 2015, and carried out later in the autumn (figure 19). A preliminary study of responses from schools were presented in the TADPK – TNP 3-meeting in Oslo 20.11.2015, and a more systematic study were presented and discussed in the TADPK workshop in Oslo, April 2016. We have received 18 responses from the European schools that were addressed. From a statistical point of view we are fully aware that the limited number of responses, and possible misunderstanding of terms used, might blur the study. On the other hand, we feel that our investigation has helped us to get a valuable picture of the situation.



Erasmus+ Project: CONFRONTING WICKED PROBLEMS
Adapting Architectural Education to the New Situation in Europe

TADPK think-tank: Teaching Architectural Design and Professional Knowledge
QUESTIONNAIRE FOR ARCHITECTURE SCHOOLS

Please, fill out, scan if necessary, and email your response to:
TADPK Think-tank Leader: tarald@snohetta.com
and
Project Coordinator: anne.marie.overaas@adm.aho.no

UNIVERSITY / SCHOOL:	
RESPONDENT:	
CONTACT INFO:	

1. **Does your school give education on *professional/practical knowledge* to students studying architecture?**
   Yes ☐ No ☐
2. **This education is:**
   Concentrated in specific course(s) ☐ Dispersed in (various) course(s) ☐
3. **If this education is offered at your school within specific course(s), please check the relevant boxes stating in which semester such course(s) are offered and whether this type of education is mandatory (required) or optional (elective):**
4.

	Bachelor semesters						Master semesters					
Mandatory (Required)	1	2	3	4	5	6	1	2	3	4	5	6
Optional (Elective)	1	2	3	4	5	6	1	2	3	4	5	6

(Please check all boxes that apply. For integrated programs treat Master level semesters 1-6 as 7-12)

5. **What is the structure of this education and its length (hours per semester – HpS)?**

Type:	*HpS*
lectures	
seminars	
exercises / assignments	
visits to architectural offices (public and/or private)	
visits to building sites	
other (please specify):	

TADPK Questinnaire 1 / 3

Figure 19. First page of the survey addressed to twenty-five European schools of architecture by the TADPK think tank

The questionnaire and some graphics elaborated by ACE representative Dubravko Bačić can be found in Annex T.5. Some of these graphics can be studied by means of figures 20 and 21 of the present project report.

Figure 20. Location of the eighteen European schools of architecture which were inquired by TADPK think tank

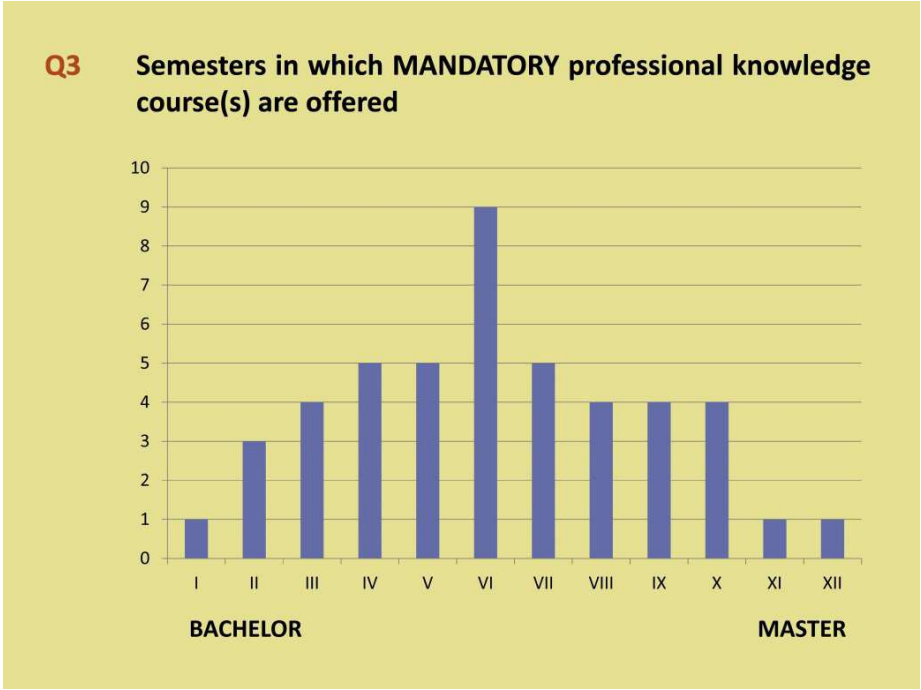


Figure 21. Results of Question #3 of the TADPK survey

2.4.3. Workshops 2 and 3

According to the sector study "The Architectural Profession in Europe 2014", by ACE, 21 out of 28 states or federal regions in Europe requires 1 – 3 years of post-study practice before registration as architect is allowed. The reasons for these requirements are based on different cultural, political and professional traditions, but states the fact that most parties means that (sufficient) professional/practical knowledge only could or should be obtained in a "real" context, after the years of institutional education.

The schools' attitude versus professional/practical knowledge as a vital element in the study-years is varied, and seems to be unclear or ambivalent. This might be the result of the (partly sub-conscious?) opinion that professional knowledge only is obtained in a real work-situation. In earlier years, with huge tasks related to post-war rebuilding of Europe, this was for sure a natural position: most architects were employed, and achieved their professional insights through real work and experienced, older colleagues.

The challenges of today, or the "*wicked problems*" we face, is that a reduced number of architects get these possibilities. The reason for this is the huge unemployment problems, especially in southern Europe, and the "eroding roles" for the practicing architects in Northern Europe, where various types of engineers and specialists takes (not at least the managing) roles that architects historically possessed.

In this situation, possibly some sort of "*new normal*", architect-students ideally should be given tools enabling them to re-conquer earlier positions – and/or go into new roles and tasks.

These questions have been discussed in our think-tank, and our preliminary conclusion is that architecture-students should be given a wider set of insights and knowledge, to make them more employable and prepared for wider fields of work.

The plan for our second and third years of research was to test the hypothesis above, through meetings with architectural practices, public offices employing architects, master-students, recently educated architects and teachers.

A detailed programme for the TADPK Workshop 2 and TADPK Workshop 3 can be found in Annexes T.2 and T.3.

In order to prepare for the upcoming meetings, we discussed previously on definitions of knowledge to ensure that our vocabulary was clearly understandable and efficient for discussions with externals. We decided to continue with our earlier definitions: the knowledge of an architect consists of *disciplinary* knowledge, *practical* knowledge and *professional* knowledge.

Before the external meetings we had to discuss which questions we would raise. We agreed that we wanted open, fruitful meetings, but prepared questions that enabled structured debates. We wanted to pose similar questions to the different parties we would meet (figure 22), allowing for more elaborated cross-checking afterwards. The questions were split in six topics, and allowed for sub-questions, with different "labels" according to whom we met. The six themes were:

A: Understanding and awareness of professional knowledge
B: Role of professional knowledge within an architecture degree curriculum
C: Role of professional knowledge regarding employability
D: Sufficiency of professional knowledge at diploma level
E: Professional learning after diploma
F: Professional knowledge in evolution

Final form with prepared questions for external meetings can be found in Annex T.6.

Figure 22. Caption of the form used by TADPK think tank members during the interviews carried out within the second and third workshop in Oslo and Barcelona respectively

And to enrich the discussions, trying to obtain more clarity in the on-going series of external meetings we introduced a new model to enrich the discussion on our knowledge-definitions:

Disciplinary knowledge = the art of architecture
Practical knowledge = science, "how to do", technical solutions
Professional knowledge = business, society

We also understood that the vital themes/aspects of architectural professionalism are: roles for the architect, process, law and codes, economy, participation, documentation, and management. With these precisions/keywords some of our "external" discussions proved to develop more smooth and efficient.

Figure 23. TADPK think tank researchers interviewing AHO Master students during Workshop 2, held in Oslo in April 2016

Figure 24. TADPK think tank researchers interviewing the Catalonia Chamber of Architects CPD managers during Workshop 3, held in Barcelona in April 2017

The detailed programme for Workshop 2 and Workshop 3 including the detailed list of different stakeholders interviewed is presented in Annexes T.2 and T.3.

2.5. Findings

2.5.1. Intermediate findings

Through the sequence of meetings in Workshop 2 and Workshop 3 we got a series of statements: related to the six "themes", and given by parties with different positions. Some of them are mere statements, while others are more explicit and deserve to be called "intermediate findings".

A. Understanding and awareness of professional knowledge:

All parties agreed that professional knowledge is important. Students, young architects and faculty would not oppose "a little more" education in this field, but not more detailed knowledge – instead there should be clear focus on society, process and management. In fact, they agree that employers seldom expect detailed technical knowledge.

Offices are basically looking for team-players, people with awareness for society and communication, socially trained, and process-oriented, pro-active, curious.

B. Role of professional knowledge within an architecture degree curriculum:

None of the external parties asks for a substantial increase of professional knowledge. But at the same time they propose that students should obtain more "understanding" (of society and the roles and tasks for an architect). Keywords like awareness, social insight, knowledge on political decision-making, knowledge on how society "functions", management and process were given by respondents.

C. Role of professional knowledge regarding employability:

Students, young architects and faculty emphasize skill (documented by portfolio), that they should have some years of practice after education, and that they should be "self-driven".

Offices says clearly that personal qualities (as for example a well self-organisation or the ability to work in teams) and social awareness are most important, and that the portfolio document just helps to make the decision and is not the most important data. Anyway, the employability also depends if the office is looking for help in a specific task or a competition, or just to increase the staff. Besides, a small office tends to look for a candidate able to do many different things. Hiring a new architect or a student follows similar processes, but is always difficult, since a lot of experience cannot be expected. Therefore it is important to discover capacities or potentials that are not obvious. Sometimes, as public

offices stress out, eager architects who are capable of learning, are better than those that who have a global knowledge. Commitment and a sense of responsibility are very important values. We should also take into account that close to 75% of the architect offices are small.

D. Sufficiency of professional knowledge right after diploma:

All external parties mention that some knowledge on how the actual society/context functions should be taught. No clear attitude to practice in study years – if introduced, it has to be well controlled and monitored. Students want better understanding of normal progression/steps in a "complete" planning and building process.

Offices mainly ask for general awareness of the roles of an architect in society, but each office has different idea of what a student should be and should know. In fact, it is very difficult to define the perfect architect (figure 25).

Figure 25. Collage on a wall of the Catalonia Chamber of Architects offices depicting jobs that can be performed by architects according to field of specialization

E. Professional learning after diploma:

Most external parties said that 3 to 5 years of practice after education are necessary to make a young architect fully "operative". Many mentioned that more post-graduate courses should be offered in order to make the architects more competitive in the market. Is also important to implement tools in

order to get architects informed and aware of the chances in the market that they have, because otherwise they cannot choose.

F. Professional knowledge in evolution:

All external parties predict a future where teamwork and interdisciplinary processes will be even more important.

All external parties also said that professional knowledge definitely will be necessary, but more focused on the actual social and political context, and on process management.

2.5.2. Survey findings

Above we have mentioned the importance of how professional knowledge is dealt with in European architecture schools today. Responses to the questionnaire that we sent out have given relevant information, which can be summarized as follows:

- All responding schools offer education on professional/practical knowledge.
- Roughly 50% of the schools offer such education in specific courses, and the other 50% also offers such education in dispersed/integrated in other types of courses.
- Roughly 50% of responding schools offers courses on professional/practical knowledge on Bachelor level, the rest on Master level.
- Mandatory courses on professional/practical knowledge are mostly given on Bachelor level, roughly 2 out of 3.
- Volume (hours pr. semester) of mandatory courses, average: Bachelor level ca. 75, Master level ca. 50.
- ECTS earned, mandatory courses, average: 8 ECTS
- A majority of responding schools reports that education on professional/practical knowledge covers these themes: roles of the architect, standard procedures and tools, legal aspects related to public sphere (law and codes) and private sphere (business, ownership), project management, etc.
- Roughly 60% of responding schools does not require external practical experience (internships or similar) during the study-years to obtain degree, and does not plan to introduce such requirements. (Responses from the last 40% are unclear, often mixed with existing requirements of mandatory practice in the post-study years.)

The picture that evolves from the study is diverse but in some ways clear:

- All schools give education on professional/practical themes, but the volume of such education is relatively small, never valued to more than 20 ECTS of a normal total of 300.
- A majority of European schools give education on professional/practical themes through mandatory courses on Bachelor level. In addition elective courses are often offered on Master level.
- A majority of European schools intends to "cover" a broad set of relevant professional aspects in such education: roles, tools, procedures, law and codes, project management.

The questionnaire, survey and findings were presented in the EAAE-assembly in Delft in early September 2016, as an element in our dissemination process.

2.5.3. Findings with relevance for architectural education

The most relevant findings we have considered after the research, findings that are fully agreed, can be classified into three main items: findings related to professional knowledge in general, findings related to the academic sphere, and findings related to the professional sphere.

2.5.3.1. Findings related to professional knowledge in general

One of our first efforts has been, as commented before, the need for defining what Professional Knowledge is, and what type of scenario we actually have to deal with. Trying to tackle this discussion, we concluded that:

I. Teaching Professional Knowledge is wicked indeed:

During our three project years we spent much time discussing the particularities and virtues of the Professional Knowledge. We realized that the content and borders between the terms Professional Knowledge and Practical Knowledge as we described in the beginning of the research are not so clear – actually they are quite blurred. In addition, the term Professional Knowledge is in fact understood very differently, and in spite of the precise definition we used during our investigation, we met

noticeable different approaches according to which group or collective we were dealing with. Moreover, we noticed that Professional Knowledge is in a constant but evolutionary change.

II. Professional Knowledge basically includes an understanding of relationships: as team work, social participation, communication and the relation to client and users:

This finding implies an understanding of the great complexity of Professional Knowledge, because of the different stakeholders, aligned and contradictory interests, easy and complicated social attitudes, different levels of engagement and diverse and even changing points of view. Insight to this complexity demands a different approach than only conventional teaching, and claims new active methodologies, new kind of tasks and cooperative work in order to learn how Professional Knowledge "works". This means also to implement more discussion about new methodological pedagogies, in addition to the syllabus content.

Education on Professional Knowledge should increase the focus on typical plan and building processes, on design of task-defined, appropriate processes, and general process management. This education should also problematize new challenges, on themes like sustainability, heritage, re-use and changes in technology and migration.

Figure 26. TADPK think tank researchers interviewing ETSAB recently graduated architects during Workshop 3, held in Barcelona in April 2017

Not at least the students and the young architects we met stress that an overview of the normal, "full" process of plan and building, and the typical teams involved, should be given during the study years. Such knowledge will help students to make the transit from studying to practicing easier (figure 26). It could also help the young architect to be more aware of his or her role and capacities when new types of challenges are addressed.

2.5.3.2. Findings related to the academic sphere

In the academic scenario there are some considerations we must take into account, related to the learning process and to the syllabus linked to the study programmes. Trying to tackle these questions, we concluded that:

III. Professional Knowledge should be taught in both specialized and integrated contexts, at mandatory and elective level:

In the different areas of our research we noticed that the amount of information and knowledge delivered at the universities, related to what we call Professional Knowledge, is mostly satisfactory for the basic education of our students. However, we also found that it is a good idea to make a wider and more diverse offer, ideally present both in the mandatory level as in the elective one.

Students and young architects say that the motivation – and readiness – to learn professional knowledge grows through the study years. Through elective courses on elements of professional knowledge some students might obtain special insight and ability, preparing them for management and abilities on a higher level. This specialisation could increase the student employability.

IV. Students should be aware of various processes and how to use them:

Following the discussion about how to teach and learn Professional Knowledge, and taking into account its complexity, this finding has to do more specifically with the syllabus and content, which should be reanalysed and discussed, in order to give the students a coherent and more accurate overview of the Professional Knowledge. Teachers should aim to give the students a general awareness of context and a more fundamental consciousness, as preparation to face the professional world.

V. Professional experience during the studies is highly recommended:

Our studies focused on schools that are responsible for a complete architectural education. Even though external professional experience and internship activities are not mandatory in these schools, we agree that one of the most important environments to acquire at least some of the Professional Knowledge is working in an office. To obtain such knowledge it is normal to spend much time in an office after completed education at school.

Also it must be said that mandatory programmes related to Professional Knowledge might have potentially negative consequences, especially when they are related to theoretical topics not engaging the students, or actually boring.

However, all our respondents seems to agree that some experiences from office work in the education years are fruitful and even necessary, especially to "open windows" towards the field of Professional Knowledge.

If introduced, mandatory practice-periods during the study-years have to be well monitored and quality-controlled by school. Not at least in the countries where no practice period after the study-years are mandatory for licensing, types of controlled/monitored integrated practice-periods could be considered.

VI. Entrepreneurship is valuable for those who wish to strike out on their own:

Taking for granted that the kind of work that students imagine for his or her future may vary, and that the architect profession has a lot of faces, the knowledge and ability for entrepreneurship is a possibility that may interest many students. This dimension of Professional Knowledge could be taught in the universities, at least in elective courses.

VII. Schools should offer various and relevant post-graduate courses on professional knowledge:

We know that the amount of such courses is increasing in most European countries. Courses are offered by different actors in the planning and building environment. All schools giving architectural education should examine their actual situation, establish fruitful collaboration with other parties, and secure that less commercial, professionally relevant courses are offered to architects (for instance, working with BIM, restoration courses, facility and project management...).

2.5.3.3. Findings related to the professional sphere

The professional world is diverse and heterogeneous. The great difference between the small architect offices and the big ones, or the requirements that a public office could demand, are distinct, even between the same kinds of offices. Trying to approach this discussion, we concluded that:

VIII. Architectural practice is increasingly interdisciplinary:

Is quite evident that the architect can no longer assume a privileged position in the development of all projects. In spite of the fact that the architect has an evident ability to deal with different inputs simultaneously, and is trained to make clever discernment of the problems he may be facing, it is also evident that the architect will be increasingly dependent of other professionals with specific abilities. Teamwork training, to handle these challenges, is vital.

Education with focus on society, should present the typical roles for an architect in the actual society, and the stakeholders/parties in environments that an architect will meet. Students and young architects say they learn too little about the various work-positions, the typical tasks they will meet and the typical teams or working relationships they will encounter. The amount of such knowledge given varies from school to school, but increased awareness on these items should be considered.

Awareness of and preparation for more interdisciplinary processes should be given as an element of professional knowledge. All parties we met in our meetings stressed that the work of an architect more and more would take place within an interdisciplinary context. A better understanding of the knowledge, values, working-methods and capacities of other professionals should be presented. New types of processes that evolve from broad teaming should be presented and discussed as an element of professional knowledge.

IX. The architecture practice lends itself to a lifelong learning process:

The work of an architect is traditionally a row of separate projects, often with new teams and new collaborators. Most projects have a defined stop, and a fresh start. The work is actually a series of new learning situations. Every element of Professional Knowledge learned by the student during the graduate studies, will be renewed, completed – or rejected – during the coming years of architecture practice. This will happen as a normal, continuous development.

X. Employers accept that detailed Professional Knowledge has to be transferred to newcomers:

Leaders of offices, even in the public sector, accept that detailed Professional Knowledge and what we have categorised as Practical Knowledge, specific for the sector, has to be conveyed to the new employees. They take it for granted that the newcomers often struggle with unknown challenges and tools that they have not acquired during their study years, and accept to "invest" in newcomers (figure 27).

Figure 26. TADPK think tank researchers interviewing Jensen & Skodvin architects during Workshop 2, held in Oslo in April 2016

XI. The most important item for the employability is the attitude, not the amount of knowledge:

It has been regarded that the opinion in architectural offices is that students coming directly from education lack the necessary insight in practice. We are a bit surprised that these types of arguments did not occur in any of our discussions. On the contrary: practicing architects expect that various elements of professional knowledge has been *illuminated* for the students, but they pay little or no attention to limited knowledge on relevant laws, building codes, user treatment procedures, project and office economy, management etc. Our respondents are very clear on what makes a job candidate attractive: he or she has to be socially aware, pro-active and curious – a team-player!

All students finish their academic development with more or less similar knowledge of the discipline, even though they may have different student's records. A portfolio that unveils projects of high architectural quality is always interesting, and useful as a backdrop. This being said, what makes a fresh architect really different and attractive for the potential employer is attitude, curiosity, ability to work in a team, the way of facing adversity, decision-making ability and personal flexibility in dealing with different problems.

Our reflections and conclusions above are not detailed or economically calculated. It is also clear that the practical and professional knowledge offered in European schools must reflect national and regional differences. Design of a "local" content and education for this type of knowledge should be considered.

In the CWP-project's final report on Teaching Wicked Problems, it is also necessary to discuss our proposals in relation to the findings of the Sustainability and Heritage think-tanks.

2.5.4. Some concluding proposals for curriculum structure and pedagogical methods

Having presented our main findings, we want to propose some strategies to reinforce our academic courses, both in programmatic terms and methodological considerations, to bridge between the academic and the professional sphere. We suggest some improvements for our schools, some oriented towards a better academic teaching per se, and other strategies oriented to the bridging of spheres. (We include – in brackets – the findings we presented above, in each proposal.)

2.5.4.1. Improvements related to academic strategies

a. Reinforce the cooperative work between peers, [VIII] [XI]:

One of the main items and discussions we had during our work is the teamwork ability of our students to face the challenges in the future. Taking into account that this ability is a key point in the professional world, it must be reinforced during the academic period.

b. Strengthen the importance of the extracurricular activities as a crucial point in the study curriculum of our students, [XI]:

The external activities that our students develop besides the regulated studies are fundamental for the construction of their knowledge of the discipline. Not only experiences in an architect's office, but also workshops, travels, other studies, and the personal experience in other fields, become valuable inputs for building a wide and rich knowledge. These kinds of extracurricular activities and interests deserve more focus and recognition.

