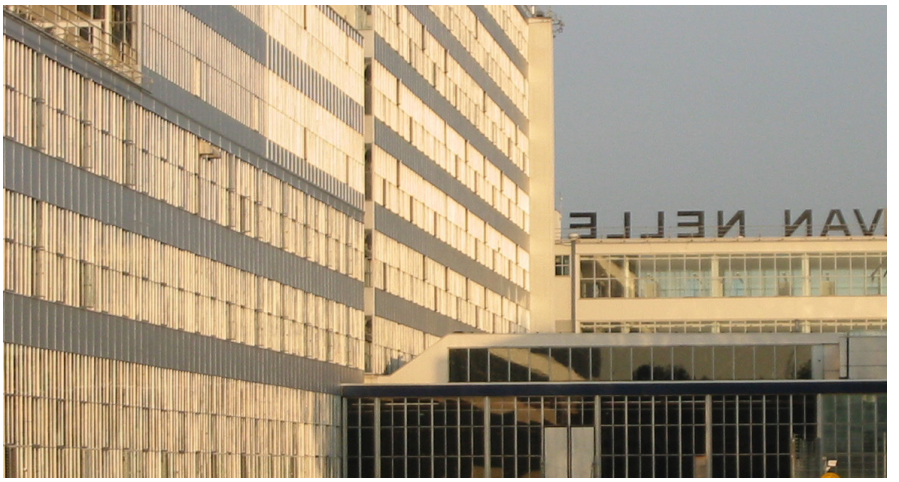

Modern Building Reuse: Documentation, Maintenance, Recovery and Renewal

Vincenzo Riso, editor

Universidade do Minho
Escola de Arquitectura

Modern Building Reuse: Documentation, Maintenance, Recovery and Renewal

Proceedings of the Advanced Training Seminar *Architecture: Sustainability, Conservation and Technology*

Second Edition of the Doctoral Programme in Architecture of EAUM
Academic Year 2011–12

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The Van Nelle Factory, Rotterdam, after restoration in 2003, rear overview.
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The Van Nelle factory, Rotterdam, after restoration in 2003 - The common dinning hall in the ancient toasting house with it's double height space. Photo by Vincenzo Riso, 2006.

Foreword

Vincenzo Riso

The present volume gathers the transcriptions of a great part of the lectures given within the second edition of the Doctoral Programme in Architecture of EAUM (School of Architecture of the University of Minho) of the academic year 2011-12. Under the motto *Architecture: Sustainability, Conservation and Technology* and considering all the didactic intentions, we thought about *Modern Building Reuse: Documentation, Maintenance, Recovery and Renewal* as a specific thematic line, which could embody the current changes in architectural education and professional practice, and their significant impact on the way architectural knowledge is today developed.

This idea emerged on the assumption that nowadays the conservation conditions of modern buildings, whether recently proliferating on the periphery of the urban consolidated centres or inserted in the historic centres, begin to require a special disciplinary attention. Due to both technical-projective and socio-economic reasons, most of these buildings can no longer endure the challenges of a long service life or respond satisfactorily to the current performance requirements. For these reasons, the uncertainty of their destiny is a growing concern. Even though, in some cases, demolition may be advisable, the radical solution of replacing a great share of buildings is not sustainable. Social housing buildings as well as administrative, commercial, sportive and educational buildings, which formed the

Vincenzo Riso was the cientific cordinator of the 2011-2012 Academic year of the doctoral program and is the current dean of the EAUM - School of Architecure at the University of Minho.

basis for the development of cities in the twentieth century, are in danger of being abandoned or inappropriately altered, consequently losing not only their cultural and social legacy, but also their real economic value.

Therefore, under the theme of ageing technology and physical degradation of buildings, constructed in the twentieth century, we invited a number of renowned specialists to provide us with advanced training, based not only on the conscious resolution of constructive aspects, but also on the critical reflection on the emerging and key themes of contemporary architectural thought.

The systematic description and diagnosis of defects in buildings constructed with the so-called modern materials – iron, concrete and glass – is a key aspect that cannot be separated from the historical and critical interpretation, which is essential to devise a coherent extension of the buildings' service life (e.g. depending on the definition of an appropriate strategy for conservation and/or restoration that should respect the subject of the intervention). Since the 1980's, the so-called monuments of modern architecture – all the buildings that symbolise the History of Architecture – were being tested to determine the best practices of analysis and intervention aiming at their conservation. From those case studies, it became clear that it is essential to understand the relationship between design and technology, as well as between materials and construction culture, which is in fact crucial to the specific material reality of each work that is important to preserve.

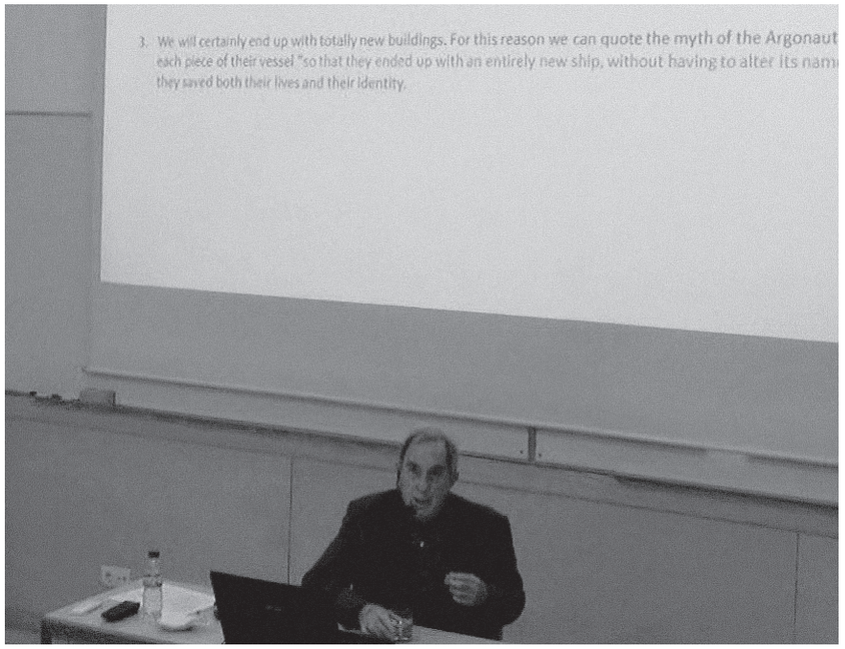
To summarise, we tried to recognise this need by disseminating research methodologies and best practices of intervention applicable to the material and cultural conservation of modern buildings, whether they are classified as heritage or just as usual places of our daily lives.

Beyond representing the tangible result of a scientific understanding, this publication offers us a moment of reflection on the nature of the doctoral programmes and research in architecture, which explains the pertinent section entitled "Research Methodologies", present in this volume.

As a result, this publication not only presents some characteristics of the doctoral education offered by our school, but also constitutes a moment to envisage new ideas that will provide a variety of themes and the continuation of the link between architectural research and practice in future editions of the programme, by taking into consideration the requests deriving from society.

The collection of such comprehensive themes and intentions has been possible mainly due to the kindness of all the lecturers who first participated in the Seminar – Ana Luísa Rodrigues, Ana Tostões, Benedetto Di Cristina, Bruno Mengoli, Carlos Puente, Giovanni Fontana Antonelli, Ivo Hammer, José Gigante, José Miguel Rodrigues, Maija Kairamo, Manuela Almeida, Nuno Valentim, Paulo Catrica, Paulo J. S. Cruz, Pedro Bandeira, Peter Erlacher, Raimundo Mendes da Silva, Teresa Ferreira, Vasco Freitas, Vítor Abrantes – and doubly to those who then accepted to work on the resulting text in this publication. Therefore, as concluding words, we express our profound gratitude to them.

THE DEFINITION OF THE FIELD



Benedetto Di Cristina lecture on the 21st of October 2011. EAUM

Two or three things I know about conservation of modern architecture

Benedetto Di Cristina

It took a long time to accept the idea that the works of modern pioneers, full innovators, who would reject the notion itself of heritage, could become a subject for conservation. An early and stimulating contribution came from practicing architects like the Smithson who performed a systematic and passionate field survey of modern icons, following the idea to convert the principles of modern architecture into a language of their own. They made the first inventory of "heroic relics". But the definitive formulation of an effective and convincing strategy, based on intelligent reuse, came from a place where modernity was born when Hubert Jan Henket and Wessel de Jonge demonstrated at Zonnestraal sanatorium that a modern masterpiece could be brought back to life from its ruins and founded do.co.mo.mo. At that time this was a most convincing answer but also the beginning of an unpredictable process. Documentation and conservation were absorbed into the art historians' domain to become part of a practice that extended its scope to the whole of XX century architecture, including the works of authors who considered themselves traditional. This opens again the old problem of remaining true to the spirit of the modern when literal conservation of buildings could become a subtle way to betray its ideals of social and technical progress. It is still an unanswered question that could possibly spot our future.

> "Sometimes we can spot our future through the unanswered questions of our past"
>
> (quote from *La strada di Levi*, a 2006 film by Davide Ferrario and Marco Belpoliti)

For almost thirty years the idea that XX century modern architecture would need and deserve conservation was considered inappropriate and almost dangerous. Several modern buildings had been conceived as expendable by their designers, pioneers of full innovation,

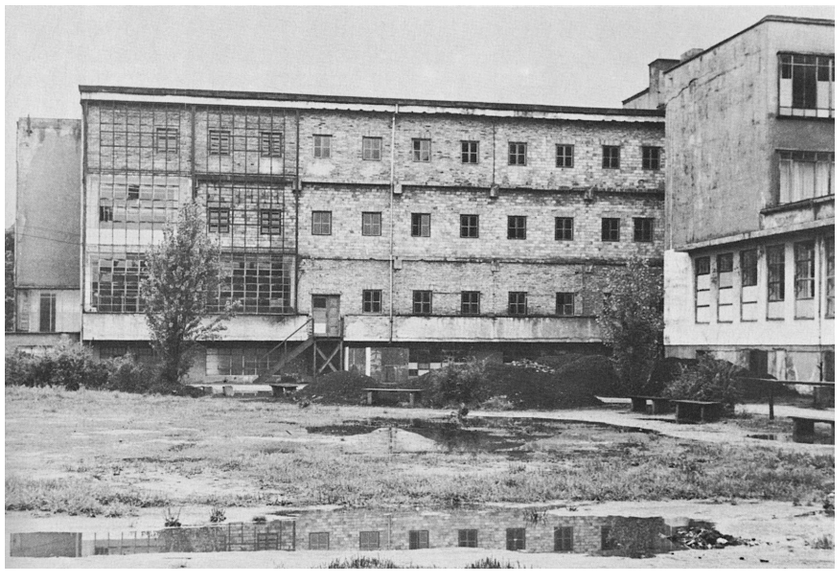


FIG. 1 Bauhaus in ruins photographed by Benevolo in 1956. Pictures like this reinforced the conviction that modern buildings' expendability should be accepted as matter o fact.

who would have never thought that their works could become heritage of the past. Far from pursuing their ideals of social and technical progress, conservation of modern buildings could be a subtle way to betray them. A few lines from Leonardo Benevolo's 1956 visit to the Bauhaus site, in ruins [FIG. 1]:

> "This type of finishing (white plaster, Ed.) worsens the maintenance activity, and, with identical conditions, the Bauhaus Building ages certainly worse than Fagus factory;[1] but this result must be attributed to the new conception of architectural values. If architecture is not confined to embody the ideals of society but must instead contribute to implement them, then architectural artefacts are worth in relation to the life that takes place in them, and, differently from natural things, don't last more then men, and need to be maintained with specific operations. Therefore, now that its original life is gone and it has become a stack of broken walls and frames, the Bauhaus, strictly speaking, does not exist anymore; it isn't a ruin, as those of ancient building, and has no physical allure. The emotion raised by its sight is of historical and reflected nature, as it happens in front of an object that belonged to a great man".[2]

We can now imagine that keeping rational and cool was, at that time, also a way to control the emotion to see that such an architectural landmark had not survived the tragedy of German and European history. Nevertheless the belief that the pursuit of modern movement's mission could do without the actual conservation of its buildings lasted much longer, as we see in this speech of Martin Pawley[3] at the first do.co.mo.mo. conference (Eindhoven 1990). Suggesting that "terminal neglect" was the only alternative to "filmed destruction" to remain true to the spirit of modern architecture he asserted:

> "Although bathed in a sentimentality of its own, the concept appeals to me because it reminds me of a trip I made as student to the maison Savoye in the summer of 1957, when this great Corbusier villa was a ruin surrounded by waist-high grass and nettles. At that time one could enter the building easily, wander up and down the discoloured ramp, contemplate the looting of one of the doorhandles, even find undrunk wine in a cupboard. Never was the authority of this machine for living in so well expressed as in this scene of picturesque desolation. It was like stubbing upon a forgotten battlefield, which in a sense was exactly what it was".[4]

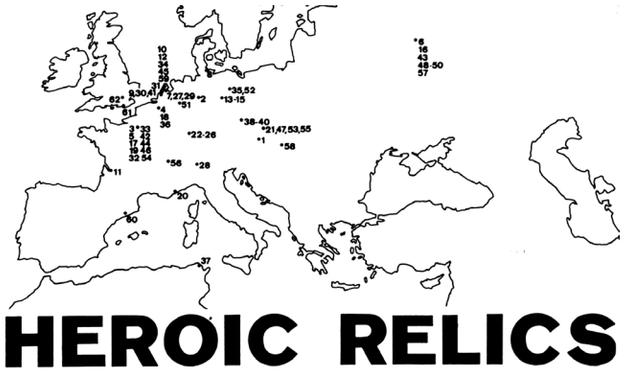


FIG. 2 Map of the first 62 "Heroic Relics" published in 1965 by A&P Smithson. It covered a period of 27 years: from Adolf Loos' Steiner House in Vienna, 1910, to Maxwell Fry's Kensal House in London, 1937.

We find a new approach in the work of A&P Smithson who made in fact the very first survey of 62 modern movement's key buildings [FIG. 2] in two issues of *Architectural Design* (12/65 and 12/67).[5] As theorists and practicing architects, highly engaged in converting the principles of modern architecture in a language of their own, the Smithsons repeatedly visited some works of the modern masters in an attempt to understand and learn, through direct experience, what they had studied beforehand in drawings and photographs. [FIG. 3-6] Though conservation and maintenance weren't their explicit task, their work on "heroic relics" was an implicit request to keep alive such an invaluable and limited source of study and investigation "because it is the rock on which we stand". Their following books — *Without Rhetoric* and *Changing the Art of Inhabitation* — perfected this special type of field survey.[6] With the second book we are close to the end of the century, when the need for conservation and maintenance of modern architecture is widely recognised. In the meantime research and investigation have gone through significant steps. Among them we must remind Max Risselada's courses at Delft Technical University and the book he published in 1988[7] performing

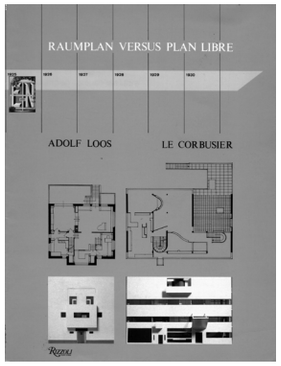

3


4


5


6

FIG. 3 - 6 Farnsworth House (left) and Upper Lawn (right). In a genuine effort to create their own version of Mies glassed pavilion the Smithson were not ashamed to use the humble available technology: balloon frame on top of stone walls.



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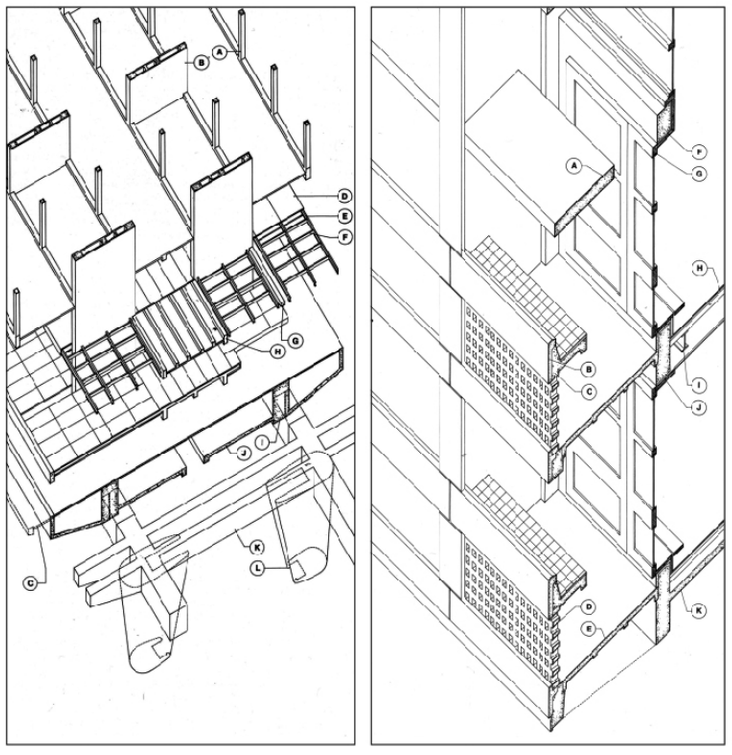

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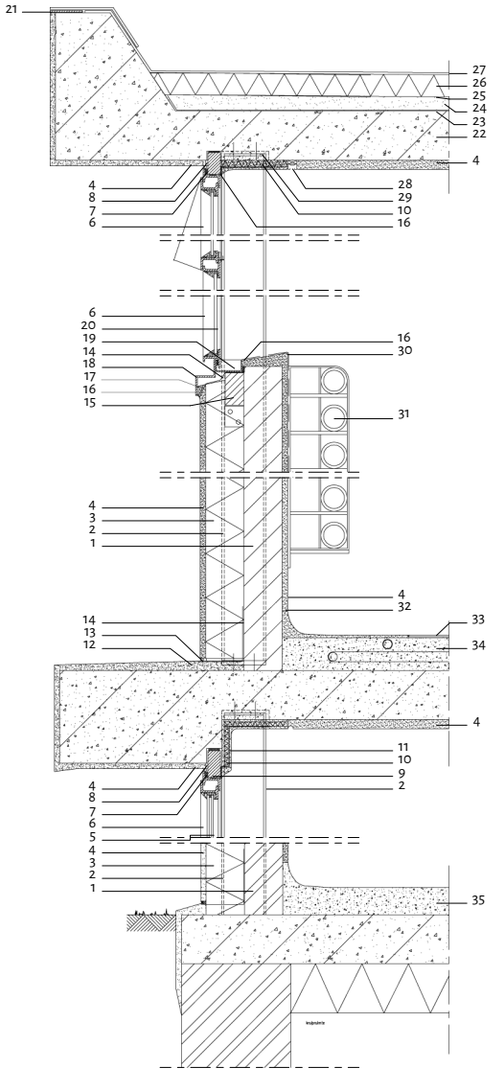
FIG. 7 *Raumplan versus plan libre*. The cover of the first edition fully anticipates the contents of the research. Documented comparison of projects based on scale drawings and models, in the context of XX century history.
FIG. 8 Front cover of *Rassegna* December 1985. Basic drafting instruments to symbolise a new attention to the production of architecture and its "humble" processes as opposed to generic exposition of formal-artistic values by professional historians.
FIG. 9 Edward Ford's axonometric line drawings give a complete and effective description of architectural conception and construction. In this case Marseille's *Unité* is exactly depicted in its constructional complexity of a layered building, resulting from a hybrid combination of work in situ and assembled components. Quite far from the initial concept of "inserting bottles in a rack".

a stimulating comparison between Adolf Loos's *raumplan* (interlocking different spaces within an almost traditionally built envelope), and Le Corbusiers' *plan libre* (stacking different floor plans thanks to a concrete pin point structure). In this original work architectural conception-composition is explained with interpretational drawings and extremely detailed 1:20 models made after scrupulous historical research [FIG.7]. This method also acknowledges the pluralistic nature of modern architectural thinking, whose "truth" can better result comparing different works. In the same line Manolo De Giorgi, for a time director of *Abitare*, the Italian magazine that performed a successful combination of large diffusion with uncompromised modernity, edited the December 1985 issue of *Rassegna*: *Microstorie di Architettura* [FIG. 8]. "If history is the science of the past is it than scientific to consume architectures as products without going through the steps of their production?" [8] He meant that the way we learn architecture from XX century buildings is too important to be left in the hand of professional architectural historians, who tend to see formal-artistic values detached from the process of their production. A similar idea led the work of Edward Ford, professor at UVa School of Architecture, who published, in 1990 and 1996, the two volumes of *The Details of Modern Architecture*, by far the most complete research in this field.[9] Ford's axonometric line drawings, intended to give an immediate full understanding of the buildings' construction, reached a particularly effective synthesis between architectural illustrations and technical diagrams [FIG. 9].

The first do.co.mo.mo conference in Eindhoven (1990) is the official announcement of a new attitude based on a type of pragmatic reuse that entails some fundamental steps: carefully selecting new suitable functions;[10] restoring or reconstructing the buildings



New facade

1. light brick
2. new steel INP80 post
3. thermal insulation, Rc=2,0 m2/W
4. mineral plaster
5. double glazing 4-4-3
6. steel window casing = 32 mm
7. pre-compressed neoprene
8. cellular rubber
9. wooden batten in existing concrete rebate
10. thermal insulating plaster
11. wire net
12. cementicious plaster
13. sealant on backer rod, inlaid with san and painted
14. dpc foil
15. wooden batten
16. cut
17. weep hole
18. drip Z40
19. condensation gutter
20. single sheet glass d = 5mm
21. aluminium strip d = 3mm
22. extant concrete roof slab
23. damp proof foil
24. cementicious sloping layer 5mm/m
25. bituminous damp proofing
26. thermal insulation, Rc = 1,3 m2K/W
27. bituminous roofcovering
28. curtain rail
29. existing concrete rebate
30. fortolite water proofing
31. replica tubular radiator
32. cement plinth 225 mm
33. replica linoleum
34. cementicious top flooring with heating/cooling
35. replica terazzo d = 50-60 mm

FIG. 10 Vertical section of Zonnestraal reconstructed by Wessel de Jonge. This operation requires a subtle adaptation of early XX century technology to contemporary standards. Courtesy by Wessel de Jonge Architecten.

FIG. 11 Zonnestraal sanatorium brought back to life became the icon of a successful approach to conservation based on sensible reuse, historical documentation and technological expertise. Photo by Benedetto Di Cristina

with original materials and techniques; executing the necessary modifications in tune with the architectural conception of the original designer. This move would have never be possible without the contribution of Jan Hubert Henket and Wessel de Jonge whose pioneering work at Zonnestraal sanatorium would become the emblematic example that a modern masterpiece could be brought back to life from its ruins. Sharing the scientific approach to design that had led Duiker's work in the twenties, they showed that conservation of the modern could start from the places and buildings were the early modernity bas born [FIG. 10-11]. A look at the conference programme shows that:

- the role of modern architecture as a basic component of XX century culture is now widely recognised. Cultural institutions as European Council and UNESCO are fully involved in the project;
- a number of exemplary projects can be tested and discussed to evaluate the proposed methodology;

– the mission of conservation-documentation is going to extend its scope to the whole of XX century architectural heritage, including the works of architects who considered themselves traditional.[11]

It is now the case to remind that, since the late seventies, the idea of a possible "renaissance of the European city" through a full conservation of its heritage, had softened the opposition between modern and traditional, so strongly felt in the interwar period of XX century. "The city within the city", final document of a 1977 workshop at Berlin Sommer Akademie, stated that "The superimposition of ideas, concepts, decisions, causalities, and reality across the arc of seven centuries have given the city its present form... The contemporary vicinity of contrasting elements is from a historic point of view the expression of the dialectic process in which the city has always found itself and still does. The project for critical antithesis and divergent multiplicity is the profound sense and characteristic of Berlin".[12] From that moment documentation and conservation of XX century architecture enlarged its field of action [FIG. 12], well beyond single buildings, to relevant sectors of the towns. The German Siedlungen of 1924-1933, still present in towns like Berlin, Frankfurt, Magdeburg, Leipzig, whose basic maintenance had never really stopped, thanks to collective ownership of the estates by the original building societies, received further care after 1989 and some of them are now listed in UNESCO world heritage [FIG. 13]. The "Ring 20-40" of Amsterdam, by far the larger and better housing programme of its time (90.000 dwellings built under the strict guidelines of the municipality, in a unique process of collaboration between different architects) went through a long work of documentation and restoration, whose important step is the *Atlas* edited by G. Bolhuis.[13]

XX CENTURY BUILDING TYPES TO BE SCHEDULED FOR CONSERVATION

1. Factories
2. Railway stations and buildings for urban rail transport
3. Buildings for transport by car: viaducts, service and petrol stations, garages and parking places, racing and testing circuits
4. Buildings for air transport –airports, hangars etc.
5. Cableways and lifts
6. Power stations, and installations for producing and delivering energy
7. Post and telecommunication offices
8. Building for commerce, shopping arcades, department stores, markets
9. Buildings for storage of goods and products, silos and weathering places
10. Places for exhibitions and fairs
11. Clubs and meeting places
12. New towns and villages for workers
13. Holyday places for the workers
14. Sport equipment, large stadia for football, gymnasia, nautical clubs
15. Cinemas
16. Modern hospitals i.e. hospitals for the treatment on TB
17. Skyscrapers and office blocks
18. Defensive structure for the modern war (trenches, bunkers, air-raid shelters)

FIG. 12 XX century building types to be considered for conservation according to E. Godoli "Restaurare il moderno". *La Nuova Città*, n. 3, 1993.

FIG. 13 The insertion of Berlin interwar housing estates into the UNESCO list (2011) marked the official recognition of modern social housing as heritage of XX century, while reckoning the effort of the city to maintain e conserve them through the vicissitudes of German history.

With this unexpected enlargement of conservation programmes architects have to face new and different questions. At the beginning of their work they had to ask themselves what to do in front of the pitiful decay of some icons of the modern movement: was there a way to keep them in life without betraying the ideals of their authors, who were often convinced asserters of building expendability? Could the principles of restoration, invented to ensure the survival of historical buildings, by employed for the works of a movement that had pursued a most radical break with history?

Now that documentation and academic research on XX century architecture have become, as predictable, much faster and efficient than the actual conservation of buildings, practicing architects must redefine their role and their priorities. To answer these questions we must first acknowledge that documentation and research of the very detailed type that started in the past twenty years is an invaluable tool in itself, even when it can't be followed by conservation.

Historical research on prefabricated housing estates built mainly in eastern Europe (subject of September 2011 do.co.mo.mo. meeting in Glasgow) could possibly clarify what went wrong with concrete panel construction, started in Frankfurt *siedlungen* as early as 1925. A pathologic distortion of the initial (good) method induced by totalitarian ideology? What then about the complete adaptation of the Balency system started in 1970 by GLC for the new town of Thamesmead? Accurate and updated survey of the state of conservation of key buildings and places should regularly alert the public to prevent the false belief that, because of the large amount of studies and documentation, modern architecture is now well preserved. At present we can affirm the opposite: it is still in great danger in spite of the large amount of research being carried on it. A single example: Florence railway station, 1936, (a most celebrated masterpiece of Italian Rationalism that foreshadowed the contextual approach to modern design of Italian post-war architecture) has never ben seriously restored. Maintenance is lacking; additions are improper; a trendy bus terminal added in the eighties resulted so unsuitable that it was removed last year (though with undue brutality); the ventilation shaft of the new underground parking is a scar in the front garden; the shopping arcade added to the pedestrian underpasses was such an economic failure that is presently being sold.

We must therefore accept that not only the restoration approach is unsuitable but also that full conservation is out question. We should instead remember that a most effective contribution came from architects who saw in modern masterpieces a principal source of inspiration for their present work. The Smithsons' love for Mies was explicit both in their writings and in their work; as much as Henket's affinity to Duiker can be appreciated in some of his minimalistic works

as the Maasteather in Rotterdam [FIG. 14]. In any case, we will end up by selecting some really crucial aspects (environmental, architectural, typological, constructional) of the places we want to conserve and to give them the right evidence. When this kind of selection and choice are consciously and responsibly done we can hope to avoid the worse: definitive loss of a work of architecture.

It is in this sense that we can use the metaphor of the Argonauts who, to rescue their ship and their lives, had to change, piece by piece, all parts of it and ended up with an entirely new vessel without having to alter its name and its form.

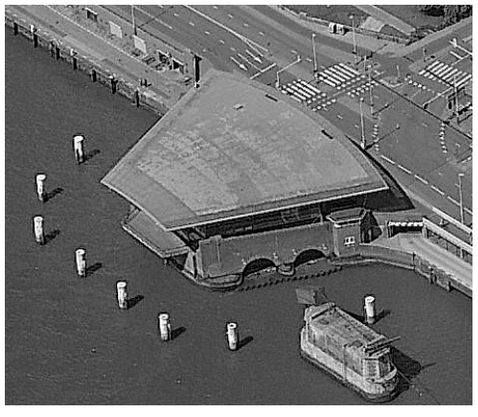


FIG. 14 Rotterdam *Maastheatre* by Hubert Jan Henket. A Willemsbrug pier, that survived the bridge's destruction, was covered with an elegant steel frame to make a unique stage with breath taking view on the river. Pioneers of modern conservation share with the modern masters this minimalist approach to design.

Notes

1 He had previously described Gropius' Fagus factory (Alfeld an der Leine, 1911) to be built with solid bricks and therefore well preserved at the time of his visit.

2 Leonardo BENEVOLO, *Storia dell'architettura moderna*, Bari: Laterza, 1971, p. 463. [translation from Italian by the author].

3 Martin Pawley, 1938-2008, among the most listened critics of the British architectural scene, very well known for his radical ideas and unconventional approach to design. Among his most original projects was the conversion to housing production of the assembly line of Citroen 2ch vagonette, done in 1972 for Chile under embargo.

4 "A modern morituri" in Proceedings of First do.co.mo.mo International Conference, September 12-15 1990. Eindhoven, 1991, p. 64-68.

5 Alison SMITHSON; Peter SMITHSON, "Heroic Relics" in *Architectural Design*, n. 12, December 1967, p. 542. "The heroic period of modern architecture" in *Architectural Design*, n. 35(12), December 1965, p. 590-639.

6 Smithsons' books are a unique combination of travel notes, architectural theory and design proposals.

7 Max RISSELADA (ed.), *Raumplan versus plan libre*, New York: Rizzoli, 1988.

8 *Rassegna* 24, December 1985, "Microhistories of architecture".

9 The only one precedent could be Alfred Roths' *La Nouvelle Architecture* of 1940,

10 This is even more important than giving the project to its original architect, as stated by Henket at first do.co.mo.mo. conference when commenting the future conversion into school of Aldo van Eyck's orphanage. Proceedings of First do.co.mo.mo International Conference, Sept.12-15 1990. Eindhoven 1991, p.53.

11 Of the architecture called traditional in the XX century Henry-Russell Hitchcock wrote "it can now be seen to have been not so much a cul-de-sac as a road without a goal". Henry-Russell HITCHCOCK, *Architecture: Nineteenth and Twentieth Centuries*, New Haven: Yale University Press, 1958.

12 "Cities within the city, Proposals by the Sommer Akademie for Berlin", *Lotus Internationa*l n. 19, 1978, pp.82-97.

13 Gijs BOLHUIS (ed.), *De Atlas Gordel 20-40*, Amsterdam: Stedelijke Woningdienst Amsterdam, 2000.

Casa de Serralves, interior view after conservation by Álvaro Siza, 2014. TF

Some considerations on the preservation of 20th century architectural heritage

Teresa Ferreira

These brief notes relate to the shared reflections and discussion that took place at a seminar held in 2011 at the Escola de Arquitectura da Universidade do Minho, which dealt with the general context on the safeguarding of 20th century architectural heritage, with special emphasis on conservation and maintenance practices. These considerations are not intended to be conclusive or systematic, as they do no more than highlight some of the questions raised in the course of the debate. The seminar involved a discussion of both theoretical and methodological issues, followed by the presentation of concrete examples.

The preservation of 20th century heritage is now one of the most challenging debates taking place in the field of architectural conservation. Among others,[1] the ICOMOS International Scientific Committee on 20th Century Heritage laid down some useful guidelines for its safeguarding and conservation, which are summarised in the *Madrid Document* (ICOMOS ISCAH20, 2011).

Despite its international recognition, 20th century architecture and particularly in Porto is frequently a *heritage at risk* – or *prizewinning ruins* (Tavares, 2012) – as it belongs to a recent past that has not yet been sufficiently recognised or studied. Most of it remains unprotected by structures or laws designed to guarantee its safeguarding,[2] and it is still not afforded due recognition by public opinion. In this way, it would be interesting to discuss ways of transforming this problem into an opportunity, by implementing proactive (and not reactive) measures for its safeguarding.

FIG.1 Álvaro Siza, Casa de Chá da Boa Nova, 2013. Photo by Attilio Fiumarella.

Nevertheless, some positive programmes have been implemented in the form of inventories and surveys undertaken by DOCOMOMO Iberico, *Ordem dos Arquitectos* (*Inquérito à Arquitectura do século XX – IAPXX*), SIPA (*Sistema do Inventário do Património Arquitectónico*) and the recent listing of 20th century buildings carried out by *Direcção Geral do Património Cultural* (DGPC, former IGESPAR), among others.[3] Moreover, the number of seminars,[4] exhibitions, publications and studies on these subjects has been gradually increasing. However, these seem to be insufficient, as only a few buildings are protected and even some of these are at risk, because of their lack of use or maintenance, as well as accidents or intrusive transformation.

But what is the specificity of this kind of heritage? What are the differences between this and other period heritage? How should it be identified and how best can it be safeguarded?

FIG.2 Eduardo Souto Moura, Casa no Gerês, 2012. Photo by Leandro Oliveira.

Generally speaking, despite its diversity, 20th century architecture (especially since the modernist period) stands out both for its scale and its quantity (including serial production), its new architectural programmes and typologies, the new building materials and constructive techniques that start to be employed (or old materials used in an innovative way) and which normally age faster than pre-industrial construction (Boriani, 1997).

In some contexts, such as that of Porto, we can find the persistence (approximately until the 1960s) of hybrid constructive solutions which incorporate industrial and pre-industrial systems and materials (stone, limestone plasters, concrete, wood, metals, glass, plastic, aluminium, etc). Moreover, also in Porto some modern buildings form the 40s and 50s have very interesting contextual relationship with its pre-existing urban setting (in terms of scale, proportion, materi-

als and textures) for instance as in the Edifício da União Eléctrica Portuguesa by Januário Godinho (1952-55) or in the Edifício Parnaso by José Carlos Loureiro (1954-1956), listed since 2013.

As far as the safeguarding of this heritage is concerned, one operative instrument is the *Carta do Património*[5] (Heritage Map) published by the Porto Municipal Council, as it is directly linked to regulatory plans and urban municipal policies (Plano Director Municipal). The map identifies heritage based on criteria such as antiquity, rarity, authenticity, artistic and scientific value, the authorship of the project, as well as the aesthetic quality or innovative character of the architecture. Moreover, this map includes not only listed buildings, but also other buildings and areas with patrimonial interest such as UNESCO World Heritage, archaeological, urban or architectural protected areas of interest, natural heritage, among others. In this way, this tool makes it possible to safeguard buildings that are not protected by other governmental regulations.

Another support provided by Porto Municipal Council is the *Carta dos Bens Patrimoniais*[6] which has no legal determination but is intended to provide the public with information about historical and architectural heritage of artistic value in the city (churches, palaces, public buildings, housing, public art, among others). Furthermore the map is permanently updated by the *Divisão Municipal de Museus e Património Cultural* and is linked to the inventorying of forms of characterisation of buildings and artefacts.

Through an analysis of these maps, we can conclude that most of the buildings with heritage value in the city of Porto date from the 20th century, naturally with a greatest incidence on the 19th/20th century areas of the expansion of the city. Furthermore, we can see that approximately 1/3 of the listed buildings in the city of Porto are from

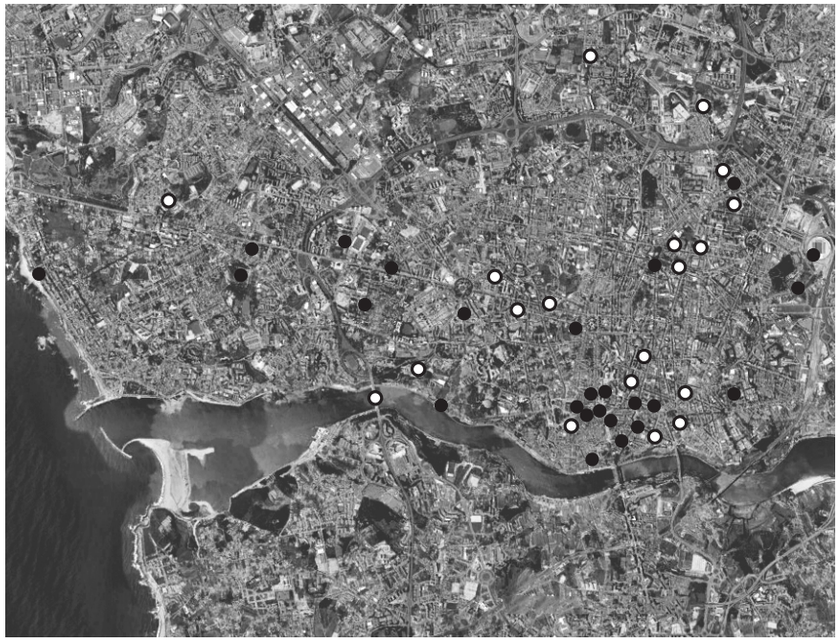


FIG.3 Map with indication of listed heritage of the 20th century in the city of Porto, January 2013.

FIG.4 & 5 Januário Godinho, União Eléctrica Portuguesa, 1952-1955. Photo by Carlos Albuquerque Castro; Edifício Parnaso, José Carlos Loureiro, 1954-1956. Photo by Rodrigo Rodriguez.

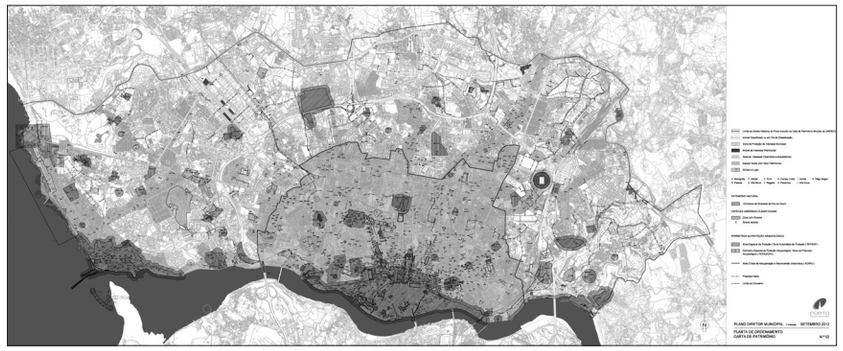


FIG.6 *Carta do Património* (Heritage Map) of the *Plano Director Municipal* of Porto. Source: *http://goo.gl/w1ksuQ*

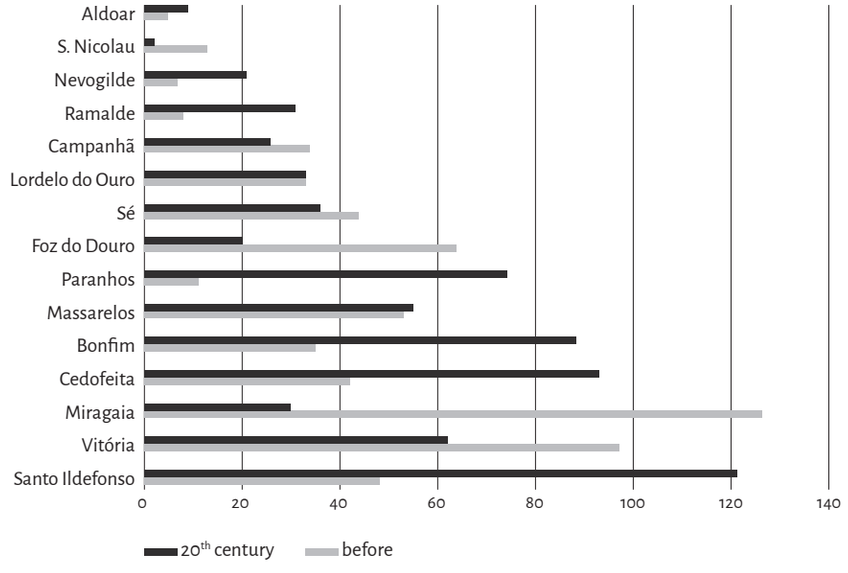


FIG.7 Graph showing the distribution of 20th century heritage in the city of Porto in the *Carta do Património*. Domingas Vasconcelos.

the 20th century (32%), even though more than half of the buildings with patrimonial value identified in the *Carta do Património* were built in the 20th century (53%).[7] These numbers underline the progressive importance of specific attention and knowledge for the safeguarding and conservation of this kind of heritage.

But how to conserve 20th century heritage and how to manage the inevitable transformation? Which criteria should be followed and what are the differences when compared to intervention activities undertaken on buildings of different periods? Should we conserve design authenticity or material authenticity?

This has been a matter of intense debate over the last 20 years,[8] and there has been some consensus achieved in the general recognition that existing philosophical approaches, such as conservation charters, are broadly applicable to the conservation of 20th century heritage; still, there are some specific technical challenges (innovative construction and use of materials) that require careful case-by-case consideration. Hence, as in other architectural periods, the methodology and criteria of intervention should follow an architectural reflection based on a casuistic approach and, conflicts between design and material authenticity must be balanced, with significance at the core of decision making (Macdonald, 2009: 8).

However, some authors maintain that, in the conservation of 20th century architecture, there has been a prevailing trend (particularly in relation to the so-called iconic buildings) to give special privilege to the formal value recovered by restoring an *original* image and neglecting its material and intangible values (ageing, uses, transformations), integrity, authenticity and aura (Dezzi Bardeschi, 1995: 12; Capitel, 2009: 77-79).

Hence, the conservation of 20th century architecture, as well as of more ancient buildings, requires prior in-depth knowledge material signs, "including physical location, design, construction systems and technical equipment, fabric, aesthetic quality and use", but also its intangible values, such as "historic, social, scientific or spiritual associations, or creative genius" (ICOMOS ISCAH20, 2011: 1). In looking for a comprehensive approach to 20th century architectural heritage ("total architecture"), the *Madrid Document* also stresses the importance of identifying and accessing "all components of the heritage site, including interiors, fittings and associated art works" (ICOMOS ISCAH20, 2011: 1).

Acknowledging that function and programme are essential for any kind of architectural intervention, an important consideration regarding the conservation of 20th century architecture is its re-adaptation and its re-use. Modern programs (such as towers, factories, cinemas, garages, among others) are eventually more difficult to re-use because they were constructed for a very specific situation with a functionalist approach ("form follows function"), so that it may become more challenging to find compatible uses, especially in the case of very large-sized buildings.

