CADERNOS
PROARQ 21

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A word from Proarq

It is our pleasure to present the number 21 of CADERNOS PROARQ, an expression of the scientific and professional knowledge of the authors who participated in this edition. We are, then, pleased to share this material through this website.

Thanks to everyone who contributed to the fulfillment of this edition, in particular to Professor Luis Amorim who opens journal with his article titled Text and Space: about intervention procedures in modern heritage assets. We also highlight the excellent work done in the publishing of CADERNOS PROARQ by Professors Cristiane Duarte and Ethel Pinheiro.

This is a special time for us, who undertake the coordination of PROARQ. We take this opportunity to introduce the new members who came to compose the current Editorial Committee together with the former one: Professor Andrea Queiroz Rego, Assistant coordinator of Publishing, and Professor Virginia Vasconcellos.

Our publication will continue to be biannual and among our objectives we highlight the broad dissemination of knowledge, the constant pursuit of quality parameters and the internationalization of the journal, attracting contributions from researchers from all continents.

We are sure we still have much to develop, but we hope to have accomplished our role of counterpart and articulator of diverse and complex issues with the different contributions of various areas of knowledge in Architecture.

Maria Angela Dias
Coordenadora do Proarq/exercício 2014

Editorial

Balancing between two major research fields, equally important in the questioning of the future of cities and the practice of architecture, the 21st issue of CADERNOS PROARQ presents topics related to cultural heritage and the role of BIM (building information modeling) systems. Both subjects, in their proper sphere, position man and space in a scenario of doubts and anxieties able to incorporate the insurgent demands for qualitative preservation of contemporary cities and also to assist recent architectural proposals – through the use of digital tools aimed at depth study of spatial constraints. This contemporary condition, tensioner of new paradigms and new (and always possible) answers, is also the engine for growth and improvement of related researches. Besides these two most comprehensive themes in the set of articles, a special attention is also dedicated, at the end, to two topics relating to technology (accessibility and construction), which bring up relationships regarding researches of practical nature in architecture.

Along this path, LuizAmorim, in developing our anchor text, presents a study of spatial and programmatic analysis around a specific construction of the modernist heritage in Pernambuco, revealing that matter (concrete, physical) and space (immaterial, receptacle) must converge to the assessment of heritage value and direct the actions of intervention.

The first one of the articles included in our scope of selected authors, presents a reading on the specific manner in which modern man "worships" their monuments. For this, Celia Helena Castro Gonsales develops an approach following the parameters used by Riegl for the evaluation of buildings and demonstrates that such parameters also serve to evaluate this same architecture as heritage. In this sense, endorsing the timeliness of a current discourse, architectural heritage (mainly modernist) is unveiled at the Third Master Plan of the city of Pelotas - RS.

In turn, Claudio Antonio S. LimaCarlos proposes a reflection on the actual political stance with regard to urban planning and the conservation of protected urban areas of the city, in face of the social and urban demands related to current concerns with major international events. The reflection takes as a case study the "Porto Maravilha" project, in Rio de Janeiro, which comprehends three traditional neighborhoods of city in addition to part of the city downtown area, protected by municipal law since 1985,taking as plot one of the themes of greatest concern nowadays.

Paula Paoli sets the goal of investigating the nature of architectural production and its relationship with the pre-existing contextin Rio de Janeiro at the turn

of the twentieth century, with particular emphasis on the period of the administration of Pereira Passos, when the city went through major urban reforms. This powerful image of the total renovation of the city proves to be schematic, in that it does not encompass the complexity of relations between the new produced architecture and the pre-existing one. Advancing the hypothesis that the idea of the total renovation of the city had concealed a much more complex relationship of the city with its past and its material pre-existence, the work intends to show that the architecture production of that time occurred within 'another' building culture.

Still discussing the architectural production of a particular cultural context, Ana Slade recovers the trajectory of the architect and urban planner Lúcio Costa in the 1920's, marked by an apparent contradiction between his "eclectic" and "modern" production,which, by historiography, is taken as a conceptual breakthrough. The paper analyzes eclectic and neo-colonial projects, as well as his textual productions, seeking to reenter the period in his work process.