2.5.4.2. Improvements related to reinforce the connection to the professional sphere

c. During the last courses of the study years there should be implemented activities between different schools that share concern about real and concrete problems, [II] [VIII]:

The architect's professional activities have to do with other disciplines and other professionals. Their points of view are fundamental to know, to reach further in a specific work. Although the coordination of activities between different schools are difficult, the benefits of such relationships should increase the amount of knowledge and preparedness. This involves, for example, other disciplines like fine arts, law, engineering, biology, economy, and so forth. Architects should also be taught some insights regarding sociology and management, in order to make them more competitive. The numerous presence of project managers, often educated as engineers, in big commissions nowadays, reveals that there is a lack in either the education or the training of architects.

d. Encourage lectures from other fields in the last courses of the study years, [II] [VIII]:

Lectures from other types of professionals, about specific problems that the architects must face, can give new and fresh points of view and strengthen the understanding of that problem.

e. Implement organised and well prepared visits to architecture offices, both big and small, and also public offices, [IV] [VI]:

The points of view from members of such offices, and considering the difference between offices, are of great help for the students to get an appropriate overview of what is going on in the professional field.

f. Offer both mandatory and elective courses related to professional knowledge during the last study years, [V]:

According to the content, the schools should implement both kinds of courses in order to fulfill the presence of professional knowledge in the degree syllabus.

g. Reinforce the relationship between the schools and the professional activities through academic agreements, [IV] [V] [X]:

Especially in those schools where the internship is not mandatory, there should be implemented a real effort to provide a solid programme, with easy access for the students, to intensify the relationship between the two spheres.

h. Extend and consolidate the formative and specialization courses oriented towards the recently graduated architects, [VII] [IX] [X]:

Taking into account the wide scope of activities that a professional architect discipline can tackle is obviously very important to offer specialized courses for the architects, to be implemented through the universities or other academic entities. In many European countries such courses should also be linked to the architects' councils.

i. New pedagogic methods, to give increased understanding of the great complexity of Professional Knowledge, [VII] [IX] [X]:

Different stakeholders, aligned and contradictory interests, easy and complicated social attitudes, different levels of engagement and diverse and even changing points of view is the reality for the practicing architect. Insight to this complexity demands a different approach than only conventional teaching, and claims new active methodologies, new kind of tasks and cooperative work in order to learn how Professional Knowledge "works". This also means to implement more discussion about new methodological pedagogies, in addition to the syllabus content.

2.5.5. Continuous professional development

The work of an architect is traditionally a row of separate projects, often with new teams and new collaborators. Most projects have a defined stop, and a fresh start. The work is actually a series of new

learning situations. Every element of Professional Knowledge learned by the student during the graduate studies, will be renewed, completed – or rejected – during the coming years of architecture practice. This will happen as a normal, continuous development.

Considering this very important fact, and the unique characteristics of our profession, our think-tank has come to the conclusion that what is being doing nowadays is well oriented, but in any case must be reinforced the post-graduate courses mentioned under point 2.5.4.h, as also must be reinforced the hidden curriculum and the social aspects akin to the discipline (figure 28).

Figure 28. TADPK think tank researchers presenting the third season results to EAAE President, Karl Otto Ellefsen, during the sixth TNP held in Oslo in April 2017

2.6. Deliverables

This document is a result of a project and a process that has its own limitations. Although the intention with the debates, research and different activities was to obtain final and global conclusions, we must accept that this type of work implies some degree of subjectivity in some cases, physical restrictions in other, and conclusions not fully agreed in some cases.

Through our work we realized that the content of the term architecture, the way it is practiced, and the attitudes to problem-solving, are different in European countries. We could say, in general terms and with few reservations, that the discipline is quite similar. But its practicality may be very different from country to country, although reasonably similar in each area or region. To impose even more emotion to this problem, each architect may in fact have his own individual attitude confronted with a specific problem (figure 29).

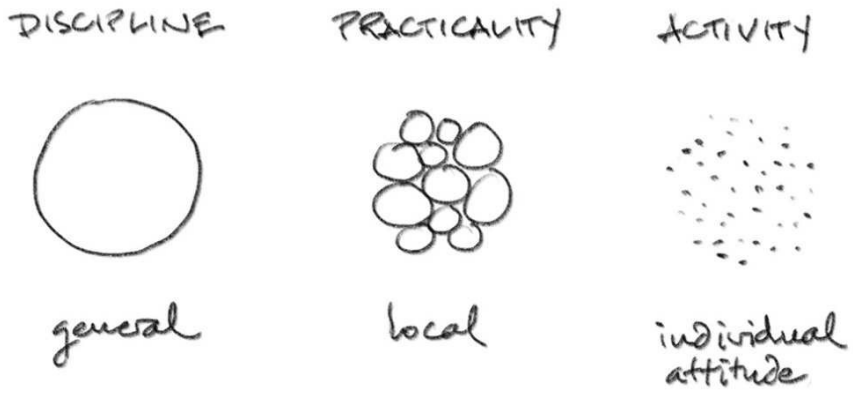


Figure 29. Drawing by Jordi Franquesa representing the different types of knowledge within architecture education

This means that we must be aware of the importance of the site, the context and the area we are talking about. Perhaps individuals should have a certain "blending" to obtain creative, effective and fruitful participation in the discussion! Such considerations should be taken into account in the elaboration of future seminars and workshops related to these themes.

2.7. Dissemination

The project will be disseminated through the different channels we have within range: through the web pages of the schools involved, and web pages of other entities that may be interested in this research. We think it is appropriate to deliver the final "Teaching Wicked Problems Report" to all the European architecture schools, and to the different architects' councils in Europe.

3. THINK TANK #2 ON "HERITAGE" REPORT

Main editors:

LOUGHLIN KEALY
European Association for Architectural Education

KOENRAAD VAN CLEEMPOEL
Universiteit Hasselt

Collaborators:

TOMÁŠ EFLER
České vysoké učení technické v Praze

GIOVANNA FRANCO
Università degli Studi di Genova

STEFANO FRANCESCO MUSSO
Università degli Studi di Genova

EUGEN PĂNESCU
Architects' Council of Europe

BIE PLEVOETS
Universiteit Hasselt

SARA VAN ROMPAEY
Architects' Council of Europe

PETR VORLÍK
České vysoké učení technické v Praze

3.1. Problem statement

3.1.1. The new normal in architecture practice. Typical changes in architects' roles and positions in Europe

Our built environments in Europe are mainly inherited from the past. Many are of cultural, architectural and historical interest. Many are not, but they bear witness to the development of the social and economic frameworks that shape the everyday lives of our peoples. They shape our literature, art and our thinking about the future. They have value both as a resource for the present and for the future.

The condition of living with, near, in, or surrounded by the relics left by our ancestors defines the sustainability of heritage conservation (Graham et. al., 2000). If cultural heritage is not sufficiently involved in the everyday life of its community, it becomes a "*heritage without heirs*" (Šćitaroci, 2015). In the meantime if it is "too much involved" and transformed without thought for its value it could disappear forever - a loss with no gain. Heritage as a concept is susceptible to change and interpretation but always taking into account our responsibility as provisional heirs of what we received from the past. Each generation bears the responsibility of deciding what to transmit to future generations. It is always a matter of cultural and civil consciousness. This is a process determined by societal trends, academic studies, professional practice, and political focus on the consolidation of certain local identities, with all the risks that this term brings within itself, power relationships, and cultural appropriations (Lowenthal, 1998).

Every culture within Europe has its own heritage, and typically heritage management involves local perspectives, values and legislation which affect architectural practice engaging with tangible relics and intangible values partly embedded within their material status. However, heritage is increasingly put forward by the European Commission as the collection of tangible and intangible testimonies of a shared European past. This inherited past is framed as the basis for intercultural exchange and a hopefully "shared identity" among the European people. What also emerges is an influential economic perspective on heritage in the European context. The European Parliament acknowledges that cultural heritage is part of the broader cultural and creative sector that is "a major and growing part of the global economy" (European Parliament, 2016). Architects are also part of this sector and graduates thus require to be prepared to assume a fitting, competent, responsible and effective role within it. Furthermore, they need to take into account involvement of local stakeholders and participatory

decision-making processes. The European Commission had voiced an ambition to make heritage policies "society- and citizen-driven" in order to stimulate the development of societal and economic benefits from the exploitation of European Heritage (Council of the European Union 2014).

Design centred on the built inheritance increasingly influences architectural culture and attracts the interest of many subjects. Mediagenic projects of adaptive reuse, conservation, restoration or brownfield redevelopment ever more generate the icons of the contemporary architectural avant-garde, with positive but also negative consequences. Such iconic projects need to be seen in a context of wider increased importance for conserving and compatibly reusing existing structures, whether designated as heritage or not. Many European regions have a large old building stock that only increases slowly by means of new construction. Here lies a great challenge of comfort, universal accessibility, energy use and resource efficiency. Statistics from an ACE Sector Study demonstrate that the balance is tilting towards refurbishment, accounting for 59% of the total workload (Mirza & Nacey, 2017). It is estimated that in Italy, refurbishment accounts for more than 70% of the total workload in the architectural sector.

Heritage therefore is not only preserved, but also restored and (adaptively) reused. If a building is rigorously preserved, its lifetime seems to be "frozen" in time; it becomes a museum or a (historic) monument (Choay, 1992). Otherwise, accepting the open-endedness of its lifetime, a building might continue to develop in face of continued usage in service of societal programmes, without losing its physical consistency (historically layered built matter), values and meanings. Adaptive reuse prevents degradation and obsolescence of historically valuable structures by means of this continued or new use, and potentially brings new life to old, urbanized areas. This occurs on many levels and is a diverse, context-specific practice. It includes the establishment of cultural, economic or residential purposes in abandoned or underperforming buildings, but also the envisioning opportunities for 'difficult' buildings without an obvious or feasible purpose in the near future. Think of typologies of which the functionality is decreasing (e.g., churches in times of secularization) or of societies with decreasing spatial footprints (e.g. in regions facing demographic shrinkage and ageing).

Architectural practices involving heritage cover processes on diverging scales, from interior adaptation to urban reconfiguration and regeneration or even redevelopment on the level of entire landscapes. Such processes possibly occur in conjunction with significant socio-economical historical changes. The de-industrialisation of the past decades has left many sites vacant and available across Europe - such as mines, blast furnaces, mills, and industrial harbours - and many of these have found inspiring new purposes. In addition, secularization in Western European countries is currently resulting in novel

questions how to protect, conserve and restore obsolete but valued church buildings and even monasteries. Equally, adaptive reuse may be part of slow and gradual processes occurring in European settlements, for example the ongoing adaptation of our dwellings to contemporary standards and demands, always preserving their memorial and documentary values. With regard to the physical and lived environment, maintaining spaces and settlements in use, be it for an original or an altered function, is widely seen as an efficient way of preserving valuable relics of the past as significant parts of our present and future environment, and of reducing material flows and energy consumption as consequences of demolition followed by new construction (figure 30). Conservation, restoration and adaptive reuse of built-up areas or cultural landscapes is therefore an important approach to protect the assets of open space, as sealed surface and built-up space keeps increasing, and for preventing reduction of resources. Heritage relics have a special role in the wider process of adaptive reuse, serving as exemplary cases and focal points of societal interest in the more general framework of safeguarding what of our inheritance can be still useful and meaningful for the future.

Figure 30. The built environment palimpsest: inheritance/transmission/renewal. Chania (left) and Valencia (right).

3.1.2. Architecture's potential for problem-solving and innovation

Thus, dealing with heritage is a task susceptible to societal trends that raise considerable challenges and opportunities to European architectural education. The Think Tank on Heritage has been considering the relationship of these challenges and opportunities starting from the wider problem statement of "Confronting Wicked Problems". The project referred to the term coined by Rittel and Webber referring to transdisciplinary problems that resist straightforward, positivistic problem solving (Rittel & Webber, 1973). Such problems are meat and drink to the discipline of architecture where the essential requirement is the ability to think across modes of thought, from the material to the metaphoric.

The initial questions of the 2014 in response to the perceived wicked problems were formulated as follows:

- How to strengthen students' and architects' research expertise in order to tackle complex problems and to improve their capacity to communicate their knowledge, may it be explicit or tacit, within multidisciplinary teams?
- How to develop design processes in order to be able to contribute to the complexity, sustainability and by nature long-lasting character of the urban and territorial transformation process?
- What is e.g. the proper way to balance and integrate cross-professionalism, creativity and flexibility in the curricula and teaching methods to better lay ground for entrepreneurship and employability?
- How can adjustments in architectural education better foster good ideas for implementation in "the real world", and thus empower architectural graduates to define the future of European transformation of the built environment?

The concept of the wicked problem has received much response from the discipline of architecture, because architectural problems are often considered as wicked problems, and architectural problem solving is predominantly design-based, and so has its proper heuristics (Lawson, 1980). This peculiarity of architecture should be considered its strength in addressing complex societal problems alongside other scientific, technological and humanistic disciplines, particularly as they relate to the built heritage and historic landscapes.

This hypothesis was tested and contested during the research project. For example, the report of the staff training event in Genoa (2015) presents the perception of "the apparent loss of Architecture's authority and that of Conservation's attractiveness", which emerged from a discussion between local staff and Think Tank members. The latter part of this statement resulted from a discussion about the perception among the young that intervening in something which already exists would limit their design creativity. The former part refers to the increasing complexity of intervening in space, where architecture more and more needs to be interrelated with other disciplinary fields without losing its own specificities. Equally, during the Hasselt staff training event, the risk was discussed that students avoid heritage as a topic during their studies and graduate without a solid knowledge base or experience regarding this important subject.

Another issue that reoccurred during the staff training events, was the impossibility of generalising or proposing "one size fits all" solutions that could apply to architectural education across Europe. National and regional intricacies require customised approaches. And in extreme cases, preservation, conservation or restoration of some historic environments could be considered impossible in the light of contemporary societal demands. Heritage thus manifests itself as a very distinct category of wicked problem.

In sum, there is a strong urgency to seek appropriate pedagogical methods, and to integrate this transdisciplinary nature into the curriculum, training future professionals in applying their creativity to existing historical material which could then survive into the future even if appropriately adapted to meet new needs. Hence, the questions raised in 2014 remain urgent and valid, but the conducted research has opened up additional aspects. The Think Tank reports below how it addressed the question of offering the appropriate competences in architectural education: Knowledge and skills – not only of design, but also for example, of comprehension of existing fabrics/sites and of essential societal engagement – effectively need to be brought to bear in educational environments as they address questions regarding heritage. In addition, students and young professionals, in whatever context they operate, need to be able to exercise correct judgment beyond the area of design and into the area of problem definition and resolution. This research project demonstrates this is not as straightforward as it might seem.

3.1.3. Architecture's teaching nowadays. Present situations regarding pedagogical methods, curriculum structure and continuous professional development

Local culture and legislation shape the courses followed in architectural education across Europe. Sometimes, engaging in transnational discussions, diverging viewpoints and paradigms appear to be incommensurate. This challenge was addressed primarily by means of comparative case studies of projects undertaken by the partner institutes participating in the Heritage Think Tank, as a means of exploring curricula and pedagogical models.

In a wider context, the approaches were compared to approaches, traditions and trends across Europe. In order to get an overview of the weight given to conservation and restoration in European curricula, a questionnaire was prepared in Hasselt in October 2015. This was first tested with participants in an international workshop organised by the EAAE Conservation Network and then circulated via the EAAE network (*). In addition to responses received, curricula were retrieved from institutional websites and analysed. This enquiry identified significant differences among European schools in terms of the weight given to restoration and conservation. Italian schools stand out in the high amount of ECTS credits for compulsory courses in these subjects (between 6 to 26 credits), at different level of courses (bachelors, masters, post-masters). Other countries offer between 3 and 6 compulsory credits on the topic. In some countries, special programmes are offered such as Master-post-Master or PhD programmes in conservation.

> (*) Overall, the response to the questionnaire was limited, which already indicates diverging priorities given to this subject across European cultures. Participants in the Conservation Network responded readily, among which were many Italian institutes. Thus, the results are indicative but serve to illustrate aspects of the "wickedness" of problems related to heritage.

In greater detail, the three models of Prague, Genoa and Hasselt were studied and compared, which generated the basis for a hypothesis for improving architectural education across Europe. The University of Genoa is one of the 7 Italian institutions offering the aforementioned advanced diplomas, which are for example necessary for graduates to enter the ranks of the Ministry of Culture. The University of Prague has a research and documentation centre for industrial heritage, which involves students in documentation of buildings and oral histories. Hasselt University recently started an international Master in Adaptive Reuse. The Think Tank emphasised curriculum and programme development as well as lifelong learning, thus responding to the main objectives formulated in the 2014 project application.

3.2. Challenges and opportunities

3.2.1. Pedagogical methods

From the outset, the primary challenge identified by the Heritage Think Tank was the fundamental premise posed by the project itself: to arrive at findings that could help in developing programmes and curricula that addressed the emerging parameters and developing circumstances of heritage, and that could apply to schools of architecture across Europe, given the variety in the scale, character, tradition and institutional arrangements, including relationships with the profession. Each of these considerations would, in itself, give reason for reflection: how could the project structure a recommendation that could apply to schools that were stand-alone entities and be equally useful to schools whose curriculum development opportunities were largely controlled by their hosting institution or determined by Education or Cultural Ministries?

A particular challenge was seen to lie in the fact that schools of architecture are generally animated by a design-led ethos, and that experience suggested that "design" and "conservation" were uneasy bed-fellows. While differences in educational philosophy could be bridged only by the response of individual schools to the emerging challenges posed by the inherited environment, the project could propose perspectives and examples of good practice that could prompt innovative response or support existing endeavours. Some significant points of intersection existed: the prevalence of the studio-based culture, the interest in tectonics, the use of digital media, the emergence of the research imperative and the recognised need for connection between academia, the profession and the community.

At the same time, it was recognised that the schools participating in this challenge brought a richness of experience to the task. They brought differences in perspective and experience so that initiatives would bring their own challenges and presuppositions would be tested at an early stage. This is elaborated in 3.2.3 below. However, they also brought experience in how that dilemma might be approached.

A significant resource lay in the existence of the EAAE Conservation Network, which was established as a result of a workshop in Genoa in 2007, and gave access to schools of architecture across the continent that were engaged in heritage-related teaching. A bi-annual meeting of the Network was scheduled within the project period and this would provide an anchor for the debates within the Think Tank.

3.2.2. Curriculum structures

The early focus of the Heritage Think Tank was to identify the range of issues that impinged on curricula and pedagogy in the field of heritage (Genoa 2015). The general considerations outlined in the Section A, Problem Statement, were broken down into specific issues through a cross-disciplinary round table workshop. In effect this workshop was a scoping exercise to determine how the work of the Think Tank could be effective, given the range and complexity of the issues that are involved. The outcomes in thematic terms were organised under three headings: specialist knowledge, stakeholder engagement and the integration of research. These established the framework of challenges to be addressed through the project.

3.2.2.1. The integration of specialist knowledge

The focus here was the range of specialist knowledge involved in working with the inherited environment and the challenge of integrating related pedagogies into architectural curricula. The dominant paradigm within architectural education sees the discipline as design-based, and pedagogies inevitably reflect this. New circumstances require new understandings, and in turn open architecture to new areas of knowledge, or to new perspectives on what was already known. Much of this new knowledge and revised perspective derives from research and the experience of practice. Specialist knowledge can struggle to make its voice heard where the focus is on a form of cultural practice that is rooted in an earlier time. Exploration of this issue is elaborated in Section 3.3 below.

3.2.2.2. Stakeholder engagement

Projects based in communities have long been a stable feature of architectural education. However, the pursuit of stakeholder engagement introduces a different character to the architectural project. Such engagement has emerged as a core requirement of practice in the context of rapid social and cultural adjustments. The Heritage Think Tank considered that the imperative for engagement had the potential to develop new methodologies in education, specifically in the design of the architectural project itself. The means through which the Heritage Think Tank addressed this issue are elaborated through the tools outlined in Section 3.3 below.

3.2.2.3. The integration of research in heritage-related pedagogies

Here the Think Tank considered, both the integration of the activity of research within the curriculum, and also integration of research findings as regards the perception and consumption of heritage. Both of these perspectives are reflected in the case studies outlined in Section 3.3 below. Particular characteristics of this element are the differing paradigms underlying research and its application in teaching and the differing timeframes involved, in execution, translation for pedagogical purposes and direct relevance to other concerns being addressed within the curriculum.

3.2.3. Continuous professional development

The three academic programmes represented in the Think Tank are located in different jurisdictions, have distinct intentions, institutional and professional contexts and programme contents. The differences offered the opportunity to investigate the commonalities and differences in approaches to teaching and how these related to the curriculum structure and educational outcomes vis a vis professional perspectives. In effect, the pedagogical and curricular elements were tested against these contexts.

3.3. Tools and methods

3.3.1. Introduction

The Heritage Think Tank adopted a range tools/methods in exploring the challenges and opportunities described in Section B above. These were designed to give concrete expression to these general issues outlined and had a three-fold focus:

- the connection of curricula to emerging understandings of heritage within the profession and society;
- the place of heritage–related pedagogies within architectural curricula
- heritage-oriented pedagogies and competences and their implications for life-long learning.