As far as inevitable transformations and additions are concerned – namely the necessary adaptation of the building to new uses and requirements – the *Madrid Document* recalls the principles of contextual design in continuity with the pre-existing attributes (character, scale, form, setting, composition, proportion, structure, materials, texture, colour). Even though these additions may be discerned as new or identifiable upon closer inspection, they should be "developed to work in harmony with the existing; complementing not competing" (ICOMOS ISCAH20, 2011: 4).

In this matter, Álvaro Siza makes an interesting consideration about the conservation of his earlier work of the *Casa de Chá da Boa Nova* (1958-63): even though nowadays he would have designed it differently, he realizes that it is the project of "another" author and so he considers that we should respect the coherence and the integrity of the pre-existence. Hence, in his words the interior strength of the building should guide the intervention, and "conserving the integrity of what exists is very important" (Siza, 2011: 186,188).

But how to conserve buildings designed for a short life cycle, how to repair experimental technologies and materials, how to slow down their ageing? How to make plans for their cyclical repair, planned conservation and maintenance over time? And how can we best respond to current regulations and comfort standards?

As previously mentioned, 20th century architecture starts applying new industrialised technology and materials – such as exposed concrete, plastics, different types of glass, fibreglass, synthetic rubber, metals – or traditional materials in an innovative way. Consequently, the conservation of 20th century architecture requires specific research and knowledge of non-traditional materials, their condition and deterioration processes.

Interesting research is being undertaken in this field: for example, an interdisciplinary study on exposed concrete (involving both engineers and architects) by the *Politecnico di Milano* that seeks to improve knowledge and identify possible causes of its deterioration, thereby providing better technical solutions for its conservation and repair (Di Biase, 2009).[9] Among other aspects, an important contribution of this research is the definition of a specific and shared glossary on the manifestations of decay,[10] illustrated with images and examples from different European and non-European countries, such as India and Brazil.

FIG.8 Francesca Albani; Teresa Ferreira; "Casa de Chá da Boa Nova" in Calorina DI BIASE (a cura di), *Il degrado del calcestruzzo nell'architettura del Novecento*, Santarcangelo di Romagna: Maggioli, 2009.

FIG.9 - 10 Casa de Chá da Boa Nova during conservation intervention, 2014. Photos by Teresa Ferreira.

Considering the vulnerability of modern heritage to accelerated deterioration caused by material, formal and technological characteristics (such as built-in material problems and a lack of maintenance), preventive and planned maintenance strategies are vital for its conservation and to reduce long-term repair costs (Canziani, 2009). Ordinary maintenance can also be a useful instrument for preventing decay and material damage (and thereby increasing preservation), as well as for improving local participation, education and employment by reactivating professional craftsmanship and construction skills.

As Álvaro Siza also says, "the way in which we have lost the habit of maintaining houses is very alarming. Basically, it's a cultural problem. Until we create an environment, such as the one that exists in the Netherlands, for instance (when spring comes, all you see is people painting windows and doors, and plastering), until we have the possibility of creating this habit and find the resources to do so, it's clear that, on one hand, you will recover some heritage, but, on the other, you also begin to accumulate new heritage that is already beginning to decay. (...). If the money could be channelled into those resources, into creating the habits and culture of maintenance, the problem would be much less serious." (Siza, 2002: 20).

Furthermore, the pressure for architectural heritage sites to become more energy-efficient has been gradually increasing over time, so that conservation should take into account contemporary approaches to environmental sustainability (ICOMOS ISCAH20, 2011: 4). Nevertheless, many pre-existing buildings have good passive design systems (good inertia in their supporting walls, good thermo-insulation, natural ventilation systems), and the existing technical devices have a good potential for reuse, often resulting in economic benefits and greater respect for patrimonial values. This is one of the most problematic

and threatening issues in the safeguarding of 20th century architecture (Tostões, 2011: 205), namely because of current building regulations and standards (e.g. accessibility, health and safety, fire safety, earthquakes, and energy efficiency) which should be more flexible, as they are often not adapted to the site's climatic conditions and thus become very demanding as far as the conservation of pre-existing buildings is concerned.

In Portugal, this problem has recently been minimized by a recent law which does away with the obligation for regulations governing buildings that are more than 30 years old (DL 53/2014 of 8 April); however, on the other hand, this document can be dangerous because of the facility that it provides for conducting transformation interventions.

An interesting case study of conservation of the 20th century architectural heritage is Alvaro Siza's recent intervention at the Casa de Serralves (used for temporary exhibitions), a detached house which is considered to be the most remarkable example of an Art Deco building in Portugal. This house was designed and constructed between 1925 and 1944, and it was listed in 1996 as a "Building of Public Interest".[11] This building is a mixed construction of stone walls, concrete slabs and a wooden roof structure covered by tiles, limestone plaster, steel frame windows, and interior floor coverings in marble and wood.

Siza proposed maximising the preservation of the existing building through a highly surgical conservation intervention with specific and highly accurate repairs.

In the case of the intervention made on the exterior plasters work, localized repairs in deteriorated areas were preferred to complete replacement. Research involved the analysis of pre-existing mortars with

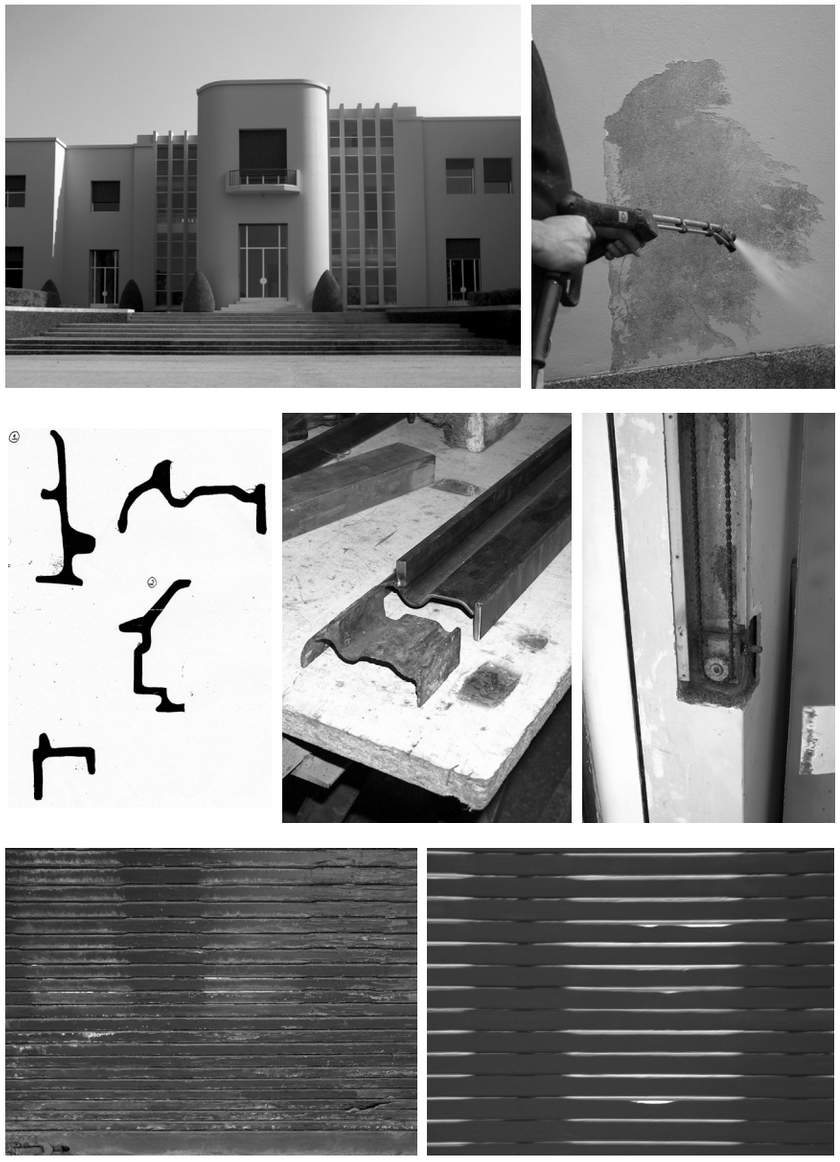


FIG.11 -17 Photographs of Alvaro Siza's intervention at the Casa de Serralves, 2003. On the top: General view and detail of the plasters' conservation; In the middle: Details of the windows' steel frame and the blinds' opening-closing mechanism; Bottom: wooden blinds before and after the intervention. Photos by Filipe Ferreira, A.O.F.

the aim of establishing the most compatible solutions for their repair.[12]

As far as the windows are concerned, extruded steel frames were conserved or replaced, where necessary, with a similar design, and the wooden blinds were conserved, as well as their opening and closing mechanisms. The interior plaster work was partly replaced, while the wooden and marble floors were treated and conserved

Regarding to technical devices the new electrical infrastructure made use of the previously existing circuits, old heating systems were preserved, and a new heating system was proposed, as well as new bathrooms for visitors.

Hence, despite the recent prolific debate on the preservation of 20th century architectural heritage, there are still many questions remaining open for discussion: the definition of authenticity (image, material or progressive?) (Jerome, 2011); the repair of different materials, technical devices, energy efficiency and sustainability, social mission and community engagement, among others. Hence the need for previous knowledge in a case-by-case approach, ensuring that the design is in keeping with the building's aura; all of these principles serve to remind us that "managing change is an essential part of the conservation process to maintain cultural significance, authenticity and integrity" (ICOMOS ISCAH20, 2011: 3).

Finally, the sharp decline in economic and ecological resources calls for a wider reflection on heritage preservation, which should converge not only on the restoration of iconic monuments from the past, but also on built heritage in the broad sense – most of which is from the 20th century – as a resource that is spread all across the territory.

Notes

1 Recently, there has been prolific debate on the documentation, safeguarding and conservation of 20th-century architectural heritage. Among other institutions, DOCOMOMO International, ICOMOS International Scientific Committee on 20th-Century Heritage (ISCAH20), The International Committee for the Conservation of the Industrial Heritage (TICCIH), UIA modern heritage – including the Modern Heritage Committee of the Association for modern Asian Architecture Network (mAAN) – and the Getty Conservation Institute (GCI) have promoted conferences, workshops, meetings and publications on these subjects. For further development of this subject, see Susan MACDONALD, "Modern Matters: Breaking the Barriers to Conserving Modern Heritage" in *Conservation Perspectives, The GCI Newsletter,* n. 28.1, 2013.

2 Very few monuments from the 20th century are listed as national monument (12 in the beginning of 2013). For further information see Ana TOSTÕES, "Património moderno : conservação e reutilização como um recurso", in *Revista Património*, n.º 1, Lisboa: DGPC, 2013.

3 Important researches on 20th century portuguese architecture are among others: Ana TOSTÕES, Annette BECKER; Wilfried WANG (coord.), *Arquitectura do Século XX - Portugal* (Catálogo da Exposição). Frankfurt /Lisboa, 1998; Ana TOSTÕES (coord.), *Arquitectura Moderna Portuguesa 1920-1970*, Lisboa: IPPAR, 2004; Ana TOSTÕES (coord.), *IAPXX - Inquérito à Arquitectura do Século XX em Portugal*, Lisboa: Ordem dos Arquitectos, 2006. For further information see Ana TOSTÕES, *Património moderno* : ...cit..

4 Seminars held about these subjects, among others: Docomomo Iberico thematic seminars - industrial (2005), housing (2009), public buindings (2010), education (2013); *Cuidar das casas 2: a conservação do Património do século XX*, ICOMOS/FAUP/FEUP, FAUP Porto, 8 February 2013; *EWV_Exchanging World Visions, Modern Architecture in Lusophone Africa (1943-1974), looking through Brazilian experience since the 1930s*, International Conference, Escola de Arquitectura da Universidade do Minho, 7-8 December 2012.

5 See *Carta do Património*, in *Planta de Ordenamento*, *Plano Director Municipal do Porto*. Source: http://goo.gl/w1ksuQ [accessed on 2 May 2014]

6 This map is based on the *Carta do Património*, as well as on the *Carta de Arte Pública* which relates to statues or sculptures placed on building facades or in the gardens, streets and squares of the city. See *Carta dos Bens Patrimoniais* at *http://sigweb.cm-porto.pt/MipWeb/* [accessed on 22 April 2014]. Information kindly provided by Domingas Vasconcelos.

7 Information kindly provided by Domingas Vasconcelos.

8 "Traditional conservation practitioners argued for the application of existing philosophical approaches, tempered by the particular requirements of the conservation challenges at hand, while others argued for a new philosophical approach specific to the demands of modern heritage. The question that generated the greatest debate was whether accepted conservation norms could be applied to places representing the modern age, specifically

with respect to material conservation. Could authentic fabric be conserved without compromising design intent, which had been driven by new social ideals?" Susan MACDONALD, *Modern Matters.* ...cit, p.6.

9 Interesting studies in this field include, among others: Carolina DI BIASE (a cura di) *Il degrado del calcestruzzo nell'architettura del Novecento*, Santarcangelo di Romagna: Maggioli, 2009; Francesca ALBANI, *Superfici di vetro negli anni Trenta. Storia e conservazione*, Santarcangelo di Romagna: Maggioli, 2012. For a broader and more specific bibliography, see: Susan MACDONALD, Gail OSTERGREN, *Conserving Twentieth-Century Built Heritage: a Bibliography.* Los Angeles: GCI, 2011.

10 The research includes the following decay manifestations: "trikling, biological growth, incrustation, warping, mineral deposit (dust), scaling, delamination, efflorescence, erosion, exfoliation, stalactite, stalagmite, staining, discoloration, spall, popout, cold-joint lines, honeycombs, air voids, non structural cracks and, finally, corrosion of reinforcing steel (rust spots, crack, delamination, spalling). See. Carolina DI BIASE and Francesca ALBANI, Alterazioni e degrado in Carolina DI BIASE (a cura di) *Il degrado del calcestruzzo...*cit.

11 The design of the villa may be attributed, with some caution, to the French architect Charles Siclis (1889-1944), and José Marques da Silva (1869-1947), who developed, modified and implemented the project. Carlos Alberto Cabral, Jacques Émile Ruhlmann, and subsequently Alfred Porteneuve also participated in the project, as did Jacques Greber (gardens). See *http://www.serralves.pt/pt/fundacao/a-casa-de-serralves/historia/* [accessed on 22 April 2014]. For further development of this subject, see André TAVARES, *Os fantasmas de Serralves*, Porto: Dafne Editora, 2007.

12 See Universidade do Minho – Laboratório de Engenharia Civil, *Caracterização dos rebocos exteriores da Casa de Serralves,* Proc. 241.03, 2003; Prof. Ing., Vasco Peixoto de Freitas, *Parecer sobre as soluções de revestimento de fachadas previstas na Casa de Serralves*, Relatório HT 2046.03, 2003. Information kindly provided by Filipe Ferreira, A. O. F..

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André TAVARES, "Prize-winning ruins" in *http://domusweb.it*, 14.03.2012. Available at: http://www.domusweb.it/en/architecture/2012/03/14/prizewinning-ruins.html [accessed on 21 April 2014]

Ana TOSTÕES, "Modern and Sustainable: a resource", in *Intervention Approaches in the 20th Century Architectural Heritage*, International Conference CAH20th, Madrid, 2011, pp. 205.

Ana TOSTÕES, "Património moderno : conservação e reutilização como um recurso", in *Revista Património*, n.º 1, Lisboa: DGPC, 2013.

Paulo Catrica lecture on the 25th of May 2012. EAUM

The *Architectural Press* photographs at the core of the modern architecture paradigms, UK 1950/1970

Paulo Catrica

The post-war Welfare State ideological atmosphere favoured the emergence of certain visual types of photographs, which played a critical role in the questioning of the *modern* as the prevailing architectural discourse. This essay aims to discuss how those photographs moulded and influenced the architectural debates themselves.

The archetype of the architectural photographs since the late 1920s, were grounded on the recreation of architectural space into a metaphoric image. Most of the pictures assumed a plurality of visual styles and aesthetic trends, and their roots have no definitive boundaries, thus broadly they can be affiliated to the terms New Vision or New Photography. These apparently distinct visual styles had a considerable impact on commercial and industrial applications of photography. Their symbolic narratives undoubtedly propelled architecture as the core of technological progress and design novelty.

The harsh realities of the war reversed this atmosphere and the post-war new social order propelled another cultural environment. The needs of the Welfare State to expand the access to education and health, together with the reconstruction effort, brought pragmatism and utilitarian concepts to architecture and design. Public commissions by the government or by local authorities became the unique source of work for architects and urban planners. Schools, hospitals, housing schemes, public buildings and the reconstruction

of vast bombed areas were the main types of architectural structures to be built immediately after the war.[1]

In the post-war climate the high sophisticated scenarios rehearsed by the 1930s architectural photographs became associated with the pre-war modernist elite formal and functional aesthetics. They were ineffective to represent and promote a new ideological atmosphere. Reflecting this environment, architectural photographs withdrew from the symbolic abstractions surrounding the form and the design of the architecture object. A realistic approach favoured context instead. Echoing a growing interest in townscape, buildings began to be depicted within their surroundings. In the devastation of post-war Britain, landscape design became a predominant subject of interest for architectural photographs, understanding architecture as the total environment made visible.

A group of young architects and planners who began their practice working in public commissions, immediately after the war, foresaw the need to extend and relocate the ideological role of architecture. Their aim was to bring architecture closer to the "individual body, to become more localized and flexible... to make it less visible and coercive, and more pleasurable and adapted to local differences".[2] The main divisive issue between the younger and the older generation – associated with the MARS group and New Empiricism – was the functionalist's perception of modern architecture and urbanism as stated by the CIAM's Athens Charter (1933).[3] Their critical voice began to be heard at the congress of CIAM 9 (Aix-en-Provence, 1953) in a presentation given by Peter and Alison Smithson.[4] Displayed in the format of a grille, according to CIAM's rules, it combined a series of photographs of children playing in the streets on the left side, with a composition of images and drawings presenting

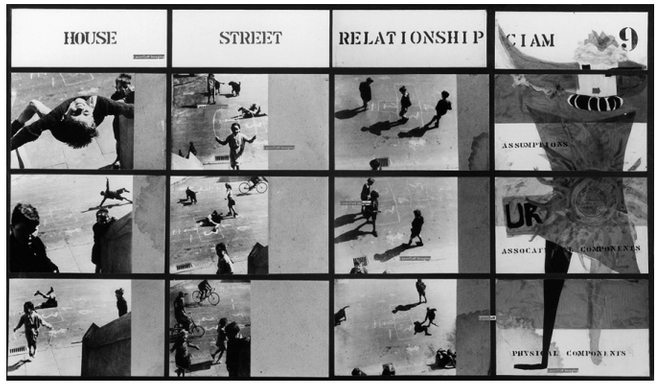


FIG. 1 Team X grid presented at CIAM IX, June 1953. Alison and Peter Smithson, with Bethnal Green Nigel Henderson photographs.

architectural / urban conceptions on the right side. It advanced Smithson's theory of "urban re-identification", developing the concepts of "association" and "identity" in alternative to the functional CIAM discourses.

This presentation became a seminal statement of the counter critique discourses and would later lead to the formation of TeamX. Their critical stance argued against the understanding of urbanism as a quantifiable social science, in Allison Smithson's words, because 'cities patterns spring from man's aspirations rather from his necessities'.[5]

Smithson's grid used Nigel Henderson's Bethnal Green photographs of children playing in the streets shot from a close range together with a view from a street decorated with flags. The photographs' intent to foster a notion of the 'identity' of Bethnal Green was grounded in its strong "community" ties.

Humanistic rhetoric and documentary aesthetics were previously used as critical weapons to denounce the appalling situation of the working class neighbourhood areas. They were recurrently employed

within the "thumbs up" war official propaganda and the debates of the reconstruction.[6] Within CIAM, photographs of children playing were used by Sert in 1942 to denounce the lack of conditions of the old cities and promote the advantages of the functional urban plan. In the aftermath of the war these aesthetics and the humanistic paradigm overran photographic discourses fuelled by notions of getting closer to the subject, unveiling an experience and revealing a moment of truth. Within the architectural these rhetoric's brought into play semi-scientific claims, regarding the hypothesis of a sociological/ anthropological approach.

While seeing the city through children eyes and their performances, Henderson's photographs are inscribed within a recurrent metaphor of the post-war visual representations of urban space. Children playing in the streets are among the most recurrent subject of French humanistic photography from the fifties, i.e. Robert Doisneau, Willy Ronis or Henri Cartier-Bresson.[7]

Children's eyes also lead the viewers through the city in post-war Italian Neo Realism films, such as Roberto Rossellini's *Roma, città aperta* (1946) or Vittorio De Sica, *Ladri di biciclette* (1948). Post-war (neo) realism reinvented documentary discourses, perceiving human subjects through an anthropological stance. They proposed a positive and sympathetic position regarding community life and neighbourhood under extremely difficult living conditions, making use of the shattered urban spaces of European cities as a plateau for realistic poetic chronicles. Although undoubtedly affiliated in these humanistic trends, Nigel Henderson's photographs avow avant-garde roots, blending surrealism, documentary interests and English Neo-Romanticism.[8] They bear the influence of Bill Brandt's 1930s photographs and Humphrey Jennings documentary films. The photographs captured by Henderson at Bethnal Green (1949 to 1953), as well as Roger Mayne's North Kensington work (1956), are commonly acknowledged by architecture historians as seminal visual pieces in the rediscovery of the core of the industrial cities as living communities. They brought notions of urban space and social cohesion at a time when Bethnal Green was overpopulated, extremely poor and bomb damaged and North Kensington on a waiting list to be demolished. However, both Henderson's and Mayne's pictures were peripheral in relation to the prevailing visual types of architectural photographs in Britain and their influence took some time to be felt.

Inside the expertise domain of architecture, in a lecture delivered at Royal Institute of British Architects in 1968, entitled *The camera always lies*, John Donat argued for the need of a less formal and more realistic tendency of architectural photographs. Himself a photographer, Donat was a regular collaborator of the *Architectural Press*, from the 1960s until the 1990s.[9] He expressed his doubts about the photographs of architecture that were devised on perspective and abstract views of the buildings, which he deemed as artistic. He questioned the architects'/editors' obsession with taking photographs of buildings immediately after the conclusion of the construction works and before their inhabitants' and users' arrival. He proposed that architecture photographs should account for a vivid experience of a building or a place, emphasizing the architectural space as perceived by its users, rather than the abstract forms of the building depicted by a photographer. As an example he mentioned Roger Mayne's photographs of Park Hill, Sheffield published at the *Architectural Design* in 1961.[10]

His proposal implied the use of small hand held cameras and the adoption by the photographer of a reportage or journalistic

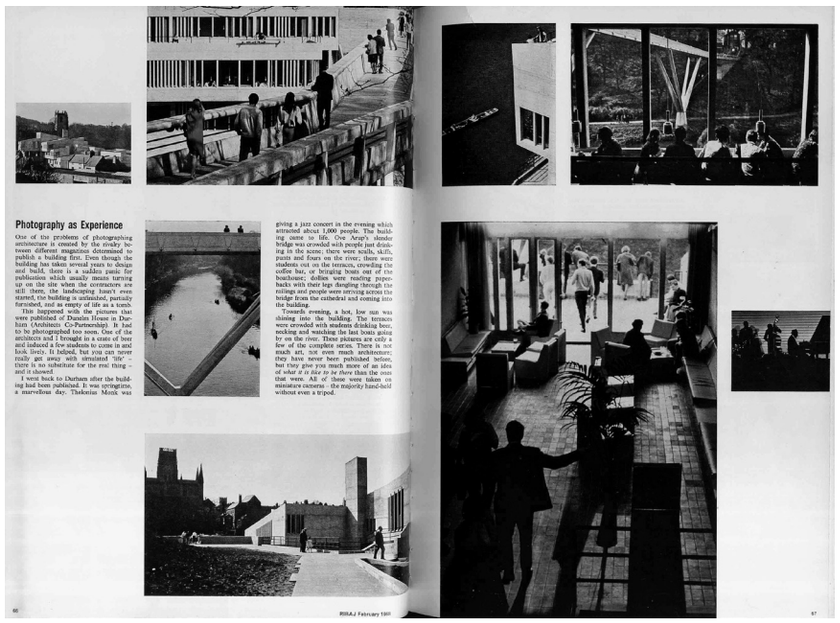


FIG. 2 John Donat RIBA journal, vol.75, February 1968.

approach, in order to develop an understanding of the architecture as a vivid stage. The photographer had to be an observer of daily life, depicting the scene in a casual manner, to use his own words, showing "a slice of time in the life of a building".

Donat's argument was a late call for realistic aesthetics and a humanistic experience of a site, claiming notions of objectivity and veracity. He stated in his conclusion that photographs ought to:

> "(...) reveal the environment, suppress subjective abstractions. Allow people to inhabit pictures (...) If someone sees the photographs and then visits the building – he should feel he has been there already".[11]

The height of this debate surrounding matters of authenticity, subject and representation in architectural photographs came about when the editors of the *Architectural Press* decided to reassess post--war Britain. Instead of discussing the customary issues focused on buildings and town planning, they proposed to address issues such as health, welfare, education, housing, communications, industry and religion. They propped their critique with a visual narrative grounded on radical graphics and photographs with a documentary/ journalistic approach.

Named *Man Plan*, this series of thematic portfolios were published between September 1969 and September 1970. Instead of employing photographers that regularly collaborated with the *Review*, the editors decided to commission photojournalists and documentary photographers. The group included Ian Berry, David Hurn, Peter Baistow, Tim Street-Porter and Patrick Ward, photographers frequently published in Sunday papers' colour supplements. Paradoxically, it also integrated Tony Ray-Jones, who usually refused to work for the media industry.[12]

This series of portfolios proposed to revaluate and discuss the achievements of the British post-war Welfare State, exploring public spaces and everyday life, instead of looking at architecturally conventional subjects, such as building design or town planning. The photographs allude to, and quote, the visual types of the documentary/ humanistic rhetoric. Radical graphics layout spread the pictures along a full page or double pages, with captions or text over the images. It aimed to emphasize the visual autonomy of each photograph within the theme, as well as strengthen its relations to the whole argument. The political engagement of this critique is obvious; the photographs operate as fragments of British society in the late sixties, and their

intention is to denounce the harsh reality and provoke an immediate emotional response in the viewer.

By then, in late sixties, the utopian claims regarding the social implications of architecture were set aside. Ultimately what came out of the *Man Plan's* visual essay is an anticipation of the bitterness and disillusionment that characterized Britain in the 1970s. In its critical stance the *Man Plan* suggests a crisis of architectural representations and the radicalism of their visuals were not unanimous among the editors and readers, which led to the decision of interrupting the publication of the folios in September 1970.

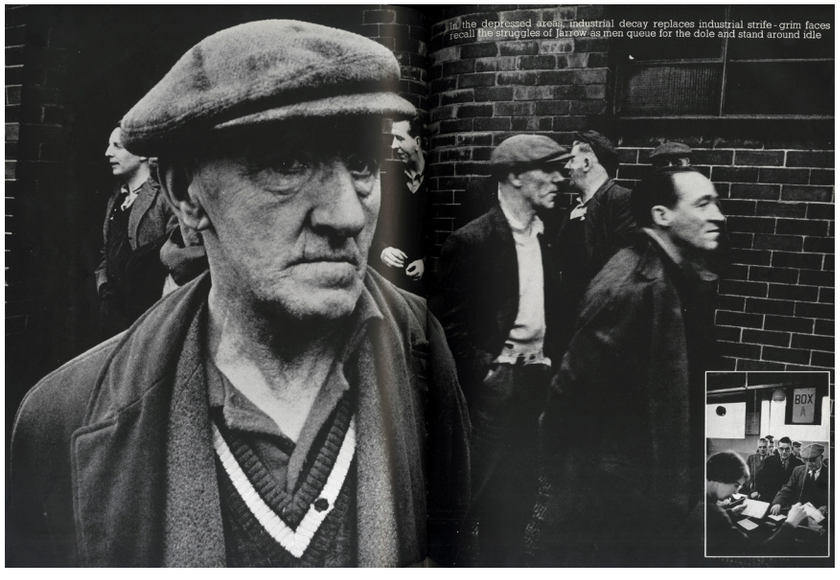


FIG. 3 Architectural Review: Man Plan 1, September 1969.

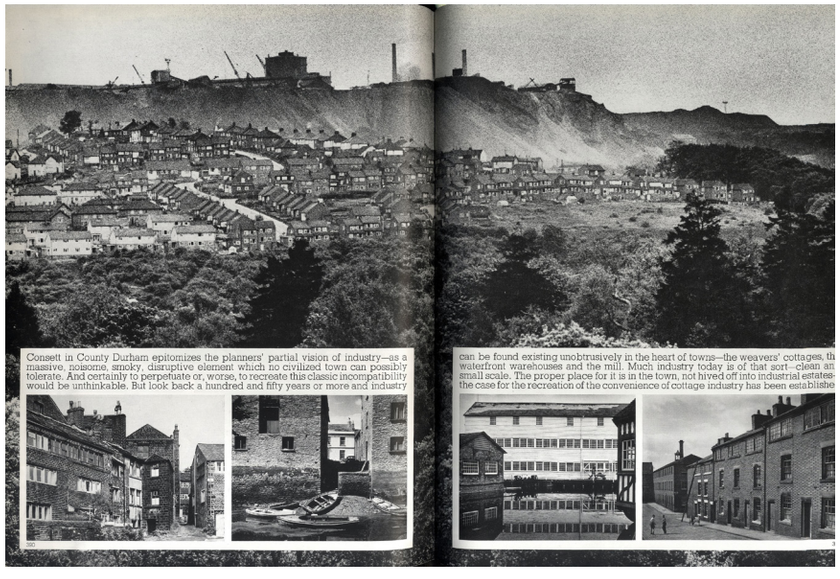


FIG. 4 & 5 Architectural Review: Man Plan 3, November 1969.

Notes

1 Within the politics of reconstruction New Empiricism emerged as the dominant architecture style/trend. The term was coined by J.M. Richards, editor of the *Architectural Review* in 1947, referred to Swedish modernism as the "humanized" aesthetics of functionalism, as an attempt to "bring back another science, that of psychology, into the picture". New Empiricism tempered radical functional architecture favouring the employment of indigenous materials and including traditional forms. In J. M. RICHARDS, "The New Empiricism: Sweden's Latest Style" in *Architectural Review*, 101, June 1947, pages 199-204. Quoted in Eric MUMFORD, *The CIAM discourse on urbanism, 1928-1960*, Cambridge and London: MIT Press, 2002, pp. 167-168.

2 Roy KOZLOVSKY, "The Child Grilled at CIAM : Children as Representation and as subjects in post-war architectural discourse" in *IN SI(S)TU*, n. º 7, 2004, pp. 88-105.

3 *The Athens Charter* (1933) classified and organized urban space according to categories and functions: work, house, transport and leisure. This functional grid generated a set of guidelines aimed to help to legislate, regulate and standardize matters such as hygiene, health and education. Broadly it acknowledged architecture and urban planning as a practical tool for social engineering, therefore it match the agenda of post-war reconstruction. It had an international programme sustaining that these functional concepts ought to be applied everywhere.

4 Peter and Allison Smithson organized together with Eduardo Paolozzi, Nigel Henderson, and Ronald Jenkins the exhibition *Parallel of Life and Art*, held at the ICA in 1953. It stated the old avant-garde ambition to bring closer together life and art. The exhibition consisted of a hundred photographs of all kinds deriving from a vast array of sources, ranging from X-rays and microphotographs to landscapes, aerial photographs or photographs from art works. All the images in the exhibition were presented as photographs printed on a "coarse, grainy paper and mounted on cardboard". The intention was to challenge the viewer's perception of what a "good" image is (was) and what should or shouldn't be shown in an art gallery. Although the impact of the show at the time could be considered insignificant, given the fact that the exhibition only had 443 visitors, it propelled the motif for Reyner Banham's formulation of New Brutalism, in an article published by the *Architectural Review* in December 1955. On *Pararell* Banham stated: "(...) it dealt almost exclusively in images drawn from anthropology and technology and, as objects to be exhibited in an art gallery...they were a deliberate flouting, not only of conventional ideas of 'beauty' but also of the common concept of a 'good' photograph".

5 The banality and rawness of the *Pararell* photographs raised questions surrounding aesthetics, scientific and technological uses. Misplacing the images outside their conventional uses they become absent of their given meaning, unveiling the limitations of the photographs to represent a given subject and stressing their full potentialities as images.

6 Alison SMITHSON, *The Emergence of Team Ten out of CIAM*, London: Architectural Association, 1982, p. 61.

7 A good account of "thumbs up" photographs is given at the book: John TAYLOR, *A dream of England: landscape, photography, and the tourist's imagination*, Manchester: Manchester University Press, 1994.

8 Within the politics of reconstruction, New Empiricism emerged as the dominant architecture style/trend. The term was coined by J.M. Richards, editor of the *Architectural Review* in 1947, referred to Swedish modernism as the "humanized" aesthetics of functionalism, as an attempt to "bring back another science, that of psychology, into the picture". New Empiricism tempered radical functional architecture favouring the employment of indigenous materials and including traditional forms. J. M. RICHARDS "The New Empiricism: Sweden's Latest Style" quoted in Eric MUMFORD, 2002, pp. 167-168.

9 See Victoria WALSH, *Nigel Henderson: parallel of life and art*, London: Thames & Hudson, 2001. And Claude LICHTENSTEIN; Thomas SCHREGENBERGER (ed.), As Found: The Discovery of the Ordinary Baden: Lars Müller, 2001.

10 The lecture was later published at the *RIBA Journal*. John DONAT, "The camera always lies" in *RIBA Journal*, Vol.75, February 1968, pp. 62-71.

11 Roger Mayne photographs on Park Hill, Sheffield, were published in Architectural Design, September 1961. They emphasised the benefits of a carefully planned development seen from its inhabitants' point of view.

12 DONAT, "The camera always lies", 1968, p 71.

13 Martin Harrison, *Young meteors: British photojournalism: 1957-1965*, London: Jonathan Cape, 1998. Harrison's book is a good visual source for British photojournalism, reproducing journal and magazine spreads and mentioning lesser-known photographers, although it has no bibliography notes and the information becomes impossible to trace.

INVESTIGATION METHODOLOGIES

José Miguel Rodrigues in Villa Savoye, 2004. JMR

Intervening in modern architecture: a design theme and a research problem

José Miguel Rodrigues

The intervention in modern architecture as a design theme will be the research object of our reflection, where we propose a problem-based research as an alternative to conventional research. The need to think against will be defended so as to identify a common denominator between architectural research and architectural design.

1. Investigate problems and not geographical boundaries or chronological delimitations

The first step in any *research project* lies in defining a coherent field of reflection, allowing research to identify subdomains of the real which may raise problems (according to the perspective that has interested us, in architecture, these subdomains are generally manifested through *examples*). In other words, we seek comparable *realities*, whose differences and similarities allow the researcher (a doctoral student, for example) to draw analogies, trends, patterns, inclinations and affinities (in ascending order of abstraction, i.e. from the most figurative analogy to the most abstract affinity). The interpretative representation of those realities is, therefore, what we call *the paths of research*, which in parallel, in architecture, lead to what Aldo Rossi called project theory.

In general, for the accomplishment of this first step, one of the following procedures is used, separately or simultaneously: limit a geographic area (an administrative boundary, if possible) in an extension accessible to the average doctoral student; or frame a chrono-

logical period, based on the same principle. Despite the doubts that are presented (with great ease, one should say) to us by this "method", nothing is frontally opposed to its "technique".

Our discomfort arises from its exclusive consideration – as if there were no other hypotheses to frame an area of study – that monopolises the academic debate on research projects within the subject area of architecture.

A reflection on an illustration by Richard Long 1978 [FIG. 1] shows how an abstract geographical boundary – a circle – only acquires interest as research object when it interweaves with *a problem*: a four day walk along all riverbeds in the region of Dartmoor at a fixed distance of x km from a particular centre.

Without the second information – *the problem* – Long's picture – which can be seen as a research project – would amount to a simple circle printed on the topographic map.

It is the inconstancy of *the walk* which inscribes on the circumference and draws on the circle capillaries accompanying the lower elevations of the topography, thus revealing continuities and forks, and even impasses: these pathways, being still within the radius of the proposed action, would only be accessible from its exterior. This is precisely what occurs when one opts for a *problem-based* research.

In Long's letter, the continuities correspond, in research, to the crossing points of problems to other problems, or of examples to other examples (for example, to study Mis van der Rohe we must study Schinkel) – the forks to the *dilemma* (how can we reconcile Frank Lloyd Wright with Mies van der Rohe, or the latter with Edith Farnsworth knowing that they clashed in life?).[1] Finally, the need to leave the limit – which Long imposed on his pilgrim – so he could reach the farthest corners of his pilgrimage, thus corresponding, in

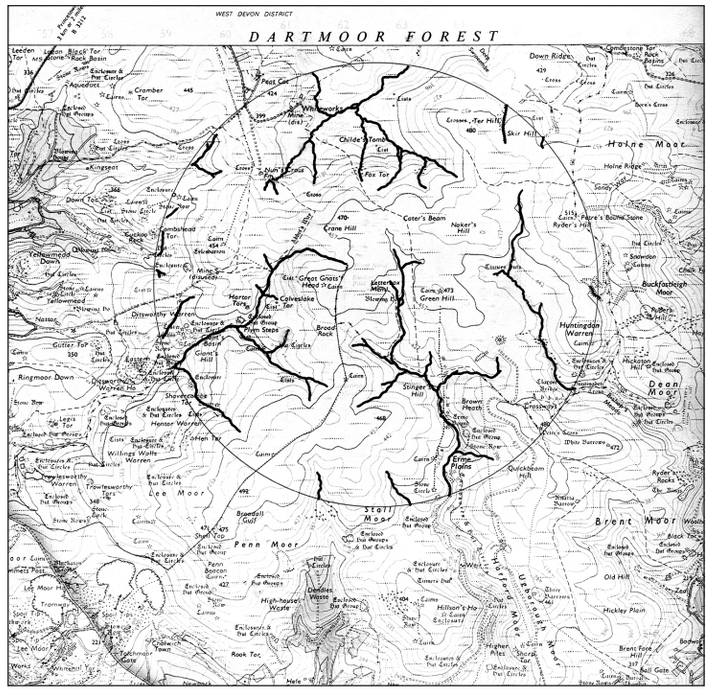


FIG.1 Richard Long, *A four day walk along all the riverbeds within a circle on Dartmoor*, 1978.

academic research, to the permanent incursions from outside the *research domain* (this idea is now used in a double sense: *domain* meaning area of research, but also *mastery of an area* by the candidate: a recurring expectation in specialisation).

2. Need to think against

In architecture, in research as in the design practice, the irreconcilable urges. Fernando Távora called it "the drama of choice",[2] something he himself experienced in his early years: "I started school passionate about Venus de Milo and left fascinated by Picasso".[3] Eduardo Souto de Moura mentions an indecision of the same kind when he states that at some point he encountered a drama: "Siza and Rossi were the architects I admired the most and though they showed

mutual respect, I realised they did not agree with each other."[4] However, the question is not exclusive of architecture. The philosopher Fernando Gil states there are constraints of thought arising from undecidable oppositions:

> "Something as an intrinsic failure forces thought to be ordered by binary alternatives and, in this sense, the controversy finds itself inscribed in the very structure of the mind. It is difficult for us to think simultaneously in terms of continuity and discontinuity, form and function, fixism and evolution, structure and history, matter and energy, and so on".[5]

If we think of the great issues that divide architects since modernity, we easily find a parallel very evident with the description of Fernando Gil. As for the latter and also for us architects, it is hard to simultaneously think about continuity and rupture. In other words, analysing and valuing concrete *architectures* (i.e. constructions and designs) from the point of view of tradition (i.e. continuity) reveal irreconcilable perspectives with the avant-garde perspective (i.e. rupture or discontinuity). Taking the example of the early architectures, called as "neoclassical", of the pioneers of the modern movement, such as Alvar Aalto, Sigurd Lewerenz or Mies van der Rohe – the Manner house of Aalto (1923), the Chapel of the Resurrection of Lewerentz (1921–1925) or the Mosler house of Mies (1924–1926) – let us confront them with the two views previously mentioned. In the avant-garde perspective, all these houses were unduly late and, in this sense, reveal little disciplinary relevance. Their historiographical interest is thus virtually nil: the avant-garde is always more interested in discovering who first used a particular feature (whether formal or technical). In the, almost opposing, perspective of tradition (and a fortiori of traditionalists) the three houses are immediately important as they establish a causal link with the *ancient*, but, above all, their qualities can be discussed and compared with older architectures (from the Renaissance, for example), and can even be considered as better than their predecessors, even though the latter are pioneers and the former recent. That is, from the standpoint of tradition, the confrontation between architectures has a certain autonomy in relation to their age, being precisely this principle that allows the traditional perspective to be critical for certain architectures of the past, never being intimidated by seniority status that, in the *hyper conservative perspective of a nostalgic reactionary*, constitutes a priori a guarantee given by age to the ancient building.

Therefore, it is useful to be aware that research in architecture means making choices; choices without which the construction of a personal point of view on things would never arise, preventing the emergence of hypotheses potentially convertible into theses. It is also worth mentioning that "we do not only think about anything; we also think against; and to think 'about' is perhaps useful to think 'against' as well."[6]

3. Tradition and originality (in research as well as in the design project)

The conservation of architecture of the 20th century and, inside, the restoration of the architecture of the modern movement actually constitute a new (in a certain perspective) research domain. In regard to the relevance of this field of study – only chronologically recognised by the end of the last century – we have been insisting on the importance of continuous upgrading of buildings as the only way

FIG.2 & 3 SUVA building before and after the intervention of Herzog & de Meuron, Basel, 1991–1993.