Contributing to teaching and academic practice, MaísaVeloso presents reflections on two international teaching experiences of Architecture and Urbanism, held in workshops in Brazil and France. The author emphasizes the importance of observing distinct methods and approaches that bring together undergraduate students, teachers and representatives of the professional environment and of the communities involved, towards a better learning and the autonomy of creation in professional training in Architecture and Urbanism.

In the context of academic research in modeling and parameterization, NatáliaKokumai Nakamura and Joyce Correna Carlo analyze the issue of energy efficiency in Brazil through laws and technical regulations that aim to reduce energy consumption in commercial, public and residential buildings. Trying to combine the facilities offered by the BIM Platform to the current prospects of energy consumption reduction in buildings, the concerned research aims to study the potential interaction between a BIM-Platform software, ArchiCAD, and two thermo-energy simulation softwares; EnergyPlus and Daysim.

Continuing on this same theme, the work of MarceleArianeLopes Garbini and Douglas QueirozBrandãoaddresses the design process using BIM technology in architectural offices. Methodologically based on multiple case studies, which were interpreted qualitatively and implemented in offices in the cities of Cuiabá, São Paulo and Goiânia, the authors carried out a comparative analysis of results, revealing the changes occurred in processes, procedures of work and in the training of the technical staff of the offices in regards to architectural design.

Speaking further on smart technologies, NicolòParaciani, Luigi Biocca and Marco Padula show a study of technologies that aim to establish a self-service forelderly in social housing. In developing a project supported by the European Commission under the AAL program (Ambient Assisted Living),aimed to

provide a network of "social housing connection" in partner countries (Italy, France and the U.K.), the HOST technology seeks to; improve the life condition of elder residents, enhance their social inclusion, enable a longer stay in their homes and implement domestic management functions, extending the full participation of the individual in activities related to the house - the first human dimension.

Finally, Heloísa Helena Couto discusses the problems and vices of the irregular disposal of construction waste (RCC) in Brazil, offering a wholesome and effective proposal for its correct reuse in urban areas, in the form of mortars or compatible material, reducing the amount of cement and silica used in current mixtures. Both from an academic standpoint, anda laboratory one, this study shows that solutions in construction do not always respond to expense suppression criteria, but often to conscious reuse.

In summary, this issue ends by dismantling a quite rich panorama of the role of research in architecture, whether in the field of theory, practice, or the combination of both. Again, we refer to the Carlos ChagasFilho Foundation for Research Support in Rio de Janeiro - FAPERJ with full gratitude for the support of institutional and monetary order, without which this journal would not be consolidated; we also thank the entire body (administrative, faculty and students) of Proarq for building, together, a space for intellectual growth. And to you, the reader, as editors of Cardernos Proarq, we hope that in the following pages many of your questions can be redeemed, or grow - for the sake of research in architecture and urbanism.

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Text and space: on procedures for intervention in modern heritage property

ABSTRACT

This article deals with programmatic and spatial evaluations, which are key steps in the development of intervention projects. It seeks to present, through a case study, how the referred evaluations allow us to understand the principles that supported the architecture design and to establish the guidelines for the intervention project, defining the appropriate scale: preservation (maintenance of the substance and delay of wear processes); restoration or reconstruction (retrieval to the previous state); adaptation (appropriateness to current use or to a new use). The programmatic evaluation is based on texts, which are representations of the performance that the building should present. It is the result of choices that will be apparent in the ways in which spaces are organized in the building. In the spatial dimension, matter is barrier, thus delimiting fields for occupation and movement, establishing relations of co-science and co-presence. In the physical dimension, space is narrative, i.e., it reveals the possibilities for enjoyment of the building, whether in everyday conditions, whether in ritual or appreciative condition. Thus, matter and space must converge for the evaluation of the significance of good and for the selection of intervention actions.

Keywords: Intervention project, the space of architecture, conservation.