It was considered essential that the tools used in the project should derive from the distinctive approaches to architectural heritage education being developed in the three participating schools. At the same time, given the differences in approach between the three academic programmes, it was realized that generic overall concepts were required in order to have a shared platform, and that within this, there would be considerable variation in how issues were addressed. In addition, in the light of known differences in programme intention and structure, the participants would have somewhat divergent pedagogic practices. The concern was to identify examples of best practice and initiatives that had the potential to assist schools to develop their own curricula and to bridge between academia and the profession through life-long learning applications.

In summary, The Heritage adopted two primary tools, case studies and intensive workshops, and two supplementary tools, a questionnaire and a relationship matrix. These are described below.

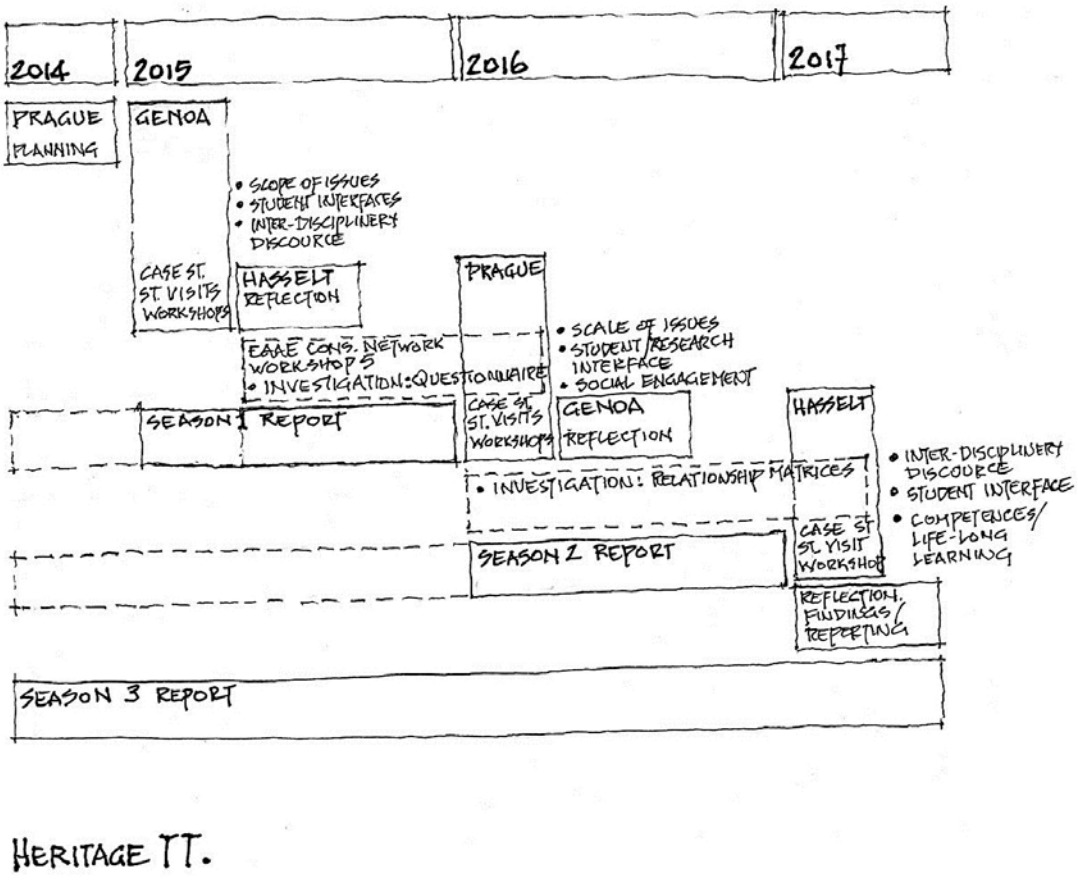


Figure 31. Scheme of the Heritage think tank working process

The previous diagram (figure 31) illustrates the relationship between the various elements adopted: Case study analyses, related site visits and the issues workshops. Also indicated are the specific enquiries conducted to clarify the contexts that impinged on the discussions and provisional findings, namely a questionnaire (presented in Annexe H.1) and the production of a relationship matrix (presented in Annexe H.2).

In addition, the Heritage Think Tank was able to exploit a significant resource in the form of the EAAE Conservation Network. This Network was established in 2007. A bi-annual workshop organised by the Network was scheduled with the CWP project timeframe.

3.3.2. Primary tools

The primary tool driving of the work of the Think Tank was the analysis of a range of case studies, prepared and presented by the participating schools, and a series of intensive workshops. These case studies represented significant aspects of the task: the demands of significant architecture faced with change; the reclamation of redundant industrial buildings and areas and the deep question of adaptive reuse of historic buildings. There were several dimensions to the case studies: presentation by staff and students of case studies of work in progress within each school; study visits to related buildings and sites; engagement with students through question-and answer sessions and small group work, followed by summary discussions and reflection by project members.

For illustrative purposes, three case studies are outlined below. These are selected from a range of presentations and debates within each of the participating schools. The summary accounts set out the structure of the events, a summary of the material presented in each case, and the principal matters raised in discussion. Supporting material provided as an attachment.

3.3.2.1. Genoa 2015: Case study of the Palazzo Belimbau

Palazzo Belimbau (figures 32 and 33) is a noble palace dating at least from 15th C. It is a highly complex building, incorporating a range of former apartments and servant spaces, and with a monumental entrance hall and staircase leading to its honorific spaces. These elements are

characterised by the presence of important fresco and stucco decorations dating from the 17th C. Owned by the University of Genoa it is now almost empty and under a programme aimed at its re-use and restoration.

Figure 32. Genoa: Palazzo Belimbau Case Study, the front elevation belies its complexity

The event combined a briefing site visit, presentations by students and tutorial discussions involving all Think Tank members. The student work demonstrated a range of methodologies that were designed to combine protecting, conserving/restoring its architectural and artistic elements with the need for new uses, and the interventions needed to realise the necessary spaces, architectural elements and services. The requirements of the project extended to compliance with local regulations regarding safety and accessibility.

This session was followed by an intensive multi-disciplinary workshop which explored the issues involved in teaching heritage within architectural curricula. The need to see the identified issues in their curricular contexts led to the decision to undertake a structured enquiry, utilising a short questionnaire. The intention was to give the Think Tank members a better sense of the range of situations in which heritage-related teaching was conducted. This element is described more fully later on. Following the TT events the teaching methods were adjusted to take observations made into account.

Figure 33. Genoa: the Salon of the Palazzo Belimbau

3.3.2.2. Prague 2016: Case study of Zbůch industrial coalmine area in the Pilsen region

The second event was held in Prague in 2016. The format adopted, while similar in many respects to the one of Genoa, was adjusted to reflect the distinct nature of the programme. Several case studies were presented and discussed, from which one is selected for description here. The event also included a workshop session in which the case studies were analysed and their possible wider application in architectural pedagogy discussed. An additional initiative was also proposed which is described later on.

The area once possessed a thriving coal extraction industry, producing high quality material used in coke production and in the chemical industry (figure 34 and 35). The villages at the centre of the activity expanded greatly during the early years of the 20th C with substantial built fabric. Mining activities ceased in 1977 and much of this infrastructure was demolished. Some remaining complexes promote educational initiatives on the area's industrial tradition.

Figure 34. On site at Zbůch: Case Study site

The event combined briefing site visits, presentations of project work and related publications and discussions (figure 36) involving the Think Tank members. The student work in this instance was based on earlier, extended research conducted by the institution into the history, development and decline of the locality. The project involved the students in direct work with the local community and the harvesting of experiences, collective memories and eyewitness accounts, as key elements in the

preparation of different and colourful possibilities and diverse strategies (incorporating multi-disciplinary inputs and outputs in terms of landscape, urban planning, architecture, scenography, interior, design, visual and graphic arts and sociology). The intention was to be a regenerative force for the locality. It also resulted in a publication that, in itself valorised the experience of the community.

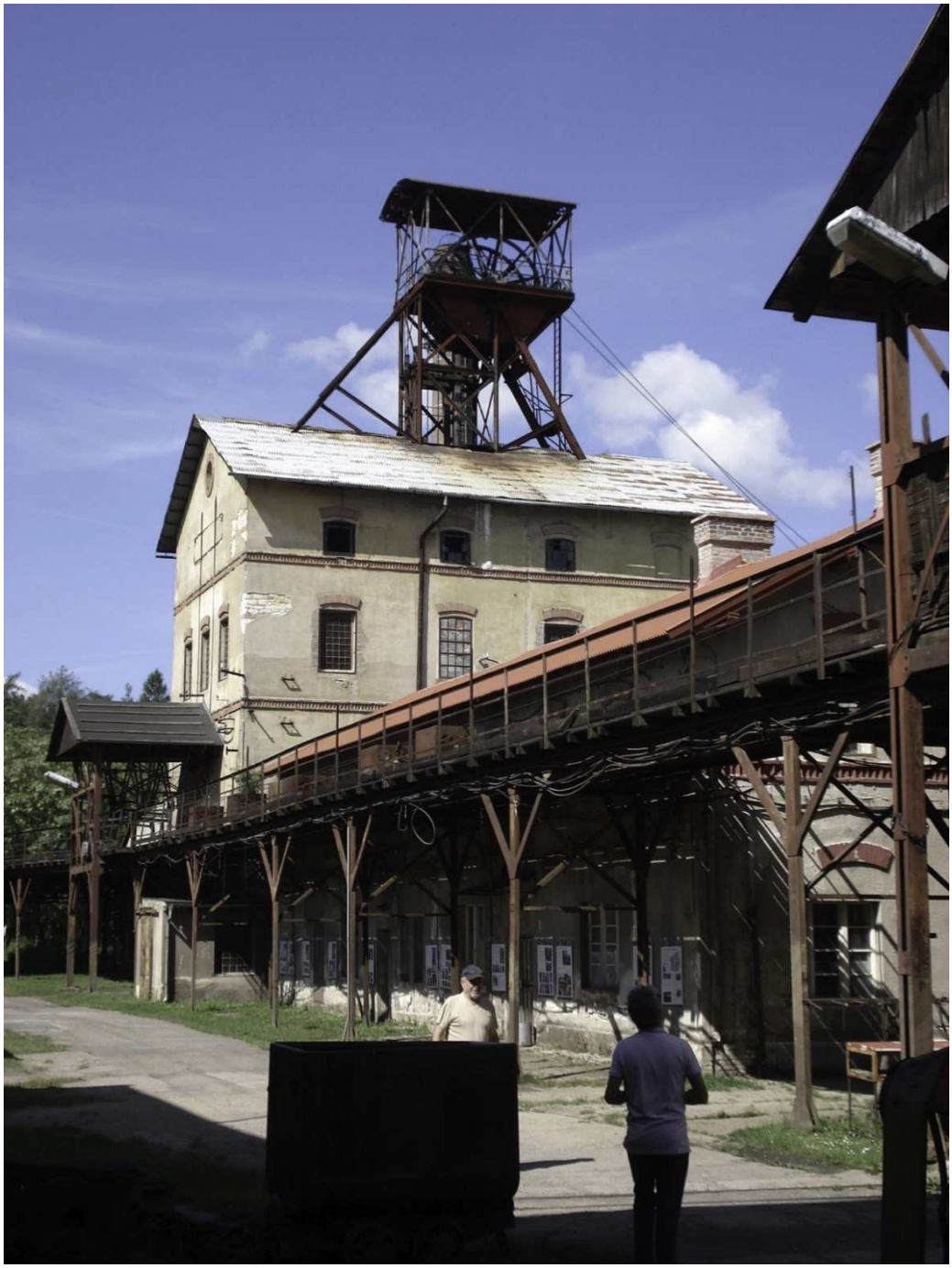


Figure 35. Zbůch Case Study: visit

Figure 36. Prague: Heritage think tank workshop

3.3.2.3. Hasselt 2017: Case study in adaptive reuse

The third event was held in Hasselt in 2017. Again, the principal elements were a briefing site visit for Think Tank members, focused on ruse and regeneration initiatives in the Antwerp docklands, the presentation and discussion of a range of student projects carried out within the new Masters in Adaptive Reuse programme (which also included discussion of broader issues of conservation, adaptation and design with the students and staff), and an intensive workshop among Think Tank members.

The meeting combined site visits to Antwerp (figure 37), discussion and tutorial meetings centred on a pedagogic case study (figures 38 and 39). The selected case study focuses on two assignments which together gave shape to the first semester design studio of the International Ma in Interior Architecture – Adaptive Reuse. Both assignments dealt with heritage in an urban condition, in central locations in Flemish cities – firstly, the *Gruuthuse* Palace in Bruges, originating from the 15th century and secondly the *Zwartzusterklooster* – a monastic site in Antwerp dating back in its current form to the 14th century. Both assignments were elaborated, coordinated and supervised by practicing architects.

Work in the design studios strongly related to research seminars organised by faculty researchers, in which the students participated simultaneously.

For the *Gruuthuse* palace, students were asked to develop and design a project providing in public space, especially for the inhabitants of Bruges. In this assignment, contrast is sought with the 19th century, social construction of Bruges as a historical city, engendering the omnipresence and intrusiveness of tourism at the cost of urban quality of life. The students furthermore were trained in taking a position with regard to authenticity, memory, truth and history, and in developing a proper design-based position with regard to these issues.

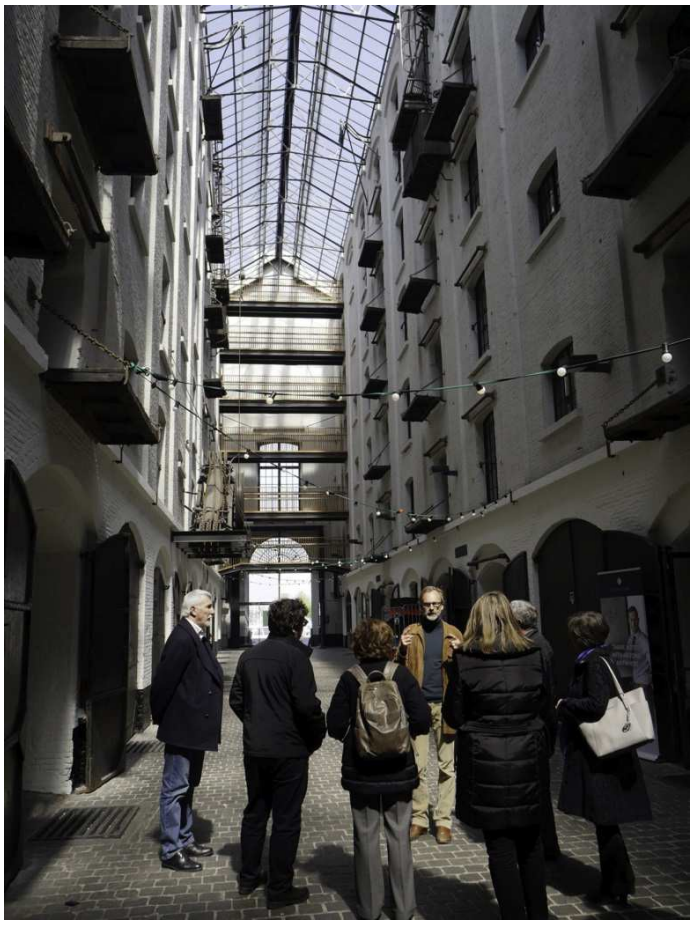


Figure 37. Heritage think tank study visit to Antwerp regeneration project

In the assignment for the *Zwartzusterklooster*, students centred on the notion of spirituality and reuse of religious heritage in the contemporary context. The case study at hand was brought into connection with the idea of the *Hortus Conclusus* as a typological built form and as a spiritual and mystical idea originating from the Christian tradition. Students explored innovative ideas to project an urban programme on the Cloister gardens, and sought for new residential programmes of the buildings,

testing concepts of co-housing. The Zwartzusterklooster is currently also topic of research conducted by faculty members, hence part of a portfolio of enquiry into religious built heritage.

Figure 38. Heritage think tank workshop at Hasselt

Figure 39. Hasselt: student presentations

3.3.3. Supplementary tools

The issues that arose in the discussion and reflection sessions inevitably ranged from the generic to the highly specific. In order to create effective frames of reference, two supplementary methods were adopted: a questionnaire and the creation of relationship matrices.

3.3.3.1. Questionnaire (Annexe H.1)

The discussions in Genoa (2015) acknowledged the fact that heritage-related teaching did not have a singular, identifiable profile that applied across the board in architecture schools. While a degree of uniformity could be posited in countries where curricula are centrally determined, the field as a whole is characterized by diverse approaches, curricular and programme structures. The Think Tank devised a simple questionnaire in an attempt to map, in an indicative way, the place of heritage-related teaching within architectural curricula. The questionnaire sought to provide a snapshot picture - a provisional measure that would make more concrete the range of experience encountered. The questionnaire was distributed initially to staff from thirty EAAE member schools, participating in a workshop organised by the EAAE Conservation Network in Hasselt/Liege in 2015. It was later distributed to schools participating in the ERASMUS+ CWP project and to EAAE member schools.

While it was recognised from the outset that a comprehensive picture was not achievable in the context of the project itself, the exercise demonstrated clearly the range in the teaching of heritage-related matters. This was investigated with reference to the allocation of ECTS in the "presence" of conservation and heritage-related teaching within architectural curricula, the different levels at which they occur (Bachelor, Masters or post-Masters programmes), their linkages to different disciplines and the variation in relationship to practice and professional structures. A short report and spreadsheet is included as an attachment.

3.3.3.2. Relationship matrices (Annexe H.2)

Discussion of the inter-locking factors governing the management of the inherited environment, frequently struggled with the need to clarify which aspects of the issue were most relevant to the matter in hand. The idea of preparing relationship matrices emerged in this context. The matrices were

seen as a way of capturing the complexity in which heritage related teaching and professional activity took place, and as a way of contextualising the input of the different actors within the Think Tank.

The matrices plotted the issues and opportunities offered in the management of the built inheritance against the actors involved, transnational, national and educational institutions, as well as academic interests of research and teaching. In the first instance, relationship matrices were drafted by the participating interests in the Think Tank: the three schools and the representatives of EAAE and ACE. The matrices plotted the issues identified in Section A, as they were elaborated in the Genoa seminar, against the institutions, agencies and stakeholders involved. The matrices prepared by the schools worked from the perspective of the focus adopted in their case studies: the other matrices took a broader perspective. These were subsequently merged to provide a comprehensive mapping of the "wicked problem" of the teaching in the field of heritage.

A short description of the approach and an overview of the outcome are given in Annexe H.2.

3.4. Findings

3.4.1. Intermediate findings

The Findings presented here were iteratively developed during the consecutive Staff Training Events and Transnational Project Meetings (*). The earliest TPM report prepared in Genoa (2015) concludes with the proposal to concentrate on those problems that can be valid and significant for European countries generally, at least those involved in the programme, more than to exclusively look at the specificity of a single national reality. This preliminary conclusion was founded on the Staff Training Event, which demonstrated the wicked problems of architectural education, as they emerged from discussion with local staff members. For example, in the case of Genoa, one could note that complex heritage relics such as the Palazzo Belimbau and Albergo dei Poveri, raise complex questions that are specific (including their partial reuse), and the question of their future is particularly urgent.

(*) The paragraph hence includes sections and fragments of earlier reports prepared by the Think Tank members.

3.4.1.1. Common vocabulary

The Heritage think-tank meetings held in Genoa hence concluded with the proposal to find common "vocabulary", based on the essence of the topic – European Cultural/Architectural Heritage in the emerging situation, Contemporary Tasks and Adaptive Reuse. The Meeting in Hasselt of October 2015, coinciding with the meeting of the EAAE Conservation Network (figure 40), continued on this note.

- In discussions of issues, common terminology could help over-bridge different educational systems, cultural roots and current problems (and not only in the Heritage project), allowing a focus on generic issues with certain typologies. It would offer a common basis for consideration, useful because each of the partner institutes is addressing a local, intricate focus: Genoa has its palaces, Hasselt is part of a region where secularization is strongly affecting church usage at the moment, and Prague addresses industrial and post-war heritage.

- Common terminology is also fundamental because of the wide and interdisciplinary nature of contemporary architecture and urban planning, usually involving development strategies, sociology, computer modelling, landscape and interior design, graphic arts etc. The role and competences of the contemporary architect have changed and universities need to adapt their educational offerings accordingly.

Figure 40. Working group at the EAAE Conservation Network meeting at Hasselt

From these discussions, the following abilities (skills) for (young) professionals emerged as necessary topics in architectural education, and formed the preliminary focus of the Heritage Think Tank:
a) to be able to reconstruct, read and understand the story of the building;
b) to be able to comprehend the structural conception and behaviour of the building;
c) to be in the condition to "know" the building in its material and physical reality without limiting the efforts of studying and interrogating it to a "digital environment" (in terms of tools and of output) thus avoiding the risk of substitute the real matter with a virtual (augmented, mixed) version of the built reality;
d) to be able to acknowledge and understand the different scales at which significance lies and to work at each of them;
e) to be able to conjugate the competences necessary for the material conservation of the building with the expressions of the culture of the architectural design;
f) to be able to identify the performances of the building (on different levels and with regards to different technical fields) with the necessary requirements and the new needs expressed by the customers and the clients, among which are: those for the improvement of thermal performances, the reduction of energy consumption and requirements, the conservation of existing resources for the sustainability of the built environment, including that of historical value, considered as a general need for the societies of the future;
g) to be able to use in proper ways the new digital technologies for studying and elaborating the acquired data, for developing the project and for communicating it to the external world;
f) to be able to learn from experience and thus to learn how to learn by themselves;
i) to develop a self-critical and pro-active attitude.