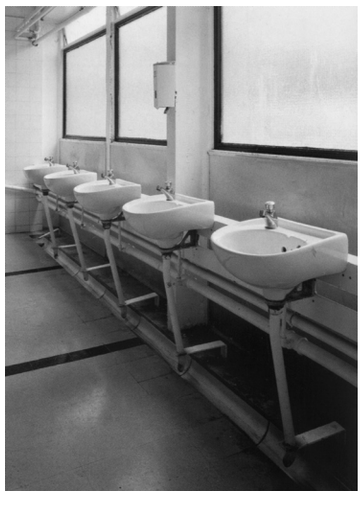


FIG.4 & 5 Alison and Peter Smithson, Hunstanton Secondary Modern School (1950–1954) in 2003.

for survival, something historically verifiable over time and, as Fernando Távora stated, that the ancients were well aware "since their 'restorations' – to which they certainly gave another name – were made with more realistic criteria and a more dynamic sense of the organised space".[7]

In *O problema da intervenção na arquitectura do movimento moderno como um problema antigo*[8] we proposed to learn from the ancients how to preserve buildings, not involving them in a glass dome. Nevertheless, we are not content with just examples of the past. Therefore, we sought in the present for similar situations and even elected as a research field situations in which the authors of the buildings were confronted in life with an intervention in their own works (Eduardo Souto de Moura and the Municipal Market of Braga, for example). Yet, not satisfied with the limited nature of the sample obtained (the specified condition rarely occurs), we extended the reflection on those situations where an architect, forced to return to a design order, opts, *chooses* and designs in a totally different (if not antagonistic) way compared to the same starting point: the case of Siza in Avenida da Ponte. Finally, we sought to examine possible design options for existing structures with a very diverse asset value, whose design solutions also constitute completely different outputs to the "living" conservation of buildings problem: the intervention of Herzog and de Meuron in the SUVA building [FIG. 2-3]; the "anonymous" intervention in Smithson's Hunstanton School [FIG. 4-5]; and the profound transformation introduced by Koolhaas at Mies van der Rohe's IIT [FIG. 6-7]. At that time, we reflected on the value of diverse existing structures in the final decision (i.e. it is evident that Koolhaas raised the bar compared with that of Herzog and de Meuron) and highlighted that the most

consensual of interventions – which someone, who we could not ascertain, planned for Hunstanton school – actually differed from the problematic condition that we sought and without which no research problem arises. Before the restoration process, we showed how the intervention in buildings of the modern movement becomes an almost exclusively technical problem (the conservation of colours, plasters, shades of glazing, ironwork, etc., with a clearer sense of the modern requirements in terms of thermal efficiency of buildings, etc.) and, in this sense, how the paradigmatic case was also the simplest case and, therefore, the poorest, contrary to the significant motto of Fernando Gil whereby: "the well-structured problems are generally the less interesting".[9]

Thus, pursuing our idea of rediscovering the lesson of the *ancient* in the *modern*, we came back to *the restoration problem of Villa Savoye*. The paradigmatic dimension of this example aroused interest amongst avant-garde research. In fact, it was the first time that a modern architect was removed, in life, from the operation to safeguard his own work for fear that his intervention would profoundly alter the last known *version* of Villa Savoye. In addition, the one responsible for the removal of Le Corbusier – André Malraux – was also the promoter of the rescue operation of this mythical house, greatly altered in the Second World War, and later converted into a barn for agricultural activity, occupying what was once its extensive garden. The progressive destruction of the house, *as in the time of the Savoye*, was coupled with the expropriation of the surrounding land to build a school in the dynamic municipality of Poissy in the sixties. André Malraux – the first "minister of culture" in History – saw the historic opportunity that was presented to him and classified a modern building as "heritage". The demolition of the house was only apparently safeguarded,

FIG.6 & 7 Mies van der Rohe, Commons Building before and after the intervention of Rem Koolhaas, Illinois Institute of Technology, Chicago, 2003.

since the architects responsible for the design of the new school were considering demolishing and rebuilding it a few metres to the side. Once this contention was overcome, two issues emerged, of course: what to do with the house? And to what extent the new purpose entails profound changes in its structure which, apart from anything else, had always had constructive failures (the persistent problems of Savoye's son with asthma motivated by the presence of damp inside the house are well known). Although the author had later denied, the possibility of lodging a *Le Corbusier museum* was actually considered. As we advocated in *Le Corbusier and the restoration of the Villa Savoye*,[10] the only two designs found in his estate (carefully maintained and organised by himself) are not by itself enlightening as to its transformative impetus.

However, if we coupled the known outcome of the design with the following two factors, the hypothesis of Le Corbusier wanting a profound transformation of his most famous house acquires plausibility:

> - "And the paintings?" - Le Corbusier questions in a typed note stored in his collection.
> - "How are you going to manage to put them in this glass house? I intentionally did not build large walls to prevent the owner from feeling tempted to fill them with hideous pictures".[11]

> "The restoration of this work, today a civil building, would have been easier if done by its author. But Le Corbusier exceeded the age to be an architect of civil buildings and national palaces; in fact, if we let him, he would be tempted to make a '1963 Le Corbusier'".[12]

In other words, there is a great possibility that Le Corbusier was designing a profound change to Villa Savoye, even considering modifying the design of its elevations to increase the wall surface that he had purposely reduced to a minimum. Therefore, it makes sense to question the small amount of drawings of the rehabilitation process of Villa Savoye, safeguarded in his collection. From our point of view, an extremely probable explanation emerges: the deliberate destruction by the author of the evidence of his transformative impetus that later would restrain him from proceeding, orderly accepting the decision of assigning to a colleague "restorer" – Jean Dubuisson – the conservation operation, described by himself as "loyally pursuing the truth, i.e. exactly reconstructing the primitive state of construction".[13]

Notes

1 Cf. Ana Luísa RODRIGUES, *A habitabilidade do espaço doméstico: o cliente, o arquitecto, o habitante e a casa* [doctoral thesis in architectural culture], Guimarães: University of Minho, 2009, pp. 135-171 [specially p. 158]. Available at: http://hdl.handle.net/1822/9512 [accessed on 16 July 2013].

2 Fernando TÁVORA, Da Organização do Espaço, Porto: FAUP Publicações, 2008, p. 73. [1st ed. 1962]

3 Interview conducted by Javier FRECHILLA, "Fernando Távora. Conversaciones en Oporto", in *Arquitectura*, Madrid: Colegio Oficial de Arquitectos, Year 67, No. 261, July — August, 1986, p. 22.

4 Eduardo SOUTO DE MOURA, "Su Aldo Rossi, Eduardo Souto de Moura, a cura de Antonio Esposito" in *d'A, d'Architettura, rivista italiana d'architettura*, Dopo Aldo Rossi, No. 23, April 2004, p. 188. [text from 2003]

5 Fernando GIL, *Mediações*, Lisbon: INCM, 2001, p. 51.

6 Fernando GIL, 2001, p. 59.

7 Op. cit. Fernando TÁVORA, 2008, p. 31.

8 José Miguel RODRIGUES, "O problema da intervenção na arquitectura do movimento moderno como um problema antigo" in Rui RAMOS (coord.), *Leituras de Marques da Silva, Reexaminar a modernidade no início do século XXI: arquitectura, cidade, história, sociedade, ciência, cultura*, Porto: FIMS, 2011, pp. 154-161.

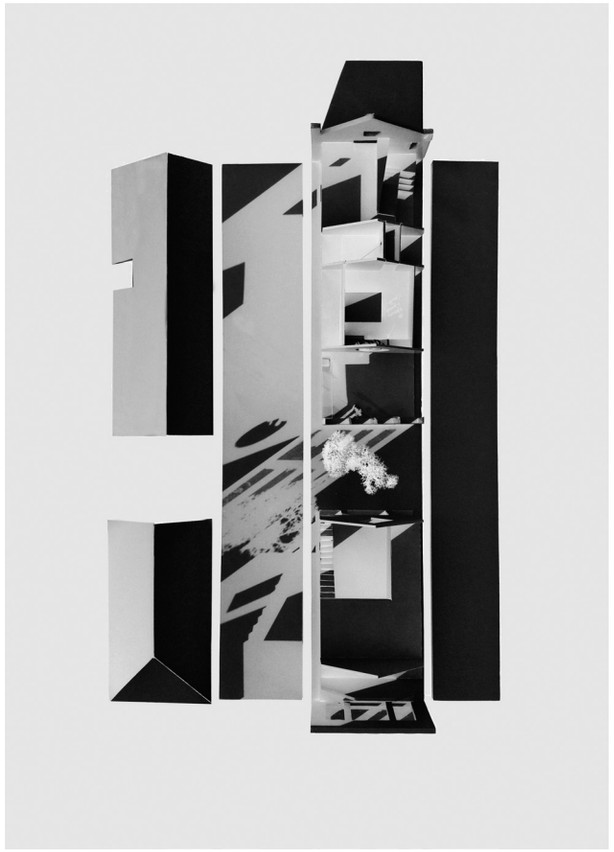
9 Fernando Gil, "Inventar", in *Enciclopédia Einaudi*, vol. 41, Lisbon: INCM, 2000, p. 176.

10 José Miguel RODRIGUES, Ana Sofia SILVA, "Le Corbusier y la restauración de la Villa Savoye, Le Corbusier and the restoration of the Villa Savoye" in *Conferencia Internacional CAH 20thC, Criterios de Intervención en el Patrimonio Arquitectónico del Siglo XX, CAH 20thC, International Conference, Intervention Approaches for the 20th century Architectural Heritage*, Madrid: Ministerio de Cultura, 2011, pp. 247-258. Available at: http://www.calameo.com/read/000075335 42d6151d5dd9 [accessed on 16 July 2013].

11 Le Corbusier, *Untitled* (*newspaper article + typed notes* Le Corbusier: sheet 3 of 4), Fondation Le Corbusier H1-12-464, 1962-1963.

12 Op. cit. Jaques MICHEL, "La villa Savoye sera aménagée en «musée Le Corbusier»" newspaper article accessed at Fondation Le Corbusier. It should be stressed that this news article is part of a group of four «documents» filed jointly at Fondation Le Corbusier (See footnote 11), which leads us to believe that the *typed note* mentioned earlier (in which Le Corbusier confides the reason for the minuscule wall surface in Villa Savoye) might be linked to an interview with Michel Jaques, although, understandably, the final content of the interview was not included.

13 Cf. "*J'ai pensé bien faire en suivant loyalement la vérité, c'est à dire en reconstituant exactement l'état primitif de la construction*." Letter from Le Corbusier to Max Querrien, dated 10 November 1964: Fondation Le Corbusier H1-12-290.



Pedro Bandeira, M&Q project, 2013. PB

Design as research in architecture

Pedro Bandeira

This paper proposes to rethink the role of architectural design project in academic research and, in particular, in the development of a doctoral thesis.

Simultaneously, under the argument that "architecture is an art", it aims to contribute in the definition of the position of the architect-researcher in a university context increasingly conditioned by scientific production.

In the last two decades, the academic research in architecture, in Portugal, has increased substantially: on the one hand, due to the implementation of the Bologna Process (which forced the introduction of master's theses in the second cycle of the European courses); and, on the other hand, due to the increase of scholarships for doctoral theses promoted by the Foundation for Science and Technology (FCT). Factors associated with the recent decline of public and private contracts presented academic research as an alternative to a professional practice "temporarily" postponed, or even considered in the expectancy of a teaching career in one of the many existing schools of architecture in the country. The doctoral research in architecture has rarely been seen as a complement of professional practice, where there is a tendency to opt for research in universities, delineating the distance between "academic work" and the "real work"; a dichotomy expressed by Jean-Paul Sartre in his brief passage through the Portuguese revolution.

This gap between theory and practice is, in our view, accentuated by the fact that academic research in architecture does not have as privileged instruments the "drawing/image" as well as the "architectural design" as objective.

This discrimination of design within the academic research, particularly in the doctoral theses, is due to some questionable reasons:

1. The first of which is that the teaching of architecture, with the admission to the university, adopted a model of canonical thesis (imported from the social sciences) that actually privileges the alleged objectivity of the "word" rather than the supposed subjectivity of the "image". This legacy of Platonic origin is certainly based on the difficulty that many seem to find in the assessment of architectural designs, structured mainly by drawings and images, i.e. in supposedly subjective elements. However, we recall that since the Renaissance drawing and design became the mother tongue of architecture, i.e. architects have the same relationship with drawing as mathematicians with numbers, philosophers with words, or musicians with staves. Also, being the doctoral thesis a disciplinary specialisation, it should be common to adopt drawing and image as privileged instruments of research. Unfortunately, theses seldom mirror any sense of design, leading their authors to abdicate the essence of being an architect.

2. A second reason is that the canonical model favours the study of the "past" (albeit in a perspective of the present), in relation to any speculation about the "future". The historian Manfredo Tafuri argued that the theses of architecture should not address past issues with less than twenty years. Perhaps this is why the vast majority of theses in architecture are on history or theory, but rarely aspire to be "architecture" in the sense of being "projective", dignifying, on the one hand, the etymology of the word "project" (to thrust forward) but, on the other hand, the etymology of the word "architect", which in its Greek origin refers to the sense of "master builder". Only by favouring the architectural design in research can one distinguish the role of the architect (as specialist of how to do) from an architectural historian (as specialist of how to interpret).

3. The third reason relates to the fact that the canonical model of the doctoral thesis is based on an essentially deductive reasoning model, rejecting with conviction a more inductive model and close to the creative processes and artistic practices. This perspective will only be legitimate if we are willing to also accept architecture as an art – the "poetic profession" which has always been claimed by Álvaro Siza. Also, by accepting architecture as an art we are simultaneously acknowledging its own speciality (what distinguishes it from other construction practices and architecture as a whole without architects); an awareness of the subjectivity understood as intimate space of the individual (the internal world of the architect as author) in its relationship (more or less confrontational) with the social world, where architecture, beyond everything else, is presented as cultural production.

On 14 September 2009, the Portuguese government enacted the possibility of "awarding the degree of Doctor to creators of works and achievements resulting from the practice of design in areas and forms hardly compatible with the dominant model of the doctoral thesis" (Decree-Law 230/2009). Although not specifically referring to architecture, this law sought to fight against the "remoteness and discouragement that the doctoral thesis arouses in the designers who develop, based on the practice of design, research methods typical of artistic activity." If, on the one hand, this decree-law furthers the recognition of the importance of the design and artistic practices in

research (in which we integrate architecture), on the other hand, it does not validate the design as a research tool, since it just integrates it as a curriculum assumption in evaluating past work. In other words, the specific scope of this decree-law still does not stimulate the integration of the design in research while prescient, speculating and promoting instrument of experimentation.

Considering these arguments, it is argued that the doctoral thesis in architecture should include drawing and image as privileged instruments in academic research and consider design as a priority objective. However, we should like to safeguard that the architectural design in the academic context should distinguish from design of professional practice primarily on the following points: consider design in an intermediate place (not necessarily as a vehicle) between the immaterial of the idea and the material of the work, between theory and practice; be the privileged place of experimentation, the place of the master (the "master builder"), the lack of commitment or of doubt or uncertainty. The place, if you will, where it is still allowed to fail.

Paulo J. S. Cruz lecture on the 14th of October 2011. EAUM

Inspection and condition assessment: Concepts, methods and tools

Paulo J. S. Cruz

In recent decades the monuments of Modern Architecture have been the subject of numerous experiments to ascertain the best practices of analysis and intervention, with a view to their conservation. From these case studies emerged unquestionably the importance of understanding the relationships between design and technology, and between materials and culture of construction, as essential to the specific material reality of each work to be preserved.

The systematic description and the diagnosis of the anomalies of buildings built with modern materials – iron, concrete and glass – are a reading key that cannot be decontextualised from the historical and critical interpretation, which is essential to devise a coherent elongation of the buildings' service life.

In the context of condition assessment, this article aims at exploring the importance of different types of inspections and opening some perspectives for the use of different techniques for non-destructive testing.

1. Introduction

The condition assessment of any structure must be understood in a very broad sense as something that describes a set of activities performed to characterise the current state, which include:

- Building condition assessment – In the form of a numeric or alphabetic classification, based on a pre-defined scale;
- Structural analysis – Based on the technical parameters of the structure and level of degradation;
- Safety assessment – Measured in terms of the partial safety index, reliability index or failure probability;

- Durability assessment – Evaluation process of the remaining service life;
- Functionality assessment – Evaluation which is based on the criteria governing normal use.

The procedures for assessing the state of conservation are often based on the results of inspections, taking into account the anomalies and degradation processes identified therein. The general criteria for the classification of the most common anomalies as well as the classification of mechanisms of degradation are often presented in manuals to support inspection and condition assessment.

In general, routine inspections are merely visual, so sometimes you cannot detect in advance the early processes of internal degradation.

Major inspections usually have a variable frequency. Unlike what happens with the current methods of testing, advanced non-destructive testing (NDT) techniques are not often used in periodic inspections. Therefore, their use is meant for special inspections, generally required when an anomaly is observed, whose cause, extent or gravity is unknown or known with some degree of uncertainty, and an evaluation is considered essential to ensure the safety and/or durability of the structure.

It should be kept in mind that the application of advanced techniques for NDT requires skilled and experienced staff, and even the use of simple methods requires knowledge of the associated physical foundations.

The judicious application of these concepts to all bridges, including railway bridges, has received strong attention from the international scientific community, in particular, as regards the improvement of NDT methods and the respective equipment, as well as the degradation models. In this area, the European project *Sustainable Bridges* deserves special mention. Amongst the requirements arising from the conservation problems, formulated in detail in this project, it is worth highlighting the lack of better inspection tools for use in:

- Concrete structures:
  - Reinforcement corrosion;
  - Early diagnosis and description of cracking (including the cover of reinforcements);
  - Defects in prestressing sheaths (including corrosion);
  - Carbonation;
  - Waterproofing defects.
- Metal Structures:
  - Corrosion and delamination;
  - Fatigue cracking;
  - Loose joints;
  - Coating defects;
  - Brittle fracture.
- Masonry Structures:
  - Material degradation;
  - Cracking;
  - Waterproofing defects;
  - Stone or brick fracture.

In the context of condition assessment of bridges, the project described above developed a guideline for inspection and condition assessment,[1] as well as a catalogue of anomalies with the classification of the most frequent anomalies,[2] and an NDT "toolbox" that provides a set of information on NDT methods to inspectors.[3]

For its importance, many of the concepts contained in the documents referred to above and described in[4] apply to the inspection and condition assessment of buildings; thus the reason for their relevant and appropriate brief presentation herein.

2. Guideline for inspection and condition assessment

The manual is structured in two main parts: one initial and general part with the analysis of the state of knowledge of the inspection and condition assessment of railway bridges, and a second more specific part focused on NDT specific requirements and the presentation of a set of appropriate methods for bridges of various materials. The manual, with the annexes now identified in [FIG. 1], complements the information available in the different national standards and recommendations for inspection and assessment.

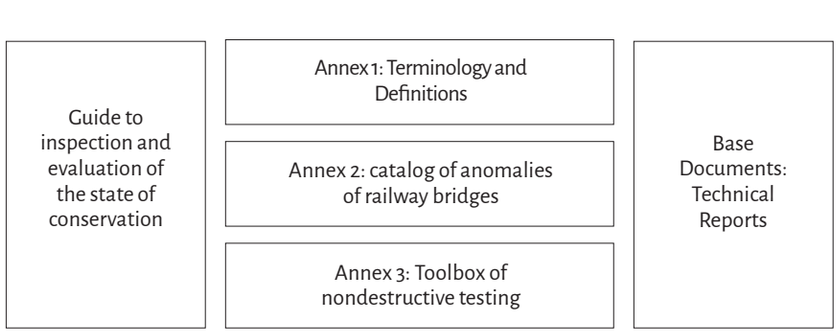


FIG.1 Structure of the manual for inspection and condition assessment

The technical reports with detailed results of the research undertaken aggregate key information. The associated databases are very useful for the development of procedures for condition assessment through the implementation of advanced tools presented in the manual and technical reports:

- Standardised testing and simulation of anomalies:
  - Collection of inspection and condition assessment methods;[5]
  - Condition assessment: proposal for a unified procedure;[6]
  - Inspection and condition assessment of metallic railway bridges.
- Project analysis and locating heterogeneities:
  - Assessment programme to combine data with different characteristics;[7]
  - Prototype of a 2D system of automatic acquisition for the crack depth assessment using impact-echo techniques[8] [FIG. 2];
  - Georadar (GPR)[9] and a prototype of a tomography system.[10]
- The corrosion of steel in concrete bridges and electrochemical measurement methods:
  - Electrochemical techniques to detect the corrosion state of reinforcement in concrete structures[11] [FIG. 3];
  - Presentation of the results of laboratory tests on the effects of reinforcement corrosion;[12]
  - Numerical analysis with finite element models of reinforced concrete structures subject to corrosion;[13]
  - Optimum set-up of a LIBS (Laser-Induced Breakdown Spectroscopy) system for application *in situ*.[14]
- Implementation and demonstration of diverse techniques [FIG. 4].[17]

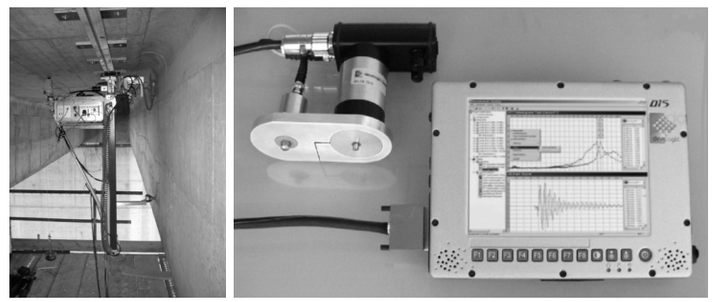


FIG.2 Examples of equipment developed: a) automated 2D scanner, b) Impact-echo equipment.[8]

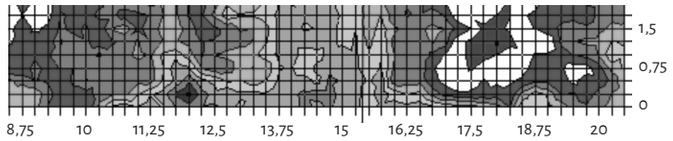


FIG.3 Result of the measurement of potential fields

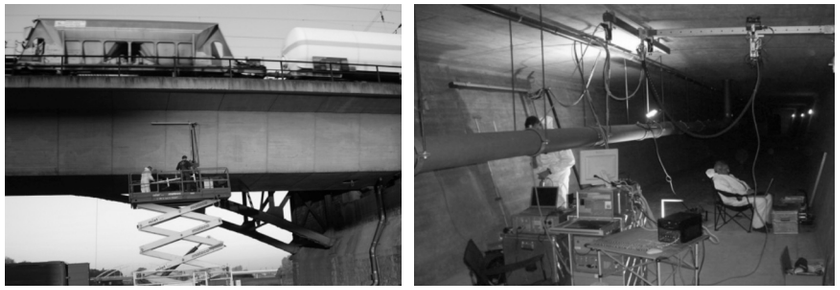


FIG.4 Applying advanced non-destructive methods to a German railway bridge. Use of GPR, ultrasonic and impact-echo techniques in the same area to obtain a geometrical accurate correlation.

3. Tools for inspection and condition assessment

3.1 Procedures

The rate of degradation and the effects of ageing of structures strongly depend on the quality of the design, quality of execution, the level of conservation and serviceability. Advanced NDT is mainly applied in special inspections.

Performing NDT allows us to detect internal voids and inhomogeneities, whether they have been caused during construction or during service life due to continuing deterioration, for example. The NDT methods are already at a level that allows the material characteristics or internal homogeneity to be investigated fairly quickly and in a reliable way. Automated methods of data acquisition using echo non-destructive methods offer high geometric correlation, so the images resulting from the use of different non-destructive methods can be overlapped to better detect hidden anomalies.

Figure 5 summarises the different levels of inspections referred to in the manual. Probably most of the existing bridges will only be subject to regular inspections, usually done by visual methods or through the use of simple non-destructive techniques. Even for a visual inspection, it is necessary to train inspectors, so that they understand the most important degradation mechanisms and know the critical aspects of different types of bridges [FIG. 5].

If there is a need for more detailed information about the internal structure, the combination of advanced NDT methods is required; thus increasing the precision of the results.

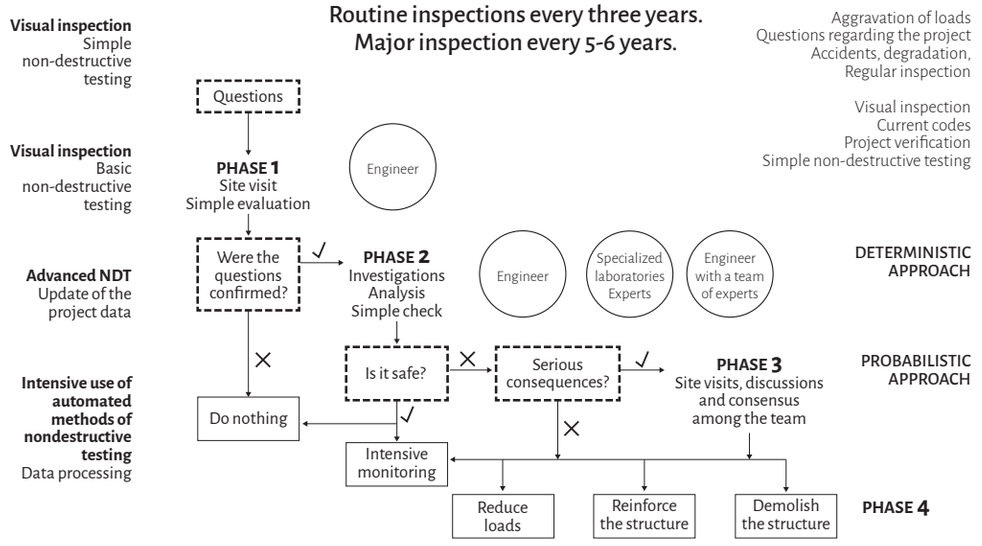


FIG.5 Levels of use of NDT in inspections

3.2 Non-destructive testing toolbox

The non-destructive testing toolbox contains a set of non-destructive methods for inspection, including important information about: its use; physical foundations, the necessary experience for its use; implications on traffic; the duration; cost; etc.

The NDT methods have evolved continuously. Currently, the data acquisition can be automatic and the results reconstructed and combined, allowing a clear view of the interior of elements and sections. Typically, each type of material requires specific techniques. The homogeneous steel is easier to investigate than concrete, whose results are quite affected by factors, such as porosity and dampness.

For the reasons stated, all methods are correlated with the materials. The methods can be distinguished by their physical foundations: acoustic (impact-echo or ultrasonic), electromagnetic (reinforcement detectors), electrochemical (potential fields) and X-ray.

Figure 6 presents the information of a page on ultrasound and impact-echo using an array with point contact transducers. These sensors can be simultaneously applied to a concrete surface with an automatic scanner [Fig. 6].[7] Echo methods have the additional advantage of only requiring access to a surface of the elements.

In the *Sustainable Bridges* project, a computer application was developed to relate the anomalies in railway bridges with appropriate methods [FIG. 7].

4. Specific recommendations for inspection and material assessment

4.1 General Recommendations

Although well developed, the NDT methods do require a validation procedure that allows us to judge their accuracy. At an initial stage, test pieces may be used for validation of the methods in laboratory.

At a second stage, the influence of the material characteristics, its age and deterioration should be estimated *in situ*. For calibration purposes of the propagation of ultrasonic waves, electrical characteristics or electromagnetic parameters, for example, partially

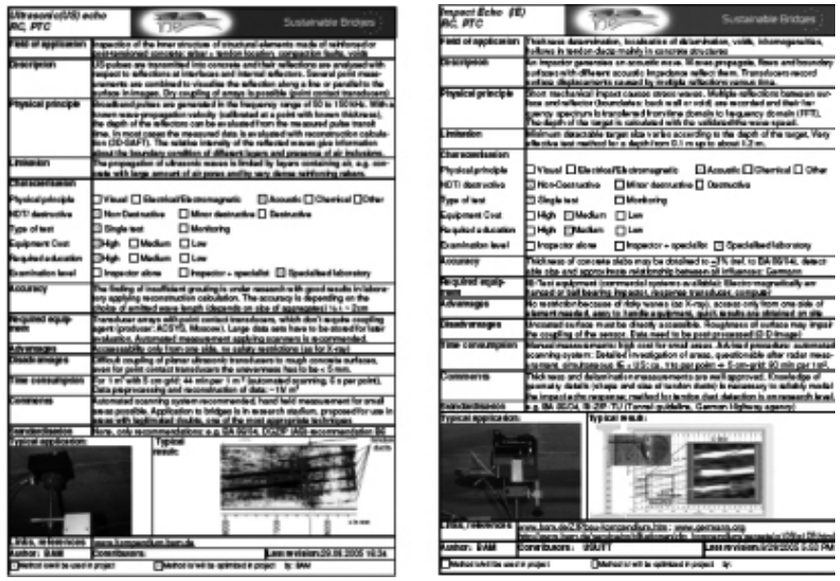


FIG.6 Examples of records with information about the impact-echo and ultrasonic methods

FIG.7 Example of the computer application of the toolbox in which the inspectors will find anomalies and NDT tools, resorting to a search by levels or a graph index.

destructive testing can be performed, such as: extraction of concrete cores, drilling or the use of spectroscopic methods. The validation and calibration are highly dependent on the quality of the materials.

4.2 Concrete Structures

The anomalies in concrete structures are conditioned by their age, implementation conditions, characteristics of the environment and degradation processes. In recent years, new data acquisition techniques developed at BAM - Federal Institute for Materials Research and Testing allow the overlapping of multiple sets of data measured with high geometric correlation (data fusion); thus, achieving very high precision. Figure 8 shows the results of a test on a German box girder railway bridge.

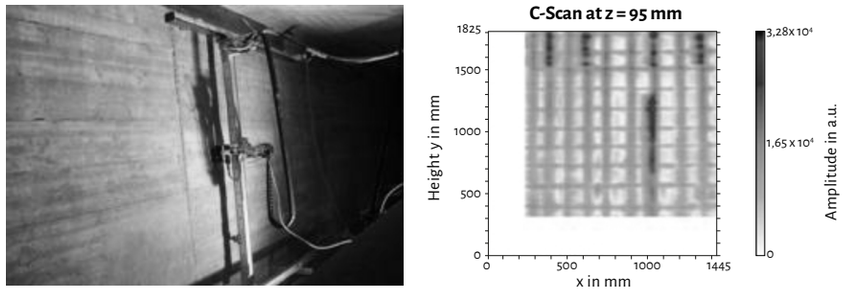


FIG.8 Equipment set-up for automatic acquisition with pulse radar, ultrasonic echo and impact-echo inside a box girder (left), and an example of the reconstruction of the results from the use of the radar, at a depth of 8 cm (right).[15]

4.3 Metal structures

The durability of metal structures is essentially conditioned by corrosion and fatigue, so special attention should be given to inspection of hidden critical details. In case of doubt, a special inspection should be conducted. The NDT on metal structures is widespread in other sectors, such as in: pipelines, boilers, industrial tanks and aeronautics. The experience of professionals in these sectors may be useful for metallic bridge inspectors. The requirements for metallic bridge inspections, the estimate of inspection intervals and criteria for analysing the reasonableness of faults can be found in.[16]

4.4 Masonry Structures

The manual presents an overview of the usual tests and the latest research results, considering the feasibility analysis of using radar in tomography mode.[10] In special inspections, NDT should be applied. These tests may be accompanied by load testing to assess the calculation models.

5. Conclusions

With the increasing age of existing urban buildings, emphasis is added to the need for better tools for assessing building conditions. Inspections and condition assessment methods are crucial factors of management systems.

It was concluded that, in general, those responsible for the management of these infrastructures and inspectors lack information on non-destructive or partially destructive testing methods.

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APPLIED INVESTIGATION

Bruno Mengoli lecture on the 4th of November 2011. EAUM

Architecture of the 20th century in Seine-Saint-Denis: an emerging heritage

Bruno Mengoli

The awareness of our built heritage and, in particular, the abundant architectural production of the 20th century are at the heart of a sustainable approach towards contemporary urban renewal. In this context, the aim of the intervention is to build a critical perspective on the practices implemented in France within the scope of projects aimed at territorial and architectural reconversions. Therefore, the article focuses on the Seine-Saint-Denis department, as it is assumed as both the third part of the north-east periphery of Paris and the privileged context of the intense metropolitan "recycling" of Paris.

Welcoming the activities rejected outside the walls of the capital, the Seine-Saint-Denis department became the guardian of industrial development and workers' habitat from the late 19th century. The collapse of industry in the 70s has left important properties available, in the face of a major popular habitat which had developed in the vicinity of the work site in the form of initial pavilion plots of working cities and, later, in the aftermath of World War II, of "Great Housing Complexes". This context has forged a particular identity that does not rely on conventional images of heritage, thus enhancing the rupture between the old centre, "Place of History", and an "economic periphery", where everything is possible.

Moreover, Seine-Saint-Denis is constituted as an extreme situation, where a strong development potential for the capital and serious economic and social problems actually intersect. This territory, the target of both Greater Paris and successive planning policies, is revealed as being a showcase of national actions

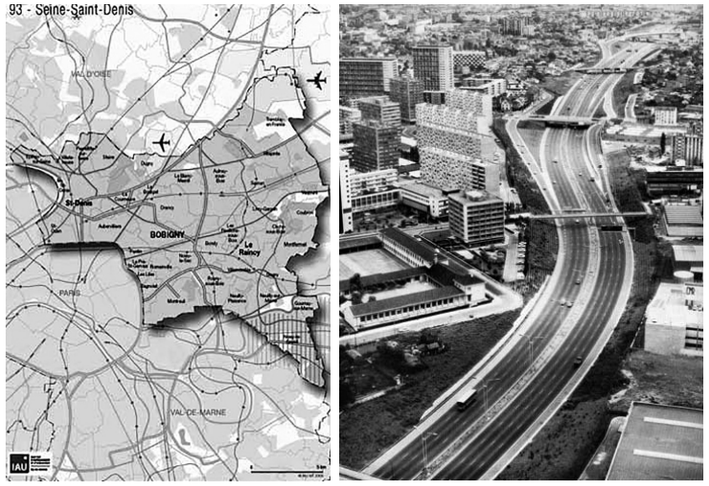

FIG. 1 Map of Seine-Saint-Denis department.
FIG. 2 Highway infrastructure.

whose intensity drives a radical development to change its image, thus perpetuating the approach of "tabula rasa" of the "post war". Given these challenges and the scale of operations at stake, the alternative to the demolition issue has much more to do with a cultural approach than with a simple technical or financial need.

In response, this threatening situation forces the awareness of the value of what seems to be unfairly denigrated. The positive revelation of the "surroundings (suburbs)" makes its eligibility for "History" possible, within an often chaotic approach, characteristic of the French context, which stresses the opposition between "development" and "heritage". This situation represents, in particular, recognition of heritage as a vital issue against disappearance, well before the establishment of a rational and shared intervention methodology, far upstream of the restoration problem in itself. Suffice it to say that this is an urgent situation driven by the threat of destruction in which the results of an architecturally successful reconversion remain highly mitigated.

This article presents evidence of the problems in question through significant projects in which the positive awareness of the architectural production of the 20th century, as well as the urban and landscape identity resulting from it are, therefore, put into question. The following three examples expose recurring problems questioning the doctrine of intervention, position-taking regarding construction, the technique and aesthetics in terms of buildings as well as their spatial or symbolic features. Next, these situations question us regarding the "tools" needed for the recognition and appreciation of architecture as we are able to understand it in a recognised heritage.

The Deposit of *La Plaine Saint-Denis*

It is a complex of buildings located on the plain of Saint-Denis (former north sector of Paris) that the abandonment of industry turned into the biggest industrial wasteland of Europe thirty years ago. The buildings in question are linked to the railways, along the extensive network that connects Paris to the North and East of France. These large constructions were destined to receive the locomotives and carriages for their maintenance.

The buildings in question are composed of large domed pavilions in reinforced concrete. The abandonment of these facilities in anticipation of a sale of land by the railway company raised concerns about the future of the emblematic buildings of the area: emerging in the landscape of the plain, these buildings were called "cathedrals". This allowed the initiation of a process of protection on behalf of the Historical Monuments in the hope of enhancing the set and generate a rehabilitation and reconversion project, given its remarkable architecture.

FIG. 3 View of the railway structure.
FIG. 4 & 5 Cathedral and Railway Station. Photos by Bruno Mengoli.

The implementation of a protection tool on this complex highlights the specific problems of industrial heritage from the time when it ceased to be used. The impressive dimensions of these buildings and their spaces pose huge problems for reconversion. The difficulty in finding a new programme, new uses and motivated investors, who have the resources at a building scale, are indeed factors that constitute real obstacles to their preservation. Protected since 2004, these buildings remain vacant, without maintenance and do represent major security problems. Meanwhile, the French context, extremely standardised regarding the functional dimensions of the programmes

(offices, schools, etc.), reinforces the difficulty of reconversion. Thus, as time passes we witness a "disconnection" between the monument and the environment: the degradation of buildings and their rehabilitation costs actually increase as their neighbourhood is renewed.

Today, to save what can still fall within that scope, a new study is under way to assess the ability to reconvert the buildings into "housing/flats". It is clear that the creation of new floors and partitions entail less overall space in the pavilions, whose interior dimensions were a crucial point of interest. This solution, which I am tracking, is the last possible answer for preservation in the current context, saving at least the exterior volumes and façades, as well as the personalised mark set upon the landscape of this place and its past. This type of problem is recurrent and often leads to the complete removal of all existing buildings to encourage the arrival of promoters capable of meeting the expectations of territorial development.

La Cité de la Muette in Drancy

La Cité de la Muette is a social housing complex, created by Beaudouin, Lods and Prouvé in the "thirties". This is an experimental operation designed to test the construction methods and industrial prefabrication, taking into account France's delay in the production of housing, in relation to the old and dilapidated buildings. This operation was destined to extend and replace the "garden cities" implemented after World War I. The complex is constituted as a remarkable testimony foreshadowing the "great complexes" of the 50s / 70s.

Unfortunately, this complex would not entirely be completed due to a difficult economic context. Later, during the war and the German occupation, the city was transformed into a place of internment and of transit towards the Nazi death camps. At the time of the liberation,

the complex returned to its housing function, trivialising the location. In the 60's, a memorial was built on the outskirts of the city and, in 1976, an important part of the complex disappeared during the demolition of the towers – the "skyscrapers" – before a quasi-general indifference

It is only in 2000, during maintenance works, that the patrimonial interest for the complex suddenly arises. The placement of sliding windows in plastic disfigures the very orderly architecture of the buildings that still existed at the site. The Ministry of Culture was summoned, and protected the complex under the programme of Historical Monuments, thus interrupting the work already in progress. The motivations that led to the protection of the complex are particularly interesting to analyse: it constitutes as both a remarkable testimony to the history of French architecture and a complex of memories associated with the place and the dramatic events of the occupation.

As a result, managing the dual title of "historical monument" and "place of memory" imposes specific problems. Firstly, the recognition of a "recent" object on which any work of restoration or improvement is not decided yet: the industrial character of the building, the presence of reinforced concrete in the structure and coating, the social housing character of the occupied spaces induce new intervention problems regarding conservation and restoration. Secondly, the nature of the memorial monument introduces an intangible component that escapes the consistency of the architecture and, at the same time, questions the usual restoration doctrines. Memory is not History. Memory is part of the Living, the agents of the events or of those who commune with the memory during ceremonies (Celebration). The distancing, the objective and scientific evaluation of things, beyond feeling and emotion, is the

FIG. 6 La Cité de la Muette aerial view.
FIG. 7 Cité de la Muette in 2012 : new Windows matching original work from Jean Prouvé.
Photo by Bruno Mengoli.

field of history, an elaborate construction of events a posteriori. This particular context is characteristic of a very recent heritage on the verge of entering the field of history. The significant dimension of its use as social housing amplifies this problem and blurs the classic approach of "Historical Monument". The example of Muette fulfils this complexity of uses and values, as well as the contradictions it generates.

Thus, the replacement of the windows, which is one of the first works of Jean Prouvé, was scheduled due to social housing and current tenants' needs for immediate comfort, according to the following guidelines: a continued intervention with new plastic Windows on all facade, except for a minimal linear (15%) remade according to the original (metallic profiles and glass dimensions matching originals features) – but encompassing the modern thermal and acoustic details that required the removal and destruction of the original works.

Similarly, the treatment of the central space occupied over time by grass, by a square and a car park raises the question of its renewal. Thus, restoring the courtyard of the place of internment within a residential complex is as questionable as proposing the planning of an improper garden to commemorate the memory connected to the space. Also, will not the progressive recognition of a Memorial call into question the conservation of this complex as a place of residence over time?

These uncertainties and these issues constitute the particularly fertile context of new ideas around the concept of heritage, arising in these new themes located at the margins of territories and architectures that benefit from a conventional recognition.

La Cité des Courtillères in Pantin

La Cité des Courtilllères allows us to address the question of recognition of a very specific heritage, of the "Great Complexes". The name ''great complexes" regroups the massive production of social housing in France during the three decades following the post-war period. The need to build hundreds of thousands of accommodations in large-scale per year challenged the government in an unprecedented construction policy. This situation contributed to a radical change of the lifestyle of the time, of the landscape of cities and their suburbs, as well as the acceleration of industrial construction – almost exclusively in reinforced concrete – rather than the traditional methods, materials and know-how. The neighbourhoods that arise during this period reflect innovative policies and techniques. They are a French specificity that, at a first moment, associates to progress and modernity, and, at a second moment, endangers and stigmatises the territories of social and economic segregation.

This production is distinguished by a number of characteristics. Firstly, the dimensions of the buildings and the magnitude of the programmes (sometimes several thousands of accommodations per works contract) are able to place architecture at an urban and regional scale. Extraordinary for its importance, the architecture becomes a neighbourhood, it defines a landscape and contributes to the contemporary image of the "surroundings". In parallel, its format shows a "wise" architecture, made by renowned architects of the time (many of them won the Grand Prix de Rome). The use of a repetitive composition that extols the scales, the plastic effect or the minimalist industrial monotony, characterises the formalisation of these complexes. The context and the production mode which is no longer used today, represented the expression of an epoch and the support of a strong territorial identity at the time. With several millions of accommodations built, the "great complexes" are a part of the collective memory of the French.

However, the recognition of this production is hampered by its large scale, its "normal" and "recent" character. The difficulty of its admission in the heritage field is amplified by the challenges and projects included in this architecture, contrary to the inert context of churches and palaces of conventional heritage. Popular in post-war times, the "great complexes" are now detested: these neighbourhoods drained the ills of society, concentrating the most vulnerable populations. They associated themselves to images of social devaluation, of precariousness and insecurity, against which the heritage recognition shocks. At the same time, the ageing of these buildings criticises the lack of maintenance, the inadequacy of comfort standards of the time; finally, the density of the flats affects promiscuity.

In a tense economic and social context, "great complexes" be-

came the "showcase" of public policies for housing: urban renewal, social mixture, transports, "Greater Paris", etc. The "great complexes" are located in the heart of the territories whose technical, social and symbolic value is the crucible of development of the French metropolises.

This specific context places the social, economic and cultural approaches in competition with each other in a very tensely way. The design and intervention models resulting from this are distinct from the conventional methodologies concerned about recognised heritage, and question our practices. Thus, the intervention involves a transformation potential of sites that is based upon the predicted utilisation rate: programmatic contestation that will enable better functional and social heterogeneity, a lower densification of neighbourhoods, the recomposition of housing types (suitability of the area to the price of rentals and real occupancy rates), a drastic renovation

FIG. 8 Photo by Bruno Mengoli

of social housing (isolation, accessibility for people with disabilities, energy efficiency, etc.). Faced with these issues, "great complexes" impose themselves as an architectural response to urban and societal problems, whose evolution is contradicted by the mass and immutability of its constitution. The patrimonialisation of this construction through a "conservative" or "restorative" approach precludes due to its own nature the necessary renewal of the city, turned on itself, and the evolution of habitat modes.

La cité des Courtillères in Pantin illustrates some of the challenges of this type of operation. This complex was built between 1956 and 1960 by Emile Aillaud and constitutes one of the great works of this architect. This architect is distinguished for introducing an oneiric and poetic dimension in his works, as opposed to the repetitive rigour of industrial production which would soon be criticised by the public. In *Courtillères*, Emile Aillaud designs a huge undulating building, the "serpentine", which encloses a landscape park with many trees, slightly undulating with the remains of the construction works. In the periphery, we can see a neighbourhood with its market square and "tripod" towers (3 flats per floor with triple orientation), which hold a view over the park. The "serpentine" consists of a minimalist façade, without ornaments, just narrow balconies and random openings. The polychromy, important to Aillaud, consisted of a layer of paint coating the concrete: from the "street", the "serpentine" was monochromatic grey-blue, while from within, overlooking the park, each flat had a different colour chosen within a range (a dozen colours between "sky blue" and ochre); a child would be able to recognise his/her home. This complex soon became famous at the time of its construction through the press of the time that released and hailed its visionary architecture.