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Text and space

Some authors attribute the rapid obsolescence of modern buildings to its character of transience (MACDONALD; NORMANDIN; KINDRED, 2007; MARTÍNEZ, 2008) or its functionalist essence, establishing thus, a profound bond with the requirements that originated them (PRUDON, 2008). However it is important to note that the referred obsolescence is not an exclusive condition of the modern object, but rather a condition that is imposed to architecture in its various expressions and historical periods. In fact, the issue of obsolescence in buildings is centered mainly on the expectations of use and conditions of compliance to such expectation.

The technical and material factors are considerable, evidently, and are revealed by the stress of the materials, the collapse of building systems or pathologies of constructions, however, are the new premises of use that have established the overcoming of building structures and, more worryingly, the loss of integrity and authenticity of significant works of a recent past. For example, the building ensemble designed for the treatment of patients infected with leprosy and tuberculosis became obsolete as medical procedures made unnecessary the insulation system to which they were subjected.

The demands and expectations of use are not only the causes of such obsolescence, but also constitute the premises for the development of intervention projects, as it involves, on the one hand, programmatic issues – what is intended from the building – and, on the other hand, spatial issues – how is the spatial structure able to meet such demands. The project of intervention, as opposed to a process of architecture design, which deals with becoming, is characterized as a process of "back to beginning", or revises. It is necessary to remake the paths initially traced, to then undertake the path of decision making to restore the essential condition of the building, whether from a structural point of view, the point of view of materials, elements and components, or a functional point of view. Thus, one can determine the scales of intervention: preservation (maintenance of the substance and delay of wear processes); restoration or reconstruction (retrieval to the previous state); adaptation (appropriateness to current use or to a new use).

According to Prudon (2008, p. 166) the preservation of modern buildings involves a series of both cultural and professional challenges, requiring new approaches and research techniques and more sophisticated evaluation: *Of concern are not just the materials and the larger scale of the buildings, but also the very purpose for which the original structures or complexes were built and the methods by which they were designed, detailed and constructed.* (PRUDON, 2008, p. 166).

To meet these challenges, Prudon (2008 p.166) suggests two different tasks: the first concerns the programmatic evaluation related to current uses and the proposed function for the building or space; the second concerns the evaluation of the physical conditions of various components that are relevant and necessary to the current and proposed use.

The programmatic evaluation deals with laws that operate in the social and spatial world, while the physical evaluation deals with laws that operate in a material world. Although both express different dimensions of the architectural object – the physical and the experimental – they are embedded in the essence of the architectural object and are inseparable. However it is important to note that in the referred dimensions are expressed both aspects inherent to social knowledge, scientific and cultural, and substantive and instrumental qualities, based on cultural norms. In the spatial dimension, matter is barrier, thus delimiting fields for occupation and movement,

establishing relations of co-science and co-presence. In the physical dimension, space is narrative, i.e., it reveals the possibilities for enjoyment of the building, whether in everyday conditions, whether in ritual or appreciative condition. Thus, matter and space must converge for the evaluation of the significance of good and for the selection of intervention actions.

The programmatic evaluation is based on texts that are, according to Markus and Cameron (2003), representations, which are not constituted, however, only as neutral descriptions of a priori reality. They are private constructs, the result of choices that will be apparent in the ways in which the building organizes spaces. The architectural program is a written version, prescriptive, of what is expected that the building will be and the performance it shall present. However, beyond the evaluative dimensions proposed by Prudon (2008) and discussed above, it is necessary to investigate how the text is translated in space through a system of spatial evaluation.

The spatial evaluation deals with the laws of the encounter and the movement – the co-presence and the co-science. The evaluation is based on the patterns of barriers and permeabilities, indicating, as suggested by Evans, the ways in which walls and openings separate to then reunite selectively (EVANS, 1997).

Regarding the physical evaluation, especially in what concerns the materials and techniques of modern architecture, there is an extensive literature that deals with the subject, related in particular to the conservation of modern architecture (see ALMEIDA; LEITÃO, 2004; HARRIS, 2001; MACDONALD, 2002).

This article focuses on the procedures for programmatic and spatial evaluation, since the physical evaluation lies in the field of construction itself. The evaluation procedures contribute to the construction of proceedings for a project of intervention, as they establish the basis on which decisions must be made.