These abilities raised the question at what level should they be developed during the period of formal studies and how should they be progressed afterwards, in ways that allow also for monitoring them over the lifetime of practice. This question pertains to the corollary that these abilities can also be seen as requirements of preparing for a career path of "generalist architect".

The Genoa event of 2015 had identified a range of factors that continued to be addressed throughout the project period. These can be summarised as follows:

- the inter-disciplinary approach and hierarchical organisation of the design process, both in terms of scales (from urban planning, to historical studies to detailed design) and related competences;
- the necessary interaction between scientific research and professional engagement through simulation of professional practice;

- the interrogation of the meanings of interventions and the need for reflection on the impacts of choices of project proposals;
- the application of digital technologies (digital survey through laser scannering/ management of cloud point into architectural drawings/ information management (database in GIS system and construction of a webGIS; management of the renovation process through BIM/ strategies and tools for communication .

3.4.1.2. Additional reflections

Some additional reflections on pedagogical methods were developed during the meeting in Prague in 2016 and can be summarised:

- much of architectural pedagogy reflects dominant concepts of contemporary architecture and lifestyle – there was a need to intersect them with the potential of historic substance (identity, representative, human, artisanal, layered, colourful etc.) to enrich common inhabited environments;
- the challenge for teachers is to attract and motivate students for restoration of architectural heritage and to open their eyes to the wonderful space for architectural creation in existing structures and in the historic context;
- teachers have a key role in defining the cultural value and importance of heritage objects and areas, and in educating students about landscape and urban planning and their importance for the future of the human environment and ways of life;
- the issue of social engagement, explored through case studies of endangered heritage and utilising student workshops, competitions and exhibitions;

The 2016 meeting in Prague also centred particularly on specific local case studies as a testing ground for the defined abilities and terminology. Crucial points were accentuated and rendered more precise (*):

> (*) This list excludes issues which were discussed, but left open-ended by the Think Tank at the Prague Meeting in 2016.

- Heritage (and architectural) education should be project-based. In their academic work students should engage with real problems and sites, be confronted with real needs and challenges through meetings with politicians, practicing architects, conservators, craftsmen, etc. and finding optimal solutions to the real situations through multidisciplinary dialogue.

- Thus, heritage should be taught as an interdisciplinary issue.
- Effective teaching is founded on participation with local communities; solutions are found through cooperation with local communities, municipalities and owners of heritage objects and areas, finding the new use and concept of adaptive re-use of heritage objects; it should respond to the European tendencies of perceiving cultural heritage as a particularly local memory and identity, but also as contribution to a common identity, and a component of the European project.
- Architectural Heritage expertise is based on knowledge of history and historic consequences, and based on detailed knowledge of building technologies of the past and present.
- Heritage education takes into account shifts between materiality and immateriality, in the context of the data-based society.
- Architectural Heritage studies are focused on design as transactional arrangement, and on sharpening empathy as the crucial competence of architect. The Think Tank chooses humanism over of modern, rational, enlightened engineering.
- Heritage education reflects contemporary concepts of architecture and lifestyle (think of universality, flexibility, and temporality) and intersect it with potential of historic substance (identity, representation, artisanal values, human endeavours) to enrich the common, inhabited environment.

3.4.1.3. Comparison of curriculum structures

The three schools have different curriculum structures yet have developed a range of shared concepts which were refined during the TPM and STE in Hasselt in 2017. Rigorous comparison of curricula, case studies and contextual concerns led to the formulation of key findings that demonstrated both convergence and divergence. Those that demonstrated convergence were:

- the use of the design studio pedagogy in relation to heritage in all three institutions illustrates that the philosophy and ethos of architecture as a design discipline are central to heritage;
- all institutions use real cases: actual buildings which face retrofitting, reuse, obsolescence, or restoration. Usually, students themselves are engaged in selecting interesting cases;
- all three institutes have curricula which demonstrate involvement of practitioners in teaching;
- moreover, the teams that addresses the student in heritage in the three partner institutes are transdisciplinary;

- all three institutes acknowledge that societal and professional attitudes towards heritage are shifting in their own national context. Moreover, each for the three schools sees heritage as open question, not a predefined one. All three schools engage in thinking on a meta-level about what is heritage and how heritage can be protected, conserved, documented or reused.

At the same time, the preliminary findings of the Think Tank identified a range of divergences in how the issues were addressed. These can be summarised:

- the length of design projects varies substantially among the partner institutions, as does the number of ECTS credits invested in such design projects, in relation to the curriculum as a whole. This finding was reflected in the results of the questionnaire, where conservation and preservation courses are given different weight and importance across architectural schools. Genoa stands out as it has a large critical mass, because of its advanced master and PhD programmes to which also Ba and Ma trajectories prepare students;
- while there is common understanding of the range of issues, from regional or urban regeneration to building detail, the three schools focus on somewhat different points in the range of scale;
- the interdisciplinary cooperation at each faculty is interpreted differently, and is structured in diverging manners;
- each school emphasises specialist methodologies: for Genoa, the detailed survey and analysis of fabric is fundamental; for Prague, oral history is important, so that techniques for social engagement are essential; in Hasselt, hand drawing is considered a key skill which needs sufficient training;
- while all schools acknowledge the changes occurring in the field of heritage, they formulate diverse ways in responding to the changes. Genoa maintains a technical-professional outlook that emphasises research skills, building surveys, legal issues, and chemical, physical, mechanical, mineralogical and petrographic expertise as wefll as design; Prague focuses strongly on documentation of buildings and sites, and also on oral histories of relevant stakeholders; Hasselt has a strong focus on design as a form of exploring new futures for obsolete buildings;
- the three schools have different involvements with CPD, and even more so as regards heritage.

3.4.2. Project findings

Findings in relation to the threads of discourse between the Heritage Think Tank participants are as follows:

i. The integration of specialist knowledge into architectural curricula and pedagogies:

The requirements for education in conservation and the design of interventions in existing buildings of significance involve additional skill sets (Corr et al., 2011). Thus, curricula and the pedagogies that serve them need to provide opportunities for students to exercise judgment in the area of problem definition as well as in the area of design. These skill sets are required to address issues such as the pathology of aging materials, the applications of digital technologies and analogue practices both in establishing the conditions for engagement with the inheritance and in the tools and techniques required to establish and test the interventions proposes. A further consideration is that programmes in architectural history and theory need to be further interrogated as to their purpose and content, most fundamentally to establish the importance of change as a fundamental element of inheritance, as manifested in the composition and construction of inherited buildings and their varying uses over time.

ii. Methods for stakeholder engagement as regards the community and the profession:

As remarked above, education and skills development in relation to conservation and reuse is most effective when based on projects that concern real-life situations and places. This brings with it the requirement that curricula and pedagogies address the question as to how to engage communities, politicians, practicing architects, conservators, craftsmen, and other stakeholders appropriately in understanding the nature of the problem and in devising and testing solutions. Similarly, the pedagogies adopted should allow for the involvement of professionals from disciplines that contribute to problem definition and resolution: planners, archaeologists, community workers and sociologists, and so on. The critical element here is the question of time. The timespan of project-based programmes must establish clear outputs in terms of learning outcomes as expressed in student work. Comprehensive projects may require a perspective that extends over a series of programmes, in which the goals of the project can be revisited and distinct outputs established. These can be the basis for modules devoted to specific outcomes. In these situations, there is a clear requirement for an end product in which all contributions become visible. A project structure designed in this way provides for the coherent conscription of appropriate pedagogies and the appropriate participation of the professions.

iii. The integration of research into heritage-related pedagogies:

The integration of research into teaching in architecture programmes contends with two principal challenges: the differing timeframes of research and projects and the differing mind-sets and ethos-related practices of both activities. The resolution is also two-fold: the design of projects and the design of areas of investigation within the project. Designing projects so that continuing research can be used appropriately requires collaboration over time. In the first instance the research framework is used to establish the project parameters, the questions to be addressed, the methods used and the design project briefs are to be constructed, and the scope of the design project itself.

In addition, integration will involve the design of areas of investigation within the project that can contribute to the larger research context. This is an ideal platform for "research through design". It is a notable feature of the projects examined in this Think Tank that the products of student work, involving as they do models, drawing and other visual material, have a powerful role in engaging the attention of stakeholders, to the benefit of the research project as a whole.

3.4.3. Recommendations

The Recommendations prepared by the Heritage Think Tank relate to curricula, pedagogical methods, competences, the use of digital media in learning and with regard to the relationship of the profession with society.

3.4.3.1. Regarding curricula

- Real case studies have the capacity to provide students with multiple learning opportunities, both in terms of skill sets and the testing of ideas. In particular, they provide a context in which areas of the curriculum can be experienced in relation to one another: studies of urban history, morphology and social and constructive history, building structure and construction, environmental performance and services provision, methods of representation and communication can be readily integrated. Within a modular framework, module descriptors should indicate, where possible, the potential interfaces with other elements of curricula in terms of content and learning outcomes.

- History and theory integration: a crucial element is the approach taken to the area of history and theory of architecture. Earlier, it was pointed out that, if intervention in historic contexts is to find a conceptual context, architectural history needs to encompass the fact of change and modification. This is an area where the student project can make a wider contribution. Short projects, structured as detective work applied to specific instances, can chart developments and alterations through documentary sources and structured observation and recording exercises. Teachers should prepare precedent studies that support this kind of investigation.

- Studio projects. Conventionally, many studio projects incorporate an investigation phase and a study of precedent prior to the commencement of the design. Studio projects that involve intervention to existing environments should be designed to "close the circle", that is, to bring the results of the design back to the starting point by means of a reflection on the impact of the proposal in terms of the original problem statement and how it related to the precedent studies carried out.

- External critics and reviewers. Every opportunity should be taken to involve external critics and reviewers, drawn from the disciplines whose knowledge and experience contributes to the problem statement, as well as from architects with experience in that area. Where the project involves communities, structured opportunities should be devised to ensure that their perspectives are brought to bear. Where major projects are involved, they must have an opportunity to reflect on and comment on the student work.

3.4.3.2. Regarding pedagogical methods

It is evident that heritage is approached in widely disparate ways among schools of architecture, with at times, very little weight (in terms of ECTS) attached to its study. For this reason some guidelines are suggested. For short, "minor" courses and projects, emphasis should be directed towards providing students with tools for "seeing" and valuing the inheritance, exploiting local resources and making connections to art forms and cultural activities; longer programmes, in addition to the foregoing, should exploit the inter-disciplinary nature of the field of study; major undertakings need to incorporate elements that develop investigative and analytical skills as well as design competences.

3.4.3.3. Relating to competences

- Technical competences. The ICOMOS Guidelines on Education and Training for Architects were found to have retained their relevance (ICOMOS, 1993). They identify the ability to read a building as a fundamental competence that distinguishes conservation architects from others who concentrate on new work. Apart from an appreciation of architectural history (see above), this ability involves a knowledge of traditional methods of construction, and of the structural and environmental behaviour of buildings as they age and are subjected to change. Schools who wish to enhance the ability of students to practice in this area must also stress the importance of techniques of maintenance and repair.

- Site analysis. Knowledge of urban and rural morphological development is critical to working in the area of architectural heritage. Schools should ensure that students can work analytically with map-based information, combining it with analysis of documentary sources and historic graphic records. This can readily be achieved through a graduated approach to the initial stages of studio projects, involving progressively deeper analysis according to the levels at which projects are undertaken.

- Documentation and archival resource literacy. The ability to source information is a vital part of the architect's formation. It becomes more important where work to existing buildings is concerned. Project-related research is a core activity in architecture. Schools should consider how this can be strengthened through programmes that ensure that students are familiar with the primary sources of historic building-related information and can navigate repositories and archives, as well as having a critical appreciation of the value of sources.

- Design skills related to the specific condition of heritage sites. We see a paradigmatic shift from heritage values to architectural values. To manage this while retaining the significances of what is inherited will include mastering specific 'empathic' skills to understand the spatial possibilities and potentials of an historic site, combined with technical skills.

- Analytical and writing skills. One of the core competences required in both academic and professional life is that of writing succinct and clear reports. The requirements of working with or studying the historic environment place a heavy emphasis on the ability to integrate information from diverse sources (humanities and physical sciences) and disciplines, thus providing a framework within which to develop skills in written expression. These skills have wider

application, beyond the concerns of heritage, but the rigour required in that application is of great potential value to other areas in the curriculum. It is recommended that schools consider how sharing these opportunities could bridge between the conservation/ restoration programmes and the design studio.

3.4.3.4. Relating to media in learning

The management of any restoration/renovation process of existing buildings poses difficult challenges as compared to new construction. They concern the information-gathering stages, the preparation of the contracting procedures, the management of the construction site, and the successive life cycle of the asset. Digital tools, GIS, web-GIS or even parametric software such as BIM, can make the management of data easier during the life cycle of buildings but they have so far been mainly used for design, setting up the construction site, and managing new buildings and this is a crucial aspect of the problem that should be addressed. The correct use of digital tools will be a crucial task in the very near future, because data are variable and mutable in time, reflecting the parallel changes of the context due to the works in development.

Digital tools, such as BIM, applied to the conservation of inherited buildings and sites could:

- reduce the duration and cost of operations that may be required during buildings life cycle;
- reduce and minimize the contingencies pertaining to all restoration interventions and to the ordinary maintenance and management;
- avoid excessive and unsustainable degrees of discretion in making choices during the planning and design stages.

At the same time, and in the light of the increasing potentials of digital media in spatial recording and visualisation, the use of these tools in analysis must be emphasised. In addition, it is recommended that schools maintain in parallel a focus on drawing by hand, and the practice of drawing from observation. These skills can be at risk of being supplanted by drawing on computer, and by using digital techniques to create three dimensional images from digital photographs or scans. The emerging technologies complement established methods that are familiar in their capacity to connect the individual with the material object. The ability to observe closely is crucial in the conservation/restoration of historic buildings and the traditional analogue techniques are important in this regard.

3.4.3.5. Regarding relationships with profession and society

- Methodologies for engagement and project definition. The experience gained by schools of architecture in working with real situations and existing communities is a potential resource for both the profession and the wider society. Schools should liaise with their local Chambers and Institutes to explore opportunities for sharing this experience. In particular, their methods of engagement are of value in situations where intervention in existing environments has significant social impact. Case Study-based contributions are especially valuable.

- Where specialised skills are being developed in schools, there are often opportunities to provide master classes for professionals or to provide life-long learning opportunities in the form of workshops for professional or lectures for lay audiences.

- Continuing Professional Development. In many jurisdictions, there are structured opportunities for schools of architecture to contribute to professional CPD. It should be noted that ACE has initiated a list of quality European CPD system for architects, endorsed by ACE Member Organisations in various EU Member States (Architects' Council of Europe, undated). While different in content and emphasis, these CPD systems all meet the minimum agreed European quality standards. Schools that have the capacity to develop their pedagogic offerings in this direction should explore the opportunities and constraints involved.

4. THINK TANK ON "SUSTAINABILITY" REPORT

Main editors:

SUSANNE KOMOSSA

Technische Universiteit Delft

NEGAR SANAAN BENSI

Technische Universiteit Delft

Collaborators:

ZENO BOGDANESCU

Universitatea de Arhitectură şi Urbanism Ion Mincu din Bucureşti

CARMO CALDEIRA

Architects' Council of Europe

MARIA VITTORIA CARDINALE

Politecnico di Milano

ANA MARIA DABIJA

Universitatea de Arhitectură şi Urbanism Ion Mincu din Bucureşti

ADALBERTO DEL BO

Politecnico di Milano

MARIA FARAONE

European Association for Architectural Education

VERONIKA SCHRÖPFER

Architects' Council of Europe

4.1. Problem statement

The architectural profession continues to suffer from the economic crisis. Between 2008 and 2012 construction output fell at a faster rate than GDP in general, impacting workload salaries and profits in the architectural profession, and leading to higher unemployment rates and more architects working part time. Alongside this, more architects are educated in Europe than ever before. This new normal also implies that the pressure on the employed architects is increasing.

This means that on one hand, there is a necessity for redefining and reformulating architecture's potentialities both as a discipline and profession to address and respond to the current condition. On the other hand, this statement puts certain emphasis on the education as a foundation for approaching the current issues. Hence, it offers opportunities to re-evaluate and re-formulate our pedagogical methods and institutional curriculums within the architectural education. To Adapt the Architectural Education to the New Situation in Europe, hence, this think tank focuses on the wicked problem of Sustainability in architectural education. Indeed, sustainable thinking can at the same time offer alternative possibilities regarding the employability for architects.

By definition, sustainability means working within the limitations and turning those limitations into possibilities. As a topic, sustainability is a multi-facetted and complex issue. It is a 'wicked' problem, which means that searching for scientific basis to confront it is bound to fail. According to H. W. J. Rittel and M. M. Webber, wicked problems cannot be definitively described, and hence, there cannot be any objective definition of them provided that is meaningfully correct or false. (H. W. J. Rittel and M. M. Webber, 1969) Sustainability issues can only be met by taking into account cultural, physical and socio-political structures, economy and technology in an iterative process of questioning and redefinition. Moreover, possible design-responses have to be questioned and tested on different scales ranging from detail to city and to territory.

It is widely acknowledged that the built environment is the largest sector that can contribute to energy savings: Buildings in Europe are responsible for 40% of energy consumption (Directive 2010/31/EU of 19 May 2010 on the Energy Performance of Buildings (recast)), 36% of CO2 emissions and it is estimated that 75% of our housing stock is energy-inefficient (*).

(*) In 2014, EU leaders agreed a binding target to reduce EU domestic Greenhouse Gas emissions by at least 40% below the 1990 level by 2030. They also set a target of at least 27% for renewable energy and energy savings by 2030. EU legislation supporting these targets in the building sector, namely the Energy Efficiency and the Energy Performance of Buildings Directives, have resulted in significant unintended consequences and have suffered from low credibility and poor implementation by Member States.

The architecture of a building has a major impact on building performance outcomes. The spatial and material configuration of buildings and in a larger context the city, is one of the most important determinants of occupants' experience of comfort, security and productivity, and how energy is used in the building to achieve this. Architects create bespoke designs integrating structural, technical, spatial and material solutions for each project that balance the passive and active measures required to control indoor environments that meet the long term needs of occupants. The way in which buildings can support and adapt to occupants' needs requires a holistic and long-term approach to building performance. Socio-technical methods of analysis and design, employed by architects, ensure that buildings enhance occupants' lives and can adapt to variations in occupancy patterns, use, demographics and climate (*).

> (*) 40% of residential buildings in the EU date from before 19603 and 75% of our housing stock is deemed to be energy inefficient4. While the benefits of an energy-efficient renovation of buildings are numerous and well known5, the pace of renovation of the EU building stock remains very slow (1.4% annually on average). Urbanisation, combined with the growth of the world's population could add another 2.5 billion people to urban populations by 2050. Two thirds of the inhabitants of our planet will be concentrated in cities by 2050.

Empowered by progressive legislation and investment, architecture's reach goes well beyond individual building boundaries. Architecture plays an important role in achieving the cultural transformation required to create a sustainable built environment.

The design of 'smart buildings' cannot only be seen as the universal solution to decrease in the carbon footprint of the built environment. Generally, more fragile, smart buildings require high technology for their operation and routine maintenance. A greater emphasis is needed on the evaluation of buildings over their lifecycle so that more architectural solutions to energy use, such as building form and mass, usability, spatial adaptability and other parameters are recognised as preferential over solutions that may appear more effective and lower cost in the short term such as mechanised/automated heating, cooling, ventilation, lighting solutions. Priority should be given to simple, passive, low-tech, locally tested solutions that do not consume energy and are less prone to human error.

While the wider long-term societal benefits of energy-efficient buildings (health, mitigation of climate change, employment, productivity, etc.), the reduction of energy consumption should not be the only objective. Designing sustainable buildings and cities requires also taking into consideration economic, social, environmental, political and cultural aspects affecting the built environment.

Architects have the ability to address all these aspects in a holistic manner. Thus, they enable populations to settle in secure, healthy and humane conditions and contribute to the mitigation of

climate change and the adaptation of our societies to its effects. We call on the EU institutions to recognise and promote the contribution of architects to energy and resource efficient construction in all relevant legislation, standards and funding programmes.

Today the architectural education is certainly aware of the necessity of integrating the sustainability into its curriculum. This process of integration has experienced a shift from more technical approach to a rather multivalence approach to the underlying social, cultural and economic forces involved. This implies that architectural education today should become more research-based, meaning that it encourages the formulation of relevant questions and building a hypothesis, operationalizes definitions, includes data gathering, and enhances interpretation to be able to propose possible design solutions and draw conclusions. In this sense, the design process is an iterative process in which mission, goal and performance requirements continuously have to be reformulated and adjusted.

To test and address the issues stated above, this think tank formed a contribution among three universities: Politecnico di Milano, Technische Universiteit Delft (TU Delft) and Universitatea de Arhitectura si Urbanism "Ion Mincu" (UAUIM)) and Architect's Council of Europe (ACE) and European Association for Architectural Education (EAAE).

Figure 41. One of the several meetings of the Sustainability Think Tank group, Discussion and Debate on current challenges regarding the topic, pedagogy and curriculum of teaching architectural sustainability in each university and the integration of the architectural research into the larger context EU programmes, Milan May 2017

4.2. Challenges

4.2.1. A short reflection on the pedagogies of sustainability and its curricula: how to learn and how to teach

Education studies in sustainability increased quite rapidly since the field became recognised in academia. But research since 2015 shows that the content of Bachelors and Masters' programme contain a wide divergence of content with few being able to achieve an integration of natural and social sciences (O'Byrne, D. et al 2015). This EAAE Erasmus + programme was aimed specifically at the experiences within architectural education and the creation of contexts for learning that would grow skills and critical thinking across these scientific fields both for students and teachers.