This exceptional work, located on the outskirts of Paris, did not escape the social problems and degradation. Since 2003, a national programme has committed itself to these neighbourhoods, presenting the demolition as a prerequisite for urban design. *Courtillères* did not escape this policy and one-third of the length of the "serpentine" was proposed for demolition, while the preserved parts were entirely coated with terracotta panels. The difficulty in enforcing the patrimonial argument in this context has led some historians and architects to summon the Ministry of Culture thus suspending the project. Negotiations were opened, and a new project which oscillated between preservation, development and revitalisation of the neighbourhood was developed. The result is interesting to analyse as it presents a specific approach to the recognised heritage.

Firstly, the integration of the demolition of the original building in the recognition and valuation process. On the basis of the assumptions provided by the demolition project of a linear part of the "serpentine", discussions led to a reduction only by half and, for a better arrangement, a virtual preservation of the continuity of the building in the landscape. The recognition of the patrimonial interest by the State in 2009, before the beginning of the demolition, through the "Heritage of the 20th century" award (*Label XXe*), proved that it neither constituted as a form of protection nor as a funding source for preservation. Although the official recognition helped save part of the condemned building, as well as formalise its partial destruction. Economically, the reduction of the demolitions entailed a decrease in public funding destined to "renew" the neighbourhood: paradoxically, and against any real logic, rehabilitation is more expensive than the demolition/reconstruction.

FIG. 9 New couloured enamelled mosaic coating by artist P Di Sciullo and RVA architects. Photo by Bruno Mengoli

Secondly, the question of the coated panels in terracotta, profoundly altering the appearance of the "serpentine", does not lead to the restoration of the original façade. Under a "legible" revitalisation framework of the houses and their architecture, the municipal authorities can not consider the possibility of restoring the original "painted cement": it is necessary to implement a specific material to highlight the qualitative evolution of the neighbourhood and reveal the originality of the architecture. The political tension arising from the project would then result in a financial plan with "additional costs", not for the demanding restoration process, or for the sustainability improvement of accommodations, but for the aesthetic effect of the façade designed to ensure the legibility of the

architectural quality amongst the population. Thus, the coating used consists of small coloured enamelled mosaics (2x2 cm), set up by an artist – P. Di Sciullo – according to a colourful gradient that evokes the "pixels" of a screen. The collection reinterprets Aillaud's sequencing in harmony with a uniform and neutral "exterior", as opposed to an "interior" marked by intense colour variations. The enamel technique evokes the coatings in molten glass used at the time; and as such, the evocation of heritage, without intending to restore anything, is present in the artist's work through a contemporary project.

Conclusion

The examples shown allowed us to both paint the picture of a specific territory and reveal its interest from the point of view of the built heritage. Through its inherent stigmas or apparent triviality, the objects that emerge reveal a chaotic context of recognition, which is the threshold for new themes in the field of heritage. Moreover, it is not illegitimate to think that this production is, along with all that holds the suburb, the heritage deposit of the 21st century.

Ana Luísa Rodrigues Villa La Roche, Paris, 2004. ALR

A conversation on *the habitability of the domestic space. The client, the architect, the inhabitant and the house.*[1]

Ana Luísa Rodrigues

Having as a starting point the resulting experience from our PhD thesis realization, the discourse was structured around: the «Theme», embodying our understanding of the idea and the concept of house; clarifying the «Perspective» of our approach, i.e. the point of view that was decided to question; embodying the «Choices», justifying the choice of each *Exemplar Case*; ending with some considerations on «Writing», because it is the key instrument in achieving the final document.

To address the invitation made to me in regard to the Seminar on Advanced Knowledge of the Doctoral Programme in Architecture – Sustainability, Conservation and Technology – of the School of Architecture of the University of Minho, on 23 March of the current year, I prepared an oral speech which accompanied, for about 3 hours, a sequence of projected images, quoted phrases and the index which structured my doctoral thesis. I was asked to dwell upon my personal experience, in a testimony tone, about the completion of my doctorate entitled *A habitabilidade do espaço doméstico. O cliente, o arquiteto, o habitante e a casa*.

If that circumstance proved accessible, the completion of this document, on the other hand, would become difficult, provided that the intention – now – was to record the speech which had naturally flowed into a dialogue, fuelled by questions and answers articulated amongst those present at the time.

So, instead, I opt here to simply reveal the structure that was outlined as the underlying theme of that conversation where I assumed *four separate sections,* which I will describe briefly.

1. Theme

The awareness of the "problematic" that falls within a certain "theme", embodying the "problem" is – generally speaking – the starting point for those who want to undertake a doctoral research programme. In this sense, the realisation of the inevitability of an initial state, shared by almost everyone, based on the anguish of the blurriness before a vast universe of possibilities, and coupled with an anxious need to circumscribe a subject field that conveniently directs our research, sparked the motto of our conversation. Thus, taking into account my particular case, I tried to fulfil my understanding of the theme of the *house* not only as an *idea*, but also as *concept*.

2. Perspective

The *point of view* that one decides to approach the theme is also decisive in the initial process of research. Therefore, I designated as "perspective" this particular "view", bringing to light the analogy of José Ortega y Gasset in "A few drops of phenomenology" from his book *The dehumanization of art*.

In other words, I tried to study the "house" taking into account the views of the three participants involved in the process of design, implementation and achievement: the client that orders it; the architect who designed it; the inhabitant that appropriates it.In this sense, I wanted to relate the architecture of the house with the life within it, reflecting on how the house is designed and built according to the way it is later inhabited. And also decided to consider them equidistant in relation to the house by admitting that each subject actually assumes a relevant role in its implementation, by identifying three distinct chapters: client versus order; architect versus design; and inhabitant versus purpose.

3. Choices

By conveniently justifying the choice of the most specific use of *exemplary cases* rather than *case studies*, I have explained my choices, giving a more complete picture of the type of approach in each chapter, with a view to building the argument that was sought to justify this research.

Casa come me is the house of the Italian writer Curzio Malaparte. It is a house built for a single client, in a promontory of the Italian island of Capri, situated in the bay of Naples. As it is a clear example that witnessed a total break between the client/future inhabitant, Curzio Malaparte and architect Adalberto Libera, it was possible to question about the vulnerability of the relationships between the various participants in the implementation process of *the house*.

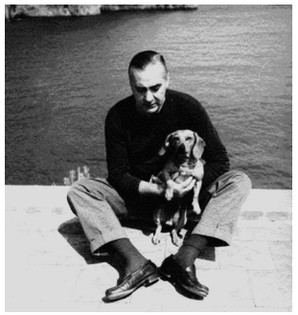

FIG.1 Curzio Malaparte on the terrace.

Farnsworth house, designed by German architect Mies van der Rohe, was built in the metropolitan area of Chicago, located on the banks of River Fox in Plano, Illinois, for a single client, the doctor Edith Farnsworth. This house was chosen on the pretext of being able to reflect on

FIG.2 Edith Farnsworth in the living-room.

the lack of communication between the various subjects involved, namely, in the conformation process of the respective *house*.

FIG.3 Vanna Venturi in the garden. Photo by Rollin La France, 1964.

The mother's house, designed by American architect Robert Venturi, is the house he designed for his mother Vanna Venturi, in Chestnut Hill, in Pennsylvania State. This is a house built for a widow client in the residential suburbs of Philadelphia, on the Atlantic coast of the United States of America, which witnessed an exceptional intimate relationship between the participants involved in the conformation process. By taking this into account, it allowed us to infer possible consequences that this proximity may introduce, influencing, or not, the architectural design of *the house*.

FIG.4 Pitite Maison by Le Corbusier and Lake Geneva. Photo by trevor.patt, 2012.

Une petite maison, from the Swiss architect Le Corbusier and the house he built for his elderly parents, the Jeanneret – located in the Swiss margins of Lake Geneva, in Corseaux, near Vevey, a Swiss municipality in the canton of Vaud – it was possible to evoke the rather interesting relationship, contrary to the previous one, i.e. the existence of a possible emotional distance between the various participants involved in the conformation process of the house. It was precisely in these terms that we

problematised the topic, trying to understand the extent to which a greater autonomy by the architect may influence the composing action of the design of *the house*.

In ***Solar Pavilion*** the British architects Alison and Peter Smithson were chosen when I wanted to question *the house* that the architect builds for his/her own enjoyment, witnessing a particular coincidence of the three subjects, i.e. when the client, the architect and the inhabitant are embodied in the same person. This holiday house, designed by this couple of architects, built in the middle of farmland in a small village in Upper Lawn, Wiltshire, in the outskirts of London, witnesses the exceptional achievement of a modest domestic space that was simply designed, constructed and used to accommodate their family during their holiday periods.

FIG.4 Alison Smithson in the garden.

In ***Can Lis and Can Feliz***, the Danish architect Jørn Utzon, when building two houses for himself and his family, in the same Spanish island of Palma de Mallorca, eventually formed the ideal example that illustrates an eminent problem expressed in the conflict of interests between the various subjects that implement the same house. After this architect had designed, built

FIG.5 Utzon family in Hellebæk.

and inhabited Can Lis – located in Porto Petro, next to the Mediterranean sea, exposed on a rocky escarpment bordering the coast of the island – he designed, built and dwelt in Can Feliz – deployed in S'Horta, on a wood mountain – eventually arousing the curiosity of many.

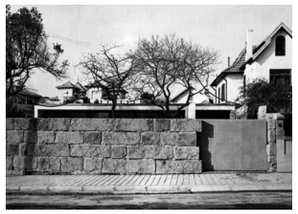

FIG.6 House on Rua do Padrão.

FIG.7 House on Rua do Crasto.

Two houses in Nevogilde addressed two (distinct) houses that the portuguese architect Eduardo Souto Moura designed for two (distinct) families in the same residential area of the parish of Nevogilde, in Oporto. This choice is intended to reflect on the role of the architect in response to the ambitions of other subjects, in relation to the house that all help to finish. Here we have raised the issue about the performance of the architect who seeks to justify and consolidate his design options, tempering expectations of each; thus finding the desired consensus amongst all and the whole which is *the house*.

FIG.8 Milada Müller on the terrace.

Khuner villa and Müller villa were designed by Austrian architect Adolf Loos and built in the year 1930 for the Khuners family in Kreuzberg, located on top of the Austrian mountainous region of Semmering, and for the Müller family in Prague, framed in the residential suburbs of the capital of the Czech Republic. These two houses were chosen on the pretext of reconsidering the role of each individual in the implementation of *the house*. For considering this architect to have contributed in an exemplary manner for the reassessment of the house and the dwelling itself, he was chosen to end the second part of the thesis.

FIG. 9 Khuners family on the terrace.

4. Writing

Finally, I decided to talk about the writing as a key instrument in completing the document, recalling Mies van der Rohe when he acknowledged: "Since I am no writer, I find writing difficult; in the same time I could have completed a new design".[2]

Notes

1 Cf. Ana Luísa RODRIGUES, *A habitabilidade do espaço doméstico: o cliente, o arquitecto, o habitante e a casa* [doctoral thesis in architectural culture], Guimarães: University of Minho, 2009. Available at: http://hdl.handle.net/1822/9512 [accessed on 16 July 2013].

2 Fritz Neumeyer – Note 40: letter to Hermann von Wedderkop, Cologne, February 1924, in the Library of Congress.

Peter Erlacher lecture on the 11th of November 2011. EAUM

Improving the energy efficiency of existing building envelope

Peter Erlacher / Marianna Marchesi

Existing buildings are responsible for sizeable energy consumption and existing buildings with high energy consumption represent a significant amount of the existing building stock. This means that the entire building stock should be improved with a high decrease of the energy consumption. For this reason the improving of buildings energy performance is an important European objective to achieve by 2020.

Energy problems of existing building envelope are identified and energy efficiency strategies for heating and cooling to improve its thermal performances are proposed. Insulation systems and technologies are analyzed according to current European standards, topical knowledge and practice. Special attention is paid to different insulation systems in order to propose a critical evaluation of potential solutions. In an energy retrofitting on existing building envelope, specific design solutions on the building components (walls, floor, windows and roof) and joints are required; hygrothermal checks have to be carried out during the design phase and a correct realization has to be fulfilled in the construction phase to avoid future damages in the building. Especially moisture and condensation problems, which could occur as a consequence of retrofitting interventions, require careful evaluations.

Introduction

In the policies to reduce energy consumptions and emissions the energy saving improvement of existing building stock represents an important potential in the European background. In the overall European Union built environment, the present rate of construction of new buildings is below 2% in all major European nations and the destruction rates are even lower, in the range of 0,5%.

Buildings constructed before energy efficiency regulations represent over 60% of the existing building stock and they have unacceptable energy consumptions (Ecofys, 2005). The existing buildings absorb almost 40% of the energy demand and they are responsible for 36% of CO_2 emissions (European Parliament, 2010). This means that, in order to contribute to a real energy efficiency of the built environment, the entire building stock should be improved within a reasonable timeframe. Energy efficiency building strategies could reduce the energy consumption by 50% to 90% (ENEA, 2007). For this reason the energy performance of buildings is an important European objective to reduce 20% of Greenhouse gases emissions and 20% of energy consumption by 2020.

The energy performance of a car is usually indicated by fuel consumption for 100 kilometres, but there is not a similar indicator to express the energy performance of existing buildings. Therefore it should be possible to evaluate the energy performance of an existing building indicating energy consumption for every square meter a year [FIG. 1].

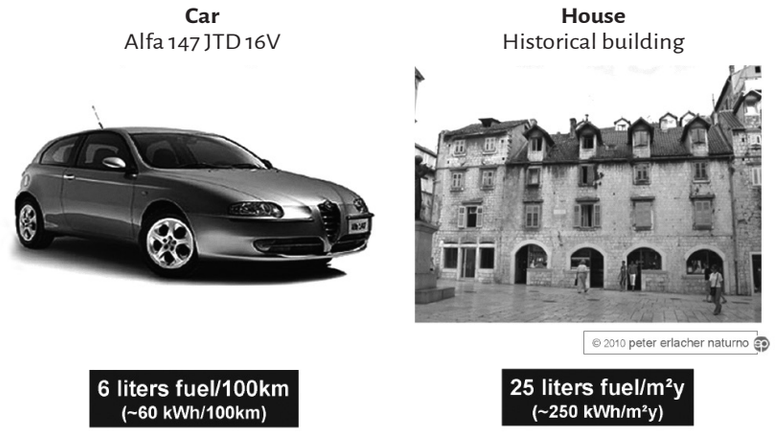

FIG 1. Comparison between energy performances of a car and energy performances of an existing building.

In Italy buildings constructed before energy efficiency regulations (1975) represent over 65% of the existing building stock (ISTAT, 2004) with high energy consumptions compared to standards of new buildings: average heating/cooling energy demand of existing buildings is equal to 170 kWh/m2y (ENEA; 2007), while a passive house absorbs 15 kWh/m2y (Feist, Passivhaus Institute, 2008) [FIG. 2].

In Italy households use 72% of energy demand for heating and cooling, 14% for warm water, 12% for domestic appliances electricity and 2% for light electricity (ENEA, 2007) [FIG. 3].

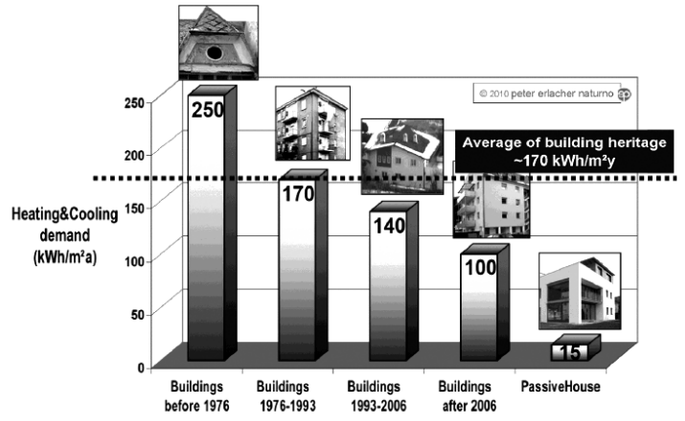

FIG 2. Energy consumption of existing buildings in Italy.

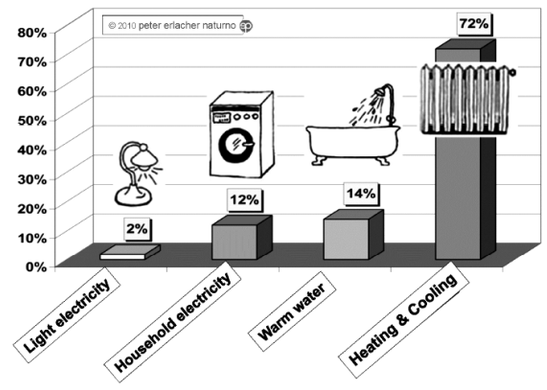

FIG 3. Energy demands of households in Italy.

Improving the energy efficiency of existing buildings means a reduction of consumptions for heating and cooling by the following measures:

- energy efficiency improving of building envelope;
- energy efficiency improving of heating system;
- using renewable energy sources.

Therefore it is possible to save energy if a methodical intervention on existing buildings is implemented. An intervention on existing buildings requires specific solutions and verifications in the design phase and a correct realization in the construction phase. In fact, in the energy retrofitting, problems and complex variables can limit the possibilities of intervention. The designer often has to find specific solutions due to existing limitations, structural situation and rules in force. In an energy refurbishment we cannot always achieve a high energy efficient envelope due to existing constraints. When an intervention on existing building envelope is planned, specific solutions are required to improve envelope behaviour for heating and cooling.

Improving energy efficiency of existing building envelope for heating

Energy efficiency improving of existing building envelope for heating implies the decrease of energy demand for heating. Energy demand in building energy balance for heating is calculated as the difference between heat losses and heat gains, according to UNI EN ISO 13790. Heat losses are the sum of transmission losses and ventilation losses whereas heat gains are the sum of solar gains and internal gains [FIG. 4].

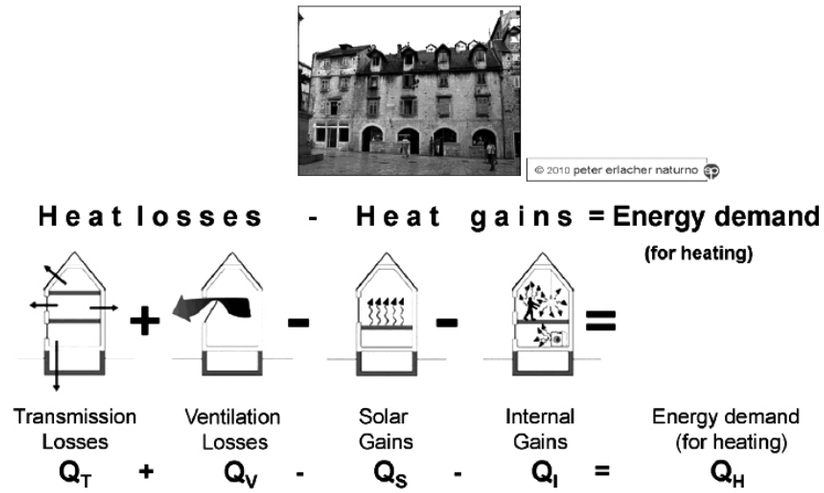

FIG 4. Energy demand for heating according to UNI EN ISO 13790.

Therefore energy efficiency improvement of existing building envelope for heating should consist in the following actions:

- decrease of transmission losses by thermal insulation;
- decrease of ventilation losses by air tightness and controlled air exchange;
- increase of solar gains by utilization of solar radiation;
- increase of internal gains by utilization of room-heat.

The transmission losses have a significant impact on the energy demand for heating in an existing building. The insulation of thermal building envelope allows reducing transmission losses. In the new constructions, systems and new materials can guarantee good thermal performance. On the other hand, in restoration, problems and complex variables can limit the possibilities of intervention. The designer has often to face the difficulty to find feasible solutions

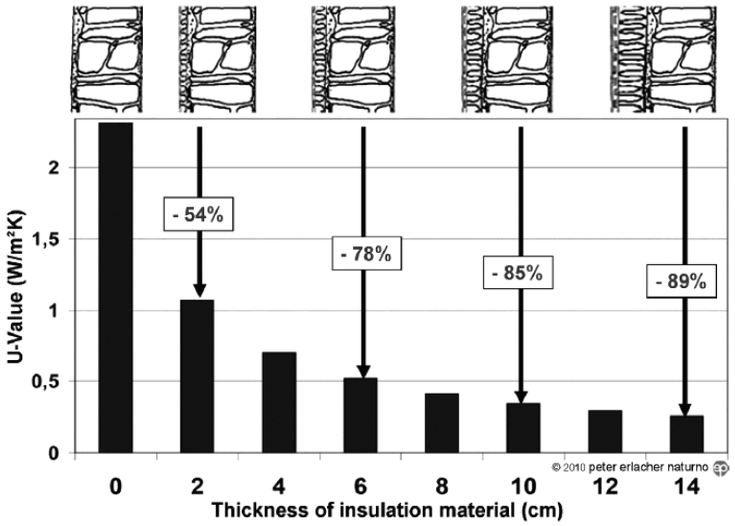

FIG 5. Decrease of transmission losses increasing the thickness of insulation materials – Stone wall: 50 cm, λ=1,9 W/mK; Insulation material: λ=0,040 W/mK.

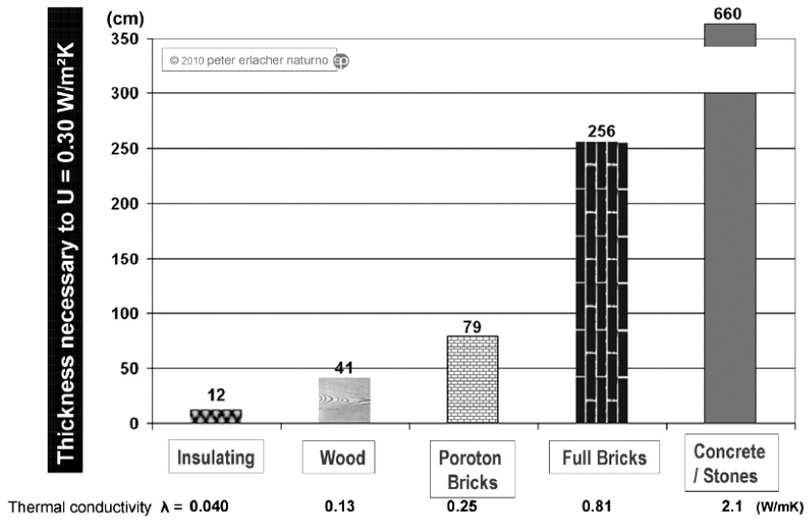

FIG 6. Thermal performances of different building materials.

because of the historical limitations, structural situation and regulations in force. An energy retrofitting on existing buildings requires specific solutions on the building envelope components (walls, floor, windows and roof) and joints, checks in the design phase and a correct realization in the construction phase. Thermal and hygrometric evaluations of insulation solutions on the building components (elements and joints) have to anticipate the planning decisions to avoid future damages in buildings. For this purpose, a complete analysis of the problem should consist in:

- investigation of the existing building envelope;
- identification of energy problems and performances;
- research on possible materials and technologies to apply;
- check of moisture transport, interstitial condensation, surface condensation and mould growth;
- critical evaluation of potential insulation solutions.

Thermal performance of building envelope is evaluated according to climate zone where the existing building is placed. The climate conditions of every area are evaluated and expressed by Heating Degree Day (HDD). Heating Degree Day is a measurement of the energy demand for the heating of a building. The heating requirements depend on a specific location or rather they are derived from the value of outside air temperature.

Improvement of thermal performances of the building envelope depends on thickness of applied insulation material and on its thermal characteristics. The transmission losses of the thermal building envelope decrease when the thickness of applied insulation material increases [FIG. 5].

Moreover insulation materials have a lower value of thermal conductivity compared to other building materials [FIG. 6].

Therefore a small thickness of insulation material is necessary to achieve the same thermal performance as other building materials with high value of thermal conductivity. European Standard EN ISO 10456:2007 indicates design values of thermal performances of several building materials.

Insulation of external walls could be realized by different systems. The insulation system is chosen according to specific evaluations and checks on existing wall. The available systems are as follows:

- external insulation by ETICS;
- internal insulation;
- ventilated façade;
- insulation of a cavity in the wall.

The best thermal insulation is the external system because the insulation is applied on the external surface without interruptions except for the foundations where the insulation cannot be continuous. This insulation system allows reducing potential thermal bridges. Thermal bridges are thermal discontinuities of building envelope due to geometrical variations, thickness decrease and non-homogeneous materials of the envelope walls. They determine an increase of heat transmission loss through the building envelope and a decrease of internal surface temperature of the wall where there is the thermal bridge, leading to the formation of superficial condensation and mould on the inner surface of the wall.

The external insulation system requires a correct application to guarantee optimum results. A standard European approval guideline, ETAG 004, for external thermal insulation composite systems (ETICS) on masonry and concrete substrates has been drawn up by European Organization for Technical Approvals.
ETICS is the abbreviation for External Thermal Insulation Composite System and it is used internationally in this form as standard [FIG. 7].

Special attention has to be paid to internal insulation solutions when the external insulation system is not suitable in an energy retrofitting of existing building envelope [FIG. 8].

When an internal insulation with a high thickness of insulation material is applied, the risk of interstitial condensation and therefore of deterioration of the internal insulation solution is likely to occur. In the case of internal insulation the evaluations of interstitial condensation must be considered [FIG. 9].

FIG. 7 External thermal insulation composite system (ETICS). Photo by Arch. Dietmar Dejori.
FIG. 8 Internal thermal insulation system. Photo by Arch. Dietmar Dejori.

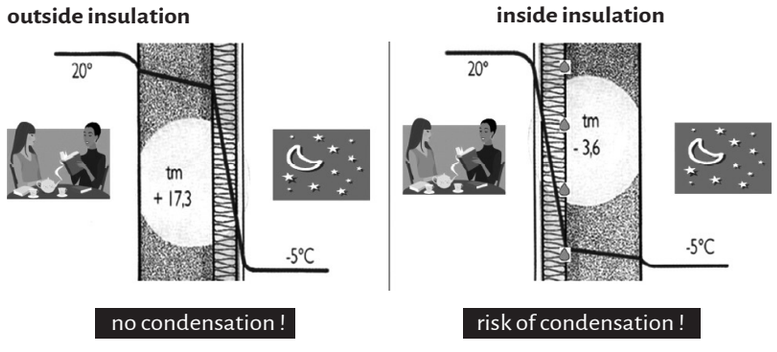

FIG. 9 Risk of interstitial condensation.

The thermal bridges have to be accurately eliminated or reduced and air tightness of the building envelope has to be correctly realized to avoid future damages in the building due to interstitial condensation. Moreover using indoor insulation materials with specific hygrothermal characteristics, such as wood fibre boards for inside or mineral insulation boards for inside, allows the reduction of the hazard of problems caused by applying an internal insulation system. These materials are characterized by low thermal conductivity, high permeability to diffusion water vapour and also outstanding hygroscopic features for absorption of capillarity water vapour [FIG. 10].

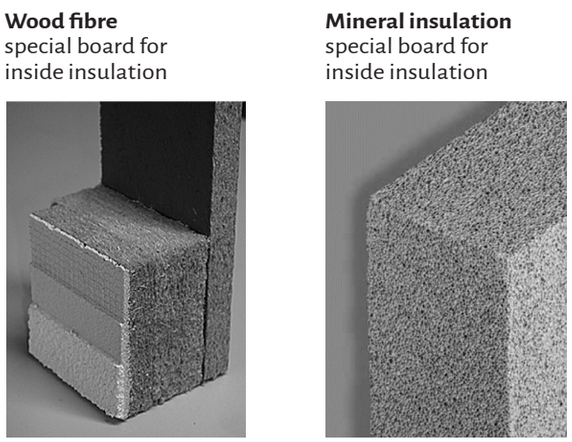

FIG. 10 Specific internal insulation materials.

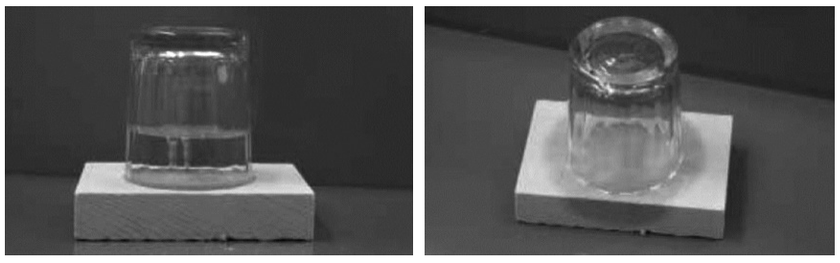

FIG. 11 Hygroscopicity of the calcium silicate board.

Thermal bridges are not easily eliminated in internal insulation systems and specific solutions are required to reduce their negative effects. If the thermal bridge remains, calcium silicate boards with thickness of 2 cm can be applied in correspondence of the thermal bridge to prevent the formation of mould on the inner surface of the thermal building envelope. This material is hygroscopic and alkaline (about 12 pH), but it is not very insulating (equal to 0,060 W/mK) and it is expensive [FIG. 11].

The following table emphasizes some differences, similarities and limits of the two insulation systems:

External wall insulation	**Internal wall insulation**
It does not modify the appearance of the outside wall, but reduces slightly the size of the room where it is applied	It renews the appearance of the outside wall, but permissions by local authorities could be required
It reduces thermal bridges	Some thermal bridges remain
It allows making use of the thermal inertia of the existing external wall	It does not allow making use of the thermal inertia of the existing external wall
It usually improves the acoustic insulation of the external wall	It could improve the acoustic insulation of the outside wall
It protects the existing external wall	The existing external wall is exposed to weather conditions
It reduces the risk of surface condensation and mould on the internal surface of the wall	It could cause the formation of interstitial condensation inside the insulation material. Check of interstitial condensation must be carried out
It requires scaffolding during construction	It does not require scaffolding during construction
Users can stay in the building during the construction	Users can stay in the building during construction only if the work is done room by room

Insulation of a flat roof or pitched roof could be realized on the outside or the inside of the existing building component. In the case of a wooden roof the best solution requires high-density, breathable and hygroscopic insulation material such as wood fibre or flax [FIG. 12].

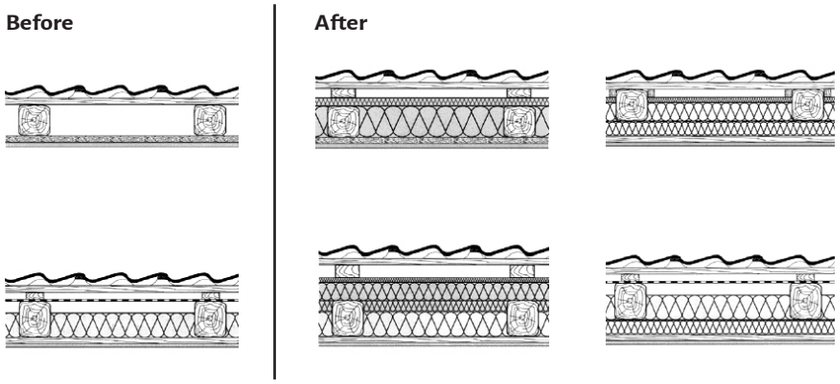

FIG. 12 Insulation of a wooden roof.

The air tightness of this building component should be correctly realized to avoid damage due to convection condensation. The convection of water vapour through the crevices in the air tightness leads to a rapid deterioration of the building envelope. Due to the difficulties of a correct installation a vapour barrier should only be applied when it is necessary. In fact very serious damages are likely to occur if the vapour barrier is not perfectly installed.

The application of the insulation on the thermal building envelope should be extended to the floor on the ground or on an unheated basement. The insulation material could be applied on the inner or outer surfaces of the building component. The first solution leads to an increase of floor level and the rebuilding of the existing flooring, while the second solution is usually simpler to realize than the first, if there is an unheated basement.

Improving the energy efficiency of the existing windows depends on their features. Some actions might have to be carried out on windowpanes and air tightness such as:

- integration of double glazing with gas in the existing window frame [FIG. 13];
- integration with low-emissivity glazing;
- application of tapes and gaskets on the existing window frame.

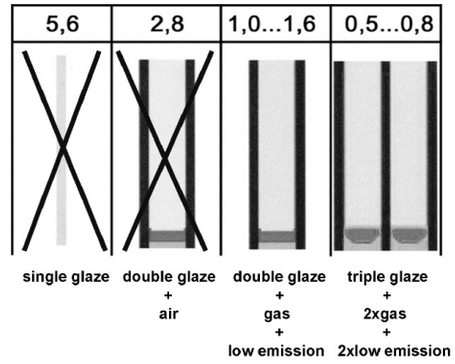

FIG. 13 Thermal transmittance of glazing.

Alternative solutions to achieve a high energy efficiency are the application of further internal or external windows on the building envelope or alternatively the replacement of the existing windows. Currently window manufacturers produce energy efficient windows in which the thermal performances of glass and frame can reach a very high level. Insulation of the thermal envelope of the existing building can lead to significant results regarding heat transmission losses. Combined actions on walls, roof, floor and windows allow reducing the heat transmission losses by minimum 50% in an energy retrofitting of existing building envelope (Erlacher, 2010) [FIG. 14].

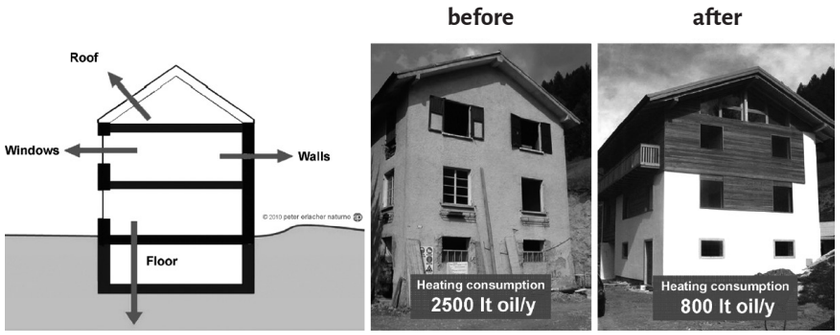

FIG.14 Heating consumption before and after energy retrofitting.

Another important contribution to the building energy demand for heating is given by ventilation energy losses. Ventilation energy losses are caused by inefficient air tightness and uncontrolled air exchange. An airflow moves through the crevices of the building envelope due to different pressure between inside and outside and it leads to inefficient air tightness and therefore an unchecked air exchange. Moreover also recurrent opening of the windows and doors to guarantee the suitable indoor air quality determines an uncontrolled air exchange. Therefore decrease of ventilation energy losses could be achieved through actions on air tightness and air exchange. Concerning the air tightness the crevices of the building envelope have to be sealed in order to reduce air leakages. The air tightness can be achieved by plasterwork, specific airtightness membranes, plasterboards or wooden panels as well as airtightness tapes on joints. Regarding the air exchange for indoor comfort the natural airflow through opening of the windows could determine an excessive ventilation energy loss. A controlled air exchange can be achieved applying mechanical ventilation systems. Especially using mechanical ventilation systems with heat recovery, the ventilation energy losses are reduced through the recovery of the heat of the outgoing air.

Improving energy efficiency of existing building envelope for cooling

Energy efficiency upgrading of existing building envelope for cooling is difficult to achieve. However some measures should be carried out to avoid overheating in summer [FIG. 15] such as:

- protection from direct sunlight and solar gain by external shading;
- minimizing heat gain by thermal inertia with at least a phase difference of 9 hours between inside and outside and by passive cooling or rather night ventilation (Erlacher, 2011);
- air tightness and controlled air exchange;
- thermal mass on internal surfaces.

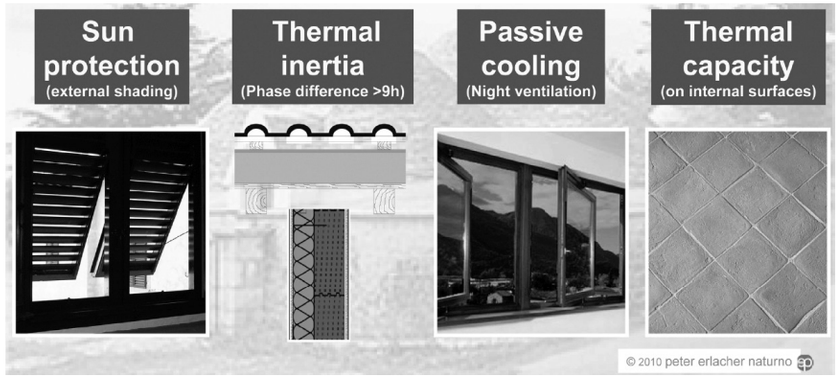

FIG. 15 Measures to avoid overheating in summer.

Conclusions

Buildings constructed before energy efficiency regulations represent a significant amount of the existing building stock and they have unacceptable energy consumptions compared with current European standards. This means that energy efficiency strategies on existing buildings could highly reduce the energy consumption.

Energy problems and measures to improve the energy efficiency of existing buildings have been analysed. Thermal performances of existing building envelope, energy efficiency strategies, insulation systems and technologies have been proposed to upgrade energy performances of building envelopes. Performances and features of different solutions have been considered in order to propose a critical evaluation of intervention possibilities. To conclude the impact of the planning decisions on hygrothermal behaviour of the building envelope has to be taken into consideration in the energy retrofitting of existing buildings. Potential insulation solutions have to be designed in detail and they have to be verified through hygrothermal checks to avoid future damages in the buildings. Special attention has to be paid to moisture and condensation problems which could occur as a consequence of retrofitting interventions.

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UNI EN ISO 13790:2005; *Thermal performance of buildings - Calculation of energy use for space heating*

UNI EN 15026:2008; *Prestazione termoigrometrica dei componenti e degli elementi di edifici - Valutazione del trasferimento di umidità mediante una simulazione numerica*

CASE STUDIES

Ivo Hammer lecture on the 28th of October 2011. EAUM

The Tugendhat House between craft tradition and technological innovation. Preservation as sustainable building policy[1]

Ivo Hammer

The Tugendhat House in Brno, a UNESCO World Heritage Site since 2001, may serve as an example of architectural heritage, representing not only innovative spatial and aesthetic concepts that aim to satisfy the needs of the new lifestyle, but that in the materiality of cultural heritage all historical, artistic and other cultural values are incorporated. The results of conservation-science investigation of the materiality of the Tugendhat House, we conducted 2003-10, may show how the artisanal and mostly quite traditional techniques of shaping the surfaces contribute to the authentic appearance of the house.

Preservation of buildings by means of intensive maintenance using materials and techniques compatible to the original technology and the and optimum use of existing buildings as a vision for a sustainable building policy that benefits the environment, are strategic goals and practice of monument care. In this sense, historic preservation can be seen as a paradigmatic strategy for sustainable building policy, both in terms of preservation and use of historic architecture as well as in terms of a modern ecological architecture.

Introduction

The motive of this essay relies on the question: How we can understand the care of monuments in a wider social sense, beyond the narrow limits of a purely technical discussion of the preservation of cultural heritage? We have all become more and more aware of the decreasing availability of resources, not only of materials, but also of space and historic knowledge. In this sense, we understand built monuments, which we refer to as cultural heritage, also as resources.

My goal is to make somewhat clear that cultural heritage is not to be regarded only as a spiritual or intellectual resource, but that in the materiality of cultural heritage, all the historical, artistic and other cultural values are incorporated. I want to make clear that the materiality is not only a particular aspect of the cultural heritage, which we usually call art. Rather, I am assuming that the materiality of the art work is an essential basis of its' expression and its meaning. That aspect is often neglected in theory and practice. I understand materiality as a manifestation of the historical, artistic or other cultural characteristics that are embodied in the artwork. Accordingly, the matter of a work of fine art is to be considered dialectically:

- on one hand as a *technology* of matter with determined elements in a certain compound, of surface appearance (including colour, structure, texture and *facture*[2]), of aging and of deliberate, anthropogenic change;
- and, on the other, as a *design* of matter with a specific subject, purpose, form, context, content and reception horizon.

The thing is, the matter is indissolubly linked with an idea, and it is not just an arbitrary character or sign documenting cultural ideas. Our Western culture, dominated by Christian culture, neglected the matter in philosophical and practical terms giving primacy to the spirit, to the idea. And the currently growing emphasis on the evidence in cultural studies and specifically in aesthetic discourse has hardly been matched by a concrete scientific engagement with the material base of artefacts.[3]

FIG. 1, View from the west of the Tugendhat House during construction. Photo by Fritz Tugendhat, about October 1929.

> "Since Plato and Aristotle, European art history has paid little attention to the materials of which of artworks are made. Aesthetic theory has long regarded material as the medium of form and not something meant to be consciously perceived as part of the meaning of the artwork" (Monika Wagner).[4]

Resources have always both a cultural and material nature. In this sense we understand building monuments, I repeat it, not only as spiritual messages, which are called cultural heritage (almost as a kind of software), but also as a resource of technical solutions (so to speak a sort of hardware). A prerequisite for the knowledge of these properties is the study of its materiality and its technological and historical interpretation, a primary professional responsibility of conservators / restorers.

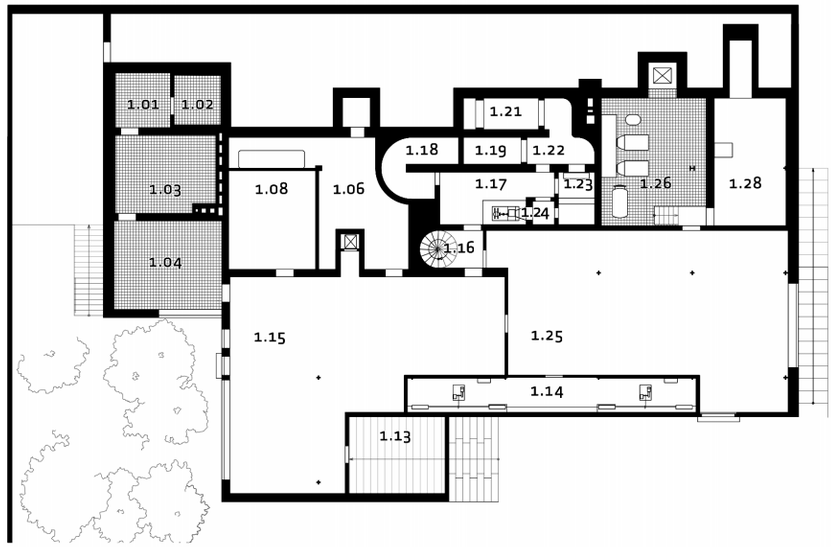
Preservation and conservation of the material substrate of cultural heritage make sense only, if they are understood as authentic resource of historical, artistic and other cultural attributes and designs materialized in the fabric of the monument and its surface. In the dominant discourse, technology only is worth being mentioned, as far as it can be called innovative. This can be seen as a devaluation of the actual technology used, by transcribing the term, which refers to organized matter and transferring it into the immaterial, into the spiritual realm of innovative thought.

