Nurture and nature of research in architecture
The research foundation of architecture as a discipline

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Abstract:
Architecture is lacking theoretical foundation, because its mechanisms to create and accumulate knowledge and experience are non existent or not well developed. Research and especially Ph.D. can contribute to overcome this weakness.
This paper focuses on 2 topics: the need for research and the nature of research in architecture. It deliberately articulates some polemic positions in order to stimulate discussion.

THE NEED FOR RESEARCH

If engineers behaved like architects, they would still be reinventing Thomas Edison's light bulb. However through years of cumulative research and invention we are now in the era of electronics and IT.

If we look at architecture we see architects ignoring or undoing what other architects have done, we see more and more specialists eating parts of the architect's cake (programmers, quantity surveyors, consultants, engineers…).

Of course nobody dies from architecture and therefore architects are less vital to society than their intellectual brothers from medicine. However more and more architects risk to die from architecture because of un- or underemployment. How does it come that after 5 years of study architects do not earn more than an unskilled labourer?

Why all these - deliberately exaggerated - statements? Why all this pessimism? Don't we still see impressive numbers of students choosing for architecture? Of course we do: they like architecture, they feel architecture is fantastic and fascinating. And indeed it is, as recognised by other disciplines, especially when they 'borrow' from architecture: systems architecture, information architecture and even systems 'architecting'[1]

There is a manifest dichotomy in the perception of architecture within and outside the discipline. And education plays only part of the game, but within its part, education has to consolidate architecture as a discipline. Architecture as a discipline needs more foundation, needs a stronger basis.

Therefore education in architecture needs to emphasise more on theory, needs to stress more on cumulative knowledge[2], on competences that have been lost or neglected in the last decades. Education in Architecture also needs a rigorous transfer of knowledge in a domain that is wide enough to employ the vast numbers of students in architecture. That means that education in architecture has to broaden and to deepen its scope towards other fields of the spatial system than the sole profession of the architect-designer. Architecture needs to think inclusively, because partly by being exclusive in the competences we are training for, we are loosing parts of our jobs

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[1] confer Zwegers,A., 1998, On systems architecting, Ph.D. thesis, T.U.Eindhoven, 1998
    Rechtin, E., 1991, Systems architecting: creating and building complex systems , Prentice-Hall, Englewoods Cliffs (NJ)

[2] Architecture has to extract and accumulate the 'reflective knowledge'(Schon, Chupin) embedded in experienced architects, in built architecture, in competitions through case studies.

but more important, we are missing opportunities where architects can make a meaningful contribution.   How did we lose the skill of construction, of correct detailing, of pricing our designs accurately...?

But primarily we need a healthier basis, more strength and evidence in our argumentation towards society and towards the client, we need more 'serieux': not by producing post-modern architecture or by building jokes. Whereas the production of post-modern dance or post-modern art is original and refreshing, the same cannot be said of the meaningless reuse of empty shapes from the past in post-modern architecture. It is a matter of intellectual level and competence, which is symptomatic for the loose way in which theoretical concepts are borrowed from other disciplines and handled in architecture. Take as an example architectural theory. A lot of people do not even know what it means. Some say this lack of definition characterises precisely the richness of architecture, there is nothing to worry about: it is a typical characteristic of a discipline in transition, or better of a discipline that escapes rules. This may be true, but we have been hearing this credo for 30 years and we still see the situation of architects becoming more and more precarious. Architecture is simply lagging behind. Every engineer knows what are the major ingredients in a course on physics - just buy the book by Ohanian [1989] or Serway [2000]- no architect knows the content of architectural theory, the foundation course of the discipline. Neither do we know what, in general, is the compulsory literature for students in architecture. Frame 1 shows a (possible) definition of architectural theory [Bekaert, 1996]. Recently several readers in architecture and urban design have been published. These can be considered significant contributions to the constitution of the body of knowledge of architecture, provided they appear in the education of architecture. [LeGates, 2000], [Hays,2000], [Leach,1997], [Heynen, 2001]

Architectural Theory

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Definition: study of the role and meaning of architecture for man and society, including the (study of) the processes of change induced by architecture

We distinguish 3 levels of generality / scope in this discourse:
1. cultural-philosophical level: is architecture an art? How does it relate to science? to economy? to philosophy? etcetera…
2. the level of the relationship between theory and practice: how does architecture come about? What is an architect? How does (s)he (have to) function in society?
3. the level of relationship between insight and action: given an assignment, a site and a programme, what to do? This level accommodates for what traditionally is called 'Architectural composition'.