The teaching research project was set out at each university with a mix of students and staff. Workshops at each of the three involved universities provided outcomes that helped shape the following workshop, while still each was a separate entity within the overall learning process. During the three workshops, we were looking for signs and routes that in every specific context at each university, their staff, and students would reveal as indictors of their notions on sustainability. Developing the format in steps from the earlier workshops we understood that a more nuanced but simple framework was needed to decompress the discovery process. The pedagogical methods were applied and reflected upon at each workshop in preparation for the ensuing gatherings. These methods could be described as Integrated learning as would be expected when approaching issues in a wicked context of complexity. Multiple layers of these was the fact of societal and political differences between countries and the mix of student ethnic and nationality backgrounds.

A focus on real world issues meant utilising experimental learning approaches. There were authentic considerations with real client groups in contemporary contexts. We learned that in order to gain insight into the reflections of students it was best to step away and encourage peer teaching. Students were the foremost leaders in reflection on students own progress presentations.

Finally, while co-operative learning, as noted above, was implicit and perhaps even obvious, the mixed groups served a much larger purpose. That is, they reflected upon the predominant confidence level, presence and teacher-student relationship difference between universities. From a pedagogic perspective, this was a key learning which linked profoundly to understanding of the differences between the wicked contexts across Europe today. This is far more than about teaching sustainability

but about the fundamental differences in our approaches to teaching in general, which is a necessary and critical reference point to engage with.

From the moment of induction at each gathering, the curriculum of the charrettes was designed to be student led. They had the chance to coordinate the wicked issues of sustainability to focus their design trajectory and shaping and influencing the outcomes. Students had the opportunity to choose their own clients and issues - this in itself within a collaborative and mixed background, contributed to the learning experience profoundly. The curriculum, as it was designed, meant to be flexible. The supporting lectures at each setting in some instances may or may not have been pertinent. The host institution proposed a framing by these specific talks but students were encouraged to question these framings. This served in creating cohesive thinking and to generate a student body energy well beyond the delivery and content of these lectures. This reflection formed a key part of the curriculum and learning from day one of each gathering.

Trans-disciplinary case studies across the university and country settings meant that students, teachers and researchers purposely shift away from the model of teachers as purveyors of knowledge and students as consumers. Through the real-world case studies there was more a process of self-learning whereby students took responsibility for applying and developing tools appropriate for achieving what they determined to be sustainable development in those contexts. The practical applied sustainability learning went far beyond simply applying the characteristics of sustainability.

Sustainability literacy is critical for evolving the tools for reading, analysis and response of problem-based scenarios. This involved the development of particular skill-sets including understanding the research setting, collecting data, data analysis, local and larger scale relevance to sustainability, communicating the results, decision-making, creativity and consideration for shifting social behaviour. These involve both higher order of thinking (critical thinking, local and systemic thinking) as well as interpersonal skills (growing a competence in multi-disciplinary work). Real life setting is critical because as Mintx et all (2014) describe there are many examples of educational sustainability courses but formal coursework did not have an impact on most students' knowledge and attitudes regarding environmental and sustainability issues (ibid, P.114). Students are required to bring clarity to often ill-defined problems and place them in context as well as deal with conflicting interests of various affected stakeholder groups. In the field of architecture which by nature encourages multidisciplinary thinking, the work that is place-based and problem-based had particular outcomes. Being a mixed setting of students and staff, also contributed. Being more sustainability literate also means students become more critical readers of society and could identify long term trajectories of action or inaction.

Students in architecture typically rush to a spatial definition of a theme. By expanding this with stages of investigation including site analysis (historic, economic, social, political, environmental) and then to a visioning stage the students had the mind space to grow their own understanding of the context and to more organically move towards the final stage of design / resolution. This did not always mean a spatially derived one. In fact, the less focus on specifically spatially derived outcomes meant that what did take shape was relevant, in keeping with a thematic intent and more profound a gesture towards sustainability.

The students also took on the role of assessors and evaluators questioning each other more succinctly and directly than the teachers. Zandvliet (2014) outlined that focusing solely on student's achievement as an elevation of learning destroys "the human qualities that make education a worthwhile experience for students" (Fraser 1998). By establishing their own criteria for evaluation, students took the agenda of defining and literacy of sustainability to another level. The variety of media used, including interviews, films, paintings, models and annotated mappings, meant a strong correlation could be developed between the media and the message. This is critical for the capacity of architects to visually communicate with their client group of greater society.

4.2.2. A short reflection on Continuous Professional Development

It is widely acknowledged in the EU that there is an existing skills gap in the construction workforce delivering sustainable buildings to a quality performing NZEB standard. Nearly Zero Energy Building construction and renovation, which is the future work field of every European architect following EU regulations and member states' implementation, requires a large contribution from the building sector and is a challenge for the whole construction industry. A successful design and construction process towards NZEB construction and renovation requires collaborative design processes and innovative technologies based on an integrated design approach and multi-disciplinary work teams. Especially the collaboration between architects, technical experts and building managers is necessary to develop mutual understanding of each other's disciplines and combine skills to achieve optimal NZEB construction and retrofitting in terms of quality, energy efficiency and cost effectiveness.

Unfortunately, this skills gap exists also in the profession of the architect. This issue concerns not necessarily the academic curriculum of the future architect. Hence, it has to be addressed through continuous professional development (CPD) of the current workforce. In the CPD and the Professional

Qualifications Directive 2005/35/EC it is stated that Member States should ensure, by encouraging continuous professional development that professionals are able to update their knowledge, skills and competences in order to maintain a safe and effective practice and keep abreast of professional developments. Yet, it does not say 'ensure that professionals are made subject to obligations to update their knowledge'.

We acknowledge the work done by EU funded projects like the BUS projects, H2020 construction skills projects, such as PROF/TRAC and BuildUp; and promote further initiatives supporting CPD training on sustainability for architects in the field. However, the word architecture barely is addressed as a discipline. This is truly a new challenge how to integrate and introduce architecture into the larger fields of EU research.

4.2.3. A short reflection on the future role of the architect regarding sustainability and urban regeneration, based on ACE Policy Positions Manifesto 1 & 2

In recent years the financing of energy efficiency measures, in particular the retrofit of the existing stock, including our built heritage, has been decoupled from investment in the spatial and architectural design of buildings. With legislation focusing on technical solutions to energy efficiency, the business case to undertake spatial and architectural renovation as part of an energy efficient retrofit has been reduced. As EU Member States embark on one of the largest retrofit efforts ever undertaken, there is a major opportunity to improve the uptake of efficiency measures by interlinking financial instruments with architectural design and renovation. By reconnecting energy efficiency with market drivers for architectural renovation, public investment in energy efficiency will offer far greater returns and achieve greater traction and robustness for technical solutions. In order to gain trust of financial institutions in energy efficiency retrofitting, it is vital to close the gap between expected and achieved performance. Current legislation does not mandate the reporting of achieved operational performance or the validation of the indoor spatial and environmental quality achieved. This has caused major unintended consequences, including a significant gap between the expected and achieved energy performance of buildings that must be tackled by revised EU legislation.

Supporting research in the overlap of architecture and energy/resource efficiency is a priority if the legacy of EU investment in energy efficiency is to stand the test of time. The architectural profession in Europe has much research potential but is in need of leadership to enable it to develop new evaluation tools, products and services. This is hampered by a lack of collaboration and a lack of research and development investment right across the construction industry.

Furthermore, a single-minded view of urban development has failed cities. Cities face many challenges with an urban dimension: social exclusion, gentrification, spatial segregation, deprived neighbourhoods, poor access to basic services, lack of affordable housing, urban sprawl, soil sealing, air quality, etc. All these realities have become exacerbated by the economic downturn. Cities are less resilient to the effects of climate change. Urban, infrastructure and landscape planning need to inter-relate and derive from social and economic challenges.

Beyond the energy-efficient renovation of buildings, ACE promotes the comprehensive urban regeneration of cities. This requires taking into consideration, in a holistic manner and at all scales, the economic, social, environmental and cultural aspects affecting the built environment.

The energy-efficient renovation of buildings should not be addressed in isolation from the other urban challenges that EU cities currently face. EU Member States, regions and cities should take the following principles into account in their renovation and urban regeneration strategies:

1. To place human beings at the centre of urban development projects in order to build cohesive and inclusive cities – the primary purpose of a sustainable city is to create sustainable communities, as defined in the Bristol Accord through active, inclusive, safe, healthy, environmentally sensitive, well designed and built places, with well-developed infrastructure.
2. To promote the compact city model – a regenerated city should combine balanced density and intensity ratios, and a fine interweaving of residential, commercial buildings and public facilities. Member States should encourage competent authorities to identify brownfield land and parts of cities, which can be built on more densely and to review urban development policies with minimal consumption of new land, as suggested in H2020 project ABRACADABRA.
3. To make accessibility and mobility major priorities – at all scales, accessibility is a key asset – both in terms of ensuring that developments are designed in a fully accessible manner, and in terms of providing good connectivity to the surrounding urban context.
4. To favour social and functional mix – the balanced planning of housing, offices, shops and community facilities must be a priority. The separation of urban functions through zoning should

be evolved in favour of an integrated and mixed-use approach, based on public priorities and interests.

5. To favour resourceful solutions and green and blue infrastructure, to build resilience to heat-waves, drought and flooding, pollution peaks, etc.
6. To propose innovative community-based approaches to territorial planning – inflow and outflow analysis beyond the city scale is crucial in order to ensure that cities benefit from the energy and resources that surround them.
7. To instigate suitable governance mechanisms to facilitate bottom-up participation – sustainable urban development requires collaborative planning involving all stakeholders in the city. The architectural profession may provide an expert role to guide individuals, empowering them through the dissemination of knowledge that may then enable them to participate actively in the planning and design processes.
8. To pay particular attention to historic buildings and structures and their settings/ contexts – architectural heritage is a capital of irreplaceable spiritual, cultural, social and economic value. Historic buildings and districts, including industrial heritage, could be capable of offering flexibility through adaptive re-use and energy efficiency. The architectural profession holds a key role in the preservation of this heritage through conservation and appropriate intervention so that it may survive and serve future generations. It is vital to promote the role of Architects in the implementation of the tools foreseen by the EU Cohesion Policy, namely Community-led Local Development (CLLD) and Integrated Territorial Investment (ITI) in order to ensure the smart use of EU funds in cities. Architects can contribute to defining the subject, areas, scope and the method of intervention of these tools, avoiding mono-directional approaches.
9. A robust implementation of the Energy Performance of Buildings and Energy Efficiency Directives in Member States to adopt robust national renovation strategies, designed to put all stakeholders on the right track towards reaching an 80% reduction of the energy demand of the EU's buildings by 2050 and calls for new long-term financing mechanisms to stimulate deep and staged deep renovations.

These are part of the challenges which the Architectural Education of sustainability has to consider integrating into its curriculum.

4.3. Tools

We used workshop and charrette as our 'teaching laboratories' and a 'short term intensive testing ground' to experience and examine the framing of the topic, structure of curriculum and pedagogical methods for teaching sustainability. Each university was responsible to host, organise and plan one workshop. Prior to each workshop, a meeting with the participation of the members of sustainability Think Thank was organised to decide about the topic of the workshop and its programme. After each workshop, we gathered to discuss the results and approaches to propose some guidelines for the next workshop. These processes were all documented in booklets and reports.

Why Charrette? The charrette can be considered as a pedagogical model, which simulates a studio unit. In our case the charrette gave the possibility for a short, time-limited, intensive exercise by a mixed group of students and teachers from different educational, geographical and societal backgrounds. The charrette provided a pedagogical and experimental framework to teach students to, on one hand, formulate a hypothetical research question and on the other hand, produce proposals vis-a-vis strategies and spatial responses to those questions.

4.3.1. Topics in Delft, Bucharest and Milan

The sustainable architecture is the realist architecture; it is the one which is able to keep together in its formal results all the issues closely related to the context and to the nature of the intervention.

The relationship with the context is established especially as a relationship of identity with what time has confirmed to be the strong structure of the urban morphology and with what has defined as permanent and primary elements in the ever-changing scene, as those historic buildings which are capable of telling the identity of a place. Here, the human stories and dynamics play a role to represent the cultural and social heritage of a site, the comprehension of which is the key element for the success of a Sustainable project. Furthermore, nowadays more than ever, to design in a sustainable way means to consider the energy issues and the consumption of non-renewable resources as the primary ones. This means, for example, to act according to the parameter of the short distance from the main public transports in order to avoid energy waste and of the compactness of the settlements and thus consciously considering the issues of the urban density and the necessity of the private and collective spaces proximity.

In new settlements, it is possible to design low energy buildings just considering first of all the close relationship between building typology, urban morphology and solar orientation, as the good architecture has always done from the origins. The settlements of the patio houses of the ancient Greece are perfect examples: the urban blocks were compact and the houses organised to expose the main rooms to the south in order to naturally gaining the most solar contribution to reduce the need for consumption of wood to heat and light.

Nowadays, energy issues are so crucial to often be, in the common practice, the primary issue released from the rest of the design issues. But, even if the market drive built environment and technology seem to be the faster way to provide sustainable design solutions independently from the other design principles, the role of the architects is to include them in a complete design process that can create "order". That leads to a redefinition of the urban shapes and principles that confirm, in the process of experimentation and evolution, the value of the consolidated architecture forms and structure of the city.

The need to clarify these issues, addressing them differently in relation to the specificities of each context, led the choice of three very different study areas for the workshops each one to be considered in relation to the various issues posed by specific lenses towards sustainable architecture.

First Workshop, TU Delft: architectural and urban sustainability in a consolidated urban area; the Cinerama urban block on Westblaak street in Rotterdam

In the first Workshop, held at the Delft Technische Universiteit, the centre of our investigation and design was a typical Dutch urban block from the 1950s, the important after war reconstruction period. The urban block here was studied not only in regards to the various scales –i.e. as an urban entity, as being part of an urban section and urban metabolism such as its relation to water and greenery and as well as in craftsmanship of the details- but also in relation to private sphere and public realm. The "Cinerama" urban block has in fact a central position in the city of Rotterdam and includes theatre, cinema, housing and shops. Its name refers to the immensely popular projector system used in the cinema during that time. More than fifty years old, it is the oldest film theatre of this kind in Rotterdam. In this case, the environmental approach was a necessary lens that leads to a realist urban and architectural design. The Netherlands in fact had to face the problem of water since the formation of its earliest settlements until today, through removing the land from the sea and managing a delicate balance by means of channels, locks and dams. Hence, it has always been subject to emergencies consisting of violent floods or droughts.

Today, new programmes have been planned for Rotterdam together with a new relationship between the hydraulic and urban design. The issue of water management in a large scale, expressed in the Delta Plan after the floods of 1953, included the rise of coastal dunes over five meters and the connections of the Zealand islands through dams and other engineering works.

The Dutch government today, following the general trends of sustainable urban planning, responds to the demands imposed in recent decades by climate change, establishing new rules in the ancient relationship between the water and the city. The new urban policies provide for the integration of systems for water storage, like the canals and water tanks, green roofs and quays. This means a new relationship between the house, the city and the water, and with the green and open spaces, which now enter into the design of the city with a new role compared with the historic city, but always based on technical reasons and overall life quality.

Figure 42. Cinerama Block in Rotterdam, 1st Workshop

The government therefore passed from technical measures, such as: raising the dikes and increasing the drainage capacity, to allow the water to take the necessary space within the urban structure, placing the issue of water and urban design in a close and more flexible relationship. Many municipalities realized, in recent years, a Water Plan, which maps the city's existing water system and, establishing the guidelines, identify future interventions. The Polder cities are therefore oriented towards systems of water storage rather than expulsive ones, giving a new development and structural role to surface water as it had in the historic city; and by doing so, also to increase the quality of the urban public space as a place to stay and as a realm where strangers meet.

The new urban design policies undertaken by the Netherlands government and municipalities, aimed to make the city able to deal with the ongoing climate change and to reduce energy consumption to face the economic crisis, therefore converge towards a return to the high density compact city. This issue was already at the base of the realizations of recent decades, which, although devoid of the deeper awareness on the basis of the latest provisions on urban planning, arranged the testing ground for new typological experiments toward a high density and compact city, that allow that mixture of activities and public realm, including urban green necessary to the contemporary an traditional city.

Figure 43. Water Square visit during the study city tour with students in Rotterdam, 1st Workshop

These issues mentioned above were all part of the concern at the Delft workshop. The Cinerama urban block at Blaak was a case study capable of offering proposals responding to these issues and also to relate with the heritage from the 1950s that was addressed.

Second Workshop, UAIM: architectural and urban sustainability in a rural area; Dealu Frumos

In the second workshop, held at the Universitatea de Arhitectura si Urbanism "Ion Mincu", the project area chosen was in a rural context characterized by a growing phenomenon of depopulation. The Dealu Frumos village, also called with the name of Schoenberg, is part of a series of similar linked villages in Transylvania, founded from the XII century by the Saxons. At the end of the XIX century, more than half of the population was made up of the Transylvanian Saxons. Only in 1930- almost twenty years after the formation of Greater Romania - a Romanian public school was opened in Dealu Frumos.

These villages all had a Fortified Church, which together with the Saxon houses, now are the main cultural and historical heritage. These houses while adapted to the life of the new settlements yet still kept their interesting typological setup. The villages of southern Transylvania strictly follow the topography. Those villages in a valley (like Dealu Frumos, have developed along a central road and, if necessary, along the secondary ones. For 'military' safety reasons and for the tradition of the Saxon citizens, the villages have a compact structure and created a clear territorial system. This was an important issue to deal with during the workshop. These 'street villages' had the typical characteristics of the medieval villages of the rest of Europe, two floor houses facing the main-street, where the markets were placed and daily public life emerged. The houses are juxtaposed next to each other, including a courtyard where agricultural machinery, harvests and cattle were, and still are housed. Even during the communist regime, and especially after the political upheavals of 1989 in Romania, the majority of the German population moved to Germany. The villages were re-populated by nomadic populations that become the main and current residents of the villages, through the typical phenomenon of nomadic populations of seasonal migration that leads to emptying of the village.

Figure 43. The village of Dealu Frumos, 2nd Workshop

The theme of the charrette was challenging, as the (rural) depopulation issue is a worldwide problem, even if its causes are different, being as geo-climatic or political conditions. These villages, like Dealu Frumos represent a built heritage that needs to be considered carefully: should it be preserved, with the original function? Or should it be preserved through architectural conversion to a different usage? Or should it be updated, retrofitted, integrated or demolished? It is not only the physical building that needs to be taken into consideration but also the entire world of links, i.e. connections to the culture,

economy, social aspects. This means that the building, the village and the whole territory was influenced by different, subsequent inhabitants, each with their own culture.

The sustainable intervention concerned here the understanding of the importance of territorial relation among the villages through potential intervention scenarios designed to boost the economy, by emphasizing a territorial and landscape heritage and local culture. Regional evaluation and strategy planning led in this case to specific architectural solutions inside a certain village of that region, in terms of heritage protection, promotion of new kinds of economy/tourism and valuation of the current culture and way of life. Moreover, the relationship with the architectural heritage, i.e. the relationship between the fortified church and the houses, was addressed by developing ideas of how houses and the former church could mutually support village life and as agro-touristic attractions.

Third Workshop, POLITECNICO DI MILANO: architectural and urban sustainability in a brownfield site; the Milano Bovisa area.

The last workshop, organised by the Politecnico di Milano School of Architecture Urban Planning Construction Engeneering, was placed in a brownfield site in the north of Milano, the Bovisa Drop Area between the two railway stations (Milano Villapizzone and Milano Bovisa) dating from the late 19th and the beginning of the 20th century. The railroad tracks created a barrier between the closed drop-shape area and different parts of the city, so including neighbourhoods which were never connected. This area represents a crucial node for urban regeneration strategies for the city of Milano and for the entire northern Milano urban region (Fiera Milano and Expo 2015). Hence, it can be a strategic resource for the territorial continuity between the urban and the countryside scale system.

Figure 44. The guided visit of Milan on May 7, 2017, started in Castello Sforzesco

The de-industrialization of this area started in the 70's. This resulted to the fact that during the last two decades this area was characterized by deep economic, social and urban transformations. The main was the placement of an important campus of the Politecnico di Milano, hosting in the history different engineering faculties (now the School of Industrial and Information engineering) and research centres. The campus has been considerably expanded after an international competition, banned in 1998 by the Politecnico di Milano in collaboration with local authorities (Municipality and Region). This led to a general renewal of the area also due to the reuse of the former industrial buildings and the presence of the Campus of the Architecture and Design Faculties in via Durando, few meters far from the Bovisa Drop that created a revitalized and attractive area. During the urban transformation process, the gasometers in Bovisa Area became both an icon with a strong symbolic value, but also an example of the difficulties to be faced for the transformation and integration of such a large-dimension brownfield and contaminated area.

Figure 45. Milano Bovisa, view towards the remaining gasometers

Furthermore, the urban transformation of this area represented a central resource to develop socio-economic and spatial strategies on a metropolitan scale. This is due to the size of the area, its exceptional accessibility by the public rail transport system as well as its vicinity to other already transformed areas or those are in the process of transformation, i.e. the former Milano Farini railway goods.In fact, this area was the object of twenty-five years of urban transformation projects, mainly developed by the Politecnico di Milano representatives. These conditions led the selection of the Bovisa Drop area for the charrette.