The Tugendhat House: innovation and tradition of craftsmanship

The Tugendhat House in Brno, built in 1928–30, is the most important work of Ludwig Mies van der Rohe in his Berlin time. It was designed about the same time as the famous Barcelona Pavilion of 1929, which survives nowadays only as a copy dating from 1986.

The contribution of Lilly Reich, the life partner and colleague of Ludwig Mies van der Rohe running with him the architecture studio in Berlin, is regularly underestimated in the available literature. For example, it is ignored the fact that Lilly Reich was the director of the exhibition in Stuttgart, which was held parallel to the Weißenhof-siedlung.

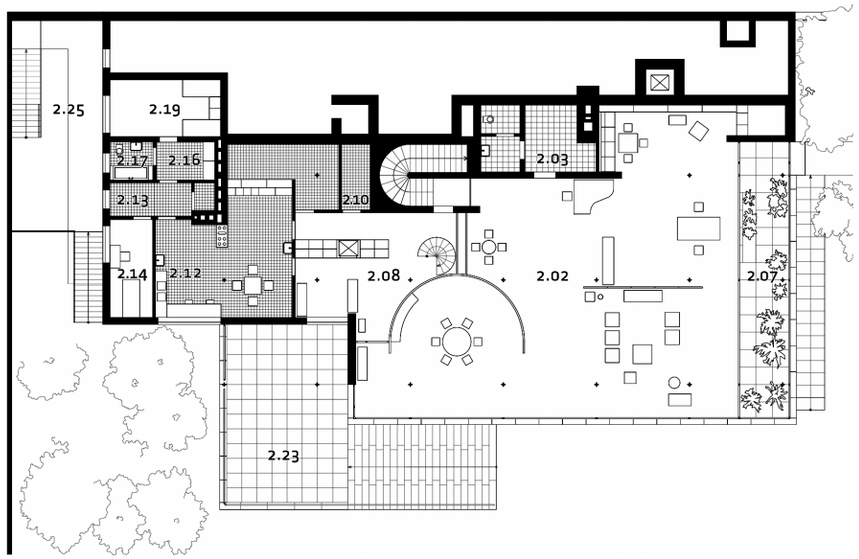
In 2001, the Tugendhat House was listed by UNESCO as a World Heritage site and was identified as "an outstanding example of the international style in the modern movement in architecture as it developed in Europe in the 1920's".[5] Its particular value, the World Heritage listing reasoned, is in the "application of innovative spatial and aesthetic concepts that aim to satisfy new lifestyle needs by taking advantage of the opportunities afforded by modern industrial production".



Basement

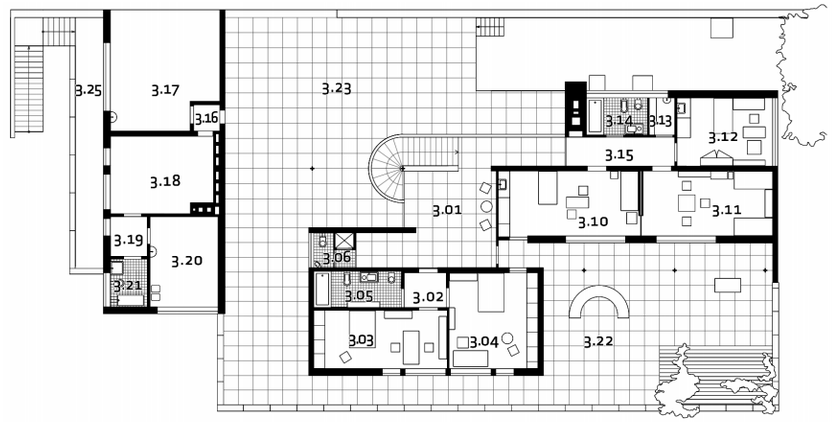
1:01 anteroom **1:02** moth chamber (for safe) **1:03** darkroom **1:04** washroom **1:06** rainwater storage room **1:08** vegetables storage **1:13** room under the garden stairs **1:14** engine room of the windows **1:15** room for drying laundry and ironing **1:16** basement stairs **1:17** control of the air conditioning and motor **1:18** space under the stairs **1:19** exhaust **1:21** cooling and humidifying the air **1:22** mixing chamber **1:23** air filter **1:24** air heating **1:25** storage for garden tools and furniture **1:26** heating and ash elevator **1:28** carbon chamber

FIG. 2 –4 Tugendhat House floor plans: Basement (1), first floor / living room (2) and second floor / bedrooms (3). The plans were created according to natural dimensions using the publication plans in 1930 (Ludwig Mies van der Rohe), the basement plan was added. Courtesy by Atelier RAW, Brno, 2012.



First floor

2:02 main living room **2:03** screening room with toilet **2.07** conservatory **2.08** pantry **2:10** stockroom **2:12** kitchen **2:13** entrance hall of the service wing **2:14** room the lady cook **2:16** anteroom **2:17** bath and toilet **2:19** room of the chambermaids **2:23** garden terrace with staircase **2:25** gallery of drivers apartment



Second floor

3:01 entrance hall with stairs to the main living room **3:02** anteroom **3:03** Fritz Tugendhat **3:04** bedroom Grete Tugendhat **3:05** parents bathroom **3:06** Toilet, Dumbwaiter **3:10** room of Ernst and Herbert **3:11** room of Hanna Weiss **3:12** room of Irene Kalkofen **3:13** utility room **3.14** bathroom of the children and of Irene **3:15** hallway **3:16** anteroom to the garage and driver apartment **3:17** garage **3:18** sleeping room of the drivers apartment **3:19** vestibule of the drivers apartment **3:20** cuisine of the drivers apartment **3:21** bath and toilet of the drivers apartment **3:22** play terrace **3:23** front porch (**3.24** technical terrace) **3:25** gallery drivers apartment

FIG. 5 Fairgrounds, Pavilion of Arts and Crafts School in Brno by Pavel Janák during construction (1927– 28). Brick-clad concrete base, hollow block brick wall, wood chip board, steel girders.
FIG. 6 Fairgrounds, Pavilion of Arts and Crafts School in Prague by Pavel Janák (1927–28). South wall, detail, fragment of the original façade plaster, which was smoothed out with a wooden board, and covered with yellowish lime wash. Photo by HAWK Hildesheim, 2005.

The Tugendhat House is known to be the first detached residence house in the history of architecture to have a support structure that consists of a steel skeleton making the open floor plan possible. Steel-frame structures in itself were not new and were already introduced in the late 19th Century in larger commercial and industrial buildings. In 1927 Ludwig Mies van der Rohe himself had already built his apartment block in the Stuttgart Weißenhofsiedlung as a prototype with a steel structure. This design was associated with high material costs and high planning effort but it certainly contributed to speed up the construction process itself.

Had the frame been made of reinforced concrete, which was preferred, for example, by Le Corbusier, thin columns would not have been possible.[6] In the interior, the shiny-chromed brass cladding plates on the supports create a "dematerialization effect that negates its static function as much as possible".[7]

FIG. 7 Main living room when in use as an orthopedic therapy room for the children's hospital. The only remaining window pane of polished plate glass was very flat, irregularities were hardly noticeable even in the oblique view. The glass panel was allegedly destroyed in the wake of the renewal in 1985. Photo courtesy of Mogens S. Koch, Copenhagen, 1972.
FIG. 8 Detail of the polished chrome cladding on the cross-shaped steel columns. In the mirror, the subtle unevenness of the surface of the metal caused by the craft fabrication process is clearly visible. Photo courtesy Dieter Reifarth, 2008.

And yet, despite all fabricated perfection, the traces of the craftsmanship and its textures are visible in all parts. This includes those materials and surfaces that give the appearance of a machine aesthetic, a *Mechanofaktur*,[8] such as the polished plate glass in the tradition of the Bauhaus seen by art critics as the epitome of the ideal of industrially produced surface with no traces of handwork (traces which I may call with the Bauhaus term: facture).[9]

The large, almost 15 square meters, partially retractable glass walls of the facade, which are now destroyed, had – as a photo of 1972 shows –, a hardly visible ripple, made apparent in this oblique view by the slightly vibrant effects of the landscape. The rounded cladding of the pillars of the interior shows - despite the industrial production of the brass plates and its chrome plating - an irregularity, which is probably due to the bending operation, the mounting and the mirror finish, creating a lively mirror effect.

The metal parts of the facade were painted with a complex multi-layer oil technique in a blue-grey tint, which comes near to the hue of the oxidized lead shielding the base of the window frame. The final clear coating of this blue-grey paint (probably consisting of cellulose acetate) was unusual and certainly not technically necessary. It reinforces the impression of shiny metal.[10] Due to the use of traditional application methods of the metal paint and its resulting effect, this gloss was certainly not completely uniform.

The multi-layered coating of metal parts, such as window frames, doors, railings and fences are industrial oil paint, blue-grey on the exterior and cream white in the interior.

The textural qualities that can be experienced directly by touching these surfaces can hardly – if at all – be represented photographically. The manufacture of wall panels and doors veneered with fine woods is difficult to capture photographically, not only because the original lacquer polish was sanded off in 1982-85 and the pattern of the wood grain is so dominant, but also because the craft work is so highly precise and well-fitting. We can perceive visually some of the ripple of the surface generated by the material and the manufacturing process only when using extreme raking light, whereas the sensitive fingertip can easily detect the surface texture when touching it.[11]

The same applies to the stone surfaces, the travertine and the onyx marble wall. In the very flat ground and polished wall made from five plates of onyx marble (consisting of aragonite), the slight unevenness is hardly noticeable even with tactile examination, but the small irregularities can be perceived on the conservatory plants mirrored on the surface of the onyx wall.

The steel skeleton – a technological innovation for a detached residential house – and the concrete floors in conjunction with the

FIG. 9 Main living room, detail of the wall of onyx marble. In the reflection of the architecture and the plants small deviations are shown, which are indicative of the manufacturing process. Photo Ivo Hammer 2012, detail.
FIG. 10 Detail of the east façade of the bedroom of Grete Tugendhat. Shortly after the building was completed, cracking of the plaster took place at the intersection of the concrete ceiling and the brick wall caused by different thermal movements of the materials, a builtin draw back created by the combining innovative and traditional techniques. Photo by Rudolf de Sandalo, detail, with original retouche, about 1931

traditional infill of bricks (and the Torfoleum insulation) – coated with highly hydraulic lime-cement plaster, have its drawback due to the different coefficients of thermal expansion and contraction of the materials used. The crack between the ceiling structure and the facade did – according to the evidence of the photos from 1931 – appeared soon after completion and was repaired – in vain – immediately afterwards with lime paint using the original technique.

Key parts of the Tugendhat House are executed in traditional craft techniques, albeit at a particularly high level of quality.

- The smoothly polished, but not glossy pieces of travertine: baseboards, the threads for the garden stairs and the coping of the parapet of the upper terrace, and, in the interior, the floor and the wall shelves in the foyer, the spiral staircase and the floor, shelves and the basin of the conservatory.[13]

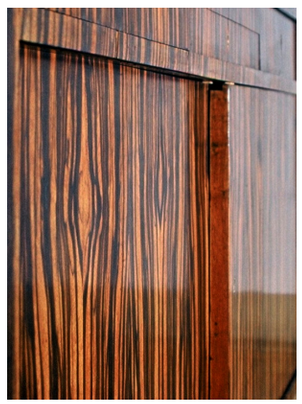


FIG. 11 Main living space with the semi circular Makassar ebony wall reflecting the light of the big glass walls and giving an image of nature on the outside. The slight irregularities of the surface of the veneer are perceptible. Photo by Fritz Tugendhat, ca. 1931, detail.
FIG. 12 Detail of the dining room buffet from the Tugendhat House, now in private ownership in Vienna. The shadow of a straight line in the reflection of the surface shows a slight ripple caused by the properties of the material and also by the manufacturing process. Photo by Ivo Hammer, 2010.

FIG. 13 Main living room, looking south. The reflections of the wall surface convey an impression of the Stucco Lustro surface. Photo by Rudolf de Sandalo, 1931.

- The wall panels of the foyer, the doors and the wall cabinets in the master bedroom are all veneered with rosewood, while the inside of the doors of the children's room and the nurses' room are veneered with Zebrano, and the semi-circular wall of the dining area and the library with Makassar ebony.
- These exotic veneers were also used for the exposed surfaces of the pieces of furniture but the interior is veneered in maple. The surfaces of the veneers were lacquered and polished. The interior of the furniture was coated with a vegetal gum (acacia or cherry) and (probably originally) waterproofed with nitro-cellulose lacquer.[14] According to recent analyses on original furniture in the possession of the Tugendhat family, the type of final paint of the exterior surfaces could not be determined with certainty, options are oil, alkyd resin or cellulose ether.[15] However, the exterior lacquer has been mainly renewed in 1985.
- The multi-layered coating of the interior wooden elements (all doors and frames, as far as they are not veneered, closets in the pantry, window shelves, boxes for the blinds, etc.), are as carefully crafted with a lacquer with glossy surface, in a cream white hue. This surface treatment is reflected in some furniture, as e.g. the vitrine at the north side and the bank at the south side of the onyx wall.

The wall and ceiling surfaces are executed with a quite exceptional precision taking advantage of traditional techniques. The ceiling on the interior is suspended, which was common since the introduction of concrete ceilings at the end of the 19th century. A traditional support of the plaster consisting of (prefabricated) mats of reeds and of 'bricked' Rabitz netting is suspended from the concrete floor with

FIG. 14 Fritz Tugendhat bedroom. Opening in the ceiling, where light fixture has been removed. The prefabricated cane mat is suspended from the concrete floor structure above and supported by a wire mesh. Photo by Ivo Hammer.

rebars at a distance of about 40 cm. The plaster itself is comprised of lime and some gypsum. Due to the suspension and the flexible reeds there is both an excellent thermal insulation and a mechanical elasticity and thus durability.

To date, the ceilings are largely in good condition and do not show cracks. Even for the surfaces of the walls and ceiling of the interior the architects resorted to a technique called *stucco lustro*, used since ancient times in substantial buildings as in villas by Andrea Palladio, and again in the 19th Century, as, for example, in architecture of Friedrich Schinkel.[16] The *stucco lustro* of the Tugendhat House had a rather mat than glossy finish, similar to the famous "Marmorino" e.g. of the Teatro Olimpico of Andrea Palladio. In the period in which the Tugendhat family lived there, from 1930–38, the walls were not covered with paint, but cleaned only by rubber gum (bread).

The flooring consisted of XYLOLITH,[17] and the cream white LINOLEUM,[18] which was laid without being glued down, so the surface was quite uneven and changed, slightly, with temperature and moisture.

FIG. 15 Upper terrace, façade, detail. The image width corresponds to about 15 cm. Sample of removal of superimposing layers of yellowish limewashes (which were executed before about 1965) and the cement / resin slurry dating from 1985. The stripe on the left: the original surface with the grated plaster with yellowish-white limewash, which is pigmented with fine sand. Photo by Ivo Hammer, 2011.
FIG. 16 Upper terrace, façade, detail. The image width corresponds to about 17 mm. The yellowish-white lime wash on the grated wall is so thin that the color of the sand grains play a role in the overall color of the mortar. Photo by HAWK/Hitzler, 2003.

The support for the plaster facade of the Tugendhat House are brick walls and - like in the interior - (prefabricated) mats of reeds and of 'bricked' Rabitz netting suspended on rebar from the concrete floor in about 40 cm distance. Differences in the granulometry of various plaster samples suggest a mortar mixed on site as usual. The surface of the plaster was smoothed out with a wooden board, so that the grit of the sand of the mortar formed a certain roughness. The final thin wash consisting of slaked lime and fine particles of yellow sand added the colouring effect.[19] The whitewash probably contained ochre and zinc (Lithopone) and additional pigmentation. The analysis of the whitewash did not bring quite solid evidence of a proportion of casein and potassium silicate. Technologically, we can see a link to handcrafted tradition as e.g. to the buildings of the fair grounds of Brno, dating form 1928 (here the pavilion of Pavel Janak, with elements of modern experimentation, similar to the facades of the Masters Houses in Dessau).[20]

The whitewash was applied to the compacted but still wet plaster, and indeed was so thin that the natural colour of the embedded sand grains contributed to the colour effect on the final surface.

The difference in materials and surfaces between the local craft tradition, as we could see investigating e. g. the pavilion displayed at the Brno exhibition grounds from 1928 by Pavel Janák, and the Tugendhat House is the allusion of the colour of the facade to the yellowish-white tone of the travertine used for the dado, the window sills and the thresholds.[21] The plastered walls of the facade of the Tugendhat House were not white but had a subtle yellowish colour.

Dematerialisation

Whereas, at the facade, the character of the material is represented in a pronounced way by means of the roughness of the plastering, it is the evenness and the shiny surface of the surfaces, of the *stucco lustro* of the interior walls, of the Onyx wall, of the painted metal of the linoleum and its reflection of light which supports the utopian striving for the "dematerialisation" of the Modern Movement architecture, formulated e.g. by Walter Gropius in 1911 when he wrote about the engineers Utopia on beeing able to produce a "transparent steel".[22]

The developed treatment and gloss applied on the surfaces, abstracts the material from its merely physical presence. The reflective chrome linings of steel pillars and the leg of the round table, combined with the chrome chair frames and railings, the shiny table top made of black stained pear wood, the shine of the polished Macassar and the wall of the board of greenish marble of Tinos (a serpentine breccia) with its reflective surfaces, contribute to the de-materialization of the architectural surface, being natural materials and, at the same time, mirrors.

Craft tradition recovered

In summary, we can see that the precise and sensitive craft production and processing of all elements, even the technically innovative components, played a significant role in the appearance of the surfaces of the Tugendhat House. The aesthetic consequences of the handwork, i.e. its facture, are noticeable in all elements, though not readily visible. At the same time it also became clear that the craft tradition was alive in the methods of production and was also used. It is noteworthy that the German architect had taken up the kind of facade plaster and local craft traditions of the Brno trade fair area. Formal innovation does not necessarily mean that the underlying basis of craft tradition was abandoned. The Tugendhat House may serve as example of a good, valuable architecture, which represents not only *innovative spatial and*

FIG. 17 Northwest facade, detail. Static defects of the lower terrace, caused by a leaky drain pipe. Damage to plaster and painting from 1985 by deficiencies in the drainage, harmful salts and a paint material that is not compatible with the previous lime washes. The former lime washes are partially dark by dirt and by environmental conversion of the lime into gypsum. Photo by Ivo Hammer, 2005.

aesthetic concepts that aim to satisfy new lifestyle needs, but also has been implemented materially in a careful and perfect manner.

This material realization using traditional methods and materials was a long-term success, at least as long the building was used and maintained. The tradition of small-scale repairs was alive up to the sixties of the 20th Century. The plastered and painted façade e.g. was maintained several times with lime wash. We found up to 5 layers of paint. Not until the 1981–85 renovation were the traditional repair techniques abandoned and was the facade painted with a cement slurry and a colour containing artificial resin, not compatible with the physics of the existing system.

Damages of facade due to incompatible repair

The traditional techniques of repair were abandoned not only in the Czech Republic. In the second half of the 20th Century the international trend has enforced the use of modern materials developed in the laboratory, instead of using traditional materials. Traditional craft intelligence was replaced by 'intelligent design' of laboratory products that are easy to use following standardized procedures and that satisfy the warranty standards and their short-term durability requirements. Long-term considerations, such as the ability for future repairs are not considered. Meanwhile, the era of plastics in architecture began, including the use of synthetic resins and corresponding composites in the construction of floors, ceilings, windows, tile, wall coatings, thermal insulation, etc.[23] The damage caused by the use of materials that are not repairable and are not compatible with the chemical and physical properties of the historic architecture, are not only economic, but also generate losses of irreplaceable historical fabric of our cultural heritage.

FIG. 18 Upper terrace, north-east facade, pilot work in 2011; Michal Pech removes the ammonium-compresses, which served to remove the gypsum crust. Photo Ivo Hammer 2011.
FIG. 19 Southwest facade, upper terrace. The craftsmen of Art Kodiak painted the whitewash in a traditional technique, which had been pre-assembled by conservators in a pilot work in accordance with the findings on the Tugendhat House. Photo Ivo Hammer 2011.

Paradigmatic strategy

The care of a built monument can be seen – if interpreted properly – almost as a *paradigmatic strategy* of preservation and use of building stock, which applies to long-term environmental thinking,[24] regarding:

- the intelligent use, well-based on cultural needs, combining utility and convenience with beauty;
- the efficient maintenance compatible with the historic fabric;
- the avoidance of energy consumption by new construction and the consideration of long-term energy balance;
- the repair capacity of the old building materials and techniques used;
- the reuse of materials in the reconstruction and adaptation to new uses;

- the separability and harmless disposability of materials no longer used;
- the long lifespan of building structures and surfaces that are periodically maintained.

Conclusion

It's not just about strategies to preserve cultural values. It is also about avoiding an unnecessary expenditure of energy, not only on one aspect such as the thermal insulation, but in the overall view of the ecological balance. Preservation of buildings by means of intensive maintenance and optimum use of existing buildings as a vision for a sustainable building policy that benefits the environment, are also strategic goals of monument care. A society-sensitive monument care provides not only for the protection of individual objects, but also addresses well-understood social needs, and can thus contribute with ideas to realize these larger ecological goals.

FIG. 20 View from the west, garden facade after restoration. Photo by Jon Soung KImm, 2012.

Even where a new building is inevitable, monuments do offer suggestions for solutions to technical, aesthetic, and overall social problems. In these monuments the experience of many years or even millennia are accumulated. The monuments and their fabric have demonstrated with their very existence that they have passed their *weathering test*, that they are repairable and that they have already proved their cultural appropriateness.

Technology transfer in this sense means using ideas and techniques that are embodied in the built monument, and which are useful for the solution of social, architectural, aesthetic and ecological problems of our time and our future.

Why should we not use these resources of knowledge?

Notes

1 Revised and shortened version of the article first published in *DOCOMOMO International, Journal 44-2011/1 (Modern and Sustainable)*, pp.48-57.

2 The term indicates to the visual traces of hand work. It was used e.g. by Lázló Moholy-Nagy in the Dessau Bauhaus, see: Lásló MOHOLY-NAGY, "von material zu architektur" in Lázló MOHOLY-NAGY; Walter GROPIUS (eds.), *Bauhausbücher*, vol. 14, Dessau, 1929. fac-símile by Florian Kupferberg editora, Mainz, 1968.

3 See z. B. Karin HASSAUER; Helmuth LETHEN; Elisabeth TIMM (ed.), *Sehnsucht nach der Evidenz, Zeitschrift für Kulturwissenschaften*, *1 / 2009*, Bielefeld: transcript. See especially the interview of Helmuth Lethen with Ludwig Jäger [p. 89-94].

4 Monika WAGNER, *Das Material der Kunst. Eine andere Geschichte der Moderne*, München: C.H. Beck 2001. See also: http://www.incca.org/resources/links/78-theory/173-archive-for-the-research-of-material-iconography (last visit 24-10-2013).

5 See Tugendhat Villa in Brno, UNESCO, *http://whc.unesco.org/en/list/1052/* [last visit 24-10-2013].

6 Wolf TEGETHOFF, "The Tugendhat House. A Modern Residence in Turbulent Times" in Daniela HAMMER-TUGENDHAT; Wolf TEGETHOFF (eds.), *Ludwig Mies van der Rohe. The Tugendhat House*, Vienna, New York: Springer, 2000, p. 43-97. See also: Alexander KIERDORF; Hubert K. HILSDORF, "Zur Geschichte des Bauens mit Beton" in: Uta HASSLER (ed.), *Was der Architekt vom Stahlbeton wissen sollte*, Zurich: GTA, 2010, p. 11-52.

7 Op. cit., Wolf TEGETHOFF, p. 15.

8 Monika WAGNER, "Materialien des 'Immateriellen'. Das Haus Tugendhat im Kontext zeitgenössischer Materialästhetik" (Engl), in: *Materiality, Akten des Internationalen Symposiums zur Erhaltung der Architektur des Neuen Bauens* (Brünn 17.-29.4.2006), Museum der Stadt Brünn [www.spilberk.cz] und HAWK, Hornemann Institut [www.hornemann-institut.de] 2008, S. 26-32.

9 Op. cit., Monika WAGNER, 2008, p. 30. As to the influence of industrial production on the aesthetic of craft work, the imitation of machine aesthetic and the suppression of the traces of hand work in the surfaces of 19th Century facade plastering see: Ivo HAMMER, "Historische Verputze. Befunde und Erhaltung" in *Restauratorenblätter*, n. 4, Wien, 1980, p. 86-97.

10 Tatjana BAYEROVA; Martina GRIESSER-STERMSCHEG, "Metal Surfaces in the Tugendhat House. Research and Findings" in *Materiality*, Brno: Muzeum města Brna; Hildesheim: Hornemann Institute, 2008, p. 176-184.

11 The sensitivity of the finger tips is higher than the resolution of the human eye: in one finger there are 250 receptors for cold, 17 for warm, 850 for pain near the surface, 441 pain in the depth, 1233 for pressure, 471 for contact, 284 for vibration, 744 for position of the joints. Frederick VESTER, *Unsere Welt - ein vernetztes System*, München: Dt. Taschenbuch-Verl, 1993, p. 28. Stuttgart, 1978.

12 According to the investigations of HAWK Hildesheim in 2004 there was no trace of Patina between the original surface and the repair.

13 Karol BAYER; Zdeněk ŠTAFFEN; Jiří NOVOTNÝ; Renata TIŠLOVÁ, "Investigation of Stone Elements in the Tugendhat House" in *Materiality,* Brno: Muzeuṁ mesta Brna; Hildesheim: Hornemann Institute, 2008, p. 194-201.

14 Inga BLOHM; Vanessa KASPAR; Kirsten LAUTERWALD; Silke TROCHIM; Nicole THÖRNER, "Wooden Built-In Elements in the Tugendhat House. Conservation/Restoration Research, including History and Proposals for their Maintenance" in *Materiality,* Brno: Muzeŭm mesta Brna; Hildesheim: Hornemann Institute, 2008, p. 186-192.

15 Analysis of Tatjana Bayerova and Karol Bayer, Litomyšl, in the frame of CIC, report of 15.02.2011; surface of the Makassar buffet, sample taken from the veneer hidden by the middle drawer. On one sample, taken from the inner part of the foot of the bed of Grete Tugendhat (rose wood) an oil resin paint was found, which might not be original.

16 Manfred KOLLER, "Wandmalerei der Neuzeit" in *Reclams Handbuch der künstlerischen Techniken,* Band 2, Stuttgart: Recalm, 1990, p. 213-398. There are few other eminent examples of Modern Movement houses with highly elaborated interior wall surfaces using *stucco lustro* technique: The Wittgenstein House (1926/28) by Ludwig Wittgenstein and Paul Engelmann, Kundmanngasse 19, Vienna 3rd district (Bernhard LEITNER, *Das Wittgenstein Haus*, Ostfildern: Ruit, 2000) and the Villa Lala Gans in Kronberg near Frankfurt/Main by Peter Behrens, 1928-31. See: Angela VON GANS; Monika GROENING, *Die Familie Gans 1350-1963. Ursprung und Schicksal einer wiederentdeckten Gelehrten- und Wirtschaftsdynastie*, Heidelberg: Verlag Regionalkultur, 2006, p. 240-245 (notice Axel Werner) and "Haus K. in O." (House of Philipp F. Reemtsma in Othmarschen) by Martin Elsaesser (1930-32 ca.)

17 Screed of magnesium chloride cement with saw dust; Sorel cement (Steinholz in German).

18 Linoleum is a floor covering made from renewable materials such as solidified linseed oil (linoxyn), ground cork dust and mineral fillers such as calcium carbonate, most commonly on a burlap or canvas backing; pigments are often added to the materials. It was invented in 1860 by Frederick Walton. See: http://en.wikipedia.org/wiki/Linoleum [last visit 24-10-2013]

19 Microscope investigations of HAWK Hildesheim revealed that the siliceous particles of the aggregate had a shape and colour of the grains similar to the sand of the sandpit of Bratice, 20 km south of Brno. The content of fine siliceous particles (silt, 0,002 mm bis 0,063 mm) accelerate the setting of the lime hydrate due to its hydraulic effect, see: Ivo HAMMER, "Buildings on the fair grounds of Brno (1928) designed by Emil Kralik and Pavel Janak. Investigation of the materiality of Modern Movement buildings" in *Materiality, Proceedings of the international symposium on the preservation of Modern Movement architecture* (Brno, 17. – 29.4.2006), Museum of the City of Brno, www.spilberk.cz und HAWK, Hornemann Institut www.hornemanninstitut.de 2008, p. 136-144. [German texts attached on CD]

20 See Thomas DANZL, "Konservierung, Restaurierung und Rekonstruktion von Architekturoberflächen am Meisterhaus Muche/Schlemmer" in: August GEBESSLER (Hrsg.), *Gropius. Meisterhaus Muche/Schlemmer. Die Geschichte einer Instandsetzung*, Stuttgart: Krämer, 2003, p. 152-181.

21 We have to take into account, that the actual hue of the travertin is changed by dirt and gypsum crust, and additionally by oil paints in the interior, see: Ivo HAMMER, "The Project of Conservation/Restoration Research at Tugendhat House. Materials and Surfaces of the Rendered Façades, Interior Walls and Painted Wood" in *Materiality*, Brno: Muzeum msta Brna; Hildesheim: Hornemann Institute, 2008, p. 164-174.

22 Op. cit., Monika WAGNER, p. 26.

23 Ivo HAMMER, "Kalk in Wien. Zur Erhaltung der Materialität bei der Reparatur historischer Architekturoberflächen" in: *Restauro*, Zeitschrift für Kunsttechniken, Restaurierung und Museumsfragen, 6, September 2002, p. 114-125.

24 It's about exemplary strategies to maintain the value of the building stock, not the "universal management" of the whole world by monument care, as Uta HASSLER is stating in her introduction to: *Das Denkmal als Altlast. Auf dem Weg in die Reparaturgesellschaft* [The monument as a burden of the past. On the way to the repairing society, transl. by I.H.], ICOMOS Hefte des Deutschen Nationalkomitees XXI, München 1996, p. 11.

Vasco Peixoto de Freitas lecture on the 18th of November 2011. EAUM

Cost-effective rehabilitation of the building envelope of a housing development. From diagnosis to completion of the work

Vasco Peixoto de Freitas / Pedro Gonçalves / Sara Stingl de Freitas

The first phase of the rehabilitation project is the Diagnostic Study developed by a multidisciplinary team. Lordelo's housing complex rehabilitation aim was to solve existing problems, conciliating sometimes conflicting needs, such as hygrothermal comfort, energy conservation, solutions durability and functionality.

Methodology

The first phase of the Rehabilitation Project of the housing development under study consisted in the preparation of a Diagnostic Study with the following main objectives: to analyse pathologies affecting the façades, roofs and common indoor areas of the buildings, and present a methodology for the corresponding rehabilitation work; to evaluate existing facilities in the stairway enclosures, and also to propose solutions for the architectural rehabilitation of the external building envelope. Following the choice of the Developer, exterior repairs were immediately excluded from the scope of the Rehabilitation Project. The Diagnostic Study was prepared by a multidisciplinary team composed of Civil Engineers, Architects and Electrotechnical Engineers.

During the preparation of the Construction Project, successive iterations were held, reflecting on the contribution of various participants: Developer, Manager of the Housing Development, Inspector of the Project and licensing authorities. In addition, some of the choices made were designed to meet specific needs or concerns of the residents.

Concept

The buildings of the housing development under study (built in 1978) had several pathologies and their image was found to be uncharacteristic due to a variety of changes and partial interventions that, besides creating great heterogeneity in the appearance of the external building envelope, in some situations conditioned their behaviour.

The rehabilitation of the buildings aimed at solving existing problems, harmonising conflicting needs, which were sometimes antagonistic, as the hygrothermal comfort, energy conservation, durability and functionality of the solutions.

Description of project

Among the contemplated works in the construction project, we highlight the following: replacement of the pitched roof coverings and application of thermal insulation in the garret; cleaning and waterproofing of exposed brick surfaces; repair and protection of exposed concrete surfaces; replacement of windows, windowsills and blinds; replacement of the external envelope of the laundry rooms, placing an outdoor metal structure to support and conceal the washing lines; reformulation of collective building entries; the planning of outdoor spaces adjacent to the buildings and installation of new infrastructures for electricity, telephone and cable television.

Objectives achieved

The rehabilitation of the housing development enabled the recovery of the constructive coherence of the buildings and the ability to adapt the construction to the most current standards and requirements, using, whenever possible, materials in their natural form as in the original solutions. From the hygrothermal comfort point of view, the buildings now present strongly insulated roofs, enhanced thermal resistance of the façade areas with simple surface (under the external glazed bays) and built-in roller blinds. In addition, frames and exterior blinds of good quality were applied in the households, besides having improved the fire ventilation as well. The collective stairway enclosures were converted into spaces with restricted access to residents with communal lighting, and equipped with new infrastructures to meet the regulatory requirements. The solution adopted for the surroundings of the laundry rooms meets the functional objectives that had been previously established, thus allowing a proper integration of individual washing lines in the building envelope. Overall, residents gained comfort and safety.

Architectural and constructive outcome

In the following figures we present a set of images that show the condition of the housing development before the intervention and final solution.

Before

After

01

01 Main Façade
Photos by João Ferrand Fotografia; Prof. Eng.º Vasco Peixoto de Freitas, Lda.; Nuno Valentim, Arquitetura e Reabilitação, Lda.

02

03

04

05

02 & **03** Rear façade in which the new design of the laundry rooms can be seen **04** Rear façade in which the transformer substation can be seen / **05** & **06** Rear façade in which an exterior air conditioning unit can be seen

06

07

08

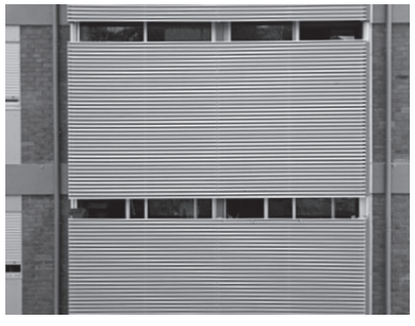
09

07 Housing with an access ramp for the disabled / **08** & **09** Detail of the entrance to the households on the rear façade

10

11

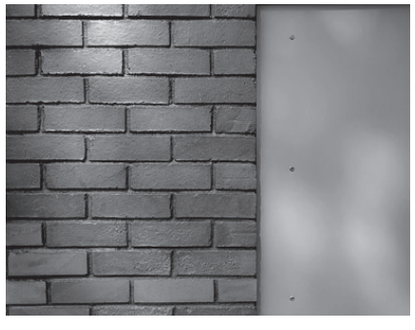
12



13

10 Main façade with the new stair case conception / **11** The laundry rooms become a confined space / **12** Laundry rooms – functionality and aesthetics / **13** Placement of double glazing and new frames – a contribution to the thermal and hygrothermal comfort

14



15

16

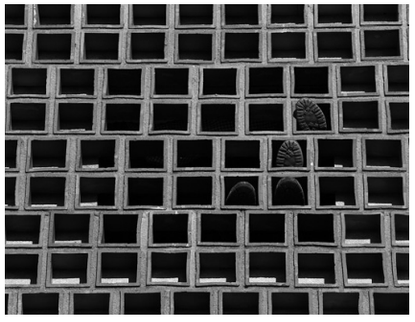
17

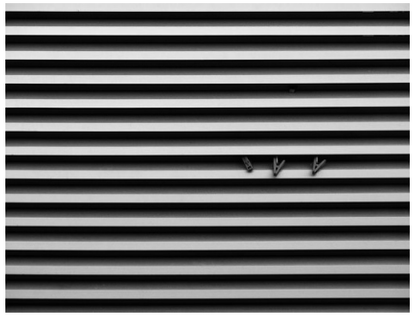
14 The insulation was made under the bays; Regeneration of concrete and rehabilitation of exposed brick / **15** Close off the stairway enclosure, guaranteeing the ventilation in the upper module / **16** Protection of the front door against rain / **17** Ensure old features and create new infrastructures

18

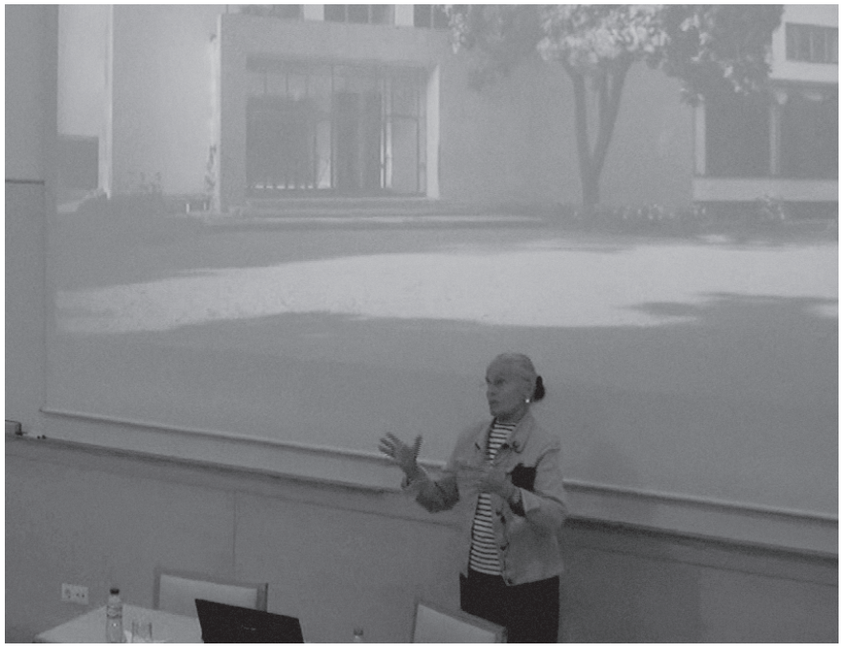
19

20





18 Rehabilitate the stairway enclosure, implementing facilities without being intrusive /
19 Lighting / **20** The aesthetic principle of the initial design was preserved for the laundry rooms



Maija Kairamo lecture on the 25th of November 2011. EAUM

Restoration of Alvar Aalto's library in Vyborg

Maija Kairamo

This paper describes the history of Alvar Aalto's library in Vyborg and its restoration plan between 1991–2013.

Alvar Aalto won the architectural competition for the municipal library in the City of Vyborg and received its commission. The library was built between 1933–1935 and, together with the Paimio Sanatorium, established Aalto's international reputation.

After the war in 1939–1944, Karelia, together with Vyborg, were ceded to the Soviet Union. The Soviet authorities decided in 1945 that the library would be renovated, and the renovation was executed in 1955–1962.

The present restoration started in 1991 as a joint venture project between the Russian city authorities and the Finnish Committee for the Restoration of Viipuri Library. The present restoration strategy is to stabilize the building by preventing it from further deterioration, to renew its basic technical facilities necessary for a modern municipal library, and to restore its original architecture.

During 1994–2010 the restoration works proceeded slowly because of the lack of funding. But in November 2010 the Russian government decided to fund the completion of restoration by granting 6.5 million euros.

An architectural competition for municipal library in Vyborg was launched in 1927. Alvar Aalto won with a classicist entry and received the commission. After a long design process the library was built during 1933–1935. Discussions about the location of the library continued after the competition. In September of 1933 it was decided that the library should be built on a new site requiring alterations to the 1929 designs. In October Aalto was asked to provide new drawings

and the building permission was signed on 28th of December 1933. The construction works began in April of 1934 and the library was inaugurated on 13th October 1935.

The final design had a completely new appearance, though certain ideas from the competition proposal were still present, albeit altered. Aalto strived to concentrate the library staff supervision on the spiral staircase that ascends from the children's library to the reading area and on the lending hall levels and the main lending desk in conjunction with these. All roofs of the building are flat. The roofs of the lending and reading halls, entrance lobby and children's library have an integrated roof heating. The rainwater is led away along inner pipes and drains are installed close to eaves. The glass roof proposed in the competition entry was reborn as a roof construction comprising a heating system and a grid of circular skylights filtering natural light into reading and lending halls. The lecture hall wing roof was designed as an exterior terrace. Next to entrance is a huge glass wall, which first appeared in 1928 sketches, that lights both the office staircase and the entrance vestibule. The Illumination through skylights and the undulating wooden ceiling of the lecture hall were new architectural inventions and became characteristic solutions in Aalto's later works. The completed building resulted in a rich whole, where minimalist shapes, exact proportions, carefully considered materials and colours are released from eclectic decoration. The daring inventions and harmonious proportions turned the building into noble and humane architecture.

The library is one of the most important works of Aalto's pre-war output and with the Paimio Sanatorium it established his international reputation. The building was widely published in international architectural reviews. Aalto's architecture, furniture

FIG.1 The Lending and Reading Halls after restoration. Photo by Finnish Committee for the Restoration of Viipuri Library, Maija Kairamo, 2012.

and design objects were exhibited in 1938 at the Museum of Modern Art in New York in his first in-depth exhibition on an International Style architect. The Viipuri Library became one of the icons of the 20th century architectural heritage.

The library made it through the wartime – between 1939 and 1944 – almost intact. In 1944, Karelia, together with Vyborg, was ceded to the Soviet Union as a result of the peace treaty between this country and Finland. An entire population was evacuated to Finnish territory. A new Russian population had to rebuild a ghost city that was lacking all necessities of everyday life.

The Soviet authorities decided in 1945 that the library would be renovated, but no decent protection was afforded. The library stood abandoned for ten years before the rebuilding. During this period the building lost its original inner and outer surfaces, fittings and furniture.

The Soviet renovation plan in the beginning of the 50's included the transformation of the lecture hall to house a cinema, but the main functions of the library would remain unchanged, with only minor practical alterations. In 1955 the rebuilding works began.

The renovation started with some demolitions. The city managers requested the Minister of Culture in Moscow to provide copies of the original drawings and some technical components, such as the round panes of glass for sky lighting and air-conditioning equipment that would be ordered from Finland. These requests were denied. The architects during the Soviet period – Petr Rozenblum and after his death in 1957, Aleksandr Shver – had to continue the project at a point when a rather thorough demolition work without proper documentation was done.

Building flat roofs was not mastered technique in the Soviet Union. To create an adequate fall on the flat roof, eaves were raised by a two brick course. Cement screed was cast over insulation mass and on top of that were fastened several bitumen felt layers. The height of the windows in the lecture hall decreased by 20 cm, because there weren't glass panes with the original size being manufactured in the Soviet Union. Thus the building lost its sensitive proportions. Thanks to Shver, the lecture hall was not transformed into a cinema. Based on old photographs and paint marks found on walls, he designed the curved panelling of the ceiling using spruce timber. According to a legend, when Aalto visited the Soviet Union in 1962 and stopped by Vyborg commented later that "The building exists but the architecture is gone" in relation to the renovated Municipal library.

At the end of the 1980's the cross-border contacts between Russians and Finns increased. In March of 1991 the Finnish Ministry of Environment organised the *Renovation of the Library of Vyborg* seminar. The Russian architect Sergei Kravchenko, who had done research on the library since 1987, showed that the library was not beyond restoration but needed urgent repairs.