 Frame 1.

We deliberately stress the weakness of architectural theory. But even towards theory in the well-established disciplines like structural mechanics and building physics or building technology or computation in general, interest is modest, not to say nonexistent. Many architects consider urban design as the making of architecture on the larger scale and they forget about traffic, because that needs computation. The major commercial developments of software for

architecture are made by non-architects. Others eat our cake, because we resign. If we want to aim at a broader profile, we definitely need more theoretical background.
Emphasis on theory, on refreshing and renewing theory, and progress in theory goes hand in hand with research. We simply need research to underpin our theoretical courses.
We ultimately need research to survive.

Structurally theory and research go hand in hand within universities or within pedagogical structures that have the size for and the diversity of many disciplines resourcing itself permanently through research. The isolated school is not capable of nurturing the discipline as a discipline. Historically, the university is the centre of production of knowledge. The university has the research tradition. Architecture on the other hand has the design tradition as its stronghold. Architectural education fully emphasises design; design teachers are the best of practitioners; they come and bring into the school what they experienced live in practice. Nothing less, nothing more. Structurally there is in this habit no built in mechanism that guarantees cumulative knowledge. After years this becomes visible and that is where architecture as a discipline is today.
At the same time architecture deserves a place at the university, more than ever before, because of its societal relevance.
The Cartesian thinking university, however, is not really tailored to the needs of architecture, neither in the appointment regulations and criteria (Frame 2), nor in the publication culture with citation indices and impact factors (Frame 3)[3].

Appointment / promotion criteria	Publications (last 5 years)
Age Teaching Ph.D. promotership Publications Projects Pedagogical evaluation Scientific consultancy Seniority in previous rank	In international and refereed magazines In other scientific magazines Papers presented in international conferences and symposia - published in proceedings - only available as an abstract or not published Presentations at national conferences, symposia, workshops… - published in proceedings - only available as an abstract or not published Internal reports Theses Books - author of the entire book - contributor - editor

Frame 2   Frame 3

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[3] These criteria are used within the University of Leuven.

European universities have difficulties in coping with a discipline that is partly artistic. It is still difficult to obtain academic credits for publications by others concerning your buildings. These should be considered as a kind of citation.

Each school doing research has its own tradition determined by the actual staff. Within the academic freedom staff members choose their research projects tailored to their capabilities and interest, the opportunities for granting, which normally accounts for its societal relevance. Being embedded within the university is a double-edged sword: it gives freedom but at the same time imposes restrictions. If indeed the university is not the paradise for architecture, it is nevertheless still the place to be. Subsequently, architecture has to take actions from within the university, in order to transform and to enrich the ruling system with the best of architecture. Although science cannot grasp architecture as a whole, major parts of it can be caught in a scientific debate. There is a lack of cumulative and incremental scientific writing in architecture and Ph.D. theses are a means to contribute in filling that gap. The Ph.D. is by definition a proof of scientific writing pushing forward the edge of knowledge. Nothing, however, limits the incorporation of seminal project work into scientific writing.

THE NATURE OF RESEARCH

Research and design are fundamentally different.

The *research* activity has a well-defined methodology. Research is based upon hypothesis formulation, model-making and empirical or logical proofing. It appeals to analytic and rational thinkers with a critical mind. In general, research is teamwork today.

In architecture we can identify two major research methodologies: historical investigation and the structural(istic) approach. The first one is traditionally diachronic and sequential, for example a monograph on "Le Corbusier" [Von Moos,1980] , the latter is synchronic and layered, for example the semantic reading of "the Kabylian house" [Bourdieu, 1980].

The output of research is insight, knowledge, discovery… Research is communicated through publications, among which doctorates deserve a special place, as has been explored at the EAAE meeting in Delft 1996.

Scientific writing has to comply with several criteria:
- being testable by verification, confirmation or falsification;
- relying on empirical or experimental evidence;
- being logically consistent;
- being economic in its formulation. [De Groot, 1994]

Citation follows strict rules.

Looking at these characteristics, it becomes clear that architecture cannot be caught in this straitjacket. This explains partly the difficulty in establishing the scientific foundation of architecture. However, it is not because the phenomenon as a whole cannot be grasped in a scientific discourse, that major parts of that discipline do not need scientific foundation. Even if the result of such an investigation primarily proves the limitations of that investigation.