To think and draw up scenarios for the future of the Bovisa area implied connecting different architectural and urban scales and issues addressing the industrial heritage, new activities and the relationship between the entire area and the railway system. The barrier created by the railroad tracks defined also the important issue on how to deal with the social aspect of the urban regeneration and with the identity of the area as a whole. It is also necessary to draw scenarios considering the time phases linked to the decontamination process that constitute the main problem of the brownfield areas as Bovisa.

4.3.2. Programme in Delft, Bucharest and Milan

Although the location and the topics of the workshops were different in each year, they were carried out under the same title "Wicked Workshop on Architectural and Urban Sustainability" thus proving the complexity of the meaning of the term. The programme of each workshop had three distinctive parts: announcement, introduction, charrette. The announcement of the theme along with documentations regarding the site and a reading list was provided to all participants, weeks before the beginning of the workshop. The introduction in the host country's culture, heritage, building technology was made in the first day by a visit in the city where the University is located. Students and teachers met and during the tour of the city, information was given. This way the interventions on the site located in a country were based on a (minimum of) understanding of the specific local conditions.

The charrette included a frame, based on a combination of lectures on topics related to the theme of each workshop and studio activity. Each workshop referred to a complex site, visited at the beginning of the charrette. The supporting lectures were delivered by specialists who provided information and specific details drawing attention to the potential problems of the site and theme. Five teams were created, with students coming from different years and countries, with different geographic and cultural environments, thus giving them the opportunity to interact and exchange ideas, as well as the ability to deal with the complex, large site. Each workshop had a clear programme with a specific theme, with supporting lectures and activities, as presented in the following paragraphs.

Programme of the First Workshop, TU Delft

The programme was divided into three facets, corresponding to each day which eventually merged in the end into a unitary result. In the frame of "1st Wicked Workshop on Architectural and Urban Sustainability", the three facets had the following themes:

- "The Architecture of the extremely condensed Urban Block within the City of tomorrow," aimed to encourage the study of the building and the connections at the scale of the building,
- "The Urban Metabolism during seasons and through time; designing with Green and Water or the 'Wicked' Scenario Writing through Section', A look at approaches in city planning and building design", aiming to position the previous exercise in a territorial scale in relation to various relations within the city.
- "Public Building: Designing today the heritage of tomorrow' or 'Wicked' Craftsmanship of Drawing Building regarding the materialization of future public buildings", which focused on the materialization and craftsmanship of specific part of the Cinerama Block in relation to other scales of intervention.

Each day lectures were delivered at the beginning of the working day, developing the given topics with theoretical elements and examples of practice. The lectures and the theoretical approach were based on the ongoing curricula of the Faculty of Architecture in Delft, where climate control and flood management are mandatory topics within the bachelor programme. Thus, each of the three facets of the workshop comprised lectures on the "topic of the day", followed by their development in the studio work.

Programme of the Second Workshop, UAUIM, Dealu Frumos

One of the internationally recognized problems in the contemporary world is the peoples' migration: from the country to the towns, from towns where industry has failed to other cities, from a country to another. The Romanian charrette moved the focus to the territorial scale, in the natural and rural landscape, where new "wicked" topics were addressed: multiculturalism, globalization, migration, depopulation, preservation, resilience, energy saving and responsible intervention.

In this particular situation, we dealt with the case of deserted houses in a village that was formerly inhabited by a population with a different cultural background than the current inhabitants. The challenge in this case was to revitalize the locality, link it to the nearby town and to the network of transportation while preserving the built historic heritage and culture. These aims are part of the curricula in the Ion Mincu University in Bucharest, as courses. A Systemic Approach [of the near future] and others provide tools for analysing and designing in these particular cases. Plunging in a depopulated village, at 5 km from a town (with a dying industry as well), that has a major built heritage dating from more than 500 years ago put the students face to face with a "live" situation not a theoretical one.

Figure 47. Lecture on site during a visit to Village Museum in Bucharest

Considering the above mentioned, the theme was fluid, leaving each team to try to identify the major problem(s) and to find a way to deal with it, as architects, and to illustrate and detail one facet. Lectures were provided in the museums of the vernacular built heritage - Village Museum, Astra Museum by specialists in traditional culture, art and architecture, as well as in the Citadel (within the site), thus contributing to the formation and understanding of the Romanian environment in a tangible way. The ex-cathedra lectures were delivered at the beginning of the charrette, providing examples of good practices, strategies, solution and projects emerging from local culture which contribute towards sustainability of rural territory/ settlements/landscape – the relation between rurality, heritage and sustainability. The lecturers were part of the teaching team, throughout the whole period, increasing the number of specialists involved in the guidance of the student teams.

Figure 48. Lecture by Adrian Ibric on "European villages depopulation risk management" in Dealu Frumos

The charrette included two distinct phases, a theoretical one and the studio work. The theoretical part was accomplished by exhibitions, visits at the open-air Museums of peasant houses, on-site presentations and case studies. In this context, the Lafayette Park Exhibition, organised by the Politecnico di Milano (Professor Adalberto del Bo) and opened in Bucharest at the beginning of the workshop, was a model of approach of the residential programme, of the fifties, in the United States of America.

In order to understand the village in the territory, the biunivocal connections between territory – building – materials, visits to the museums vernacular architecture were organised, in Bucharest (Muzeul Satului), Sibiu (Astra) and Dealu Frumos (the curator – administrator of the citadel). In both cases professional explanations were offered, by curators, architects and specialists in traditional art and culture. Different from Delft, in this workshop two lectures were prepared only at the first day of the charrette.

Programme of the Third Workshop, Politecnico di Milano

The spine of the programme of the third charrette was constructed as the previous two: a visit of the city of Milan, in order to get accustomed to its culture and architecture, the visit of the site (with the possibility of returning there), lectures and studio work.

Figure 49. Lecture by Prof. Stefano della Torre on May 11, 2017, at Leonardo Campus

On this occasion, the ex-cathedra lectures were delivered by specialists – professors – of the University, alternating and balancing the studio work. The teams of students were guided by the tutors, according to the scenarios identified by each team. A "work in progress" presentation of the work of each team of students was organised, the critics being provided not by the tutors but by the other teams. Feedback was introduced in the final presentations, carried out within the studios. Final presentations were held in the Urban Centre of Galleria Vittorio Emanuele II, after the opening of the Lafayette Park Exhibition – a good example of a residential assembly built in the fifties.

Figure 50. Final presentation at the Milano Urban Center in the Galleria Vittorio Emanuele

The supporting lectures that were provided by the invited specialists – professors within the Politecnico di Milano – are included in the curricula of the Faculty of Architecture. The lectures were delivered by professors of the University, on themes linked both to sustainability and to the site, throughout the whole period of the charrette, balancing the theoretical aspects with the work-in-progress of the studio. In Milan's workshop, the relation between theory and students' experimentation was very tight.

4.3.3. Pedagogical methods and approaches in Delft, Bucharest and Milan

First Workshop, TU Delft:

In the Delft workshop, a tight relation was established between the disciplinary and practical knowledge. Students were specifically invited to examine a concrete situation to find the immanent logic and contradictions. To respond to the ways, in which factors within the specific situation of an urban block relate to each other, within and among various scales. During the charrette, students were provided with basic historical drawings and maps of Rotterdam. Also, other sources of analysing, survey and mapping, like Google earth and archival materials, were made available for them.

Figure 51. Daily meeting between student groups and teachers during the 1st Workshop at TU Delft

Because of the main theme- i.e. the mutual relationship between sustainability and water management, urban green and the public realm- there was clear emphasis on design in various scales: Territory, Architecture, and Point. Each scale was addressed through a specific design approach: 1. SCENARIO WRITING, 2. SPECULATION ON A POSSIBLE FUTURE, and 3. constructing a MATERIAL IDENTITY in Detail. The territorial scale of the topic was addressed by working through a 'territorial section' of the site in order to elaborate the processes, inter-relations and urban metabolism that should be part of the design scenario. This section included the Cinerama Urban Block, the city and the river Maas.

The 'architectural scale' addressed the problem of sustainability on the level of the urban block and in relation with overall transformations that take place in the city of Rotterdam. The students were expected to work and design with '3D models/ Maquettes' to indicate the possible transformation in interventions in the Cinerama block. Eventually, the material scale raised the problem of actualisation of an identity, by focusing on a specific 'point' in the design. In this phase, the 'drawing' was the proposed tool for this exercise.

Hence, the aim of the charrette was to exercise an approach to the design task by utilizing various methods and scales, but also by applying specific design means: the fabrication of maps and mapping, working on the architectural and urban section, and detailed 'material' drawings. The emphasis was on working with and at different scales, zooming in and zooming out, from the building scale to the city scale and back to the scale of the detail.

Second Workshop, UAIM:

In this charrette, students were not provided with any pre-defined material like maps and drawings. Hence, they were urged to use observation, actual survey, mapping and interview, and taking photograph as their main tool for studying the location. This was also supported by the general programme of the workshop, which provided the possibility of their staying in the village during the days of workshop, experiencing the daily life of the villagers and having the possibility to talk to them.

Figure 52. Dealu Frmus medieval castle where students stayed over nights and worked during the day

The framework of the exercise mainly focused on the design process as a way of framing specific questions in a close relation to the location. This process was highlighted by three phases as: ISSUE,

VISION, and SCENARIO. The first phase, i.e. ISSUE, asked the students to come up with an enquiry into the various dimensions of the problem. The second phase, directed the students towards forming certain lenses or visions through which they can frame the problem. And the last phase, invited the students to make design proposals through writing and drafting scenarios. In this workshop, the tools and means of research and ways of presentation were broader, ranging from photography, mapping to video-making. These tools and means were selected by students according to the visions that they made and scenarios, which they proposed. Guidance was provided every day with a short presentation of the on-going work and a final presentation of the completed work.

The emphasis was on trans-disciplinary knowledge in architecture. In this sense, the students were asked to come up with scenarios as the final product of the workshop, through emphasizing the cultural, social and economic possibilities of the site, for example the activation of tourism or local economy. Less emphasis was placed on the technical aspect of a design project for the final proposals. Furthermore, the students used a Serendipity approach to pose questions and produce concepts. In other words, their findings were mainly done through an iterative process of coincidence and experimentations, which is a kind of strategic research derived from normative, typological, symbolic or simply observational sources (L. Groat, D. Wang, p.115)

Figure 53. Student presentations in the 2nd Workshop in Dealu Frumos

Third Workshop, POLITECNICO DI MILANO

The Bovisa area in formed the most complex problem in our workshop series due to its size, the issue of extensive ground pollution, economic deterioration, neglected industrial heritage and isolated position. As other workshops, the theme was fluid here as well, each international group of students

had to choose, from a variety of problems presented in the lectures and discussions and observations (Active listening and observing), what to begin with, what are the consequences on the natural and anthropic environment and how to carry on afterwards.

The five-day charrette took place in the faculty of Industrial Design of the Politecnico di Milano Bovisa campus so students would be near to the design site and that they could experience the situation in and around the Bovisa railway tracks on a daily basis and working in situ. It was clear from the beginning that the problems of a site so big, polluted and deserted could not be solved in the short period of a charrette. Actually, the workshop's aim was to contribute to sustainable local development by also including the possibilities of economic development and reuse of the heritage of the area. Because of the nature of the site and the issues and problems existing, time became very important dimension addressed by all the students-groups. Re-vitalizing the area, linking it to the city and to the territorial scale as well as dealing with a step-by-step approach of curing the soil and diminishing the pollution were parts of the challenges addressed very well by the students. Specifically, the attention on concurrence of both global and local flows, urged consideration on both regional and local scale for grappling the exiting opportunities of the site. Therefore, the interventions emphasized on the 'Phasing' of the project both in time and scale. Furthermore, the involvement of the citizens and communities were well integrated into design strategies.

In this sense addressing heritage and sustainability at the same time as one of the supporting lectures suggested 'Heritage may create the 'learning' environment where creativity and innovation can thrive' (Stefano della Torre). This basically meant that the charrette focused on the first phases of the design; i.e. the moment when stakeholders and politics start to formulate possible programmes and visions. Students were invited to develop ideas and scenarios that can support the start of this process and to think in different stages in which various scenarios could be initiated, questioned and sharpened. Basically, the students used tools like discussions, framing and phasing to structure possible scenarios like 'Post Spaces, revealing the process of turban transformation and densification', which took the idea of making the cleaning up of contamination productive as a starting point.

Here, the students were provided with historical maps and pictures of the area to possess the tools for a scientific analysis of the area. Also, other sources of analysing, survey and mapping, like aereal views and archival materials were made available for them together with the digital drawings of the area. Along with this the proximity of the project site allowed them to carry out further surveys to learn useful information for the better understanding of the area and the problems experienced by the local people.

During this last workshop, the teaching approach concentrated on phasing scenarios and process planning in which the design proposals could function as catalyst for local discussion and initiatives, while accepting complexities which cannot be solved by conventional means. Looking back, using such an open approach and trusting students in their creative abilities led to an active thinking process of questioning and a series of very interesting proposals.

As experienced in Bucharest charrette, the students were not asked to work with specific design tools and the means were selected by students according to the visions that they made and scenarios, which they proposed. Although the previous analysis of the area became available for the students, yet it was the students themselves who highlighted specific issues to be addressed. Students were left free to frame the hierarchy of issues and propose the urban transformation scenario without specific limits of the intervention area.

In Milan, more than both other workshops in Delft and Bucharest, the relation between lectures and student's practical experimentations was tight. The lectures were aiming at raising questions for students from various viewpoints which later they could discuss among themselves in the group for development of their proposal and choices of the tools and way used for the presentation of their ideas. This process led to an intensive productive process of thinking and making.

Figure 54. Student groups presentations in the 3rd Workshop in Milan

4.4. Findings: conclusive manifestoes

The workshops became a fertile testing ground within the existing structural and pedagogic organisation for addressing the wicked problem of sustainability and the challenges for teaching it. The workshops opened windows into the diverse ways of addressing such an issue. However, it also gave the possibility to share the common concerns and to reflect for some shared visions and suggestions for the future of the architectural education in Europe. Hence, based on what was experienced during these three workshops and the exchange of ideas among the teachers of three universities and ACE, as well as between the teachers and students, in following pages, we will summarize our findings in the form of some conclusive manifestos.

4.4.1. Topics

<u>The architectural education for a sustainable future lies in the production of meaningful differences:</u>

The recent discourse on Sustainability in architecture has provided the possibility of giving concrete character and solidity to the discipline, by recognizing in its practice and teaching the necessity that always have marked architecture's nature. To a discipline that over time had lost part of its profound ethical and technical validity, the discussion on sustainability has provided a horizon to oversee the construction of the world, where the form gives order and identity to complex problems.

The questions related to Sustainability concern from one side the real nature of architecture and its tradition and continuity (considering the long life of architecture that has accompanied humanity) from the other side what happened starting from the '70 of the last century. At that time, the energy crisis forced the West to a general rethinking of the lifestyle, opening again – in architecture - the need of sobriety introduced fifty years before by the Modern Movement. The latter was intended by our group of engaged schools and partners as a crucial issue and to be open to a continuous comparison within the active and rather diverse teaching dynamics, which are practiced in the three involved schools of architecture. In addition, during the charrettes students were regarded as different active subjects, carriers of varying viewpoints in virtue of the different cultures and traditions they bring. Hence the choice of charrette as a pedagogic platform, alongside the preparation and the selection of three culturally diverse universities enabled positive cooperation for approaching a shared goal. A diversity which is not necessarily overt but still it is present in the traditions and attitudes rooted in schools and

cultures. Despite this we are already on the way to a progressive and positive thematic and problem-based approach consequent to the global dimension of the problems and supported by the strong European incentive that, also with this programme, significantly contributed to find shared solutions to architectural and urban issues.

During the charrettes, students were asked to reflect on a wide range of distinct but inextricably related issues: typological and morphological, urban planning, technical, environmental, economic and social issues. These are integrated issues in the urban transformation projects and contribute to the overall teaching themes about sustainability, European heritage and the future profession of the architect. The importance of considering these issues as being related to each other has been underlined by the choice of case studies for the three workshops, as discussed in this report. During the workshops, the approach to diverse aspects of sustainability allowed us to encourage debates on positions of sustainability in architectural design and urban planning and on specific technical contributions about the single related issues.

While the focus and methods of approaching and defining the theme of sustainability can be shared among various contexts, the specific responses and [re]solutions to the shared problems should be changed. For this reason, the architectural education for a sustainable future lies in the production of meaningful differences: globalization requires developing our capacity to generate diversity and specificity in response to people's needs. Context, culture and history, together with new technologies, are our allies to produce this diversity.

The recent sustainable issues- such as the unsustainable levels of pollution, the scarcity of non-renewable resources, the increasing lack of fertile soil, etc.- have made a serious concern to take into consideration as architects, planners and designers. However, it is important to mention that these issues should become integrated into the design process, in order to produce architectures and urban plans which are still able to express and give form to diversity of needs and fast speed of transformations.

The understanding of the limits and socio-economic trajectory of the current capitalist model and the one-sidedness of its consumption and growth principles is unsustainable from an environmental, social and economic point of view. This has led the urban policy-makers towards new strategies to re-evaluate the active role of the city and its design. Today is inevitably the time of the metropolis because the urbanization is a consequence of globalization. Metropolis have the task of managing a new economic model, based on internal market, on sharing, on local production through the new

breakthroughs in technology, as alternative to the large-scale and global trade (*). This definitely means to restore the old direct relationship between the living spaces and the ancient precious attention to the rational use of resources, tools and materials on building the city.

> (*) «The socioeconomic model underlying our society is under great pressure – economically, socially, and environmentally […] We need a paradigm shift to realize the next economy: a shift from a focus on consumption to a focus on production. In search of that new model, we first and foremost need to face the realities of the twenty-first century. This is the age of urbanization, the urban age. The city is the arena in which the paradigm shift has to be accomplished […] Strong, resilient urban regions generate innovation and prosperity; they are socioeconomic machines. Due to, among other things, high concentrations of social relations, innovative activity and creativity, manufacturing capacity and markets, they can become levers. But for those to work well, both urban designers and policymakers need to know how to activate and foster them […] There is a renewed focus on local, small manufacturing economies with equal or even higher added value – a viable alternative (similar to what is happening in agriculture) to large-scale and global trade» Short introduction to IABR 2016-THE NEXT ECONOMY, http://iabr.nl/en and http://iabr.nl/en/editie/iabr2016

In the era of network and virtual world, in which the time and space lose their value as strictly connected to the human rhythms and dimension, a sustainable architecture should consider the importance of the human, its primordial needs and the relative ways to imagine and live the space, recognizing the value of the primary urban facts that survive to the short time of the feeble changes. These are the urban elements that should be collectively recognizable, answering the people's needs in a sociologically sustainable way. The interpretation of present reality and future scenarios are related to the understanding of the rules and the stable urban principles of the city over time, which describe the continuity of the shapes and their evolution, improved by the progress in accordance with the new requirements.

4.4.2. Curricula

Architectural education for a sustainable future works trans-disciplinary:

Environmental issues, economic issue, societal issues, cultural issues are problems that are dealt with in all the participant schools, in various lectures, courses and activities. Blending them and weighing them in the act of design is part of the curricula. As the pillars of sustainability – as defined in the specific literature – are supposed to have a balanced growth, emphasis should be put on all aspects regarding the sustainable construction (not building): societal, economic, and environmental. Bearing this in mind, the curricula should broaden with the appropriate sociological knowledge for providing the tools to the students to understand the changes and to develop scenarios, strategies and designs to accommodate new use of / for existing buildings.

Teaching principles for sustainable design of buildings and territories implies providing the students a set of perennial principles, while using contemporary technological tools: bioclimatic principles, green building assessment tools. In the same time the local conditions give unity to the approach and to the logic of the design structure. The "wicked" problem that education must face is not the situation (densification in the urban area, depopulation in the rural area or in the industrial areas where specific industries ceased to exist) but the sociological and economical triggers that lead to the above-mentioned effects. In the contemporary globalized world, where design is a product on a specific market and should therefore circulate in the European space without barriers, architectural education should provide the means to evaluate the opportunity of adopting one system or another, considering the local natural and anthropic conditions

Building technology that is oriented towards energy savings is remarkable but not sufficient in the act of architectural creation, as the aim is to create appropriate architectural volumes and spaces. Preserving /refurbishing the values of the natural or anthropic environment is a necessity, as in the coming 20-30 years 80% of the existing stock of buildings will still be standing. The use of new (or fashionable) technologies is a means, in the effort of accomplishing the aims of the architectural act. Therefore, the power of new practices lies in inventive and effective ways to synthesize knowledge from the most disparate fields. Therefore, future architects need to understand the traveling of ideas. Architects will need to be able to operate in networks that bring together specialists and stakeholders.

From these experiences, we can try to make a forecast of what kind of future professional fields and expertise might be expected; next to design to be involved in education in relation to our main concern of sustainability. These extra professional fields could be directed through geography, process management, economy, and certain forms of participation design, documentation, management and etc. To enter these new professional fields, what kind of skills, knowledge and insights are needed? And what are the means and tools in realm of architecture (theory, history and design) which can incorporate the issue of sustainability into its agenda?

As mentioned before, the responsibility of the architect in this historic period increases as he has to take over new roles; not only a visionary in shapes and volumes but also an anonymous who has to have a deep understanding of various aspect of society and community, while making sure that the frail balance of the natural environment will be preserved. More than the artist that brings in light the "masterly, correct and magnificent play of masses" (as Le Corbusier stated), the architect of today has to conduct and connect interdisciplinary and complex teams of specialists. The architect has to identify problems and formulate themes to the "orchestra" of specialists.