The present restoration started in July 1991 with the commission from the Finnish Ministry of Environment to Alvar Aalto & Co. Architectural Office and Magnus Malmberg Consulting Engineers Ltd. for a technical inspection. The findings were presented to Russian authorities in Leningrad on 25th of July 1991. In 1992, Elissa Aalto, the Alvar Aalto & Co. and the Finnish Ministry of Environment jointly founded the Finnish Committee for the Restoration of the Viipuri Library. The restoration should be a joint project between Russian and Finnish partners. The Finnish Committee would undertake the architectural design of restoration.

FIG.2 The great glass wall was restored 1994-1996 . Photo by The Finnish Committee for the Restoration of Viipuri Library, Maija Kairamo, 1996.

In 1995 the library was inscribed in the Russian Federation's list of Objects of Historical and Cultural Heritage. The city of Vyborg financed a scientific documentation and an architectural production design lead by Spetsproektrestavrazia, an authorised restoration institute in St. Petersburg. The Russian Federation Ministry of Culture approved the restoration design in 1998.

Over the years, several inventories of the library were done, including one by the architect Sergei Kravtsenko in 1980s, an research of the building's bearings as well as recommendations for the restoration made by Co-operative Enterprise START in 1992 and Russian scientific documentations for the restoration plan made by Spetsprojektrestavrazia in 1997.

The Getty Grant Program awarded funding to the Finnish Committee in 1998 for the necessary research, documentation, planning and designs for the restoration plan.

*

The restoration strategy was to stabilize the building and prevent further deterioration, to renew basic technical facilities necessary for a modern municipal library, and to restore the original architecture. Also some alterations from the 1955-1961 repairs were retained both for practical reasons and as a historical layer. The UNESCO's World Heritage criteria on authenticity, including form and design, materials and substance, use and function, traditions and techniques, location and setting were bared in mind.

The actual construction work was carried out by Russian building contractors with Russian workforce, using Russian materials as much as possible. However, this required that the Finnish Committee for Restoration effectively controled and guided the work.

The work was carried out as a joint cross-border project within the context of two different socio-cultural societies, where economic fluctuations and currency rates can change the situation overnight.

*

During 1994 and 2010 the restoration proceeded slowly in need of sufficient funding. The book *Alvar Aalto Library in Vyborg, Saving a Modern Masterpiece* describes the completed restorations during those years. Below is the list of the completed subprojects:

First it was necessary to ensure the adequate functioning of the technical infrastructure, electricity, heating, fresh-water supply and drainage, and to dry out the basement.

The great glass wall adjacent to the office stairs, symbol of the metamorphosis from Aalto's classicist competition entry to his

FIG.3 The restored skylights. Photo by The Finnish Committee for the Restoration of Viipuri Library, Maija Kairamo, 2006.

FIG.4 Tapani Mustonen checking the frame of the undulating wooden ceiling. Photo by The Finnish Committee for the Restoration of Viipuri Library, Leif Englund, 2008.
FIG.5 The restored lecture hall. Photo by The Finnish Committee for the Restoration of Viipuri Library, Maija Kairamo, 2010.

functionalist period, was restored in 1994–1996. The bay window of the lecture hall was conserved and restored in 2001–2003. In 2005–2010 several steel windows were restored. The former caretakers apartment was renovated and converted into a work studio in 1997–2000. This was a restoration case study for all the library interiors. The lecture hall wing roof, the lending and reading halls roofs and the main entrance for the children's library were repaired in 1999–2004.

There are in total 58 skylights on the roofs. Original skylights, with a single 1,6 cm roughcast glass simply installed, were replaced with plastic domes in 1958–1960. It was essential to reconstruct the original form of the skylights. However, modern laminated glass was used instead of original roughcast glass, and an additional pane of laminated glass was installed in the skylight drums to improve energy efficiency.

With the exception of the main doors, which had bronze doorjambs, the entrance doors were originally of steel-framed glass with brass handles. Most of the entrance doors were originals from 1930^{s} and were conserved in 2001–2010. Handles were reconstructed according to the original drawings, old photographs and a comparison with similar handles in the Paimio Sanatorium. The exterior stairs of lending hall terrace were restored in 2001. The children's library entrance was restored in 2004–2005. Wooden wall panels with coat racks dating from 1960^{s} renovation were preserved and cleaned as a later historical layer.

The periodicals reading room was restored in 2004–2005 to an appearance close to the original interior.

The lecture hall is the most interesting interior of Viipuri Library. It's restoration, executed in 2006–2010, includes the undulating wooden ceiling that has inspired many art historians to praise Aalto's

humanism. The ceiling was destroyed after the war and rebuilt in 1958-1961. However, the quality of both the wood and the detailing, was poor. The main entrance hall and side corridor were restored in 2009-2010.

*

During the period of 1994-2010 the Russian Federation Ministry of Culture, the Cultural Commission of Leningrad Oblast and the city of Vyborg financed the project through official budgeted funds with 1 115 000 euros. The Finnish Committee for Restoration raised 567 000 euros from Finland and 420 000 euros from abroad. These include the Getty Foundation Architectural Conservation Grant in 1998 for planning, design, research, documentation, education and training, the World Monuments Fund Robert W. Wilson Challenge to Conserve our Heritage grant for reparation of the roofs of the lending and reading hall, the Swedish Cultural Foundation in Finland grant to repair the lending hall terrace stairs and a donation from the Swedish State and the Alvar Aalto Sällskapet for the restoration of the lecture hall ceiling.

In October 2010 the Russian government decided to fund the completion of the restoration by granting 255 million Roubles (= 6.5 million euros) within two and a half years. The restoration works remaining were the interiors of the lending and reading hall (restored 2011-2012), the children's library, office corridor and rooms, two office stairs, book storage in the basement, the wooden and some of the steel windows, and rendering and whitewashing of the exterior walls. Also the urgent work of lowering the ground level around the building awaited its implementation.

Aalto's Library, which is an independent economical unit of the City of Vyborg, managed its restoration. The Finnish Committee for Restoration agreed with the Library to provide the necessary plans and designs, and to inspect and direct the works so that the Central City Alvar Aalto Library is now reborn as one of the architectural masterpieces of the 20th century. The restored library officially opened on 23rd of November 2013.

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and http://aalto.vbgcity.ru [last visit on the 24th of July 2013].

Vedute , abstract from

“Subtopia: Photography architecture and the New Towns programme”

Paulo Catrica

From Halton Castle, towards East, Runcorn, 21.11.2007 10.24 hrs. Mfc 290/1

From Halton Castle, towards North, Runcorn, 21.11.2007 10.42 hrs. Mfc 290/6

Willofields, Passmores, Harlow, 1.6.2006, 14:35 hrs. Lfc 531

Tryst Rd., Cumbernauld, 30.6.2008, 17:52 hrs. Lfc 761

Glebelands towards Mowbray Rd., Mark Hall, Harlow, 23.10.2006, 16:23 hrs. Lfc590

Mark Hall Park towards Muskham Rd.,Harlow, 23.10.2006,16:04 hrs. Lfc589

Towards North Carbrain Rd.,Cumbernauld, 29.6.2008, 15:23 hrs. Lfc 745

Old Groveway, Simpson, Milton Keynes, 19.06.2006,19:25 hrs. Mfc 224.5

Broadhall Way, Sheppal, Stevenage, 29.10.2006, 16:02 hrs. Lfc 591

West Road, Harlow, 12.11.2006, 15:11 hrs. Lfc 604

Valle Way, Pear Tree, Stevenage, 7.11.2006, 11:40 hrs. Lfc 595

Bishopfield, Harlow, 11.07.2010, 18:02 hrs. Mfc 402.10

Halton Lea Shopping Center, Runcorn, 20.11.2007, 15:47 hrs. Lfc 666

Plantation Close, Castlefields, Runcorn, 21.11.2007, 12:10 hrs. Lfc 672

Odeon Cinema, Lower Tenth St., Central Milton Keynes 10.6.2009, 14:45 hrs. Lfc 818

East Gate towards West Sq., Harlow, 12.11.2006, 16:02 hrs. Lfc 606

Fairlands Park, Bedwell, Stevenage, 7.06.2006, 4:32 hrs. Lfc 540

Cumbernauld College, Cumbernauld, 29.6.2008, 9:37 hrs. Lfc 740

Danestrete Centre, Southgate, Stevenage, 7.06.2006 8:42 hrs. Mfc 218/1

Central Bus Station, Milton Keynes 4.07.2010, 13:03 hrs. Mfc401/2

Towards Primerose Close, Castlefields, Runcorn, 21.11.2007, 15:22 hrs. Lfc 679

Willen Lake, Willen, Milton Keynes, 10.6.2009 20:03 hrs. Lfc 825

Silbury Boulevard, Central Milton Keynes, 10.6.2009, 13:27 hrs. Lfc 817

Turnmill Avenue and Clerkenwell Place, Springfield, Milton Keynes 11.08.2009 14:32hrs. Lfc 869

Faraday Rd., Astmoor Industrial Area, Runcorn, 22.11.2007, 12:01 hrs. Lfc 687

Ashby, Eaglestone, Milton Keynes 11.08.2009 15:43 hrs. Lfc 870

Halton Lea Shopping Center, Runcorn, 23.11.2009, 7:55 hrs. Lfc 701

Busway, Halton Lea, Runcorn 22.11.2007 11:35 hrs. Mfc291/12

ORIGINAL VERSION OF TEXTS WHETHER DIFFERENT FROM ENGLISH

Intervir na arquitectura do Movimento Moderno: um tema de projecto e um problema de investigação

José Miguel Rodrigues

Partindo da intervenção no *moderno* enquanto tema de projecto reflectir-se-á sobre esta temática enquanto objecto de investigação. Propor-se-á uma investigação *por problemas* como alternativa à investigação convencional. Defender-se-á *a necessidade de pensar contra* para, por fim, identificar um denominador comum entra a investigação arquitectónica e o projecto de arquitectura.

1. Investigar problemas e não circunscrições geográficas ou delimitações cronológicas

O primeiro passo de qualquer *projecto de investigação* visa delimitar um campo de reflexão coerente permitindo, à pesquisa, identificar subdomínios do real que suscitem problemas (em arquitectura, genericamente, na perspectiva que nos tem interessado, estes subdomínios manifestam-se através dos *exemplos*). Ou seja, buscam-se *realidades* comparáveis, cujas diferenças e semelhanças permitirão ao investigador (um doutorando, por hipótese) desenhar analogias, tendências, inclinações e afinidades (por ordem crescente de abstracção, isto é, da analogia mais figurativa, à afinidade mais abstracta). A representação interpretativa das referidas realidades constitui, assim, o que poderemos chamar *os caminhos da investigação*, mas que, paralelamente, em arquitectura, conduzem ao que Aldo Rossi chamou teoria(s) de projecto.

A tendência habitual no cumprimento deste primeiro passo utiliza, separada ou simultaneamente, um dos seguintes procedimentos: circunscreve-se um espaço geográfico (se possível um limite administrativo) numa extensão acessível ao doutorando médio; ou delimita-se-lhe um período cronológico, com base neste mesmo princípio. Apesar das dúvidas que este "método" nos coloca (com facilidade, passe o pleonasmo, podendo conduzir ao facilitismo) nada nos opõe frontalmente à sua "técnica".

O nosso desconforto surge da sua consideração exclusiva – como se não existissem outras hipóteses de delimitar uma área de estudo – que monopoliza o debate académico em torno de projectos de investigação na área disciplinar da arquitectura.

A reflexão sobre uma ilustração de Richard Long de 1978 – "A four day walk along all the riverbeds within a circle on Dartmoor" [FIG.1, p. 63] – mostra como uma circunscrição geográfica abstracta — um círculo — apenas adquire interesse, enquanto objecto de investigação, quando se entretece com *um problema*: um passeio de quatro dias na margem de todos os leitos da região de Dartmoor, à distância fixa de x km de determinado centro.

Sem o segundo dado – o *problema* – o desenho de Long – que pode ser visto como um projecto de investigação – resumir-se-ia a uma singela circunferência impressa sobre a carta topográfica. É a veleidade do *passeio* que inscreve na circunferência e desenha no círculo os capilares que acompanham as cotas baixas da topografia, que revelam continuid ades e bifurcações e, até, impasses: esses percursos que estando ainda dentro do raio de acção proposto, só seriam acessíveis a partir do seu exterior. Isto é, precisamente, o que ocorre quando se opta por uma investigação com base em *problemas*.

Na carta de Long, as continuidades correspondem, numa investigação, aos pontos de passagem de problemas a outros problemas, ou de exemplos a outros exemplos (por hipótese, para estudar

Mis van der Rohe devo estudar Schinkel). As bifurcações aos *dilemas* (como posso reconciliar Frank Lloyd Wright com Mies van der Rohe, ou este com Edith Farnsworth, sabendo que se desentenderam em vida?).[1] Por fim, a necessidade de sair do limite – que Long impôs ao seu peregrino – para assim poder aceder aos cantos mais recônditos da sua peregrinação e que, desta maneira, corresponderão, na pesquisa académica, às permanentes incursões pelo exterior do *domínio de investigação* (uso aqui, agora, esta ideia, numa dupla acepção: *domínio* significando *território* da investigação; mas, também, querendo dizer *domínio da matéria* pelo candidato: uma expectativa recorrente no especialismo muito em voga).

2. Necessidade de pensar contra

Em arquitectura, na investigação como na prática projectual, o inconciliável urge. Fernando Távora chamava-lhe "o drama da escolha",[2] algo que ele próprio experienciou nos seus anos de juventude: "entrei na Escola apaixonado pela Vénus de Milo e saí fascinado por Picasso."[3] Eduardo Souto de Moura fala-nos de uma indecisão da mesma estirpe quando refere como a dada altura se deparou com um drama: "Siza e Rossi eram os arquitectos que eu mais admirava e embora se respeitassem mutuamente percebi que não estavam de acordo."[4] A questão não será, porém, exclusiva da arquitectura. O filósofo Fernando Gil afirma existirem constrangimentos do pensamento que decorrem de oposições indecidíveis:

> "Algo como uma insuficiência intrínseca obriga o pensamento a ordenar-se a alternativas binárias e, neste sentido, a controvérsia acha-se por assim dizer inscrita na própria estrutura da mente. É-nos difícil pensar simultaneamente em termos de continuidade e descontinuidade, forma e função, fixismo e evolução, estrutura e história, matéria e energia, e assim por diante".[5]

Se pensarmos nas grandes questões que desde a modernidade dividem os arquitectos, com facilidade encontramos um paralelo, muito evidente, com a descrição de Fernando Gil. Como ele, também para nós arquitectos, é difícil pensar, ao mesmo tempo, em termos de continuidade e ruptura. Ou seja, analisar e valorar *arquitecturas* concretas (i.e., construções e projectos) a partir do ponto de vista da tradição (i.e., da continuidade) revelará perspectivas irreconciliáveis com o ponto de vista da vanguarda (i.e., da ruptura ou da descontinuidade). Pense-se, por exemplo, naquelas arquitecturas iniciais dos pioneiros do movimento moderno, como as de Alvar Aalto, Sigurd Lewerenz ou Mies van der Rohe. Observem-se as suas primeiras obras, ditas "neoclássicas" – a casa Manner de Aalto (1923), a capela da Ressurreição de Lewerentz (1921-1925) ou a casa Mosler de Mies (1924-1926) – e confrontemo-las com as duas visões referidas. Na perspectiva da vanguarda, todas estas casas pecam por tardias e, nesse sentido, pouca pertinência disciplinar revelam. O seu interesse historiográfico será assim praticamente nulo: a vanguarda está sempre mais interessada em descobrir quem pela primeira vez utilizou determinado recurso (formal ou técnico é-lhe relativamente indiferente). Na perspectiva quase oposta da tradição (e por maioria de razão dos tradicionalistas), as três casas são desde logo importantes ao permitirem estabelecer um nexo de causalidade com *os antigos*, mas, sobretudo, as suas qualidades podem ser discutidas e confrontadas com arquitecturas muito mais antigas (do renascimento por exemplo) e podem até ser consideradas melhores do que as suas antecessoras, ainda que estas sejam pioneiras e aquelas tardias. Isto é, do ponto

de vista da tradição, o confronto entre arquitecturas possui uma certa autonomia em relação à sua antiguidade, sendo justamente este princípio que permite à perspectiva da tradição ser crítica em relação a certas arquitecturas do passado, nunca se deixando intimidar pelo estatuto de antiguidade que, na perspectiva *hiperconservadora de um reaccionário nostálgico*, constitui uma garantia *a priori* conferida pela idade a toda a construção vetusta.

Assim sendo, será útil estarmos conscientes de que investigar em arquitectura significa fazer escolhas; escolhas sem as quais a construção de um ponto de vista pessoal sobre as coisas nunca surgirá, o que impedirá a emergência de hipóteses potencialmente convertíveis em teses. E, nesse sentido, também, nunca será demais lembrar que "não se pensa apenas sobre qualquer coisa; pensa-se, também, contra; e para pensar 'sobre', é porventura útil pensar 'contra' ".[6]

3. Tradição e originalidade (na investigação assim como no projecto)

A conservação da arquitectura do século XX e, no seu interior, o restauro da arquitectura do movimento moderno constituem um campo de investigação, numa certa perspectiva, novo. Estando de acordo quanto à pertinência deste campo de estudo – que, cronologicamente, só o termo do século passado permitiu – temos vindo a insistir na importância da permanente actualização dos edifícios como único caminho para a sua sobrevivência, algo historicamente comprovável ao longo do tempo e, como disse Távora, de que os antigos tinham perfeita noção "pois que os seus 'restauros' – a quem davam certamente outro nome – eram feitos com critério mais realista e um sentido mais dinâmico do espaço organizado".[7]

Em *O problema da intervenção na arquitectura do movimento moderno como um problema antigo*[8] propusemos aprender com os antigos

a conservar os edifícios, não os envolvendo numa redoma de vidro. Mas não nos contentámos apenas com exemplos do passado. Procurámos, por isso, no presente, situações análogas e elegemos mesmo como campo de pesquisa as situações em que os próprios autores dos edifícios, em vida, se tiveram que confrontar com a intervenção nas suas próprias obras (Eduardo Souto de Moura e o mercado de Braga, por exemplo). E ainda assim, não satisfeitos com o carácter limitado da amostra obtida (são raros os casos em que a condição referida ocorre), alargámos a reflexão àquelas situações em que um arquitecto, obrigado a regressar a uma encomenda de projecto, opta, *escolhe* e projecta, de modo totalmente diverso (para não dizer, mesmo antagónico), face a um mesmo ponto de partida: o caso de Siza na Avenida da Ponte. E, por fim, procurámos analisar possíveis opções de projecto para pré-existências, com valor patrimonial muito diverso, cujas soluções de projecto constituíam também saídas radicalmente distintas para o problema da conservação "viva" dos edifícios: a intervenção de Herzog e de Meuron no edifício SUVA [FIG. 2-3, p.66]; a intervenção "anónima" na escola de Hunstanton dos Smithson [FIG. 4-5, p. 66] e a profunda transformação introduzida por Koolhaas no IIT de Mies van der Rohe [FIG. 6-7, p. 69]. Nessa altura, reflectimos sobre o valor diverso das pré-existências no julgamento final (i.e., é evidente que a fasquia de Koolhaas era altíssima, quando comparada com a de Herzog e de Meuron) e salientámos, ainda, como a mais consensual das intervenções – a que alguém que não conseguimos apurar programou para a escola de Hunstanton – se afastava da condição problemática que procurávamos e, sem a qual, não surge um problema de investigação. Isto é, mostrámos como, perante a acção restauradora, a intervenção em edifícios do movimento moderno se torna um problema quase exclusivamente técnico (a conservação das

cores, dos rebocos, das tonalidades dos vidros, das serralharias, etc., etc., sem perder de vista as modernas exigências ao nível da eficácia térmica do edifícios, etc., etc.) e, nesse sentido, como o caso paradigmático constituía, igualmente, o caso mais simples e, nesse sentido, também, o mais pobre, contrariando o significativo moto de Fernando Gil segundo o qual: "os problemas bem estruturados são, por via de regra, os menos interessantes".[9]

Perseguindo, assim, a nossa ideia de reencontrar nos *modernos* a lição dos *antigos* regressámos ao *problema do restauro da Villa Savoye*. A dimensão paradigmática deste exemplo interessou mesmo à investigação de vanguarda. Na realidade, tratava-se da primeira vez em que, em vida, um arquitecto moderno era afastado da operação de salvaguarda da sua própria obra, por se temer que a sua intervenção alterasse profundamente a última *versão* conhecida da Villa Savoye. E o responsável pelo afastamento de Le Corbusier – André Malraux – era também o promotor da operação de resgate desta mítica casa, profundamente alterada na segunda-guerra mundial e, posteriormente, transformada em celeiro da actividade agrícola que, no pós-guerra, ocuparia o seu extenso jardim. À progressiva ruína da casa *como fora no tempo dos Savoye* somava-se, nos anos sessenta, a expropriação do terreno envolvente para construir uma escola no dinâmico município de Poissy. André Malraux – o primeiro "ministro da cultura" da História – percebeu a oportunidade histórica que se lhe deparava e classificou "patrimonialmente" um edifício moderno. A demolição da casa só aparentemente ficava salvaguardada, já que os arquitectos responsáveis pelo projecto da nova escola chegaram a equacionar demoli-la e reconstrui-la alguns metros ao lado. Ultrapassada esta contenda, duas questões emergiram, naturalmente: que destino dar à casa? E em que medida o novo uso implicaria modificações profundas na sua estrutura que, para além do mais, sempre havia tido falhas construtivas (são conhecidos os problemas persistentes de asma do filho dos Savoye, motivados pela existência de humidade no interior da casa). Embora mais tarde o autor o tenha negado, chegou efectivamente a pensar-se alojar no seu interior um *museu Le Corbusier*. Como sustentámos em *Le Corbusier e o restauro da Villa Savoye*10 os únicos dois desenhos encontrados no seu espólio (por si, cuidadosamente, conservado e organizado) não são, por si só, esclarecedores quanto ao seu ímpeto transformador.

Se juntarmos, porém, ao conhecido desfecho do projecto, os dois indícios seguintes, a hipótese de Le Corbusier pretender uma profunda transformação da sua mais célebre casa adquire plausibilidade:

> — " E as pinturas?" – questiona Le Corbusier numa nota dactilografada guardada no seu acervo.
>
> — "Como é que você quer metê-las nessa casa toda em vidro? Fiz expressamente questão de não construir paredes inteiras para impedir o proprietário de se sentir tentado a enchê-las de quadros horrendos".[11]

> "Teria sido fácil restaurar esta obra, hoje edifício civil, pelo seu próprio autor. Mas Le Corbusier ultrapassou a idade para poder ser arquitecto dos edifícios civis e palácios nacionais; de facto, se o deixássemos, ele seria tentado a fazer um 'Le Corbusier 1963' ".[12]

Ou seja, é muito provável que Le Corbusier estivesse a projectar uma profunda alteração à Villa Savoye, equacionando, inclusive, a modificação do desenho dos seus alçados para aumentar a superfície de parede que, propositadamente, reduzira ao mínimo.

E, assim sendo, fará sentido questionar a pequena quantidade de desenhos do processo de reabilitação da Villa Savoye salvaguardados no seu acervo. Na nossa perspectiva, uma explicação afigura-se como extremamente provável: a destruição deliberada, pelo autor, das provas do seu ímpeto transformador que, refira-se, mais tarde, refrearia, afirmando aceitar ordeiramente a decisão de atribuir a um colega "restaurador" – Jean Dubuisson – a operação de conservação, como ele próprio descreveu "perseguindo lealmente a verdade, isto é, reconstituindo exactamente o estado primitivo da construção".[13]

Notas

1 Cf. Ana Luísa RODRIGUES, *A habitabilidade do espaço doméstico: o cliente, o arquitecto, o habitante e a casa* [tese de doutoramento em cultura arquitectónica], Guimarães: Universidade do Minho, 2009, p. 135-171 [e, em especial, a p. 158]. disponível online em http://hdl.handle.net/1822/9512 [consultado em 16 de Julho de 2013].

2 Fernando TÁVORA, *Da Organização do Espaço,* Porto: FAUP publicações, 2008, p. 73. [1.ª ed. 1962]

3 Entrevista conduzida por Javier FRECHILLA, "Fernando Távora. Conversaciones en Oporto", in *Arquitectura*, Madrid: Colegio Oficial de Arquitectos, Ano 67, n.º 261, Julho — Agosto, 1986, p. 22.

4 Eduardo SOUTO DE MOURA, "Su Aldo Rossi, Eduardo Souto de Moura, a cura de Antonio Esposito" in *d'A, d'Architettura, rivista italiana d'architettura*, Dopo Aldo Rossi, n.º 23, Abril de 2004, p. 188. [texto de 2003]

5 Fernando GIL, *Mediações*, Lisboa: INCM, 2001, p. 51.

6 Fernando GIL, 2001, p. 59.

7 Op. cit. Fernando TÁVORA, 2008, p. 31.

8 José Miguel RODRIGUES, "O problema da intervenção na arquitectura do movimento moderno como um problema antigo" in Rui RAMOS (coord.), *Leituras de Marques da Silva, Reexaminar a modernidade no início do século XXI: arquitectura, cidade, história, sociedade, ciência, cultura*, Porto: FIMS, 2011, p. 154-161.

9 Fernando Gil, "Inventar", in *Enciclopédia Einaudi*, vol. 41, Lisboa: INCM, 2000, p. 176.

10 José Miguel RODRIGUES, Ana Sofia SILVA, "Le Corbusier y la restauración de la Villa Savoye, Le Corbusier and the restoration of the Villa Savoye" in *Conferencia Internacional CAH 20thC, Criterios de Intervención en el Patrimonio Arquitectónico del Siglo XX, CAH 20thC, International Conference, Intervention Approaches for the 20th century Architectural Heritage*, Madrid: Ministerio de Cultura, 2011, p. 247-258. Disponível online em http://www.calameo.com/read/000075335 42d6151d5dd9 [consultado em 16 de Julho de 2013].

11 Le Corbusier, *Sem título* (*notícia de jornal + notas dactilografadas* Le Corbusier: folha III de IV), Fondation Le Corbusier H1-12-464, 1962-1963.

12 Op. cit. Jaques MICHEL, "La villa Savoye sera aménagée en «musée Le Corbusier»" notícia de jornal consultada na Fondation Le Corbusier. Sublinhe-se que esta notícia faz parte de um grupo de quatro "documentos" arquivados, *em conjunto,* na Fondation Le Corbusier (Cf. nota de rodapé 11) levando a crer que a *nota dactilografada* referida (na qual Le Corbusier confidencia a razão que explicaria a diminuta superfície de parede na Villa Savoye) estará ligada à entrevista concedida a Jaques Michel, ainda que, compreensivelmente, não tenha integrado o conteúdo final da peça jornalística.

13 Cf. "*J'ai pensé bien faire en suivant loyalement la vérité, c'est à dire en reconstituant exactement l'état primitif de la construction*." Carta de Le Corbusier a Max Querrien datada de 10.11.1964: Fondation Le Corbusier H1-12-290.

Projecto como investigação em arquitectura

Pedro Bandeira

O presente texto propõe repensar o papel do projecto de arquitectura na investigação académica e em particular no desenvolvimento da tese de doutoramento. Simultaneamente, sob o argumento de que a "arquitectura é uma arte", procura contribuir para uma definição do lugar do arquitecto-investigador numa universidade cada vez mais condicionada à produção dita científica.

Nas últimas duas décadas em Portugal, a investigação académica na área da arquitectura aumentou substancialmente: por um lado devido à aplicação do modelo de ensino vinculado por Bolonha (que obrigou à introdução das teses de mestrado no segundo ciclo dos cursos europeus); por outro lado, devido ao incremento de bolsas de estudo para teses de doutoramento promovidas pela Fundação para a Ciência e Tecnologia. Fatores que, associados ao recente declínio da encomenda pública e privada, fez com que a investigação académica fosse encarada como uma alternativa a uma prática profissional "temporariamente adiada", ou mesmo assumida na expectativa de uma carreira docente numa das mais de duas dezenas de escolas de arquitectura existentes no país. Muito raramente, a investigação doutoral em arquitectura foi ou é vista como um complemento da prática profissional, tendendo quase sempre a opção pela investigação nas universidades a pronunciar a distância entre o "trabalho académico" e o "trabalho real"; uma dicotomia já expressa por Jean-Paul Sartre na sua breve passagem pela revolução portuguesa.

Este distanciamento entre teoria e prática é, a nosso ver, acentuado pelo facto da investigação académica em arquitectura não ter como instrumentos privilegiado o "desenho/imagem" e não ter como objetivo o "projecto de arquitectura".

Esta descriminação do projecto no âmbito da investigação académica, e em particular nas teses de doutoramento, deve-se a alguns motivos que convém seguramente questionar:

1. O primeiro dos quais, é que o ensino da arquitectura, com a entrada na universidade, adotou um modelo de tese canónico (importado das ciências sociais) que privilegia a suposta objetividade da "palavra" em desfavorecimento da suposta subjetividade da "imagem". Esta herança, de origem platónica, estará por certo na base da dificuldade que muitos parecem encontrar na avaliação dos projetos de arquitectura estruturados essencialmente por desenhos e imagens, ou seja, em elementos supostamente subjetivos. Convém no entanto lembrar que desde o Renascimento que o desenho e o projecto se tornaram na língua materna da arquitectura, isto é dizer, que os arquitectos têm a mesma relação com o desenho que os matemáticos têm com os números, os filósofos têm com as palavras, ou os músicos têm com as pautas e, sendo as teses de doutoramento uma especialização disciplinar, deveria ser usual adotar o desenho e as imagens como instrumentos privilegiados de investigação. Infelizmente são raras as teses que espelham um qualquer sentido de projecto, abdicando os seus autores da essência do ser arquitecto.

2. Um segundo motivo é que o modelo canónico privilegia o estudo do "passado" (ainda que numa perspetiva do presente), em relação a qualquer especulação sobre o "futuro". O historiador Manfredo Tafuri, defendia que as teses de arquitectura não deveriam abordar temas com menos de vinte anos passados. Talvez por isso, a grande

maioria das teses nos cursos de arquitectura sejam em história ou teoria mas raramente ambicionam ser em "arquitectura" no sentido de ser "projetivas" dignificando, por um lado a etimologia da palavra "projecto" (lançar para a frente) mas também a etimologia da palavra "arquitecto" que na sua origem grega remete para o sentido de "construtor ideal". Só privilegiando o projecto de arquitectura na investigação se poderá distinguir o papel do arquitecto (enquanto especialista do construir), de um historiador de arquitectura (enquanto especialista do interpretar).

3. O terceiro motivo refere-se ao facto de o modelo canónico de tese de doutoramento assentar num modelo de raciocínio essencialmente dedutivo, rejeitando com toda a convicção um modelo mais indutivo e próximo dos processos criativos e das práticas artísticas. Esta perspetiva só terá alguma legitimidade se estivermos dispostos a aceitar a arquitectura também como uma arte – a "profissão poética" que Álvaro Siza sempre reivindicou. E ao aceitar a arquitectura como uma arte estamos simultaneamente a reconhecer-lhe um valor da sua própria especialidade (aquilo que a distingue das outras práticas da construção e de toda a arquitectura sem arquitectos) e a reconhecer uma consciência da subjetividade entendida enquanto espaço íntimo do individuo (o mundo interno do arquitecto autor) na sua relação (mais ou menos conflituosa) com o mundo social, onde a arquitectura, para lá de tudo o resto, se apresenta como produção cultural.

Em 14 de Setembro de 2009 o governo português decretou a possibilidade de *"atribuição do grau de doutor a criadores de obras e realizações resultantes da prática de projecto em domínios e formas dificilmente compagináveis com o modelo dominante da tese de doutoramento"* (Dec. Lei 230/2009). Embora sem referir especificamente a arquitectura, esta lei procurava combater o *"afastamento e desencorajamento que a tese de doutoramento provoca nos criadores que desenvolvem, com base na prática de projecto, métodos de investigação típicos da atividade artística"*. Se por um lado esta lei avança com o reconhecimento da importância do projecto e das práticas artísticas na investigação (e no qual acedemos integrar a arquitectura), por outro lado, este decreto não valida o projecto como instrumento de investigação, uma vez que se limita a integra-lo enquanto pressuposto curricular na avaliação de obra passada. Ou seja, o âmbito específico deste decreto continua a não estimular a integração do projecto na investigação enquanto instrumento presciente, especulador e incentivador da experimentação.

Considerando os argumentos expostos, defende-se que a tese de doutoramento em arquitectura deveria integrar o desenho e a imagem enquanto instrumentos privilegiados na investigação académica e considerar o projecto como objetivo prioritário. Salvaguardando, no entanto, que o projecto de arquitectura no âmbito académico dever-se-ia distinguir do projecto da prática profissional essencialmente nos seguintes pontos: assumir o projecto como um "lugar" intermédio (não necessariamente um "veículo") entre o imaterial da ideia e o material da obra, entre a teoria e a prática; ser o lugar privilegiado da experimentação; o lugar do ideal (do "construtor ideal"), da ausência de compromisso; ou da dúvida ou da incerteza. O lugar, se quiserem, onde se ainda se permite falhar.

Inspeção e avaliação do estado de conservação: Conceitos, métodos e ferramentas

Paulo J. S. Cruz

Nas últimas décadas os monumentos da Arquitetura Moderna têm sido objeto de inúmeras experiências para averiguar quais as melhores práticas de análise e intervenção, tendo em vista a sua conservação. Desses casos de estudo emergiu, indiscutivelmente, a importância da compreensão das relações entre projeto e tecnologia e entre materiais e cultura da construção, determinantes para a realidade material específica de cada obra a preservar.

A descrição sistemática e o diagnóstico das anomalias dos edifícios construídos com os materiais ditos modernos – ferro, betão e vidro – é uma chave de leitura que não pode ser descontextualizada da interpretação histórico-crítica, que é indispensável para conceber um prolongamento coerente da vida útil dos mesmos.

Neste contexto, de avaliação do estado de conservação, o presente artigo pretende explorar a importância dos diferentes tipos de inspeções e abrir algumas perspetivas de utilização de diferentes técnicas de ensaios não destrutivos.

1. Introdução

A avaliação do estado de qualquer estrutura deve ser entendida num sentido muito amplo, como algo que descreve um conjunto de atividades desenvolvidas para a caracterização do estado atual e que incluem:

- Avaliação do estado de conservação – Sob a forma de uma classificação numérica ou alfabética, tendo por base uma escala pré-definida;
- Avaliação da capacidade de carga – Tendo por base os parâmetros técnicos da estrutura e o nível de degradação;
- Avaliação da segurança – Medida em termos do índice de segurança parcial, do índice de fiabilidade ou da probabilidade de rotura;
- Avaliação da durabilidade – Processo de avaliação da vida útil remanescente;
- Avaliação da funcionalidade – Avaliação que tem por base os critérios que regem o seu uso normal.

Os procedimentos de avaliação do estado de conservação são, geralmente, baseados nos resultados das inspeções, tendo em conta as anomalias e os processos de degradação identificados. Os critérios gerais de classificação das anomalias mais comuns, bem como a classificação dos mecanismos de degradação, costumam ser apresentados em manuais de apoio à inspeção e à avaliação do estado de conservação.

Em geral as inspeções de rotina são meramente visuais, pelo que nem sempre se consegue detetar, com a devida antecedência, o início dos processos de degradação internos.

As inspeções principais costumam ter uma periodicidade variável. Ao contrário do que ocorre com os métodos de ensaio correntes, as técnicas avançadas de ensaios não destrutivos não são frequentemente utilizadas nas inspeções periódicas sendo remetida a sua utilização para as inspeções especiais, geralmente requeridas quando é verificada uma anomalia cuja causa, extensão ou gravidade se desconhece, ou se conhece com algum grau de incerteza, mas cuja avaliação se considera fundamental para garantir a segurança e/ou durabilidade da estrutura.

Importa ter bem presente que a aplicação de técnicas avançadas de ensaios não destrutivos exige pessoal especializado e experiente e que, mesmo a utilização de métodos simples, requer o conhecimento dos fundamentos físicos associados.

A aplicação criteriosa de todos estes conceitos a pontes, nomeadamente a pontes ferroviárias, tem merecido uma forte atenção da comunidade científica internacional, em particular no que respeita à melhoria dos métodos de ensaios não destrutivos e dos respetivos equipamentos, bem como dos modelos de degradação. Nesta matéria merece especial referência o projeto Europeu *Sustainable Bridges*. Entre as necessidades decorrentes dos problemas de conservação, formuladas com detalhe nesse projeto, importa destacar a falta de melhores ferramentas de inspeção para utilizar em:

- Estruturas de betão:
  - Corrosão da armadura;
  - Diagnóstico precoce e descrição de fendilhação (incluindo o recobrimento das armaduras);
  - Defeitos em bainhas de pré-esforço (incluindo a corrosão);
  - Carbonatação;
  - Defeitos de impermeabilização.
- Estruturas metálicas:
  - Corrosão e delaminação;
  - Fendilhação por fadiga;
  - Elementos de ligação soltos;
  - Defeitos de revestimento;
  - Rotura frágil.
- Estruturas de alvenaria:
  - Degradação do material;
  - Fendilhação;
  - Defeitos de impermeabilização;
  - Fratura de pedras ou tijolos.

Nesse contexto, de avaliação do estado de conservação de pontes, o referido projeto desenvolveu um manual para a inspeção e avaliação do estado de conservação,[1] bem como um catálogo de anomalias, com a classificação das anomalias mais frequentes,[2] e uma "caixa de ferramentas" de ensaios não destrutivos que fornece aos inspetores um conjunto de informações sobre os procedimentos de ensaios não destrutivos.[3]

Pela relevância, grande parte dos conceitos contidos nos documentos acima referidos e descritos em[4] são aplicáveis à inspeção e avaliação do estado de conservação de edifícios, razão pela qual se considerou pertinente e oportuno proceder à sua breve apresentação neste artigo.

2. Manual para a inspeção e avaliação do estado de conservação

O manual está estruturado em duas partes principais: uma parte inicial, mais geral, com a análise do estado de conhecimento da inspeção e da avaliação do estado de conservação de pontes ferroviárias e uma segunda parte, com aspetos mais específicos, focada em requisitos específicos dos ensaios não destrutivos e que apresenta um conjunto de métodos adequados para pontes de vários materiais. O manual, com os anexos agora identificados na FIG. 1 [p. 84], complementa a informação disponível nas diferentes normas e recomendações nacionais de inspeção e avaliação.

Os relatórios técnicos, com os resultados detalhados da investigação desenvolvida, coligem a informação fundamental. As bases

de dados associadas são de grande utilidade para o desenvolvimento dos procedimentos de avaliação do estado de conservação, através da implementação das ferramentas avançadas apresentadas no manual e nos relatórios técnicos:

- Ensaios normalizados e simulação de anomalias:
  - Colectânea dos métodos de avaliação do estado de conservação e de inspeção;[5]
  - A avaliação do estado de conservação: proposta de um procedimento unificado;[6]
  - A avaliação do estado de conservação e inspeção de pontes metálicas ferroviárias.
- Análise dos projetos e localização de heterogeneidades:
  - Programa de avaliação para combinar dados com diferentes características;[7]
  - Protótipo de um sistema 2D de aquisição automática para avaliação da profundidade de fendilhação utilizando técnicas de impacto-eco[8] [FIG. 2, p. 85];
  - Georadar[9] e protótipo de um sistema de tomografia.[10]
- A corrosão do aço em pontes de betão e métodos de medição eletroquímica:
  - Técnicas eletroquímicas para a deteção do estado de corrosão de armaduras em estruturas de betão[11] [FIG. 3, p. 86];
  - Apresentação dos resultados dos ensaios laboratoriais sobre os efeitos da corrosão das armaduras;[12]
  - Análise numérica com modelos de elementos finitos de estruturas de betão armado sujeitas a corrosão;[13]
  - Configuração ideal de um sistema LIBS (Laser-Induced Breakdown Spectroscopy) para a aplicação *in situ*.[14]

3. Ferramentas para a inspeção e avaliação do estado de conservação

3.1 Procedimentos

O ritmo de degradação e os efeitos do envelhecimento das estruturas dependem fortemente da qualidade do projeto, da qualidade de execução, do nível de conservação e das condições de utilização. Os ensaios não destrutivos avançados são aplicados, principalmente, em inspeções especiais.

A realização de ensaios não destrutivos permite detetar vazios internos e a falta de homogeneidade, independentemente de estes terem sido causados durante a construção ou durante a vida útil, por exemplo, devido à deterioração contínua. Os métodos de ensaios não destrutivos estão já a um nível que permite que as características dos materiais ou a homogeneidade interna possam ser investigadas com bastante rapidez e fiabilidade. Os métodos automatizados de aquisição de dados utilizando métodos não destrutivos de eco oferecem uma elevada correlação geométrica, pelo que as imagens resultantes da utilização de diferentes métodos não destrutivos podem ser sobrepostas para, assim, melhor detetar anomalias ocultas.

A figura 5 [p. 87] resume os vários níveis de inspeções referidas no manual. Provavelmente a maioria das pontes existentes apenas será objeto de inspeções regulares, geralmente realizadas por métodos visuais ou mediante a utilização de técnicas não destrutivas simples. Mesmo para uma inspeção visual, é necessário treinar os inspetores, a fim de que estes compreendam os mais importantes mecanismos de degradação e conheçam os aspetos críticos de diferentes tipos de pontes [FIG. 5, p. 87].

Se for necessária informação mais detalhada sobre a estrutura interna é necessária, a combinação de métodos avançados de ensaios não destrutivos, aumentando, dessa forma, a precisão dos resultados.

3.2 Caixa de ferramentas de ensaios não destrutivos

A "caixa de ferramentas" de ensaios não destrutivos contém um conjunto de métodos não destrutivos aplicáveis à inspeção, incluindo as informações mais importantes sobre: a sua utilização; os fundamentos físicos; a experiência necessária para o seu uso; as implicações sobre o tráfego; a duração; o custo; etc.

Os métodos de ensaio não destrutivos têm evoluído continuamente. Atualmente a aquisição de dados pode ser automática e os resultados reconstruídos e fundidos, permitindo uma visualização clara do interior de elementos e secções. Normalmente, cada tipo de material requer técnicas específicas. O aço homogéneo é mais fácil de investigar que o betão, cujos resultados se veem muito afetados por fatores como a porosidade e a humidade.

Pelas razões expostas todos os métodos são correlacionados com os materiais. Os métodos podem ser distinguidos pelos seus fundamentos físicos: acústicos (impacto-eco ou ultrassónicos); eletromagnéticos (detetores de armadura); eletroquímicos (campos de potencial) e raio-X.

A figura 6 [p. 89] apresenta a informação de uma página sobre o impacto eco e ultrassons usando uma matriz com transdutores de contacto pontual. Esses sensores podem ser aplicados em simultâneo a uma superfície de betão com scanner automático [FIG. 6, p.89].[7] Os métodos de eco têm a vantagem adicional, de apenas requererem o acesso a uma face dos elementos.

No projeto *Sustainable Bridges* foi desenvolvido uma aplicação informática para relacionar as anomalias em pontes ferroviárias com os métodos apropriados [FIG. 7, p.89].