Procedures

Programmatic Evaluation

The programmatic evaluation aims to identify the original purposes and demands, in order to reveal the requirements, expectations and aspirations that motivated the architectural problem and its solutions, which should be compared to current demands and goals, whether they are to maintain or change the use, as well as to present regulations and standards. It seeks to develop a system of data base and knowledge, as well as the possible relationships between them, having as main focus, its applicability as a tool to support and guide interventions, providing a more complete and comprehensive view, on the one hand of the aspects that led to the obsolescence of the buildings – both programmatic and material – and on the other hand, of the principles of design and construction.

According to Cherry (1999, p.3) the process of developing the architectural program gives the architect a clear definition of the project scope and the criteria to achieve a successful solution. In its elaboration, the following aspects, among others, are investigated: a) human factors and functions; b) defining aspects of the form, such as the site and the climate; c) the client's aspirations and ideals; d) criteria for analyzing the relationships between space and activity that will support the interests of the client; e) budget. In short, the process provides the architect subsidies for selecting the most appropriate form to meet the client's demands.

The figure 1, based on Tusler, Schraishuhn e Meyer (apud SANOFF, 1989, p. 261), presents an overview of the process of program design and can serve as a guidance for programmatic evaluation.

Figure 1

Overview of the programming process
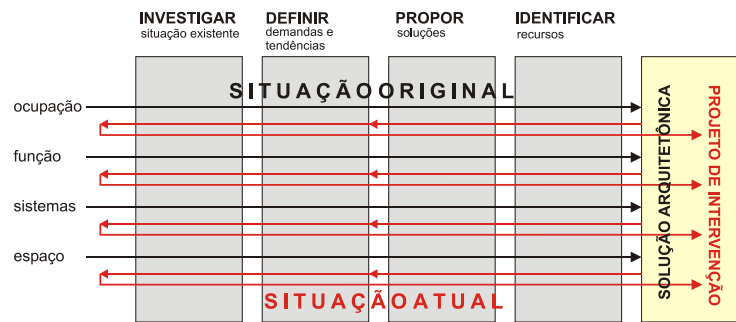
Thus, one can understand the program as:

1) Expression [or expectation] of how the function should take place – organization goals according to: a) criteria of user classification; hierarchy; b) criteria of relationship between classes; c) criteria of control and flows [of activities, of people]; and d)operational standards.

2) Determination of the necessities: a) comfort; b) equipment and systems; c) dimensional; d) accessibility; e) other.

These would be instrumental, operative, dimensions.

Spatial Evaluation

The spatial evaluation is constituted by the process of observing the following: a) the record of the convex, axial and visual properties; b) the description of their geometric and configurational properties; c) socio-functional analysis observing the spatial and functional inequalities; d) the identification of genotypic spatial patterns and final. The identification of the spatial properties likely to be conserved should be highlighted, as well as those that require restoration, if the original structure has been changed, to define a set of rules and procedures that must be followed by intervention projects.

Thus, to the already established procedures of registration, analysis and survey of architectonic and urban characteristic of edifications and historic sites, it must be added others that support the configurational study, taking into account descriptive and analytical procedures established in the architecture morphology. It is understood that the spatial configuration is both an expression of the possibilities of spatial arrangements, and that this configuration has impregnated in itself rules that restrict the possibilities of interaction between members of the social group. In this case, the space is a mediator of the co-presence and co-present aspects.

The description of space, as proposed by Hillier e Hanson (1984), is based on the manner in which we use and perceive the built environment. According to Hanson (1998, p. 39), we develop our daily activities in convex spaces and we move through axial lines and understand the environment in which we are immersed by means of visual fields. Convex spaces represent the local properties of buildings, while he axial lines and the visual fields represent the overall properties (figures 2 and 3).

The network of spaces can be described when it is represented as a relational system in which the components are analyzed according to the relative position they assume between themselves. To describe this topological system, mathematical procedures originated from the theory of grafos are used, in which spaces are represented by nodes and its relationships of permeability by lines, forming a network, that expresses how activities, or events, and people are distributed in the building in such a way to facilitate the comprehension of how these social and spatial attributes acquire particular dimensions (HILLIER; HANSON, 1984). In this sense, the spatial structure reveals not only the compositional rules, as well as the social rules that prescribe how the space is occupied and how the users interact.