In following, a summary of the curricula for teaching sustainability in each of the three involved universities in the workshops can bring light to our knowledge from the directions and efforts that the European Architectural institutions should take to arrive to the points mentioned above. As our world is confronted with environmental issues, social issues, multi-cultural issues, migration, violence, terrorism, hunger, economic crisis et cetera, the architect's role is also to interact with the authorities as mediators in the attempt to "meet the needs of current generations without compromising the ability of future generations to meet their own needs" (the Brundtland Report).

Conclusively, dealing only with materials and environmental issues would be a "lame" approach for teaching sustainability in architecture, as sustainability actually is a complex interdisciplinary approach and the task of the architect is to orchestrate and accommodate information from many different fields of science and culture. Therefore, the mission of the School in the contemporary society - where Architecture education is involved - is to form professionals who understand societal, economic and environmental challenges, who lead inter and multi-disciplinary teams, who act as mediators and influence the decision makers as well as groups of people, who, by their actions and work, educate and contribute to changing mentalities. In this context, education in architecture today should also include – beside principles of conception and design - elements of history, art, philosophy, sociology economy, engineering, geology, geography, botanists, physics, chemistry, IT etc., in order to be able to address the specific „wicked" issues by partnering with professionals from the interlocking fields of expertise on one hand, by acting as a mediator between administration, stake-holders and end-users, while preserving and developing the skills of designing long-lasting and adaptive buildings in the natural and anthropic environment.

4.4.3. Pedagogical methods

Sustainability by nature is a wicked problem. As Horst W. J. Rittel states, this means that the search for scientific bases for confronting problems of sustainability is bound to fail. This poses serious questions regarding the approaches towards both design and methods of teaching sustainability in an architecture schools. In this regard, what we would like to conclusively state is that:

Architectural education for a sustainable future is research based:

This means that the architecture student is considered as contributor to the production of concepts and the proposal of design solutions. In other words, students are not only the consumers of architectural

knowledge but also contributors to its production. Regarding the issue of architectural sustainability as a field that is still developing, teachers do not possess all the knowledge and answers. Therefore, the aim is to stimulate students to pose questions. This questioning, is not however, followed by giving immediate solutions. In other word, the wicked questions, like that of sustainability, are not definitive. In fact, the research and design process follows an iterative path where questions and answers follow each other to render the possibility of diverse solutions. Hence, the series of questions are accompanied with the re-solutions themselves. Horst W. J. Rittel in his article "Dilemmas in a General Theory of Planning" extensively dwells on this issue by claiming that the definition of the wicked problem is indeed intermingled with its [re] solutions: "Problem understanding and problem resolution are concomitant", i.e. happening simultaneously (Rittel, 1973).

Hence, there is no linear path between problem and solution; rather it is a constant exchange and shift of their allocation through the process of design and evaluation. This applies also for teaching. Exactly for that reason, the attempt for conceptualizing the problems of the design task and possible solutions is the only way to approach education in the field of architectural sustainability. Therefore, as Elizabeth Grosz states in her article "Deleuze, Theory, And Space", the concepts are always aligned by problems, which are addressed through posing questions. (Grosz, 2013). Concepts do not directly solve or answer, rather they replace the problem with other problems and through this process they induce action and thus re-solution. Therefore, concepts can activate this process of concomitant of problem and [re]solutions. In addition, they require active positioning of the designer/future architect.

<u>Towards an approach to research based-design education:</u>

- This approach encourages students to ask questions instead of providing immediate solutions.
- The way to approach architectural sustainability as a wicked problem means to put it into question within the multiplicity of other questions and possible solutions. Therefore, it helps the students to experiment and position themselves within complex field of design both in the sense of approaching the problem and also in the sense of understanding the task of design as a multi-disciplinary operation. Being multi-facetted this research based approach allowed us to address the issue of sustainability, heritage and the future role of the architect at the same time.
- This inclusive and research-based process counters further fragmentation of architectural discipline because it tries to deal with the complexity of the topic (i.e. sustainability) in a step-by-step, iterative way. Hence, it also educates the student to deal with the diversity of scenarios for future practice.

- Moreover, the research based approach and tools like scenario-writing help to avoid homogenization of design products and takes distance from educating the designer as the pure problem-solver behind design interventions.
- Emphasizing design as a process, this approach embraces the possibility of changing circumstances, different kinds of future use and various perceptions of future users. It actively differentiates between form, design and actual use.
- In the sense of education, this means that there is a shift occurring between the position of disciplinary and practical knowledge in the teaching process of design. They are mutually interrelated; teachers and students understand that disciplinary and professional knowledge overlay. Hence, both the disciplinary and practical knowledge are in a tight relation.
- In addition, understanding this mutual and shifting relationship stresses the urge for collaboration and corporation between the field of architecture and other disciplines, like building technology, sociology and geography. This means for example, approaching sustainability in a banal way and purely from an economic point of view is not enough. Rather we recognize the necessity, not only to involve disciplinary specializations, concerned with the task of design, but also to counterbalance the increasing fragmentation by collaboration.
- To be effective and adequate, the research-based approach has to address the interrelation between different scales of architectural and urban interventions. Only by 'working' and designing through scales, immanent contractions can be detected and resolved. For example, to design a zero-energy building in a remote area that is only reachable by cars does not make any sense. Concept and design solutions have to be developed and tested per scale, but also interrogated through scales.
- To conclude, the (combined) method is not a universal path or recipe. Instead, it is inseparable from its context and/or object of the study. Hence, developing and teaching a research-based design method is needed by taking into account the 'wicked' nature of the issues. Basically, we have to acquaint students with the combination of various research strategies that eventually help future architects to produce meaningful design concepts and possible design solutions. The referred tools are part of this research-based method to confront wicked problems of architectural sustainability, the preservation of heritage and to guarantee the future role of architect.

Conclusively, the role of the architect is changing. Future architects need more than ever disciplinary knowledge in their education. Being aware of and able to develop skills, like framing, phasing, working through scales and time as well as the development of scenarios for the whole process from starting initiatives, locally and globally to the maintenance of buildings and the built environment will enable future architects to enlarge their professional field and therefore employability.

4.5. Deliverables

From inception of the project idea there were fundamental and inherent benefits and flaws in trying to array aspects of sustainability across participants from a wicked Europe. First and foremost, sustainability is a framework; it is not a subject in itself but embedded in all evidence, methods of analysis and in design resolutions. Inherent in its contiguously evolving nature is the fact of its currency so it is about the current generation drawing from the past learnings and failures and setting up the future thinking. The issue of eras across the teaching staff meant that there were significant intergenerational shifts in thinking, in attitudes, in knowledge and in levels of optimism. This is a valuable range to be able to create a present-day position with but it also was challenging as reference points ranged significantly. In addition to this, the range of historical and political contexts also affected these same parameters. One of the most hopeful and encouraging evidences that came forward was the fact that each institutions' group of students had much more in common than their tutors did between them. There is an emerging globalized educational framework to address key issues of sustainability which at their heart are indeed global issues. This presented a kind of optimism because it meant that the possibility for dealing with wicked issues in context at local as well as global scales was not only possible but was already happening. Our work was simply to tap into that and bring its prominence forward.

As a generation, we are coming to terms with the idea that the focus on sustainability is simply going back to first principles. As architects, we organically determine this thinking as a foundation for anything further in design terms. In fact, separating out this terminology from, what has always been the natural processes of architecture, has not been beneficial. Yes, we are moving towards specialisations but at the heart of what an architect does, is to witness the state and patterns of flux of a society and then respond with an agenda in keeping with their goals for the future or acting as a catalyst for shifting society towards an evolved vision of sustainability in our cities and towns. This is also very relevant to the valuing, conservation and incorporation of our heritage structures and urban morphological spaces. Specialists serve to sharpen the focus and the detailing but the fundamental thinking is generated from a holistic view albeit with varied prioritisations. This is and will be the fingerprint of the architect, to determine how these are variously prioritised.

As a whole, learning has been about making. Teaching has been about understanding, questioning and responding to these outcomes. This new generation of architects will hold this responsibility and will need different kinds of knowing than their tutors. Never before have these shifts been so dramatic as

much in technological terms as in the immensely expanded capacity to access knowledge. The role of teachers is no longer about bringing forward and transferring knowledge but rather to help discern the validity and direction inside of them, to create the capacity for critical thinking. This is what sustainability means for us today. If we have been true to our role as teachers then we have also been encouraging the capacity for students to keep evolving and expanding this definition in a parallel response to the environmental, historical and social values and concerns in the deepening complexity of our 'wicked' Europe and beyond.

The needs and thus strengths of each context ranged from technical, to historical to socio-political. The strategies evolved in keeping with and understanding these issues by the students. It was essentially about expanding the scope in each setting to include other strengths, about being precise about solutions and impacts as well as emerging from a respect for a place, its people, its history of survival; be this land reclamation in the Netherlands or dictatorial regimes in Romania or the weight of antiquity in Italy. These are ingrained in pedagogic thinking of place but they are significant building blocks that will ascertain local diversity within a globalised education. The new normal we present is not a static kind of knowing but about a process for undertaking that accesses respect and which can make connections with the changes as they occur at these local and larger scales.

This work has been a measure of where we are today and a test of whether our tools have contributed to advancing the critical learning skills to recognise and manifest these definitions that will almost subconsciously be embedded into architectural and environmental reasoning within the practice of creativity as response mechanism.

What our outcomes and progress tell us about the way forward to next steps is that we will continue to collaborate; that this work has actually only just begun. The next stage of our inquiry would be to disseminate these results with students in order to measure our reflections against theirs. The true test will be to then take these pedagogic ideas and these local-global informed concepts and apply them. We would create a new pedagogical approach to teaching and then apply them by working on a long-term project. We would join the classroom context with an architectural firm and develop a project together. This would overwhelm the fine line between reality and pretence that the charrette could only elude at. We are in some ways repeating the past lessons, introducing new wicked problems to the agenda, and coming out with a diversified approach to teaching - one which balances the need for the historical tutor with the fundamental importance of student confidence and where the relationships between them become a mutual form of respect and learning.

4.6. Dissemination

Communication and dissemination activities are taken very seriously in the Sustainability Think Tank and in the whole project. The Two EU umbrella organisations involved EAAE and ACE used their well-established channels to disseminate project progress and results to their members. During the whole three years various activities were carried out and it is planned to continue dissemination of the final results and report well after the project ends. These activities involved having a special website on the project on the EAAE and ACE websites and creating a Facebook Community for the project; reporting at internal events, such as General Assemblies, General Coordination meetings, Executive Board meetings, work group meetings, etc. and external events, such as other EU project meetings and conferences, writing about it in newsletters for instance the ACE Info and MOIS and the EAAE newsletter. Moreover, the ACE project officer used the unique opportunity to report on the project and its first year at the Gypsum Forum at the European Parliament on 17 November 2015. Each charrette produced a report with the students' work and the final report will also be disseminated at various events and through established channels.

5. GENERAL CONCLUSIONS

Author:

TARALD LUNDEVALL

Arkitektur- og designhøgskolen i Oslo

5.1. Findings and recommendations

Over three years since the autumn 2014, twenty transnational meetings and nine workshops and charrettes have been arranged. Including students and professionals involved, nearly 300 persons have participated in the "Confronting Wicked Problems" project. Additionally a countless number of stakeholders and citizens have been involved: in study-areas from Norway in the north to Spain in the south, and from Belgium in the west to Romania in the east of Europe. A majority of the participators are actors within the European architectural education scene: students, recently educated architects, teachers and professors. Eight schools or university institutes giving architectural education, and two international organisations – EAAE (European Association for Architectural Education), that encompasses all institutions offering architectural education within Europe, and ACE (Architect's Council of Europe), which comprehends all national organisations for practicing architects in Europe – have participated directly. Actually, persons from most European countries have taken part.

The challenging task has been to develop deeper insight and mature reflections on the future education in three fields within architectural practice today: *professional knowledge*, *heritage* and *sustainability*. The methods and work-models that have been used in the "Confronting Wicked Problems" project have indeed proved to give fruitful results. In previous chapters the activities undertaken in each of these three fields are presented, in a detailed way. In this concluding chapter the ambition is to point at the most important findings and recommendations for future architectural education in European schools, in a more simple and direct way.

For a full and detailed presentation of the project work a reader should pay close attention to the three previous chapters: on professional knowledge, heritage and sustainability. However, it is our hope that this concluding chapter helps to see the important similarities and overlapping considerations in the work of the three separate think tanks. Finally, we will also identify some areas for further investigation.

5.1.1. Intermediate findings

The full name of our project is: "Confronting Wicked Problems: Adapting Architectural Education to the New Situation in Europe". The term *Wicked Problem* was introduced in planning theory already in 1969 and is well known. A wicked problem cannot be definitively described, since the parameters that

define or influences it are continuously shifting. Searching for scientific basis to confront it, or pointing out solutions, is bound to fail. In the project material the new situation is consequently referred to as the new normal. An Oxford Dictionary definition says this about the phrase *The New Normal*: "a previously unfamiliar or atypical situation that has become standard, usual or expected". Now: where in our three project-spheres – professional knowledge, heritage and sustainability – do we find wicked problems? And does a new normal for European architectural practice really exist?

Each of the three think tanks has presented intermediate findings, related to their primary topics. These findings documents interesting differences between the schools and institutes involved, and between the different cultures and professional attitudes in the countries that are studied or visited. These topic-related, intermediate findings are obviously a good reason for deeper studies of the previous chapters.

This concluding part of the document searchs for a broad overview on the project results. Because of this, the intermediate findings presented here are reflections on the more common aspects of the finalized studies, not at least the ones that contain attitudes that overlap or support each other.

5.1.1.1. Wicked problems

All the three think tanks points out specific professional areas characterized by wicked problems:

In the TADPK think tank report the relationship between architectural design and the professional knowledge of an architect is described as a wicked problem, because it is impossible to clearly define borders between them. To define a "correct" curriculum for architectural studies is bound to fail, since different opinions and values among teachers are always there. The continuous change and growth of possibly relevant knowledge are overwhelming, and makes permanent and stable definitions hard to obtain.

The Heritage think tank comments on the impossibility of generalising or proposing "one size fits all"-solutions to architectural education across Europe. Different building history, cultures and traditions, and differing national and regional intricacies, require customised approaches. And in extreme cases preservation, conservation or restoration of some historic environments could be considered impossible in the light of contemporary societal demands. Heritage thus manifests itself as a very distinct category of wicked problem.

Sustainability is not just an energy and resource-related subject. Sustainability issues can only be met by taking into account cultural, physical and socio-political structures, economy and technology in an iterative process of questioning and redefinition. Moreover, possible design-responses have to be questioned and tested on different scales ranging from detail to city and to territory. So: for the sustainability think-tank the topic itself seems to be so multi-facetted and complex that it deserves to be called a wicked problem.

5.1.1.2. A New Normal?

The Project Application of 2014 presents important facts related to architectural practice in Europe today: the huge level of unemployment in Southern Europe, and the shifting, even eroding roles of the architect, not at least in the northern part of Europe. These factors, perhaps due to the lack of market relevance in current architectural education, are described as a new normal for European architects. Although there are minimal changes in this picture since the economic crisis in 2007, the think tanks seem unwilling to describe the situation as a new normal. On the contrary, they stress the fact that rapid changes in public, political and cultural awareness of qualities in the built environment are prevalent these days, and architects simply have to adapt. The frame-conditions for the practicing architect are permanently in change, and the architectural education must reflect this, with increased relevance in curriculums and pedagogic methods. The situation today is unstable, and will not be "standard, usual or expected" in the future.

5.1.1.3. Vocabulary

Due to the fact that the term *architecture* spans over cultural, social, political, economic and technical realities, discussions between architects are traditionally hindered by lack of undisputed vocabulary and clear definitions. This is also the situation for the terms *professional knowledge*, *heritage* and *sustainability*.

In discussions common terminology could bridge different educational systems, cultural roots and prevailing problems, respectively typologies to solve. This project offers a basis for consideration, as each of the partner schools and institutes is currently addressing local, intricate focus. For instance in the heritage think-tank: Genoa has its palaces, Hasselt is part of a region where secularization is

strongly affecting church usage at the moment, and Prague addresses industrial and post-war heritage. Common terminology is a fundamental demand to move forward. In this case it is challenging, because of the wide and interdisciplinary nature of contemporary architecture and urban planning, hardly managed without development strategies, laws and codes, sociology, computer modelling, landscape and interior design, graphic arts etc. Discussions on terminology seldom lead to full agreement, but it is an important achievement that the think tanks, and the Wicked project in general, has been able to develop clear, useful terminology for discussions of these topics.

- What is professional knowledge, more specifically? TADPK think tank members have produced this description of the knowledge of an architect, with three elements: a) *Knowledge of the discipline* – the art of architecture. This knowledge is about architectural theory, history, tectonics and architectural design. Knowledge of the discipline is mostly learned in established schools for architectural education. b) *Practical knowledge* – the science, "how to do" – of architectural practice. This is related to the (regional, national) technical and legal aspects of professional practice. It covers building codes, standard procedures for project development, typical constructions and detailing, as well as basic frame-conditions for management of a project and a firm. Practical knowledge is mainly obtained through professional activity, but it is also a subject for learning in schools. c) *Knowledge of the profession* – the business aspects of architecture. This deals with activities and relationships with customers and government entities, negotiating contracts, teamwork with other professionals, management of projects and of the necessary logistics to carry out a particular project. It depends largely on the cultural and social context. This type of knowledge is mostly learned through professional activity.

- Built environments in Europe are inherited from the past. Many are of cultural, architectural and historical interest. Many are not, but they bear witness to the development of the social and economic frameworks that shape everyday lives of our peoples. The term heritage is too often used to legitimate only the pure preservation efforts, focused on the few objects with definite cultural and historic significance. The heritage think tank has widened their focus, discussing not only the buildings to be preserved, but also those restored and (adaptively) reused. If a building is rigorously preserved, it might be "frozen" in time, and becomes a museum or a (historic) monument. Otherwise, accepting the open-endedness of its lifetime, a building might continue its usage in service of societal programmes, without losing its physical consistency, values and meanings. Renovation and adaptive reuse prevent degradation and obsolescence of historically valuable structures by means of this continued use, and potentially brings new life to old,

urbanized areas. Heritage management applying a variety of tools is a diverse, context-specific practice.

- The term sustainability covers the relatively new, rapid growing concern for functional, long-lasting and resource-economic buildings, areas, cities and territories. Historically sustainability as term and as practice has developed: from technical responses to local climate, to more complex interventions where good allocation, optimal scale, social solidity and less use of resources are the goals. This variety in goals, fields, methods and ambitions has created a lot of confusion for the public, politicians and professionals. Through their workshops and charrettes the sustainability think tank has confronted different tasks: from urban city-interventions to improvements in rural societies. The think-tank has continuously discussed the terminology they use, and have suggested this definition: *sustainability means working within the limitations and turning those limitations into possibilities.* Priority should be given to simple, passive, low-tech, locally tested solutions that do not consume energy and are less prone to human error. The projects have experienced a shift of focus – towards the underlying social, cultural and economic forces involved. In this sense, the design process is an iterative process in which goal and performance requirements continuously have to be reformulated and adjusted.

5.1.1.4. Diversity

Architecture, both as discipline and practice, has a more than thousand year long history in European countries. It is deeply embedded in the society: the social, political, economic and cultural spheres. The practice of architecture in society shows huge differences in Europe. To some extent even the core elements of the discipline, such as theoretic curriculum content and the way of design training, differs. The three think tanks describe this as a vivid challenge in their work.

For the TADPK think-tank the huge variety of school traditions, political and social frame-conditions, building codes and frames, economic environments and the tasks themselves offers a blurred picture. To propose general, common solutions for European schools to improve their education on professional architectural knowledge is difficult. For schools where mandatory practice periods after studies are necessary to obtain licence, the curriculum might be different than for schools based in countries with neither mandatory practice nor licence examination.

For the sustainability think tank the different approaches to obtain a sustainable society is a challenge when they discuss relevant educational content. The traditions vary, from a technical focus to a socially based one. The normal planning and building procedures for physical interventions in the built environment differs, according to the prevailing ideas in the actual country.

Figure 55. Informal talks between students and teachers in the 3rd Sustainability think tank Workshop in Milan

For the heritage think-tank the huge varieties in European built environment is a dominant fact, and has led to very different laws, codes and traditions in European countries. In Italy refurbishments count up to 70% of the workload in the architectural sector, with a huge number of tasks related to traditional conservation. In other countries the focus is more on general re-use, also to obtain functional and less resource-consuming buildings. The planning and building procedures are "set up" differently, to secure the preferred goals.

5.1.1.5. Multidisciplinary teams are the future builders!

The days for the lonely, coordinating specialist are gone. In all think tank reports the described future tasks need teamwork with a variety of insights – and inputs from different types of professionals. This is not a surprising statement, but seldom presented so consequent and without reservations as in these reports. Even for architects, traditionally working in a holistic but self-dependent way, the society today and its technical complexity seem to have opened their minds.

5.1.1.6. Sustainability and heritage challenges should be met with the same tools!

After their meetings, workshops and charrettes both the sustainability and the heritage think tanks ends up with proposals on future work methods for dealing with their topics. Both tanks lay emphasis on wide, open but still analytical processes, based on research, but also iterative and holistic. And they describe how broad teams of architects and specialists of various kinds should participate, in lively cooperation with politicians, citizens, users and other stakeholders. And even more important: both think tanks underline that this working method actually is deeply embedded in the basic architectural approach. The challenges related to sustainability and heritage will actually vitalize architecture and the role of the architect in society.