4. Recomendações específicas para inspeção e avaliação dos materiais

4.1 Recomendações gerais

Ainda que bem desenvolvidos, os métodos de ensaio não destrutivos carecem de um procedimento de validação que permita aferir a sua precisão. Numa primeira fase poderão ser utilizados provetes de referência para a validação dos métodos em laboratório.

Numa segunda fase a influência das características do material, a sua idade e a deterioração devem ser estimadas *in situ*. Para efeitos de calibração, por exemplo, da propagação de ondas ultrassónicas, das características elétricas ou dos parâmetros eletromagnéticos, podem ser realizados ensaios parcialmente destrutivos, tais como: a extração de carotes, a perfuração ou a utilização de métodos espectroscópicos. A validação e a calibração são altamente dependentes da qualidade dos materiais.

4.2 Estruturas de betão

As anomalias em estruturas de betão são condicionadas pela sua idade, pelas condições de execução, pelas características do meio ambiente e pelos processos de degradação. Novas técnicas de aquisição de dados desenvolvidas no BAM – *Federal Institute for Materials Research and Testing*, nos últimos anos, permitem a sobreposição de vários conjuntos de dados medidos com alta correlação geométrica (fusão de dados) conseguindo, assim, atingir uma precisão muito elevada. A figura 8 [p. 90] mostra os resultados de um ensaio numa ponte em viga caixão dos caminhos-de-ferro alemães.

4.3 Estruturas metálicas

A durabilidade das estruturas metálicas é essencialmente condicionada pela corrosão e pela fadiga, devendo dedicar-se especial

atenção à inspeção dos detalhes críticos mais escondidos. Em caso de dúvidas dever-se-á realizar uma inspeção especial. A realização de ensaios não destrutivos em estruturas metálicas é muito frequente noutros setores, tais como: em gasodutos; em caldeiras; em reservatórios industriais e na aeronáutica. A experiência dos profissionais desses setores poderá ser de grande utilidade para os inspetores de pontes metálicas. Os requisitos das inspeções de pontes metálicas, a estimativa dos intervalos de inspeção e critérios para a análise da razoabilidade de falhas poderá ser encontrada em.[16]

4.4 Estruturas de alvenaria

O manual apresenta uma revisão dos ensaios usuais e dos resultados mais recentes da investigação, contemplando a análise da viabilidade da utilização do radar em modo de tomografia.[10] Nas inspeções especiais recorrer-se-á a ensaios não destrutivos. Estes ensaios poderão se acompanhados de provas de carga para aferição dos modelos de cálculo.

5. Conclusões

Com o aumento da idade dos edifícios urbanos existentes acentua-se a necessidade de dispor de melhores ferramentas para a avaliação do estado de conservação. As inspeções e os métodos de avaliação do estado de conservação são fatores cruciais dos sistemas de gestão.

Concluiu-se que, em geral, os responsáveis pela gestão dessas infraestruturas e os inspetores carecem de informação sobre os métodos de ensaios não destrutivos ou parcialmente destrutivos.

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Architecture du XXe siècle en Seine Saint Denis : un patrimoine émergent

Bruno Mengoli

La prise en compte de notre héritage bâti et plus particulièrement la production architecturale abondante du xxe siècle, sont au cœur d'une approche soutenable du renouvellement urbain contemporain. Dans ce cadre, l'objectif de l'intervention est de construire un point de vue critique sur les pratiques en oeuvre en France dans les projets de reconversions territoriales et architecturales. Dans ce but, l'exposé se concentre sur le département de la Seine Saint Denis constituant à la fois le tiers Nord Est de la périphérie de Paris, ainsi que le contexte privilégié de l'intense "recyclage" métropolitain parisien.

En accueillant les activités rejetées hors des murs de la capitale, la Seine Saint Denis est devenue le dépositaire du développement industriel et de l'habitat ouvrier depuis la fin du xixe siècle. La chute de l'industrie depuis les années 70, laisse d'importantes emprises vacantes, face à un important habitat populaire, lequel s'était développé à proximité des lieux de travail sous forme de lotissements pavillonnaires, de cités ouvrières, puis de "Grands Ensembles" au lendemain de la Seconde Guerre Mondiale. Ce contexte forge une identité particulière qui ne repose pas sur des images du patrimoine conventionnelles confortant ainsi la césure entre le centre ancien, "Lieu de l'Histoire", et une "périphérie économique", lieu de tous les possibles.

Par ailleurs la Seine Saint Denis constitue une situation extrême, où se croise un fort potentiel de développement pour la capitale et de lourdes problématiques économiques et sociales. Cible du Grand Paris et de politiques d'aménagement successives, ce territoire se révèle comme une vitrine des actions nationales dont l'intensité impulse un aménagement radical pour en changer l'image, perpétuant l'approche par la "table rase" de l' "après guerre". Face à ces enjeux et à l'ampleur des opérations, la problématique d'une alternative à la démolition relève d'avantage d'une approche culturelle que de la seule nécessité technique ou financière.

Par réaction, cette situation menaçante force la prise de conscience de la valeur de l'existant injustement dénigré. La révélation positive de la "Banlieue", rend possible son éligibilité à l' "Histoire" dans une approche souvent chaotique, propre au contexte français, opposant "développement" et "patrimoine". Cette situation pose concrètement la reconnaissance patrimoniale comme un enjeu vital contre la disparition, bien avant l'établissement d'une méthodologie d'intervention raisonnée et partagée, très en amont des problématiques de restauration ellesmêmes. Autant dire qu'il s'agit d'un contexte d'urgence impulsé par la menace des destructions dans lequel les résultats d'une reconversion architecturalement réussie de l'existant restent très mitigées.

L'exposé propose des témoignages des problématiques en jeu, à travers des projets significatifs dans lesquels la prise en compte positive de la production architecturale du xxe siècle, ainsi que l'identité urbaine et paysagère qui en découle, sont en question. Les trois exemples suivant exposent des problématiques récurrentes interrogeant la doctrine d'intervention, la posture sur la construction, l'usage et l'esthétique, en fonction des bâtiments et de leur caractéristiques spatiales ou symboliques. A la suite, ces situations nous interrogent sur les "outils" nécessaires à la reconnaissance et à la mise en valeur de l'architecture, telle qu'on l'entend pour un patrimoine reconnu.

Le Dépôt de la Plaine à Saint Denis

Il s'agit d'un ensemble de bâtiments situés dans la Plaine Saint Denis, ancien secteur du nord de Paris que l'abandon de l'industrie a transformé, il y a trente ans, comme la plus grande friche industrielle d'Europe. Les bâtiments en question sont liés à l'activité des chemins de fer, en bordure de l'important réseau reliant Paris au Nord et à l'Est de la France. Ces constructions de grandes dimensions étaient destinées à recevoir les locomotives et wagons pour leur entretien.

Les bâtiments dont il est question sont constitués de grandes halles voutées en béton armé. L'abandon de leur utilisation en prévision d'une vente des terrains par la compagnie des chemins de fer a suscité l'inquiétude sur le devenir de constructions emblématiques du secteur : culminant dans le paysage de la Plaine, ces bâtiments ont reçu le surnom de "cathédrales". Ceci a permis d'engager une procédure de protection au titre des Monuments Historiques, dans l'espoir de valoriser l'ensemble et susciter un projet de réhabilitation et de reconversion prenant en compte son architecture remarquable.

La mise en œuvre d'un outil de protection sur cet ensemble met en évidence la problématique spécifique du patrimoine industriel dès lors que son usage a disparu. Les dimensions spectaculaires de ces bâtiments et de leurs espaces imposent d'immenses problèmes de reconversion. La difficulté de trouver un nouveau programme, nouveaux usages, des investisseurs motivés et disposant de moyens à l'échelle du bâtiments constituent de véritables obstacles à la préservation. Protégés depuis 2004, ces bâtiments demeurent vident, sans entretien et pose d'importants problèmes de sécurité. Parallèlement, le contexte français extrêmement normalisé dans les dimensionnements fonctionnels des programmes (bureaux, écoles…) s'ajoute à la difficulté de la reconversion. Dès lors, le temps passant, on assiste à une "déconnexion" entre le monument et son environnement : la dégradation des bâtiments et leur coût de réhabilitation s'amplifient, à mesure que leur voisinnage se renouvelle.

Aujourd'hui, afin de sauver ce qui peut l'être, une nouvelle recherche est en cours afin d'évaluer la capacité de reconversion en "logements / appartements" des bâtiments. Il est clair que la création de nouveaux planchers et de cloisonnements va entrainer une perte de l'espace global des halles dont les dimensions intérieures étaient un point d'intérêt majeur. Un telle solution, que j'accompagne, est la dernière réponse possible de préservation dans le contexte actuel, en sauvant, au moins, les volumes extérieurs et les façades, ainsi que l'empreinte particulière dans le paysage de ce site et de son passé. Ce type de problématique est récurrent et aboutit fréquemment à une suppression complète de tout le bâti existant afin d'inciter la venue d'aménageur répondant aux attentes de développement du territoire.

Cité de la Muette à Drancy

La Cité de la Muette est un ensemble de logement sociaux, réalisé par Beaudouin, Lods et Prouvé dans les années "Trente". Il s'agit d'une réalisation expérimentale destinée à tester les modes de construction et préfabrication industrielle face à l'important retard pris par la France dans la production de logements face à un bâti ancien et dégradé. La perspective de cette opération est destinée à prolonger et se substituer aux "cités jardins" mises en œuvre après la 1ère guerre mondiale. L'ensemble constitue un témoignage remarquable préfigurant les "grands ensembles" des années 50 et 70.

Malheureusement, cet ensemble ne sera pas achevé en totalité en raison d'un contexte économique difficile. A la suite, pendant la guerre et l'occupation par les Allemands, la cité est transformée

en lieu d'internement et de transit vers les camps d'extermination nazis. A la Libération, l'ensemble retrouve son usage de logement banalisant le lieu. Dans les années 60, un monument commémoratif est implanté en bordure de la cité et en 1976, une partie importante de l'ensemble disparaît lors de la démolition des tours, les "grattes ciel", dans une indifférence quasi générale.

Ce n'est qu'en 2000, à l'occasion de travaux d'entretien, qu'émerge brutalement l'intérêt patrimonial de cet ensemble. La mise en place de fenêtres courantes en plastique, défigure l'architecture très ordonnancée des bâtiments encore en place. Le Ministère de la Culture interpellé, protège l'ensemble au titre des Monuments Historiques et interrompt les travaux en cours. Les motivations de la protection sont particulièrement intéressantes à analyser: c'est, à la fois, comme témoignage remarquable pour l'histoire de l'architecture française, mais également, pour le souvenir attaché au lieu et aux évènements dramatiques de l'Occupation.

A la suite, la gestion au double titre du "monument historique" et du "lieu de mémoire" impose des problématiques particulières. En premier lieu, la reconnaissance d'un objet "récent" sur lequel l'approche d'éventuelles restauration ou mise en valeur n'est pas fixée : le caractère industriel de la construction, la présence de béton armé en structure et en parement, le caractère de logements sociaux dans des locaux occupés induisent de nouvelles problématiques d'intervention en conservation et restitution. En second lieu, la nature mémorielle du monument introduit une composante immatérielle, qui échappe à la consistance même de l'architecture et qui, du même coup, interroge les doctrines habituelles de restauration. La Mémoire n'est pas l'Histoire. La Mémoire est constitutive du Vivant, des acteurs des évènements ou de ceux qui communient dans le souvenir

à l'occasion de cérémonies (commémoration). La mise à distance, l'appréciation objective et scientifique des choses, hors du ressenti et de l'émotion, est bien le domaine de l'Histoire, d'une construction élaborée a posteriori des évènements. Ce contexte particulier est le propre d'un patrimoine très récent, au seuil de son entrée dans le champ de l'Histoire. La dimension prégnante de son usage comme logement social amplifie cette problématique et brouille l'approche "Monument Historique" classique. L'exemple de la Muette concrétise cette complexité d'usage et de valeurs, ainsi que les contradictions qu'elle engendre.

Ainsi, la poursuite du remplacement des fenêtres, constituant pourtant une des première œuvre de Jean Prouvé, est actée au titre des nécessités du logement social et des locataires actuels pour des raison de confort immédiat, selon deux modes : poursuite de l'intervention fenêtres en plastique sur l'ensemble des façades, à l'exception d'un linéaire (minimal) refait à l'identique de l'origine — mais avec des performances thermiques et acoustiques modernes exigeant la dépose et destruction des ouvrages d'origine.

De la même manière, le traitement de l'espace central occupé au fil du temps par des pelouses, un square et le stationnement des voitures pose la question de sa requalification. A la suite, restaurer la cour du lieu d'internement au sein d'un ensemble d'habitation est tout aussi discutable que de proposer un aménagement de jardin inapte à la commémoration du souvenir attaché à son espace. Dans le prolongement, la reconnaissance progressive du lieu de Mémoire, ne peutelle pas poser à terme la question de la conservation de cet ensemble comme lieu d'habitation?

Ces incertitudes, et ces interrogations constituent le contexte particulièrement fertile de nouvelles réflexions autour de la notion

de patrimoine, lesquelles émergent dans ces nouvelles thématiques, aux marges des territoires et architectures bénéficiant d'une reconnaissance conventionnelle.

Les Courtillères à Pantin

Le cas des Courtillères permet d'aborder la question de la reconnaissance d'un patrimoine très spécifique, celui des "Grands ensembles". La dénomination de "grands rensembles" regroupe la production massive de logements sociaux en France pendant les trois décennies suivant l'après guerre. La nécessité de produire à grande échelle des centaines de milliers de logements par an a mis en jeu la puissance publique dans une politique de construction inédite jusqu'alors. Ce contexte a contribué au changement radical du mode de vie de l'époque, du paysage des villes et de leur périphérie, ainsi qu'au déploiement de la construction industrielle — quasi exclusivement en béton armé — au détriment des procédés traditionnels, de leurs matériaux et de leurs savoirs faire. Les quartiers issus de cette période témoignent de politiques et de techniques innovantes. Ils constituent une spécificité française qui s'assimile, dans un premier temps, au progrès et à la modernité pour, dans un second temps, péricliter et stigmatiser les territoires de la relégation sociale et économique.

Cette production est reconnaissable par un certains nombre de caractéristiques. En premier lieu, les dimensions des bâtiments et l'ampleur des programmes (plusieurs milliers de logements par opérations parfois) placent l'architecture au niveau de l'échelle urbaine et territoriale. Extraordinaire par sa masse, l'architecture devient un quartier, définit un paysage et contribue à l'image contemporaine de la "Banlieue". Parallèlement, sa mise en forme relève de l'architecture "savante", réalisée par les architectes reconnus de l'époque

(Grand prix de Rome pour beaucoup). L'usage d'une composition répétitive exaltant les échelles, l'effet plastique ou la monotonie minimaliste industrielle, caractérise la formalisation de ces ensembles. Le contexte et le mode de production qui n'ont plus cours aujourd'hui, constitue à distance, l'expression d'une époque et le support d'une forte identité territoriale. Avec plusieurs millions de logements produits, les "grands ensembles" constituent une part de la mémoire collective des français.

Pour autant, la reconnaissance de cette production est freinée par sa masse, son caractère "ordinaire" et "récent". La difficulté de son entrée dans le champ patrimonial est amplifiée par les enjeux et les projets dont cette architecture est porteuse, aux antipodes du contexte inerte des églises et des palais du patrimoine conventionnel. Désirés après la guerre, les "grands ensembles" sont aujourd'hui détestés : ces quartiers ont drainés les maux de la société en concentrant les populations les plus fragiles. Ils se sont assimilés aux images de la dévalorisation sociale, de la précarité et de l'insécurité, face auxquelles la reconnaissance patrimoniale se heurte. Simultanément, le vieillissement de ces réalisations accuse l'absence d'entretien, le décalage des normes de confort de l'époque, et la densité de l'habitat tourne à la promiscuité.

Dans un contexte économique et social tendu, les "grands ensembles" sont devenus la "vitrine" des politiques publiques pour l'habitat : rénovation urbaine, mixité sociale, transports, "Grand Paris"... Les "grands ensembles" sont au cœur de territoires dont la valorisation technique, sociale et symbolique constitue le creuset du développement des métropoles françaises.

Ce contexte particulier met en compétition les approches sociales, économiques et culturelles de manière extrêmement tendue.

Les modes de projet et d'intervention qui en résultent se démarquent des méthodologies classiques en jeu sur le patrimoine reconnu et interroge, de fait, nos pratiques. Ainsi, l'intervention engage une transformation potentielles des lieux par l'importante valeur d'usage attendue : remise en question programmatique pour permettre une meilleure mixité fonctionnelle et sociale, dédensification des quartiers, recomposition des typologies de logements (adéquation des surfaces aux loyers ainsi qu'aux taux d'occupation réels), mises aux normes drastiques de l'habitat social (isolations, accessibilité handicapés, performances énergétiques…). Face à ces enjeux, les "grands ensembles" s'imposent comme une réponse architecturale à une problématique urbaine et sociétale, dont l'évolution est contredite par la masse et l'immuabilité de leur constitution. La patrimonialisation de cette production par l'intermédiaire d'une posture "conservatrice" ou "restauratrice", s'opposent par sa naturemême au nécessaire renouvellement de la ville sur ellemême et à l'évolution des modes d'habitat.

La cité des Courtillères à Pantin permet d'illustrer quelques uns des enjeux de ce type d'opération. Cet ensemble est réalisé entre 1956 et 1960 par Emile Aillaud et constitue

une œuvre majeure de cet architecte. Celuici se distingue en introduisant une dimension onirique et poétique dans ses réalisations, en contre point de la rigueur répétitive de la production industrielle qui sera très vite critiquée par le public. Aux Courtillères, Emile Aillaud conçoit un long bâtiment ondulant, le "serpentin", enserrant un parc paysager planté d'arbres, légèrement vallonné avec les déblais du chantier. Au pourtour , un quartier avec sa place du marché et des tours "tripode" (3 appartements à triple orientation par étage) dont les vues plongent sur le parc. Le serpentin est composé d'une façade minimale, sans modénature hormis d'étroits balcons, et des percements aléatoires. La polychromie, importante pour Aillaud, consistait en une peinture sur l'enduit ciment : du coté "rue" le serpentin était monochrome grisbleu, tandis que du coté intérieur, vers le parc, chaque appartement était d'une couleur distincte choisie dans la gamme (une dizaine de couleur allant du "bleu ciel" à l'ocre); un enfant devait pouvoir reconnaître son logement. Cet ensemble a été rendu célèbre dès sa construction, par la presse de l'époque vantant son architecture visionnaire.

Cette réalisation d'exception, implantée dans la périphérie parisienne, n'a pas échappé aux problèmes sociaux et à la dégradation. A partir de 2003, un programme national est engagé sur ces quartiers, posant la démolition comme préalable au projet urbain. Les Courtillères n'échappent pas à cette politique et un tiers de la longueur du serpentin est proposé à la démolition, tandis que les parties conservées sont revêtues en totalité de panneaux de terre cuite. Le difficulté de faire valoir l'argument patrimonial dans ce contexte conduisent quelques spécialistes historiens et architectes à interpeller le Ministère de la Culture qui stoppe le projet. Une négociation s'ouvre et un nouveau projet s'élabore, entre préservation, mise en valeur et requalification du quartier. Le résultat est intéressant à analyser, dans la mesure où il présente une approche particulière sur du patrimoine, de fait, reconnu.

En premier lieu, l'intégration d'une démolition du bâtiment original dans le processus de reconnaissance et mise en valeur. Sur la base des ouvertures envisagées par le projet de démolition d'une partie du linéaire du serpentin, les discussions permettent de réduire cellesci de moitié et, par un meilleur positionnement, de préserver virtuellement la continuité du bâtiment dans le paysage. La recon-

naissance de l'intérêt patrimonial par l'Etat s'exprime en 2009, avant le début des démolitions, par l'attribution du "Label XXe" qui ne constitue pas un mode de protection, ni une source de financement pour la préservation. Simultanément, la reconnaissance officielle contribue à épargner une partie du bâtiment condamné, tout en officialisant la destruction partielle. Économiquement, la réduction des démolitions engage une baisse des financements publics destinés à "renouveler" le quartier : paradoxalement, et contre toute logique réelle, la réhabilitation est plus onéreuse que la démolition / reconstruction.

En second lieu, la remise en cause du revêtement de panneaux de terre cuite envisagé, modifiant profondément l'aspect du serpentin, ne conduit pas à la restitution de la façade d'origine. Dans le cadre d'une requalification "lisible" des logements et de leur architecture, les élus de la ville ne peuvent concevoir la restitution de "l'enduit ciment peint" d'origine : il est nécessaire de mettre en œuvre un matériau spécifique afin de mettre en évidence l'évolution qualitative du quartier et révéler qu'il s'agit d'une architecture sortant de l'ordinaire. La tension politique engagé par le projet aboutit donc à un "surcoût" financier, non pas pour l'exigence d'une restauration, ou améliorer la pérennité des logements, mais pour l'effet esthétique de la façade destiné à assurer la lisibilité de la qualité architecturale auprès de la population. Ainsi, le revêtement mis en œuvre est constitué de petits émaux (2 x 2 cm) de couleur, composés par un artiste plasticien — P. Di Sciullo selon un dégradé coloré évoquant les "pixels" d'un écran. L'ensemble réinterprète l'ordonnancement d'Aillaud selon un "extérieur" uniforme et neutre, par opposition à un "intérieur" aux variations colorées intenses. Le système des émaux n'est pas sans rappeler les revêtements en pâte de verre de l'époque ; à ce titre l'évocation patrimonial, sans être une restitution, est présente dans le travail de l'artiste à travers une œuvre contemporaine.

Conclusion

Le exemples évoqués ont permis, à la fois, de brosser le portrait d'un territoire spécifique et d'en révéler l'intérêt du point de vue du patrimoine bâti. A travers leurs stigmates ou leur apparente banalité, les objets qui émergent révèlent un contexte chaotique de reconnaissance, constitutif de l'entrée dans le champ du patrimoine de nouvelles thématiques. Au delà, il n'est pas illégitime de penser que cette production constitue, avec tout ce que recèle la Banlieue, le gisement patrimonial du XXIe siècle.

Uma conversa sobre *A habitabilidade do espaço doméstico. O cliente, o arquitecto, o habitante e a casa.*

Ana Luísa Rodrigues

Tendo como ponto de partida a experiência resultante da concretização da nossa Tese de Doutoramento, estruturou-se um discurso oral organizado em torno: do «Tema», concretizando o nosso entendimento sobre a ideia e o conceito de casa; esclarecendo a «Perspectiva» da nossa abordagem, i.e. o ponto de vista com que se decidiu problematizar; concretizando as «Escolhas», justificando a opção por cada *caso xemplar*; terminando por tecer algumas considerações sobre a «Escrita», por se tratar do instrumento essencial na concretização do documento.

Para responder ao convite que me foi endereçado, a propósito do Seminário de Conhecimento Avançado do Programa Doutoral em Arquitectura – Sustentabilidade, Conservação e Tecnologia – da Escola de Arquitectura da Universidade do Minho, a 23 de Março do presente ano, preparei um discurso oral que acompanhou, ao longo de cerca 3horas, uma sequência de projecções de imagens, frases citadas e o índice que estruturou a minha tese de doutoramento. Foi-me solicitado, então, debruçar-me sobre a minha experiência pessoal, em tom de testemunho, acerca da concretização do meu doutoramento que intitulei *A habitabilidade do espaço doméstico. O cliente, o arquitecto, o habitante e a casa*.

Se aquela circunstância se revelou acessível, já a concretização deste documento tornar-se-ia difícil se se pretendesse – agora – registrar o discurso que fluiu naturalmente num registo de diálogo, alimentado pelas perguntas e respostas que se foram articulando por entre os presentes.

Assim, em alternativa, opto aqui por revelar simplesmente a estrutura que delineei como fio condutor daquela conversa, onde assumi *quatro partes* distintas que passo a descrever sumariamente:

1. tema

A consciencialização da "problemática" que se enquadra num determinado "tema" que concretiza o "problema", constitui – em regra – o ponto de partida de quem pretende fazer um doutoramento. Neste sentido, a constatação da inevitabilidade de um estado inicial, partilhado por quase todos, assente na angústia da indefinição perante um universo de possibilidades tão vasto, aliada a uma ansiosa necessidade de circunscrever um campo temático que direccione convenientemente a nossa investigação, provocou o mote da nossa conversa. Assim, tendo em consideração o meu caso particular, procurei concretizar o meu entendimento sobro o tema da *casa* não só enquanto *ideia*, mas também *conceito.*

2. perspectiva

O *ponto de vista* com que se decide abordar o tema é igualmente determinante no processo inicial de uma investigação. Assim sendo, designei "perspectiva" a esse específico "olhar", trazendo à luz a analogia de José Ortega y Gasset em "Umas gotas de fenomenologia" do seu livro *A desumanização da arte.*

Isto é, procurei estudar a "casa" tendo em conta os pontos de vista dos três intervenientes que participam no seu processo de concepção, realização e concretização: o cliente que a encomenda; o arquitecto que a projecta; o habitante que dela se apropria. Neste sentido, pretendi relacionar a arquitectura da casa com a vida dentro dela, reflectindo sobre o modo como a casa é projectada e construída em função

da maneira como mais tarde é habitada. E decidi considerá-los de um modo equidistante em relação à casa, por admitir que cada sujeito assume uma função relevante na sua concretização, identificando três capítulos distintos: cliente *vs* encomenda; arquitecto *vs* projecto; e habitante *vs* destino.

3. escolhas

Ao justificar convenientemente a opção da utilização mais específica de *casos exemplares*, em vez de *casos de estudo*, elucidei as minhas escolhas, dando uma ideia mais aproximada do tipo de abordagem em cada capítulo, com vista à construção do argumento que procurou justificar esta investigação.

Casa come me é a casa do escritor italiano, Curzio Malaparte. Trata-se de uma casa construída para um cliente solteiro, num promontório da ilha italiana de Capri, situada na baía de Nápoles. Por se tratar de um claro exemplo que testemunhou uma ruptura total entre o cliente/futuro habitante Curzio Malaparte e o arquitecto Adalberto Libera, foi possível problematizar sobre a vulnerabilidade das relações entre os vários sujeitos intervenientes no processo de concretização *da casa.*

Farnsworth house, projectada pelo arquitecto alemão Mies van der Rohe, construída na região metropolitana de Chicago, implantada nas margens do rio Fox, em Plano, no Estado de Illinois, para uma cliente solteira, a médica Edith Farnsworth. Esta casa foi escolhida com o pretexto de se poder reflectir sobre o problema da falta de comunicação entre os vários sujeitos que participam, designadamente, no processo de conformação da respectiva *casa.*

The mother's house projectada pelo arquitecto norte-americano Robert Venturi é a casa que projectou para a sua mãe Vanna Venturi, em Chestnut Hill, no estado da Pensilvânia. Trata-se de uma casa construída para uma cliente viúva, nos subúrbios residenciais da cidade de Filadélfia, na costa atlântica dos Estados Unidos da América, que acabou por testemunhar uma excepcional relação de intimidade entre os sujeitos intervenientes no seu processo de conformação. E é precisamente tendo em conta este aspecto que permitiu deduzir possíveis consequências que essa proximidade poderá introduzir, influenciando, ou não, o próprio projecto de arquitectura *da casa.*

Une petite maison, a partir do arquitecto suíço Le Corbusier e da casa que construiu para os seus pais já idosos, os Jeanneret – implantada nas margens suíças do lago Léman, em Corseaux, perto de Vevey, numa comuna suíça do cantão de Vaud – foi possível evocar, curiosamente, a relação contrária ao capítulo anterior. Isto é, admitindo a existência de um possível distanciamento emocional entre os vários sujeitos intervenientes no processo de conformação da casa. Foi precisamente nesses termos que se problematizou, tentando perceber até que ponto uma maior autonomia, por parte do arquitecto, poderá influir no acto de composição do projecto *da casa.*

Em ***Solar Pavilion***, os arquitectos ingleses Alison e Peter Smithson foram escolhidos quando quis questionar *a casa* que o arquitecto constrói para seu usufruto, testemunhando uma particular coincidência dos três sujeitos. Ou seja, quando o cliente, o arquitecto e o habitante coincidem na mesma pessoa. Esta casa de férias, projectada por este casal de arquitectos, edificada no meio dos campos agrícolas de uma pequena aldeia em Upper Lawn, Wiltshire, nos arredores de Londres,

testemunha a concretização excepcional de um modesto espaço doméstico que fora simplesmente projectado, construído e usado para acomodar a sua própria família, durante os seus períodos de férias.

Em ***Can Lis e Can Feliz***, o arquitecto dinamarquês Jørn Utzon ao construir duas casas para si e para a sua mesma família, na mesma ilha espanhola de Palma de Maiorca, acabou por constituir o exemplo ideal que ilustra um eminente problema expresso no conflito de interesses entre os vários sujeitos que concretizam uma mesma casa. A partir do momento em que este arquitecto, depois de ter projectado, construído e habitado Can Lis – implantada em Porto Petro, junto ao mar Mediterrâneo, exposta numa escarpa rochosa que contorna a costa da ilha – projectou, construiu e habitou Can Feliz – implantada em S'Horta, no cimo de uma montanha arborizada – acabou por suscitar a curiosidade de muitos.

Duas casas em Nevogilde abordou duas casas (distintas) que o arquitecto português Eduardo Souto Moura projectou para duas famílias (distintas), na mesma zona residencial da freguesia de Nevogilde, na cidade do Porto. Esta escolha pretende reflectir sobre o papel do arquitecto na resposta às ambições dos restantes sujeitos, em relação à casa que todos ajudam a concretizar. Aqui questionou-se sobre a actuação do arquitecto que procura justificar e consolidar as suas opções projectuais, moderando as expectativas de cada um, encontrando, assim, o desejado consenso entre todos e o todo que é *a casa.*

Khuner villa e Müller villa, projectadas pelo arquitecto austríaco Adolf Loos, construídas no mesmo ano de 1930 – para a família Khuner em Kreuzberg, implantada no cimo montanhoso da região austríaca de Semmering; e para a família Müller na cidade de Praga, enquadrada nos subúrbios residenciais da capital da República Checa – com o pretexto de se reconsiderar o papel de cada sujeito na concretização *da casa.* Por julgar que este arquitecto terá contribuído de forma exemplar para o repensar *a casa* e o próprio habitar, foi escolhido para encerrar a segunda parte da tese.

4. **escrita**

Por fim, julguei importante falar sobre a escrita, enquanto instrumento essencial na concretização do documento, lembrando Mies van der Rohe quando reconheceu: "Uma vez que não sou escritor, sinto dificuldade em escrever. Nesse mesmo tempo poderia ter acabado um projecto novo".[1]

Notas

1 *"Since I am no writer, I find writing difficult; in the same time I could have completed a new design"*, Fritz Neumeyer — Nota 40: carta a Hermann von Wedderkop, Cologne, Fevereiro de 1924, na Biblioteca do Congresso.

A Casa Tugendhat entre a tradição artesanal e a inovação tecnológica. A Preservação do patrimônio enquanto política de construção sustentável.[1]

Ivo Hammer

Este texto foi traduzido para português a pedido do autor

A Casa Tugendhat em Brno, classificada como Património Mundial da UNESCO desde 2001, pode servir como um exemplo em que o património arquitectónico representa não apenas "*conceitos espaciais e estéticos inovadores que visam satisfazer as necessidades de um novo estilo de vida*" , mas que na materialidade do patrimônio cultural todos os valores históricas e artísticos e outros valores culturais estão incorporados. Os resultados da investigação científica desenvolvida na conservação da materialidade da Casa Tugendhat, que realizamos entre 2003 e 2010, mostra como técnicas de construção artesanais e tradicionais contribuíram a aparência autêntica da casa.

A preservação de edifícios através de uma manutenção intensiva , utilizando materiais e técnicas compatíveis com a tecnologia original aplicada e a através de uma da sua utilização otimizada como vista a uma política de construção sustentável que beneficie o meio ambiente, são os objetivos estratégicos na prática de preservação de monumentos. Neste sentido, a preservação histórica pode ser vista como uma estratégia paradigmática para uma política de construção sustentável, tanto em termos de preservação e uso da arquitetura histórica, bem como na concepção de uma arquitetura moderna ecológica.

Introdução

O motivo da minha palestra incide sobre a seguinte questão: como podemos entender a preservação de monumentos num sentido social mais amplo, para além dos limites restritos de uma discussão puramente técnica da preservação do património cultural? Todos nós estamos cada vez mais conscientes da diminuição da disponibilidade de recursos, não só de materiais, mas também de espaço e de conhecimento histórico. Neste sentido, entendemos os monumentos edificados, a que chamamos património cultural, também como recursos. O meu objetivo é tornar claro que património cultural não deve ser considerado apenas como um recurso espiritual ou intelectual, mas que na materialidade desse património estão incorporados todos os valores históricos, artísticos e culturais. Quero deixar bem claro que a materialidade não é apenas um aspeto particular do património cultural, a que costumamos chamar de arte. Pelo contrário, a materialidade de um monumento cultural é uma base essencial da sua expressão e significado, aspeto esse muitas vezes negligenciado na teoria e na prática. Entendo a materialidade como uma manifestação das características históricas, artísticas ou culturais que estão incorporadas no monumento cultural. Deste modo, um monumento cultural deve ser considerado da seguinte forma dialética:

- por um lado, como uma *tecnologia* da matéria, com determinados elementos num certo composto, do aspeto superficial (incluindo a cor, estrutura, textura e *facture*[2]), do envelhecimento e da mudança deliberadamente antropogénica;
- e, por outro lado, como um *projeto,* com um tema, finalidade, forma, contexto, conteúdo e horizonte específicos.

Neste sentido, a matéria encontra-se ligada, de forma indissociável, a uma ideia, não sendo, assim, apenas um carácter arbitrário ou sinal documentando de ideias culturais.

A nossa cultura ocidental, dominada pela cultura cristã, negligenciou a matéria em termos filosóficos e práticos de forma a dar pri-

mazia ao espírito, à ideia, sendo que a atual crescente ênfase na evidência nos estudos culturais e, especificamente, no discurso estético, tem sido dificilmente acompanhada por um compromisso científico concreto com a materialidade dos artefactos.[3]

> "Desde Platão e Aristóteles que a história de arte europeia tem dado pouca atenção aos materiais de que são feitas as obras. A teoria estética tem há muito considerado o material como o meio da forma e não algo entendido conscientemente como parte integrante do significado da obra" (Monika Wagner).[4]

Os recursos têm sempre tanto de natureza cultural como de material e, assim sendo, entendemos os monumentos edificados não apenas como mensagens espirituais, que são chamadas de património cultural (quase como um tipo de *software*), mas também como um recurso de soluções técnicas (uma espécie de *hardware,* por assim dizer). Um pré-requisito para o conhecimento dessas propriedades é o estudo da sua materialidade e interpretação tecnológica e histórica, a principal responsabilidade profissional de conservadores/restauradores.

A preservação e a conservação do substrato material do património cultural só faz sentido se for entendida enquanto recurso autêntico e genuíno de atributos e projetos históricos, artísticos e culturais, materializados no tecido monumental e na sua superfície.

No discurso dominante, a tecnologia só é mencionada na medida em que pode ser chamada de inovadora, o que poderá levar a uma desvalorização da tecnologia especificamente aplicada, transcrevendo o termo, que se refere à matéria organizada, e transferindo-o para o imaterial, para o reino espiritual do pensamento inovador.

A Casa Tugendhat: tradição e inovação

A Casa Tugendhat em Brno, construída em 1928-30, é a mais importante obra de Ludwig Mies van der Rohe durante a sua estadia em Berlim. Foi projetado ao mesmo tempo que o famoso Pavilhão de Barcelona de 1929, que sobrevive hoje apenas como uma cópia da versão de 1986.

O contributo de Lilly Reich, a companheira e colega de Ludwig Mies van der Rohe que geriu, juntamente com o próprio, o estúdio de arquitetura em Berlim, é regularmente subestima na literatura disponível. Por exemplo, é ignorado o facto de Lilly Reich ser a diretora da exposição em Estugarda, que foi realizada paralelamente com a Weissenhofsiedlung.

Em 2001, a Casa Tugendhat foi classificada pela UNESCO como património mundial da humanidade e foi identificada como "um excelente exemplo do estilo internacional do movimento moderno em arquitetura, conforme desenvolvido na Europa na década de 1920".[5] O valor específico inerente à classificação de património mundial encontra-se traduzido na "aplicação de conceitos espaciais e estéticos inovadores que visam satisfazer as necessidades de um novo estilo de vida, aproveitando as oportunidades oferecidas pela produção industrial moderna".

A Casa Tugendhat é conhecida por ser a primeira moradia isolada na história da arquitetura a ter uma estrutura de apoio que consiste num esqueleto de aço, pelo que torna a planta aberta possível. Esse tipo de estrutura não era novidade, tendo sido já introduzido no final do século XIX em edifícios comerciais e industriais de grandes dimensões. Em 1927, Ludwig Mies van der Rohe tinha já construído o seu bloco de apartamentos na Weissenhofsiedlung, em Estugarda, como um protótipo com uma estrutura de aço. Este projeto esteve associa-

do a custos de material e esforço de planeamento elevados, mas que, certamente, contribuíram para acelerar o processo de construção em si. Na realidade, se o esqueleto tivesse sido feito de betão armado, preferível, por exemplo, para Le Corbusier, a implementação de colunas finas não teria sido possível.[6] No seu interior, o revestimento brilhante dos pilares de aço, composto por folha de latão, cria um "efeito de desmaterialização que nega que contraria a sua função estática".[7]

E, no entanto, apesar de toda a perfeição da construção, os traços artesanais e as suas texturas são visíveis em todas as partes, incluindo nos materiais e superfícies que transmitem uma estética maquinal, um *Mechanofaktur*,[8] como o vidro laminado e polido de estilo Bauhaus, encarado pelos críticos de arte como o epítome do ideal de superfície produzida industrialmente sem vestígios de trabalho manual (vestígios, dos quais intitularei com o termo Bauhaus: *facture*).[9]

Os grandes envidraçados parcialmente retrácteis, de quase 15 metros quadrados, da fachada, que estão agora destruídos, continham – tal como ilustra uma foto de 1972 – uma ondulação quase invisível, apenas evidente nesta vista oblíqua pelos efeitos ligeiramente vibrantes da paisagem. O revestimento arredondado dos pilares de aço interiores em forma de cruz mostram – apesar do processo de produção industrial das folhas de latão e do seu revestimento de cromo – uma superfície irregular, provavelmente derivado da operação de dobra, montagem e acabamento espelhado, criando no fim um efeito de espelho vivo.

As partes metálicas da fachada foram pintadas com uma técnica complexa que consistia em várias camadas de tinta à base de óleo, de tonalidade azul-cinza, aproximando-se, assim, da tonalidade do chumbo oxidado que protege a base dos caixilhos. O revestimento incolor final desta pintura azul-cinza (provavelmente composta por

acetato de celulose) era pouco comum e, certamente, não era tecnicamente necessário, o que reforça a impressão de metal brilhante.[10] Devido ao uso de métodos de aplicação tradicionais de tinta metálica e ao seu efeito resultante, este brilho não foi, com certeza, completamente uniforme. O revestimento em camadas das partes metálicas, tais como caixilharia, portas, corrimões e vedações é feito com tinta industrial à base de óleo, em azul-cinza no exterior e creme no interior.

No entanto, as qualidades das texturas, que podem ser sentidas mal se toca nestas superfícies, dificilmente conseguem ser representadas fotograficamente. A produção de painéis de parede e portas folheadas com madeiras nobres é difícil de capturar fotograficamente, não só porque o esmalte original foi polido em 1982-1985 e o padrão dos veios da madeira é tão dominante, mas também porque o trabalho manual é extremamente preciso e adequado. No entanto, é possível visualizar um pouco da ondulação da superfície gerada pelo material e pelo processo de fabricação apenas sob a incidência de uma luz oblíqua. Por outro lado, a sensibilidade da ponta dos dedos pode facilmente detetar a textura da superfície ao mínimo toque.[11]

O mesmo se aplica às superfícies de pedra, à parede em travertino e ónix-mármore. Na parede plana e polida composta por cinco folhas de ónix-mármore (constituída por aragonite), as ligeiras saliências são dificilmente perceptíveis, mesmo com exame táctil. No entanto, as pequenas irregularidades na superfície podem ser vistas a partir do reflexo das plantas no jardim de inverno na parede ónix.

O esqueleto de aço – uma inovação tecnológica para uma moradia isolada – e os pavimentos de betão, em conjunto com o enchimento tradicional de tijolos (e o isolamento de *Torfoleum*) – revestidos com argamassa hidráulica de cal e cimento – têm a sua desvantagem devido aos diferentes coeficientes de expansão e contração térmica dos

materiais utilizados. A fenda entre a estrutura do teto e a fachada – de acordo com as provas fotográficas de 1931 – surgiu logo após a conclusão e foi imediatamente reparada – em vão – com pintura de cal, utilizando a técnica original.[12]

Peças-chave da Casa Tugendhat são executadas com técnicas tradicionais, embora a um nível particularmente elevado de qualidade. É de mencionar, por exemplo,

- as peças bem polidas, mas não brilhantes, de travertino: os rodapés, os degraus das escadas que conduzem ao jardim e o parapeito do terraço superior, e, no interior, o pavimento e as prateleiras de parede no *hall* de entrada, a escada em espiral e o pavimento, as prateleiras e a bacia do jardim de inverno.[13]
- Os painéis do *foyer*, as portas e os armários de parede no quarto principal são todos folheados a madeira de Jacaranda, enquanto o interior das portas do quarto das crianças e da enfermeira é folheado a Zebrano, e a parede semicircular da sala de jantar e da biblioteca a ébano Macassar.
- Estes folheados exóticos foram igualmente utilizados para as superfícies expostas do mobiliário, ao contrário do interior que é folheado em ácer. As superfícies das folhas foram lacadas e polidas. O interior dos móveis foi revestido com uma borracha vegetal (acácia ou cereja) e (talvez originalmente) impermeabilizado com verniz nitrocelulósico.[14] De acordo com análises recentes feitas à mobília original na posse da família Tugendhat, o tipo de pintura final das superfícies exteriores, mas sem certezas, poderá ser óleo, resina alquídica ou éter de celulose.[15] No entanto, o verniz exterior foi renovado sobretudo em 1985.
- O revestimento em camadas dos elementos interiores de madeira (todas as portas e molduras, na medida em que não são folheadas, armários na despensa, prateleiras nas janelas, caixas de estores, etc.) é cuidadosamente elaborado com um verniz brilhante, em tom creme. Este tratamento superficial é refletido em alguns móveis, como por exemplo, a vitrina no lado norte e o banco decorativo no lado sul da parede de ónix.

As superfícies das paredes e tetos são executadas com uma precisão excecional, tirando o máximo partido das técnicas tradicionais. O teto do interior é suspenso, o que era comum até à introdução de tetos de betão no final do século XIX. O suporte tradicional do estuque, que consiste em esteiras de junco pré-fabricadas e rede de tijolos, é suspenso em vergalhões a uma distância de cerca de 40 cm do pavimento de betão. A argamassa em si é constituída de cal e algum gesso. Graças à suspensão e aos juncos flexíveis há, simultaneamente, um excelente isolamento térmico e elasticidade mecânica, algo que é traduzido, por conseguinte, numa maior durabilidade.