Design is completely different, it is creative, wide, speculative, oriented towards synthesis. According to N. Cross [1982] , there is a 'designerly way of thinking': working and reasoning with and within images. Designers have a broad interest, they show lateral, simultaneous, wandering, jumping thinking, they are proficient in mixing things that apparently have nothing to do with each other, in metaphorical thinking, i.e. in seeing something as something else. Citations are most of the time tacit or implicit.

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In the early hours of apprenticeship, architects, or better students in architecture, design through trial and error; the more they get experienced the more they use heuristics.

Originality in the solution prevails. Maybe due to this 'innate' passion towards originality, meticulous, incremental and cumulative knowledge has not been fully developed within the discipline of architecture. Architects are trained in rethinking the world; scientists are trying to understand the world.

Design as a method of research?

From within architecture several attempts have been made to include design in research, to qualify design as a type of research, not always without political ambitions. And indeed, some design projects, especially those in competitions meant to explore / unveil the capabilities of a given site in a given context without a given programme, come close to what can be called research in a traditional way. Answering this kind of questions by design is probably the most appropriate way to go. Also it has been shown that the design activity itself develops new design knowledge. [Heylighen & Neuckermans, 2000]. In current architectural pedagogical practice this new knowledge and experience resides within the experienced architects and disappears mainly with them. The accumulation of all these personal knowledge and experiences is only transferred to some students in the projects tutored and is not fed systematically into the discipline of architecture as such.

A design project at the one hand and research at the other hand have different meanings, denominating different realities, different products, different rules and constraints. Design does not traverse the hypothesis phase of research, because only in using the building can the hypothesis be tested and verified.

Traditional research and traditional design thus are fundamentally different. They are different activities, they need different attitudes and different minds, they prove different aptitudes and attitudes. As a manner of speaking: the researcher has a paper sent in time for a conference and is not paid for, the architect usually has no paper or delivers it too late and must be paid for the artistic performance in public.

THEORY IN EDUCATION of ARCHITECTURE

More emphasis on theory implies less time for other activities, i.e. design. This has to be compensated by a more efficient pedagogy in the design studio, in other words a didactic framework for the design studio, that clearly shows what will be the benefit of each assignment for the student; indeed just being confronted with another tutor is not a sufficient legitimisation for yet another design. It also means a better preparation of the assignments (not the last-minute jump into the studio in a hurry between two appointments with the mayor and a contractor). More efficiency can also be obtained by eliminating all pure manual tasks that could be done by a draftsman. Take as an example model-making for presentations: students tend to loose themselves into astonishing miniature making, but at the same time – and they are not aware of it - they lose their time and their intellectual assertiveness.

Another strategy for improving the theoretical basis of our pedagogy, is working with mixed teams of practitioners and theoreticians in the design studio. The practitioner will learn about the latest developments in theory, the theoretician will find inspiration for research topics while discussing a project and the student will profit from both.

Doing so theory will entangle more with practice, and hence so will research.

Research is thus by no means a substitute for design.

All of this does not mean that research cannot benefit from 'the designerly way of thinking' as well as inversely design can learn a lot from the research tradition.

The intricate and lively relationship between research and design induces shifts in the definitions of research and design, just as - related to that - the definition and demarcation of science is a permanent subject of debate and adjustments among scientists and philosophers of science. [Popper, 1963], [Kuhn, 1962], [Feyerabend, 1975]

RESEARCH **TOPICS and EAAE ACTIONS**

Some people have doubts about the possibility of research in architecture, because most of the research done so far pertains the periphery of architecture. According to them the core of architecture does not lent itself to scientific investigation.

The contrary is true, just look at a few topics (and the list is endless), which we think to be (of common interest and) relevant to most of us:

- quality in architecture, including cost / quality assessment
- evaluation of architectural design, a topic which is related to the previous topic
- post-occupancy evaluation in order to obtain the necessary feed-back
- low-cost housing
- density and quality
- safety in the environment
- understanding and coping with old and new, with tradition and modernity
- CAAD during the early stages of design
- …..

EAAE has the structure and the capacity for collective actions in architectural research. These could be manifold.

We suggest but a few:

- the publication of the list of ongoing research projects in the different schools
- a list of publications of each school
- a list of ongoing and finished Ph.D. theses
- a list of tenure staff with research area
- a reader on history, a reader on architectural theory
- a list of priority in research topics
- identification of common research topics
- a thematic network amongst EAAE schools of architecture
- in-depth course content development
- a case-based library

Most of these can be organised through the Internet.

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