5.1.1.7. Knowledge on society, teamwork and entrepreneurship increase employability!

The work methods described above make deeper social understanding necessary. It will provide curiosity and openness, and increase the insight in how a society actually functions. Practice in management and entrepreneurship will be a reality through the team participation. In this way the architects may obtain more practical and professional knowledge, making them more interesting as employees in private and public enterprises and offices.

5.1.2. Pedagogical methods

Based on findings and discussions the think tanks have formulated topic-related proposals for changes and new pedagogical methods for architectural education, presented fully in the previous chapters.

5.1.2.1. Main project finding on pedagogy

All the three think tanks give a common, clear advice: more emphasis should be put on teamwork ability – both through a deeper understanding of the multi-professional nature of future architectural work, and through actual teamwork training during the education. Working within a team with

multiple insights should be regarded as a necessary tool for solving the architectural challenges of today.

5.1.2.2. Central findings from think tanks

Engaged readers of this final report have already studied the separate findings from each think tank. Therefore, in this concluding chapter central proposals will be highlighted as a reminder, and presented in a way that makes it easier to see the assembled project results.

TADPK think tank statements and proposals for pedagogical methods:

- Teamwork ability is necessary to face the future challenges, and must be reinforced in school situations.
- The architect will be increasingly dependent of other professionals with specific abilities. Teamwork training, to handle these challenges, is vital. Reinforce the cooperative work between peers should be encouraged.
- Introduce teamwork, on project design with defined, appropriate processes and general process management. Apply themes like sustainability, heritage and changes in technology.
- An overview of the normal, "full" process of plan and building, and the typical teams and stakeholders involved, should be given during the study years.

Heritage think tank statements and proposals for pedagogical methods:

- Education on conservation and reuse is most effective when based on projects that concern real-life situations and places. The pedagogies adopted should allow for the involvement of professionals from disciplines that contribute to problem definition and resolution: planners, archaeologists, community workers, sociologists etc.
- For short, "minor" courses and projects, emphasis should be directed towards providing students with tools for "seeing" and valuing the inheritance, exploiting local resources and making connections to art forms and cultural activities. Longer programmes should also exploit the inter-disciplinary nature of the field of study.
- The ability to source information is important where work to existing buildings is concerned. Project-related research is a core activity in architecture. Schools should consider how this can be strengthened through programmes that ensure that students are familiar with the sources of historic

building-related information, work analytically with map-based information, can navigate repositories and archives, as well as having a critical appreciation of the value of sources.

- One of the core competences required in both academic and professional life is that of writing succinct and clear reports. The requirements of working with or studying the historic environment place a heavy emphasis on the ability to integrate information from diverse sources (humanities and physical sciences) and disciplines, thus providing a framework within which to develop skills in written expression.

Sustainability think tank statements and proposals for pedagogical methods:

- *Architectural education for a sustainable future is research based*. This means that the architecture student is a contributor of concepts and proposals for design solutions, and not consumer of architectural knowledge. Teachers do not possess all the knowledge and answers.
- This approach encourages students to ask questions instead of providing immediate solutions.
- The way to approach architectural sustainability is to pose questions within the multiplicity of possible solutions. It helps the students to experiment and position themselves within complex fields of design, and to understand the task of design as a multi-disciplinary operation.
- Scenario writing, mapping and drawing should be used for elaborating different possible futures.

5.1.3. Curriculum structures

Based on findings and discussions the think tanks have formulated proposals for changes in curriculums in the schools for architectural education, presented fully in the previous chapters.

5.1.3.1. Main project finding on curriculum structure

All three think tanks give a common, clear advice: more emphasis should be put on society and actual context of architectural work. This means that an appropriate curriculum gives basic insights in how a society "functions", how decisions are taken. It should describe the normal roles of an architect, the procedures the architects are expected to follow – or develop further. It should enhance understanding of the various stakeholders and individuals involved, such as other professionals, users and citizens. Real case studies give the best opportunity to learn: about a variety of necessary insights, and societal richness in general.

5.1.3.2. Central findings from think tanks

Engaged readers of this final report have already studied the separate findings from each think tank. Therefore, in this concluding chapter only central proposals will be highlighted as a reminder, and presented in a way that makes it easier to see the assembled project results.

TADPK think tank statements and proposals for curriculum structure:

- Education on professional knowledge should cover a broader field, and present both in mandatory and elective levels.
- Through elective courses students might obtain special insights, preparing them for management, entrepreneurship and abilities on a higher level, and thus increase their employability.
- Teachers should aim to give the students a general awareness of context and a more fundamental consciousness related to social and economic frame-conditions, as preparation to face the professional world. Education with focus on society should present the typical roles and tasks for an architect, and the work relationships, users and stakeholders in the environments that an architect normally will meet.
- Implement organised and well prepared visits to architecture offices, both big and small, and also public offices. The points of view from members of such offices, and considering the difference between them, are of great help for the students to get an appropriate overview of what is going on in the professional field.

Heritage think tank statements and proposals for curriculum structure:

- Real case studies have the capacity to provide students with multiple learning opportunities, both in terms of skill sets and the testing of ideas. They provide a context in which areas of the curriculum can be experienced in relation to one another: studies of urban history, morphology and social and constructive history, building structure and construction, environmental performance and services provision, methods of representation and communication can be readily integrated. Potential interfaces with other elements of curricula, both in terms of content and learning outcomes, should be described.
- Many studio projects incorporate an investigation phase and a study of precedent prior to the commencement of the design. Studio projects that involve intervention to existing environments should be designed to "close the circle", that is, to bring the results of the design back to the starting point by means of a reflection on the impact of the proposal.

- Every opportunity should be taken to involve external critics and reviewers, drawn from the disciplines whose knowledge and experience contributes to the problem statement, as well as from architects with experience in that area. Where the project involves communities, structured opportunities should be devised to ensure that their perspectives are brought to bear.

Sustainability think tank statements and proposals for curriculum structure:

- Architectural education for a sustainable future works trans-disciplinary. Environmental issues, economic issues, societal issues and cultural issues should be dealt with in various lectures, courses and activities. Blending them and weighing them in the act of design is part of the curricula.
- Emphasis should be put on all aspects regarding the sustainable construction: societal, economic, and environmental. Bearing this in mind, the curricula should be broadened with appropriate knowledge, for providing the tools to understand the changes and to develop scenarios, strategies and designs to accommodate new use for existing buildings.
- Dealing only with materials and environmental issues is a "lame" approach for teaching sustainability in architecture. Sustainability means actually a complex, interdisciplinary approach and the task of the architect is to orchestrate and accommodate information from many different fields of science and culture. The mission of the school is to form professionals who lead inter- and multi-disciplinary teams, who act as mediators and influence the decision makers as well as citizens and users.
- Education in architecture today should also include some elements of sociology, economy, engineering, geology, geography, botanics, physics, chemistry, IT etc., in order to prepare for partnering with professionals from other fields. This will also help the architect to act as a mediator between administration, stakeholders and end-users in the design of long-lasting and adaptive buildings in the natural and anthropic environment.

5.1.4. Continuous professional development

Based on findings and discussions the think tanks have formulated proposals to enhance the continuous professional development (CPD), presented fully in the previous chapters. In this concluding part some proposals will be highlighted, and presented in a way that makes it easier to see the assembled project results.

5.1.4.1. Main project findings on continuous professional development

The professional life of an architect is project-based. All the new starts and stops, the necessary developing of programmes and shifting project set-ups helps him to focus on personal professional development. 3 to 5 years practice after education is regarded as necessary to make a young architect fully "operative". Post-graduate and specialized courses for recently educated architects, should be offered, on elective level to students and to generally all practicing architects. Such courses should be implemented through the universities or other academic entities. Structured opportunities for schools of architecture to contribute to professional CPD should be investigated and developed, also by learning experiences from other European countries.

5.1.4.2. Central findings from think tanks

Engaged readers of this final report have already studied the separate findings from each think tank. Therefore, in this concluding chapter only central proposals will be highlighted as a reminder, and presented in a way that makes it easier to see the assembled project results.

TADPK think tank statements and proposals for CPD:

- The work of an architect is traditionally a row of separate projects, often with new teams and new collaborators. Most projects have a defined stop, and a fresh start. The work is actually a series of new learning situations. Every element of professional knowledge learned during the graduate studies, will be renewed, completed – or rejected – during the coming years of architecture practice. This will happen as a normal, continuous development.
- 3 to 5 years practice after education is regarded as necessary to make a young architect fully "operative". Post-graduate courses, for recently educated architects, should be offered in order to make the architects more competitive in the market. In countries where post-study practice is not mandatory, this is of special relevance.
- All schools giving architectural education should examine their actual situation, establish fruitful collaboration with other parties, and secure that less commercial, professionally relevant courses are offered to architects (for instance: working with BIM, restoration courses, facility and project management etc.)
- Taking into account the wide scope of activities that professional architects have to deal with, it is obviously important to offer specialized courses, on elective level to students, and generally to practicing architects. Such courses should be implemented through universities or other academic entities. In many European countries such courses could also be linked to the architects' councils.

Heritage think tank statements and proposals for CPD:

- In many jurisdictions, there are structured opportunities for schools of architecture to contribute to professional CPD. It should be noted that ACE has initiated a list of quality European CPD system for architects, endorsed by ACE Member Organisations in various EU Member States. While different in content and emphasis, these obviously important to offer specialized courses, on elective level to students, and to generally to practicing architects. Such courses should be implemented through the universities or other academic entities.
- Where specialised skills are being developed in schools, there are often opportunities to provide master classes for professionals or to provide life-long learning opportunities in the form of workshops for professional or lectures for lay audiences.

Sustainability think tank statements and proposals for CPD:

- In the EU there is a huge gap in workforce skills of those who deliver sustainable buildings performing NZEB standard. Nearly Zero Energy Building construction and renovation, which is the future work field of every European architect following EU regulations and member states' implementation, requires a large contribution from the building sector and is a challenge for the whole construction industry. Especially the collaboration between architects, technical experts and building managers is necessary to develop mutual understanding of each other's disciplines and combine skills to achieve optimal NZEB construction in terms of quality, energy efficiency and cost effectiveness.
- This gap in skills also exists in the architect profession. This issue does not necessarily concern the academic curriculum of the future architect, but it has to be addressed through continuous professional development (CPD) of the current workforce. (In the CPD and the Professional Qualifications Directive 2005/35/EC it is stated that Member States should ensure, by encouraging continuous professional development, that professionals are able to update their knowledge, skills and competences in order to maintain a safe and effective practice.)
- We acknowledge the work done by EU funded projects like the BUS projects, H2020 construction skills projects, such as PROF/TRAC and BuildUp, and promote further initiatives supporting CPD training on sustainability for architects in the field.

5.2. Deliverables

5.2.1. Report: comments on value

This report covers both presentation and results of all the project activities. The project description, progress plan and project output, as presented in the Application Form of 2014, are followed closely. Specific findings and results of the project are documented previously in this report, detailed in the separate sub-reports from the three think tanks, and more general under point D above. This report is a result of a project lasting 3 years, with obvious limitations. Although the intention with the debates, workshops and charrettes has been to obtain final and global conclusions, we must accept that this type of work implies some degree of subjectivity in some cases, physical restrictions in other, and conclusions that are not fully agreed in some cases.

This being said, we are at the same time overwhelmed and positively surprised, by the quality of results and the important amount of inspiration we have received. Through the work we have reached a deeper understanding of the terms sustainability, heritage and professional knowledge. Architecture and architectural practice, and the attitudes to and methods for problem-solving, are different in European countries. The project has contributed to bridge our understanding of these differences. One of the most hopeful and encouraging evidences that have come forward is the fact that each institutions group of students had much more in common than their tutors. It is the globalized educational framework that is responsible for addressing key issues of professionalism, heritage and sustainability with openness – issues that indeed are of global interest. Students' attitudes presented optimism, because it showed that the possibility for dealing with "wicked" issues in local as well as global scales was not only possible, but was already happening. Our work was simply to tap into that and bring its prominence forward.

5.2.2. Use of the report

This report will be presented and discussed in the EAAE Academy seminar, as part of the annual EAAE General Assembly, on the September 1, 2017. It will be distributed to all participants in the seminar. Formally it should be regarded as preliminary, until it is approved by the EAAE Academy. After this approval it will be printed properly, with correct credits to persons and institutions involved, and according to EU standards for these types of publications.

5.3. Dissemination

5.3.1. Dissemination, digital and printed

We believe that the project outcome is substantial. In general there are new, vital connections established between European schools, teachers and students. Topic-based, established milieus in different countries have met, and obtained new understanding and insight of their fields through collaboration. And not at least: this final "Teaching Wicked Problems Report", presenting a full documentation of the tree years of work, will give European architecture schools an easy access to updated ideas for teaching the "wicked" fields of professional knowledge, heritage and sustainability. To practicing architects in Europe it may convey better understanding of contemporary architectural challenges and work.

The project will be disseminated through these channels:

- Web pages of Schools and Institutes involved
- Web pages of EAAE and ACE
- Web pages of other interested entities
- Distribution of the "Teaching Wicked Problems Report" (approved and printed version of this report) to all European architecture schools
- Distribution of the "Teaching Wicked Problems Report" (approved and printed version of this report) to all architects' councils in Europe.

5.3.2. Dissemination, other activities

Dissemination as described in the Application Form of 2014 will be done. Further national and international activities and cooperation are described in the 3 think tank reports, see chapters 2, 3 and 4. Such activities are prescribed both for the academic and professional spheres.

5.4. Further investigation

In the reports from the three think tanks "windows" to areas of future investigations are opened. These are related specifically to the three project topics: sustainability, heritage and professional knowledge of an architect. Here, finally, we will only present three possible tasks for further work, common and with relevance for all project topics.

5.4.1. "Atomization" of the curriculum makes ethics more important!

In the past curriculums for architectural education were looser, less specified – and mostly based on local traditions, ideas and a common understanding of professional content. In todays more complex and globalized world curriculums are broken down to "modules", where content, expected learning outcome and ECTS-values are described in detail. Students are allowed to compose their own education, combining fragments of knowledge of various kinds.

The simple curriculums of yesterday made it easy for schools and professors to convey a broad professional understanding through the study-years – an understanding that also contained professional ethics as a core element. Todays "atomisation" of the education makes it difficult to include ethical considerations – both in conscious and sub-conscious ways.

Our project points out social knowledge and awareness, teamwork ability and general empathic attitudes as more important than ever. An important future challenge will be to develop pedagogic methods and compose education curriculums to enhance the ethics of the profession.

5.4.2. How to create "realistic" studio courses?

Design training, in studio-courses, is still regarded as the most important activity in architectural education. In studio teacher(s) and a group of students are the only people present, most of the time.

Teamwork, with various types of professionals, is the core element of architectural practice. In our project this type of work, widened and also including various stakeholders, is regarded as the

appropriate tool for dealing with challenges of today. "Real" tasks, with locally based contexts and actual users, are wanted as ideal area for learning.

We could supply the studio context with an architectural firm, and develop projects together, or we could invite real clients and users to take part. Such approaches would reduce the split between reality and pretence that even workshops and charrettes can't do.

But so far the "realistic" studio-courses are seldom: it is difficult to arrange, to manage over short spans of time, and within actual economic and professional frames. Examples of "best practices" for such courses should be developed, described and distributed between European schools for architecture.

5.4.3. How to include sustainability and heritage topics in professional knowledge?

The "Wicked" project documents that both sustainability and heritage are topics of growing relevance and importance in European countries. To handle project challenges in these fields a broad set of knowledge and competences are required. The variety of approaches and procedures in European countries makes it necessary to have a general understanding – some sort of *disciplinary knowledge* – in these fields. And to deal with concrete projects in a specific context, appropriate *practical* and even *professional knowledge* are required. Since sustainability and heritage problems should be met with a version of the *typical tools of an architect*, such insights deserve to be included in ordinary architectural education.

This could be done through learning books, lectures or case studies. "Best practices" for including these fields of architecture in the education are still to be investigated.

6. BIBLIOGRAPHY

Architect's Council of Europe (undated). *ACE CPD Europe: Skills for Your Architectural Life*. Online: http://www.ace-cae.eu/110/ (accessed 27 June 2017).

Architect's Council of Europe (2014). *ACE: Mission and Objectives*. Online: http://www.ace-cae.eu/31/ (accessed 29 July 2017).

Architects' Council of Europe (2016a). *Manifesto 1 of ACE Policy Position. The role of architecture in energy efficient construction.* Brussels: Available on line: http://www.ace-cae.eu/fileadmin/New_Upload/7._Publications/Manifesto/EN/ACE_MANIFESTO_1_POLICY_POSITION_2016_EN.pdf

Architects' Council of Europe (2016b). *Manifesto 2 of ACE Policy Position. Urban regeneration: Renovating the existing building stock.* Brussels: Available on line: http://www.ace-cae.eu/fileadmin/New_Upload/7._Publications/Manifesto/EN/ACE_MANIFESTO_2_URBAN_2016_EN_.pdf

Choay, F. (1992). *L'allégorie du patrimoine*. Paris: Seuil.

Corr, S., Hutchings, J., van der Burg, J., Aguilella Cueco, D., Noll Minor, M., Gall Ortlik, A., & Dobrusskin, S. (2011). *Competences for Access to the Conservation-Restoration Profession*. Brussels: European Confederation of Conservator-Restorer's Organisations (E.C.C.O.). Online: http://www.ecco-eu.org/fileadmin/assets/documents/publications/ECCO_Competences_EN.pdf (accessed 27 June 2017).

Council of the European Union (2014). *Council Conclusions on Participatory Governance of Cultural Heritage. Council Meeting Brussels, 23 December 2014*. Online: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014XG1223(01)&from=EN (accessed 01 June 2017).

European Commission (2013a). *Erasmus+ / About / How is it managed?*. Online: https://ec.europa.eu/programmes/erasmus-plus/about_en#tab-1-2 (accessed 30 July 2017).

European Commission (2013b). *Erasmus+ / Organisations / Overview*. Online: https://ec.europa.eu/programmes/erasmus-plus/organisations_en (accessed 30 July 2017).

European Commission (2013c). *Green light for Erasmus+: More than 4 million to get EU grants for skills and employability*. Online: http://europa.eu/rapid/press-release_IP-13-1110_en.htm (accessed 30 July 2017).

European Commission (2015). *Communication from the Commission to the European Parliament, the Council, The European Economic and Social Committee, the Committee of the Regions and the European Investment Bank . A framework for strategy for a resilient energy union with forward-looking climate change policy*. Brussels: Press release

European Parliament (2010). *Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (recast)*. Strasbourg: Official Journal of the European Union.

European Parliament (2012). *Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency*. Strasbourg: Official Journal of the European Union.

European Parliament, Committee on Industry, Research and Energy, and Committee on Culture and Education (2016). *Report on a coherent EU policy for cultural and creative industries*. Online: http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML+REPORT+A8-2016-0357+0+DOC+PDF+V0//EN (accessed 01 June 2017), p.21.

Graham, B., Ashworth, G.J., Tunbridge, J.E., (2000). *A Geography of Heritage: Power, Culture, and Economy*. Arnold: Oxford University Press.

ICOMOS (1993) *Guidelines for Education and training in the conservation of Monuments, Ensembles and Sites*. Online: http://www.icomos.org/en/charters-and-texts/179-articles-en-francais/ressources/charters-and-standards/187-guidelines-for-education-and-training-in-the-conservation-of-monuments-ensembles-and-sites (accessed 27 June 2017).

Kitchenham, B., Pickard, L., Pfleeger, S. (1995). Case studies for method and tool evaluation. *IEEE Software*, 12(3), 52-62.

Kokkarinen, N. and Cotgrave, A. (2013). Sustainability literacy in action: student experiences. *Structural survey*, 31(1), 56-66.

Lawson, B. (1980). *How Designers Think*. London: Architectural Press.

Lowenthal, D. (1998). *The Heritage Crusade and the Spoils of History*. Cambridge: Cambridge University Press.

Mints, K. and Tal, T. (2013). Sustainability in higher education courses: Multiple learning outcomes. *Studies in educational evaluation*, 41, 113-123.

Mirza & Nacy Research Ltd (2017). *Architects' Council of Europe, The Architect's Profession in Europe 2016: A Sector Study*. Brussels: The Architect's Council of Europe (ACE).

Obad Šćitaroci, M. (2015). Introduction. In: *Cultural Heritage – Possibilities for spatial and Economic Development. International Scientific Conference Proceedings*. Zagreb: University of Zagreb, Faculty of Architecture.

Parelius, G. (2014). *Statutes of the European Association for Architectural Education*. Online: http://www.eaae.be/about/statutes-and-policy/eaae-status/ (accessed 29 July 2017).

Rittel, H., & Webber, M. (1973). Dilemmas in a General Theory of Planning. *Policy Sciences*, 4, 155-169.

Steiner, G. and Posch, A. (2006). Higher education for sustainability by means of transdisciplinary case studies: an innovative approach for solving complex, real-world problems. *Journal of Cleaner Production*, 14(9-11), 877-890.

Wang, D. and Groat, L. (2013). *Architectural Research Methods*. Hoboken: John Wiley & Sons, Inc.

Yin, R.J. (1984). *Case study research design and methods*. Beverly Hills: Sage Publications.

Zandvliet, D. (2014). Places and Spaces: Case studies in the evaluation of post-secondary, place-based learning environments. *Studies in educational evaluation*, 41, 18-28.