Até ao momento, os tetos encontram-se, em grande parte, em bom estado e não apresentam fendas. Inclusive, para as superfícies das paredes e do teto interiores, os arquitetos recorreram a uma técnica chamada de *stucco lustro*, usada desde os tempos antigos em edifícios substanciais, como em moradias projetadas por Andrea Palladio, e novamente no século XIX, como, por exemplo, na arquitetura de Friedrich Schinkel.[16] O *stucco lustro* da Casa Tugendhat teve um acabamento mate em vez de brilhante, semelhante ao famoso "Marmorino", por exemplo, do Teatro Olimpico de Andrea Palladio. No período em que a família Tugendhat residia na casa, entre 1930-38, as paredes não foram cobertas com tinta, mas limpas apenas com goma de borracha (pão).

O pavimento consistiu em betão *XYLOLITH* reforçado com fibras de madeira[17] e linóleo em tom creme,[18] colocado sem cola, o que originou uma superfície bastante irregular e alterada, ligeiramente, sob a ação da temperatura e da humidade.

O suporte para a fachada de estuque da Casa Tugendhat é composto por paredes de tijolos e – tal como no interior – esteiras de junco pré-fabricadas e rede de tijolos, suspenso em vergalhões a cerca de 40 cm de distância do pavimento de betão. As diferenças no tamanho dos grãos de areia de várias amostras de reboco sugerem uma argamassa misturada no local, tal como é usual. A superfície do reboco foi suavizada com uma placa de madeira, pelo que formou-se uma certa rugosidade derivada do grão de areia da argamassa. A lavagem final, constituída de cal apagada e partículas finas de areia amarela, acrescentou o efeito corante.[19] Embora a cal provavelmente contivesse ocre e zinco (Litopone), bem como pigmentação adicional, a análise da mesma não forneceu evidências bastante sólidas de uma proporção de caseína e silicato de potássio. Tecnologicamente, podemos ver aqui uma ligação com a tradição artesanal, por exemplo, com os edifícios das feiras comerciais de Brno, datados de 1928 (como o Pavilhão de Pavel Janák, com elementos de experimentação moderna, semelhantes às fachadas das Casas dos Mestres em Dessau).[20]

A lavagem de cal foi aplicada ao reboco compactado mas enquanto este ainda se encontrava molhado, e pelo facto desta aplicação ser tão fina, a cor natural dos grãos de areia embebidos contribuiu para o efeito de cor na superfície final.

As diferenças no material e superfícies, entre uma tradição construtiva local, como observamos, por exemplo, no pavilhão exibido na exposição de Brno por Pavel Janák em 1928, e a Casa Tugendhat, reside na aparência da cor da fachada com o tom branco-amarelado do travertino, usado para o dado, os peitoris e as soleiras.[21] As paredes de reboco da fachada da Casa Tugendhat não eram brancas, mas tinham uma cor amarelada subtil.

Desmaterialização

Enquanto, na fachada, o carácter do material é representado de forma pronunciada, por intermédio da rugosidade do reboco, é na uniformidade e brilho das superfícies, no *stucco lustro* das paredes interiores, da parede de ónix, do metal pintado, do linóleo e seu efeito refletor que se apoiam os esforços utópicos para a "desmaterialização" da arquitetura do Movimento Moderno, formulado, por exemplo, por Walter Gropius em 1911, quando escreveu sobre a Utopia dos engenheiros, de serem capazes de produzir um "aço transparente".[22]

O tratamento desenvolvido e o brilho aplicado sobre as superfícies, torna abstracto o material da sua presença meramente física. Inclusive, os revestimentos cromados refletores dos pilares de aço e das pernas da mesa redonda, juntamente com as estruturas cromadas das cadeiras e dos corrimões, do tampo da mesa brilhante feito de madeira de pereira preta, o brilho do Macassar polido e o painel de mármore verde de Tinos, com as suas superfícies refletoras, contribuem igualmente para a desmaterialização da superfície arquitectónica, de modo a serem dualmente materiais naturais e espelhos.

Tradição artesanal recuperada

Em resumo, podemos verificar que a produção e processamento artesanal precisos de todos os elementos, mesmo os componentes tecnicamente mais inovadores, desempenharam um papel importante na aparência das superfícies da Casa Tugendhat. As consequências estéticas do trabalho manual, ou seja, do *facture*, são visíveis, embora

não facilmente, em todos os elementos. Ao mesmo tempo, tornou-se igualmente claro que a tradição artesanal foi usada e encontrava-se viva nos métodos de produção. Sublinhe-se, ainda, que o arquiteto alemão adotou este tipo de revestimento de fachada e as tradições locais da área da feira comercial de Brno. Inovação formal não significa necessariamente que a base subjacente da tradição artesanal tenha sido abandonada. Pelo contrário, a Casa Tugendhat é um bom exemplo de uma arquitetura que representa não apenas *conceitos espaciais e estéticos inovadores que visam satisfazer as novas necessidades de um estilo de vida*, mas também como tendo sido implementada materialmente de uma forma cuidadosa e perfeita.

Esta produção material, que utiliza métodos e materiais tradicionais, foi um sucesso a longo prazo, pelo menos enquanto o edifício foi utilizado e mantido. A tradição de reparos de pequena escala subsistiu até aos anos sessenta do século XX. Inclusive, a fachada rebocada e pintada, por exemplo, foi mantida diversas vezes graças à lavagem de cal; encontrámos até 5 camadas de tinta. Só depois da renovação de 1981-1985 é que as técnicas de reparo tradicionais foram abandonadas e a fachada pintada com uma massa de cimento e tinta, que continha resina artificial, acabando por não ser compatível com a física do sistema existente.

Danos na fachada devido à reparação incompatível

As técnicas tradicionais de reparação não foram abandonadas só na República Checa, mas também a nível internacional. Na segunda metade do século XX, foi imposto internacionalmente o uso de materiais modernos desenvolvidos em laboratório, em vez de materiais tradicionais. A inteligência tradicional foi substituída pelo *design inteligente* de produtos de laboratório, que são fáceis de usar de acordo com procedimentos padronizados e que satisfazem as normas de garantia e os seus requisitos de durabilidade a curto prazo. Considerações a longo prazo, tais como a capacidade de reparos futuros não são, por isso, tidas em linha de conta. Enquanto isso, a época dos plásticos na arquitetura começou, incluindo a utilização de resinas sintéticas e compostos correspondentes na construção de pavimentos, tetos, janelas, azulejos, revestimentos de paredes, isolamento térmico, etc.[23] Os danos causados pelo uso de materiais que não são reparáveis e compatíveis com as propriedades químicas e físicas da arquitetura histórica, não só são económicos, como também provocam perdas do tecido histórico inestimável do nosso património cultural.

Estratégia paradigmática

A preservação de um monumento construído pode ser vista – se interpretada corretamente – quase como uma *estratégia paradigmática* de preservação e uso do edificado, que se aplica à reflexão ambiental a longo prazo,[24] no que toca:

- ao uso inteligente, bem sustentado nas necessidades culturais, combinando utilidade e conveniência com a beleza;
- à manutenção eficiente, compatível com o tecido histórico;
- à redução do consumo de energia através de novas construções e da consideração de um equilíbrio energético a longo prazo;
- à capacidade de reparação dos materiais e técnicas antigas de construção utilizadas;
- à reutilização de materiais na reconstrução e adaptação para novos usos;
- à separabilidade e descartabilidade inofensiva de materiais descontinuados;

- à longa vida útil das estruturas e superfícies de construção que são periodicamente preservadas.

Conclusão

Não se trata apenas de estratégias para preservar os valores culturais; trata-se também de como evitar um gasto desnecessário de energia, não apenas num aspeto, como o isolamento térmico, mas na visão geral do equilíbrio ecológico. A preservação dos edifícios por intermédio de uma manutenção intensiva e a valorização dos edifícios existentes, tendo em vista uma política de construção sustentável que beneficia o meio ambiente, são também objetivos estratégicos de preservação de monumentos. Uma preservação de monumentos com base na sociedade potencia não só a proteção de objetos individuais, mas também responde às necessidades sociais bem conhecidas, que poderão contribuir igualmente para a realização desses objetivos ecológicos.

Mesmo quando um novo edifício é inevitável, os monumentos oferecem sugestões de soluções para os problemas técnicos, estéticos e sociais em geral, dado acumularem a experiência de muitos anos ou mesmo milénios.

Os monumentos demonstraram, com a sua própria existência, que passaram o *teste do intemperismo*, que são reparáveis e que são culturalmente apropriados.

Neste sentido, a transferência de tecnologia significa usar ideias e técnicas que são incorporadas no monumento construído e que são úteis para a solução de problemas sociais, arquitectónicos, estéticos e ecológicos atuais e do futuro.

Assim sendo, por que não utilizamos estas fontes de conhecimento?

Notas

1 Versão revisitada e abreviada do artigo publicado pela primeira vez em: Ivo HAMMER, "The Tugendhat House: Between Craftmanship and Technological Innovation" in *DOCOMOMO International: Modern and Sustainable*, Jornal 44, January, 2011, p.48-57.

2 O termo refere-se aos traços visuais resultantes de trabalho realizado manualmente. Foi utilizada, por exemplo por Lazlo Moholy-Nagy na Bauhaus em Dessau. Veja: Lásló MOHOLY-NAGY, "von material zu architektur" in Lázló MOHOLY-NAGY; Walter GROPIUS (eds.), *Bauhausbücher*, vol. 14, Dessau, 1929. fac-símile pela Florian Kupferberg editora, Mainz, 1968.

3 Cf. z. B. Karin HASSAUER; Helmuth LETHEN; Elisabeth TIMM (ed.), *Sehnsucht nach der Evidenz, Zeitschrift für Kulturwissenschaften*, *1/2009*, Bielefeld: transcrição. Ver especialmente a entrevista de Helmuth Lethen com Ludwig Jäger (pp. 89-94).

4 Tradução de excerto. Monika WAGNER, *Das Material der Kunst. Eine andere Geschichte der Moderne*, München: C.H. Beck 2001. Cf.: http://www.incca.org/resources/links/78-theory/173-archive-for-the-research-of-material-iconography (última consulta em 24 de outubro de 2013).

5 Cf. Tugendhat Villa em Brno, UNESCO, *http://whc.unesco.org/en/list/1052/* (última consulta em 24 de outubro de 2013).

6 Wolf TEGETHOFF, "The Tugendhat House. A Modern Residence in Turbulent Times" *in* Daniela HAMMER-TUGENDHAT; Wolf TEGETHOFF (eds.), *Ludwig Mies van der Rohe. The Tugendhat House*, Vienna, New York: Springer, 2000, pp. 43-97. Cf.: Alexander KIERDORF; Hubert K. HILSDORF, "Zur Geschichte des Bauens mit Beton" *in* Uta HASSLER (ed.), *Was der Architekt vom Stahlbeton wissen sollte*, Zurich: GTA, 2010, pp. 11-52.

7 Op. cit., Wolf TEGETHOFF, p. 15.

8 Monika WAGNER, "Materialien des 'Immateriellen'. Das Haus Tugendhat im Kontext zeitgenössischer Materialästhetik" (Engl, Czech.), *in Materiality, Akten des Internationalen Symposiums zur Erhaltung der Architektur des Neuen Bauens* (Brünn 17.-29.4.2006), Museu der Stadt Brünn (www.spilberk.cz) und HAWK, Hornemann Institut (www.hornemann-institut.de) 2008, S. 26-32.

9 Op. cit., Monika WAGNER, 2008, p. 30. No que concerne à influência da produção industrial na estética do trabalho manual, à imitação da estética maquinal e da supressão dos traços de trabalho manual nas superfícies das fachadas rebocadas do século XIX, consulte: Ivo HAMMER, "Historische Verputze. Befunde und Erhaltung" *in Restauratorenblätter*, n. 4, Wien, 1980, pp. 86-97.

10 Tatjana BAYEROVA; Martina GRIESSER-STERMSCHEG, "Metal Surfaces in the Tugendhat House. Research and Findings" *in Materiality*, Brno: Muzeum města Brna; Hildesheim: Hornemann Institute, 2008, pp. 176-184.

11 A sensibilidade dos dedos é maior do que a resolução do olho humano: num dedo há 250 recetores para o frio, 17 para o quente, 850 para dor superficial, 441 para dor profunda, 1.233 para pressão, 471 para o contato , 284 para a vibração, 744 para a posição das articulações. Frederick VESTER, *Unsere Welt - ein vernetztes System*, München: Dt. Taschenbuch-Verl, 1993, p. 28. Stuttgart, 1978.

12 De acordo com as investigações da HAWK Hildesheim, em 2004, não havia nenhum vestígio de pátina entre a superfície original e a reparação.

13 Karol BAYER; Zdeněk ŠTAFFEN; Jiří NOVOTNÝ; Renata TIŠLOVÁ, "Investigation of Stone Elements in the Tugendhat House" *in Materiality,* Brno: Muzeum města Brna; Hildesheim: Hornemann Institute, 2008, pp. 194-201.

14 Inga BLOHM; Vanessa KASPAR; Kirsten LAUTERWALD; Silke TROCHIM; Nicole THÖRNER, "Wooden Built-In Elements in the Tugendhat House. Conservation/Restoration Research, including History and Proposals for their Maintenance" *in Materiality,* Brno: Muzeum města Brna; Hildesheim: Hornemann Institute, 2008, pp. 186-192.

15 Análise de Tatjana Bayerova e Karol Bayer, Litomyšl, no âmbito do CIC, relatório de 15-02-2011; superfície do aparador em Macassar, amostra retirada do folheado escondido pela gaveta do meio. Numa amostra, retirada a partir da parte interna do pé da cama de Grete Tugendhat (pau-rosa), foi encontrada tinta à base de resina de óleo, o que pode não ser original.

16 Manfred KOLLER, "Wandmalerei der Neuzeit" in *Reclams Handbuch der künstlerischen Techniken,* Band 2, Stuttgart: Recalm, 1990, pp. 213-398. Existem uns poucos exemplos importantes de casas do movimento moderno com superfícies de parede interior bastante elaboradas, utilizando a técnica *stucco lustro*: A Casa Wittgenstein (1926/28) de Ludwig Wittgenstein e Paul Engelmann, Kundmanngasse 19, 3º distrito de Viena (Bernhard LEITNER, *Das Wittgenstein Haus*, Ostfildern: Ruit, 2000) e a Villa Lala Gans em Kronberg, perto de Frankfurt/Main de Peter Behrens, 1928-1931. Cf: Angela VON GANS; Monika GROENING, *Die Familie Gans 1350-1963. Ursprung und Schicksal einer wiederentdeckten Gelehrten- und Wirtschaftsdynastie*, Heidelberg: Verlag Regionalkultur, 2006, pp. 240-245 (de salientar Axel Werner) e "Haus K. em O." (Casa de Philipp F. Reemtsma em Othmarschen) por Martin Elsaesser (1930-32 ca.)

17 Betonilha de cimento com solução de cloreto de magnésio e com serradura; cimento Sorel.

18 Linóleo é um revestimento do pavimento feito de materiais renováveis, tais como óleo de linhaça solidificado (Linoxina), pó de cortiça e cargas minerais, tais como carbonato de cálcio, mais vulgarmente em aniagem ou suporte de tela; pigmentos são adicionados frequentemente aos materiais. Foi inventado em 1860 por Frederick Walton. Cf: http://en.wikipedia.org/wiki/Linoleum (última consulta em 24 de outubro de 2013)

19 Investigações microscópicas de HAWK Hildesheim revelaram que as partículas siliciosas do agregado tinham uma forma e cor similares aos grãos de areia da caixa de areia de Bratice, 20 km a sul de Brno. O conteúdo das partículas finas siliciosas (silte, 0,002 mm bis 0,063 mm) aceleram o ajuste do hidrato de cal, devido ao seu efeito hidráulico, consulte: Ivo HAMMER, "Buildings on the fair grounds of Brno (1928) designed by Emil Kralik and Pavel Janak. Investigation of the materiality of Modern Movement buildings", *in Materiality, Proceedings of the international symposium on the preservation of Modern Movement architecture* (Brno, 17. - 29.4.2006), Museu da Cidade de Brno, www.spilberk.cz und HAWK, Hornemann Institut www.hornemanninstitut.de 2008, pp. 136-144.

20 Cf. Thomas DANZL, "Konservierung, Restaurierung und Rekonstruktion von Architekturoberflächen am Meisterhaus Muche/Schlemmer" in: August GEBESSLER (Hrsg.), *Gropius. Meisterhaus Muche/Schlemmer. Die Geschichte einer Instandsetzung*, Stuttgart: Krämer, 2003, pp. 152-181.

21 Temos que ter em conta que o tom real do travertino é alterado pela crosta de poeira e gesso, e, adicionalmente, por tintas à base de óleo no interior, consulte: Ivo HAMMER, "The Project of Conservation/Restoration Research at Tugendhat House. Materials and Surfaces of the Rendered Façades, Interior Walls and Painted Wood" *in Materiality*, Brno: Muzeum msta Brna; Hildesheim: Hornemann Institute, 2008, pp. 164-174.

22 Op. cit., Monika WAGNER, p. 26.

23 Ivo HAMMER, "Kalk in Wien. Zur Erhaltung der Materialität bei der Reparatur historischer Architekturoberflächen" in: *Restauro*, Zeitschrift für Kunsttechniken, Restaurierung und Museumsfragen, 6 de setembro de 2002, pp. 114-125.

24 Trata-se de estratégias exemplares para manter o valor do edificado, e não a "gestão universal" do mundo inteiro através da preservação de um monumento, tal como afirma Uta HASSLER na sua introdução a: *Das Denkmal als Altlast. Auf dem Weg in die Reparaturgesellschaft* (trad.: O monumento como um fardo do passado. No caminho para a sociedade de reparação), ICOMOS Hefte des Deutschen Nationalkomitees XXI, München 1996, p. 11.

Legendas das imagens

FIG. 1 Vista de oeste da casa Tugendhat durante a sua construção. Fotografia por Fritz Tugendhat, cerca de Outubro de 1929.

FIG. 2-4 Plantas da casa Tugendhat: cave (1), primeiro andar/sala de estar (2) e segundo andar/quartos (3). Os desenhos foram criados de acordo com as dimensões originais das plantas publicados em 1930 (Ludwig Mies van der Rohe). A planta da cave foi adicionada. Cortesia de Atelier RAW, Brno, 2012.

Cave

1.01 antecâmara **1.02** *moth chamber* **1.03** câmara escura **1.04** lavandaria **1.06** sala de armazenamento de água da chuva **1.08** sala de armazenamento de legumes **1.13** quarto sob as escadas do jardim **1.14** sala de máquinas das janelas **1.15** sala de secagem e engomagem da roupa **1.16** escadas da cave **1.17** sala técnica do ar condicionado **1.18** espaço sob as escada **1.19** ar de exaustão **1.21** refrigeração e humidificação do ar **1.22** câmara de mistura **1.23** filtragem do ar **1.24** aquecimento do ar **1.25** sala de armazenamento para ferramentas de jardim e móveis **1.26** conduta de aquecimento e cinzas **1.28** câmara de carvão

Primeiro andar

2.02 sala principal **2.03** vestibulo da quarto de banho **2.07** estufa **2.08** copa **2.10** despensa **2.12** cozinha **2.13** sala de entrada da ala de serviço **2.14** quarto da cozinheira **2.16** antecâmara **2.17** banho e sanitátios **2.19** quarto das empregadas **2.23** terraço do jardim com escada **2.25** galeria de acesso ao apartamento do motorista

Segundo andar

3.01 sala de entrada com escada para a sala principal **3.02** antecâmara **3.03** quarto de Fritz Tugendhat **3.04** quarto de Grete Tugendhat **3.05** quarto de banho dos pais **3.06** sanitário e montacargas **3.10** quarto de Ernst e Herbert **3.11** quarto de Hanna Weiss **3.12** quarto de Irene Kalkofen **3.13** despensa **3.14** quarto de banho das crianças e de Irene **3:15** corredor **3:16** antecâmara para a garagem e apartamento do motorista **3:17** garagem **3:18** quarto de dormir do apartamento do motorista **3:19** vestíbulo do apartamento do motorista **3:20** cozinha do apartamento do motorista **3:21** quarto de banho do apartamento do motorista **3:22** terraço de jogos **3:23** alpendre (**3.24** terraço técnico) **3:25** galeria de acesso ao apartamentos do motorista

FIG. 5 Feira Brno, Pavilhão da escola de arts and crafts em Praga por Pavel Janák durante a sua construção (1927-1928). Base de tijolo vestidos em betão, parede em blocos de tijolo oco, placa de lascas de madeira, vigas de aço. Cortesia do Museu Nacional Técnico em Praga.

FIG. 6 Feira Brno, Pavilhão da escola de arts and crafts em Praga por Pavel Janák durante a sua construção (1927-1928). Parede sul, detalhe, fragmento do reboco original da fachada, que foi alisado com uma placa de madeira e coberto com cal amarelada. Foto por HAWK Hildesheim, 2005.

FIG. 7 Sala de estar principal quando era utilizada como sala de terapia ortopédica para o hospital infantil. O único painel da janela de vidro polido restante era muito plano, sendo as suas irregularidades praticamente indetectáveis mesmo através de uma vista tangente. O painel de vidro teria sido destruído na sequência da renovação de 1985. Cortesia de Mogens S. Koch, Copenhaga, 1972.

FIG. 8 Sala principal. A fotografia mostra um detalhe do revestimento de cromo polido das colunas de aço em forma de cruz. No espelho, a irregularidade subtil da superfície do metal provocada pelo processo de fabricação manual é claramente visível. Foto por Dieter Reifahrt, 2008.

FIG. 9 Sala principal, detalhe da parede de ônix mármore. No reflexo da arquitetura e das plantas apresentam-se pequena saliências que testemunham o processo de fabricação. Foto por Ivo Hammer, 2012.

FIG. 10 Detalhe da fachada este do quarto de Grete Tugendhat. Pouco depois da conclusão do edifício começaram a aparecer fissuras no reboco, na zona de intersecção do teto de betão com as parede de tijolos, causadas pelos diferentes comportamentos térmicos dos materiais. Uma desvantagem derivada da combinação de técnicas construtivas inovadoras e tradicionais. Foto por Rudolf de Sandalo, detalhe, com edição, cerca de 1931.

FIG. 11 Sala de estar principal, espaço de jantar com uma parede semi-circular em ébano Makassar refletindo a luz vinda das grandes paredes de vidro e dando a imagem da natureza existente no exterior. As pequenas irregularidades na superfície do verniz são perceptíveis. Foto por Fritz Tugendhat, detalhe, cerca de 1931.

FIG. 12 Detalhe do bufet da sala de jantar, atualmente sobre posse privada em Viena. A sombra de uma linha recta no reflexo da superfície demostra uma ligeira ondulação causada pelas propriedades do material e também pelo processo de fabricação. Foto de Ivo Hammer, 2010.

FIG. 13 Sala de estar principal, com vista para sul. Os reflexos das superfícies das paredes produzem o efeito de uma superfície *stucco lustro*. Foto por Rudolf de Sandalo, 1931.

FIG. 14 Quarto de Fritz Tugendhat. Abertura no teto onde o apoio do candeeiro foi removido. A esteira de cana pré-fabricada encontra-se suspensa da estrutura de betão existente em cima e suportada por uma malha de arame. Foto de Ivo Hammer, 2005.

FIG. 15 Terraço superior, fachada, detalhe. A largura da imagem corresponde a cerca de 15 cm. Amostra removida da sobreposição da camadas de cal amarelada, executada aproximadamente antes de 1965, e da pasta de cimento / resina que data de 1985. Faixa da esquerda: superfície original com o reboco ralado com cal branco-amarelada, que é pigmentado com areia fina. Foto por Ivo Hammer, 2011.

FIG. 16 A largura da imagem corresponde a cerca de 17 mm. A lavagem de cal amarelado-branco na parede ralado é tão fina que a cor dos grãos de areia alteram a percepção geral na cor geral da argamassa. Foto por HAWK/Hitzler, 2003.

FIG. 17 Fachada noroeste, detalhe. Defeitos estáticos no terraço inferior causados por um tubo de esgoto quebrado. Danos no reboco e na pintura de 1985 devido a problemas de drenagem, sais prejudiciais e da aplicação posterior de uma pintura incompatível com as lavagens de cal anteriores. As lavagens de cal anteriores encontram-se parcialmente escuras devido à sujidade e à conversão ambiental do cal em gesso. Foto de Ivo Hammer, 2005.

FIG. 18 Terraço superior, fachada nordeste, trabalho piloto em 2011. Michal Pech remove a compressa com carbonato de amónio que serviu para remover a crosta de gesso. Foto de Ivo Hammer, 2011.

FIG. 19 Fachada sudoeste, terraço superior. O trabalhador da ART KODIAK pinta a cal através de uma técnica tradicional, com uma pré-mistura feita pelos conservadores em conformidade com as conclusões da investigação científica realizada para a preservação da Casa Tugendhat. Foto por Ivo Hammer, 2011.

FIG. 20 Vista de oeste, fachada do jardim após a restauração. Foto por Jon Soung Kimm, 2012.

Reabilitação da envolvente de um conjunto habitacional de custos controlados. Do diagnóstico à conclusão da obra

Vasco Peixoto de Freitas / Pedro Gonçalves / Sara Stingl de Freitas

A primeira fase do projecto de reabilitação é o Estudo de Diagnóstico elaborado por uma equipa multidisciplinar. A reabilitação do conjunto habitacional de Lordelo teve como principal objectivo a resolução dos problemas existentes, compatibilizando exigências por vezes antagónicas: conforto higrotérmico, conservação de energia, durabilidade e funcionalidade das soluções.

Metodologia

A primeira fase do Projeto de Reabilitação do conjunto habitacional em estudo consistiu na elaboração de um Estudo de Diagnóstico que tinha como principais objetivos: analisar as patologias que afetavam as fachadas, coberturas e zonas interiores comuns dos edifícios e apresentar uma metodologia para os correspondentes trabalhos de reabilitação; avaliar as instalações existentes nas caixas de escadas e, ainda, propor soluções para a reabilitação arquitetónica da envolvente exterior. Por opção do Dono de Obra, os arranjos exteriores foram desde logo excluídos do âmbito do Projeto de Reabilitação. O Estudo de Diagnóstico foi elaborado por uma equipa multidisciplinar de projetistas, composta por Engenheiros Civis, Arquitetos e Engenheiros Eletrotécnicos.

Durante a elaboração do Projecto de Execução realizaram-se sucessivas iterações, que refletem o contributo de diversos intervenientes: Dono de Obra, Gestor do Empreendimento, Revisor de Projeto e Entidades Licenciadoras. Para além disso, algumas das opções adotadas destinavam-se a dar resposta a necessidades ou preocupações específicas dos moradores.

Conceito

Os edifícios do conjunto habitacional em estudo, construídos em 1978, apresentavam diversas patologias e a sua imagem encontrava-se profundamente descaracterizada pelas mais variadas alterações e intervenções parciais que, para além de criarem grande heterogeneidade no aspeto da envolvente exterior dos edifícios, em algumas situações condicionavam o seu comportamento.

A reabilitação dos edifícios teve como principal objetivo a resolução dos problemas existentes, compatibilizando exigências por vezes antagónicas como o conforto higrotérmico, a conservação de energia, a durabilidade e a funcionalidade das soluções.

Descrição do projeto

Dos trabalhos contemplados no Projeto de Execução, destacam-se os seguintes: substituição do revestimento das coberturas inclinadas e aplicação de isolamento térmico no desvão; limpeza e impermeabilização das superfícies em tijolo à vista; reparação e proteção das superfícies de betão aparente; substituição das janelas, peitoris e estores das habitações; substituição da envolvente exterior das lavandarias e colocação de uma estrutura metálica exterior para ocultação e suporte dos estendais; reformulação das entradas coletivas; ordenamento dos espaços exteriores contíguos aos edifícios e instalação de novas infraestruturas de energia elétrica, de telefone e de televisão por cabo.

Objetivos alcançados

A reabilitação do conjunto habitacional permitiu recuperar a coerência construtiva dos edifícios e adaptar a construção às exigências

e padrões mais atuais, tendo-se optado, sempre que possível, pela utilização de materiais na sua expressão natural, tal como acontecia com as soluções originais. Do ponto de vista do conforto higrotérmico, os edifícios apresentam agora coberturas fortemente isoladas, um reforço da resistência térmica das zonas de fachada com pano simples (sob os vãos envidraçados exteriores) e das caixas-de-estores, e nas habitações foram aplicadas caixilharias e estores exteriores de boa qualidade, para além de, simultaneamente, se ter melhorado a ventilação dos fogos. As caixas de escadas coletivas foram convertidas em espaços de acesso restrito aos moradores, com iluminação comum, e estão dotadas de novas infraestruturas que satisfazem as exigências regulamentares. A solução adotada para a envolvente das lavandarias satisfaz os objetivos funcionais que haviam sido previamente estabelecidos, permitindo uma adequada integração dos estendais individuais na envolvente dos edifícios. Os moradores ganharam conforto e segurança.

Resultado arquitetónico e construtivo

Nas figuras seguintes [consultar p. 167-172] apresenta-se um conjunto de imagens que evidenciam o aspeto antes da intervenção e a solução final.

Legenda das figuras

Antes/Depois

01 Fachada Principal
02/03 Fachada posterior na qual se visualiza a nova conceção das lavandarias
04 Fachada posterior na qual se visualiza o posto de transformação
05/06 Fachada posterior na qual se visualiza uma unidade exterior de climatização
07 Habitação com rampa de acesso a deficientes motores
08/09 Pormenor da entrada nas habitações na fachada posterior
10 Fachada principal na qual se visualiza a nova conceção da caixa de escadas
11 Lavandarias passam a ser um espaço confinado
12 Lavandarias – funcionalidade e estética
13 Colocação de vidros duplos e de novas caixilharias – um contributo para o conforto térmico e higrotérmico
14 Isolamento térmico efetuado sob os vãos
Regeneração do betão e reabilitação do tijolo à vista
15 Encerrar a caixa de escadas garantido a ventilação no módulo superior
16 Proteção face à chuva da porta de entrada
17 Assegurar velhas funcionalidades e criar novas infraestruturas
18 Reabilitar a caixa de escadas introduzindo instalações sem ser intrusivo
19 Iluminação
20 Nas lavandarias foi preservado o princípio estético do projeto inicial

Contributors

Ana Luísa Rodrigues is graduated at the Faculty of Architecture of the University of Porto (FAUP - Oporto University) since 1994 and gets the Master Degree in 2000, at the same University. In 2009 gets the Doctor Degree (PhD) with the thesis *The habitability of domestic space. The client, the architect, its inhabitant, and the house* at the School of Architecture of University of Minho (EAUM). In 1994 begins her academic career; from 1996 to 2003 is managing partner of *João Figueira e Associados, Arquitectura e Planeamento Lda*., aiming to achieve mainly the *New Luz Village Plan and Urban Project*, focusing on the re-location of a village that was submersed by the *Alqueva Dam*. Today is Auxiliary Professor, President of the Pedagogic Committee and Vice--Dean of the School of Architecture of University of Minho (EAUM), where lectures since 1999.

Benedetto Di Cristina, born in 1940, has been professor of architecture at Università degli Studi di Firenze (1982-2010) teaching *Architectural Design, Urban Recuperation and Theory of Contemporary Architecture*, and directing a postgraduate course in *Architecture and Context*. He has been coordinator of Pennsylvania State University semester in Florence and teacher of the course *The Cities of Italy*, for Pratt Institute Graduate and Urban Design Department of New York. He has also taught in workshops promoted by UNESCO for the conservation of urban heritage in Tipasa (AL) and Sana'a (YAR), and lectured at graduate and postgraduate courses of ILA&UD, École d'Architecture de Genève, and Polytechnic University of Tirana. He has published books and articles on housing design and on renovation of public space in contemporary towns. As a practicing architect he has awarded prices in architectural competitions and been in charge of several and urban and housing projects. He has been consultant of Italian Ministry of Education Rome, Union Internationale des Transports Publiques Brussels, and UNESCO office of Ramallah (PLO). He is currently working as architect and consultant of local authorities for housing and site planning.

Bruno Mengoli, architect and urban planner. Worked at the French Ministry of Culture and directed the Territorial Department of Architecture and Heritage (STAP) of Seine Saint Denis. The service ensures the preservation of the Basilica of Saint Denis, and controls the maintenance of historic monuments and protected areas, urban or landscape, of the department. Director of the Ecole nationale supérieure d'architecture de Paris-La Villette since 2013.

Ivo Hammer, born in 1944, Ulm, Germany. Conservator - Restorer of mural painting/ architectural surface. Ph.D. in Art History. 1976-97 Chief conservator of the Austrian Federal Monuments Office. 1997-2008 Full Professor at the HAWK University of Applied Sciences and Arts Hildesheim, Germany. Chairman of the THICOM (International expert commission for the restoration of the Tugendhat House, Brno). Gave lectures and seminars in Mexico, USA and many european countries. Main activities: conservation of wall paintings in situ by treatment of the causes of damage (e.g. salt reduction, reconversion of gypsum), extension of the professional field of conservators/restorers (Historic plasters and coatings, cooperation with craftsmen) and establishment of the first University course for conservation/restoration of architectural surface internationally. Memberships: ICOMOS (Germany), ICOM (Austria), DOCOMOMO International / ISC Technology, VdR (Association of German Restorers), ÖRV (Austrian Restorers Association). Numerous publications on theory, historical techniques and technology for the preservation and repair of architectural surface and mural painting. Email: ivohammer@me.com

José Miguel Rodrigues was born in Porto on 25 August 1970. He graduated from the Faculty of Architecture of the University of Porto (FAUP) in 1994, taking his Master's Degree in 1998, and a PhD in 2007, with a thesis entitled *O Mundo Ordenado e Acessível das Formas da Arquitectura* (*The Ordered and Accessible World of Forms in Architecture*), published by Fundação Instituto Marques da Silva). In 1995, together with Ana Luísa Rodrigues, João Figueira, Luís Miguel Fareleira and Pedro Bandeira, he won first prize in the International Public Invitation to Tender for the Project for the new Aldeia da Luz, which was built in 2000, and, in 2004, he was nominated for the *Secil Arquitectura Prize*. He became a project assistant at FAUP from 1998 onwards, and is currently an Auxiliary Professor at the same faculty, where he lectures in the History of Modern Architecture and Research Methodologies in the PhD Program. He is also a member of the Scientific Committee of the PhD Programme in Architecture at FAUP and the Scientific Board of the Fundação Instituto Marques da Silva. Since 2011, he has been engaged in a post-doctoral research project entitled "*The Relationship between Theory and Practice in Giorgio Grassi: Affinities and Oppositions*", a project whose aim is to translate the author's written works into Portuguese.

Maija Kairamo, architect SAFA, educated at Helsinki University of Technology where in 1963 obtained the master degree in architecture. In private practice with Erkki Kairamo from 1963-71, worked on the restoration planning and design of several churches and other historical buildings. Conservation Architect at National Board of Antiquities, 1963-98. Manager or supervisor of several restoration projects, 1990-98. Member of Viipuri Library restoration team and board member, since 1998. Lectured in several universities in Finland and abroad and has published in several Finnish and international publications about restoration, conservation and rehabilitation of architectural heritage. She is also member of ICOMOS and DOCOMOMO.

Marianna Marchesi is an architect specialised in architectural and sustainable building design. From 2002 to 2010 she worked in private practices and building firms in Italy; she contributed to design new buildings and to renovate existing and historical buildings. From 2004 to 2007

she collaborated as a teaching assistant on Architectural Design at IUAV University of Venice (Italy). In 2011 she participated in research projects on energy refurbishment and timber building technology at the Faculty of Science and Technology of the Free University of Bozen--Bolzano (Italy). Marianna Marchesi is attending a Ph.D. program on Sustainable Energy and Technologies at the Free University of Bozen-Bolzano. The current area of research concerns the application of design theories, methods, and ways of thinking developed in other design disciplines to the sustainable building design in order to support the design process and to improve the design solution.

Paulo Catrica studied photography in Ar.Co (Lisbon, 1985), graduated in History at the University Lusíada (Lisbon, 1992), completed the MA in Image and Communication at Goldsmith's College (London, 1997) and the doctoral in Photography Studies at the University Westminster (London, 2011). He presents his exhibits and publishes regularly since 1998, recent solo exhibitions at the Galeria Carlos Carvalho, Lisbon (2011); at theMews Project, London (2011); the Museum EDP, Lisbon (2011); and the Circuit Gallery, Toronto (2010). Recent group exhibitions in the Bluecoat, Liverpool (2012); in the Milton Keynes Art Gallery (2011); the Fundacio Photo Colectania (Barcelona, 2010); and the Calouste Gulbenkian Foundation (Lisbon, 2010). Selected for the award BES (Lisbon, 2006). His work is represented in inumerous public and private collections.

Paul J. S. Cruz is Full Professor of Construction and Technology at the School of Architecture, University of Minho, which he was dean between 2004-2011 . Taught between 1989-2008 at the Department of Civil Engineering at the same university, having directed this department in the 2003-2004. Degree in Civil Engineering, University of Porto (1987). Master in Structural Engineering, University of Porto (1991). Phd in Civil Engineering, Technical University of Catalonia, Barcelona, Spain (1995). Develops since 1987 research in the scientific area of Special Structures, interested nowadays in exploring the ontological relationship between architecture and structural engineering. Coordinator of the 1st and 2nd International Conference on Structures and Architecture (ICSA2010 and ICSA2013). President of ASCP - *Associação Portuguesa para a Segurança e Conservação de Pontes*. Secretary of the Executive Committee of IABMAS - International Association for Bridge Maintenance and Safety. He is the author of more that three hundred publications and has attended about one hundred and fifty technical and scientific conferences and meetings. Associate Editor of the International Journal Structures and Infrastructure Engineering.

Pedro Bandeira (1970), architect (FAUP 1996), is Assistant Professor at the School of Architecture of Universidade do Minho (Guimarães). Invited by the Ministry of Culture integrated the Metaflux exhibition, the portuguese pavilion at the Venice Architecture Biennale (2004), and represented Portugal at the Architecture Biennale in São Paulo (2005). Participated in the exhibition *Portugal Now: Country Positions in Architecture and Urbanism* (2007) organized by the College of Architecture, Art, and Planning at Cornell University (USA). Author of the book *Specific Projects for a Generic Client* - an anthology of his works created between 1996 and 2006 (Porto: Dafne Editora). In 2007 completed his PhD thesis entitled *Architecture as Image, Built Work as Representation: Subjectivity of Architectural Images*. He was commissioner of the northern region of *Habitar Portugal 2006-2008*, co-commissioner of the international seminar *Images of Architecture and Public Space in Debate*(FAUP, 2010) and of the international seminar: *Megastructures: Architecture and Play*, as part of ICSA International Conference (UM, 2010). In December 2011 he was awarded the SIM Prize (sponsored by Samsung) for his Sunflower House project, developed in co-authorship with Filipe Bandeira e Dulcineia Santos. www.pedrobandeira.info

Pedro Filipe Gonçalves is a Civil Engineer at Prof. Eng.º Vasco Peixoto de Freitas, Lda., since 2001, with more than 14 years of experience in project design and consultancy in the field of building pathology and rehabilitation, hygrothermal behaviour and acoustics.

Peter Erlacher comes from a family that has been working in the building sector for a long time. Starting from 1990 he has been involved in an intensive teaching activity on building physics, building materials and building sustainability, and he has taken part in national conferences. From 2003 Peter Erlacher has been a speaker at the courses offered by CasaClima Agency, an Italian provincial department operating for the energy efficiency in the buildings, and from 2007 he has taught at the Free University of Bozen-Bolzano on the energy refurbishment of the existing buildings. He is author and co-author of various publications including *Materiali isolanti, Appunti di Fisica tecnica, Umidità e Tenuta all'aria, Risanare l'esistente - Soluzioni per il comfort e l'efficienza energetica* published by BU Press of Bolzano (Italy). www.erlacher-peter.it

Sara Stingl de Freitas is currently developing her PhD project at Building Physics Laboratory - Faculty of Engineering University in collaboration with Fraunhofer Institute for Building Physics, IBP. She has earned her MSc degree in Civil Engineering at University of Porto - FEUP in 2011. Sara`s research centers on building pathologies and hygrothermal behavior of building components.

Teresa Ferreira is an architect by the 'Faculdade de Arquitectura da Universidade do Porto' (2004) and Phd in the 'Politecnico di Milano' (concluded in 2009). Professional experience in the 'Direcção Regional dos Edifícios e Monumentos do Norte (DREMN-DGEMN, Portugal) and in the 'Soprintendenza per i Beni Architettonici e il Paesaggio di Milano' (SBAP-Mi, Italy), among other collaborations and projects. Teaching activity in the 'Escola de Arquitectura da Universidade do Minho' (2009-2014) and in the 'Faculdade de Arquitectura da Universidade

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Vasco Peixoto de Freitas is a Full Professor at Faculty of Engineering – University of Porto (FEUP). Director of the Building Physics Laboratory and Building Rehabilitation Advanced Course at FEUP. Coordinator of CIB W040 – Heat and Moisture Transfer in Buildings and CIB W086 – Building Pathology. Author of more than 350 scientific publications on Building Rehabilitation, Building Pathology, Hygrothermal Behaviour and Building Physics.

Vincenzo Riso, Associate Professor of Architecture at Minho University. Trained as an architect (1994) at the Department of Architectural Design of the University of Florence, where he also obtained (2006) his Ph.D. He has worked as an architect and as architectural researcher upon different and apparently distant scales and problems such as those related to the cultural and material recovery of the architecture of Modern Movement on one side and to the theory and practice of urban design on the other. He has published of a number of essays in international architectural reviews and in 2008 he has been awarded in the Bruno Zevi prize for a critical essay about modern architecture. Dean of the School of Architecture of Minho University since 2012.

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Two or three things I know about conservation of modern architecture
by Benedetto Di Cristina

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FIG. 8 Front cover of the magazine Rassegna, issue 24, December 1985.

FIG. 9 Image from the book: Edward FORD, *Details of Modern Architecture*, volume 2, published by The MIT Press, 2003. Courtesy by © Edward Ford / © Massachusetts Institute of Technology.

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A conversation on the habitability of the domestic space.
The cliente, the architect, the inhabitant and the house by Ana Luísa Rodrigues

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The Tugendhat House between craft tradition and technological innovation. Preservation as sustainable building policy by Ivo Hammer

FIG. 1 Archive Daniela Hammer-Tugendhat. Photo by Friedrich Hirz October 9, 1929

FIG. 2–4 Courtesy by Atelier RAW, Brno, 2012.

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FIG. 10 Archive Daniela Hammer-Tugendhat. Photo by Rudolf de Sandalo, Brünn, detail, with original retouche, about 1931.

FIG. 11 Archive Daniela Hammer-Tugendhat. Photo by Fritz Tugendhat, 1931(?), detail.

FIG. 13 Archive Daniela Hammer-Tugendhat. Photo by Rudolf de Sandalo, Brünn, 1931 (?)

Fig. 16: Courtesy by © HAWK. Photo by Hitzler, 2003.

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Vedute, abstract from "Subtopia: Photography Architecture and the New Towns programme"
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