Figure 2

Axial lines, convex space and visual fields.

Source: HANSON, 1998
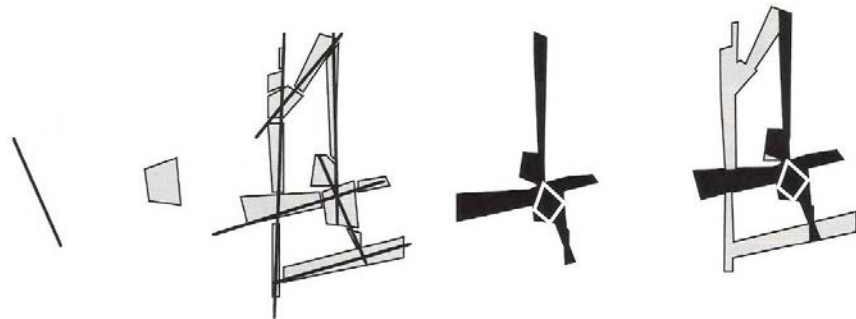
Figure 3

Configurational analysis.

Source: AMORIM, BRASILEIRO, LUDERMIR, 2009

Planta Baixa Pavimento Térreo

Mapa Convexo Pavimento Térreo

Mapa Convexo Pavimento Térreo

Grafo Justificado Pavimento Térreo
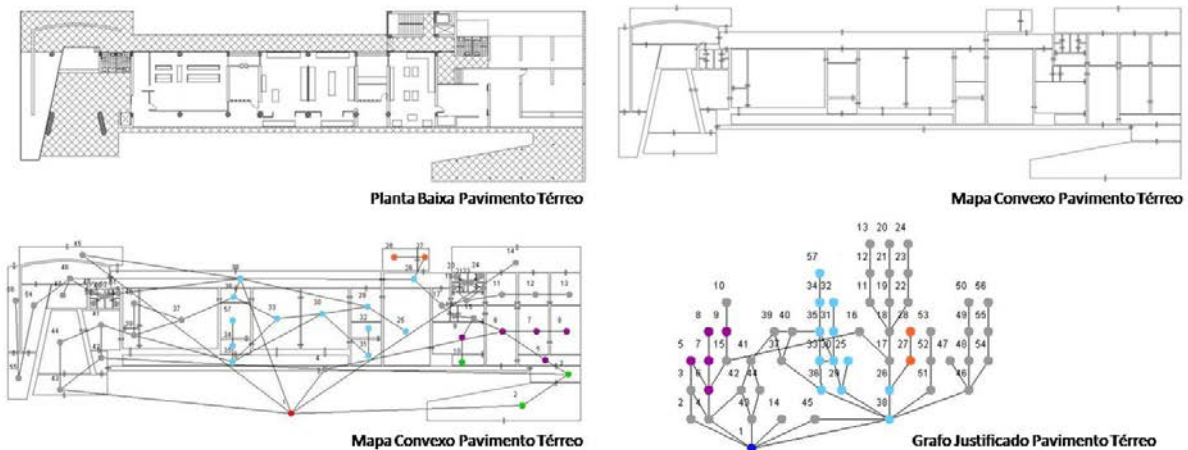
Regarding the representation of the visual field, one should consider the descriptive and analytical model proposed by Benedikt (1979), which is based on the representation of visible areas from a given point in space or from a set of points forming, for example, a convex space. The iso vista, designation given by the author to the represented area, allows the verification of patterns of co-science and among users.

The spatial evaluation is guided by the following procedures (AMORIM; LOUREIRO, 2005; 2007):

- Preparation of registration documents (plans, elevations and sections) to allow the representation, analysis and interpretation of the spatial structure of the building;

- Indication of the designation of each space, according to the planned activity or the occupant;

- Representation of convex, axial and visual dimension;

- Description of the configurational properties;

- Socio-functional analysis;

- Identification of the spatial properties considered relevant and of preservation interest (accessibility standards, visual fields, etc.);

- Definition of guidelines for the project of intervention in order to safeguard the integrity of spatial properties or its restoration;

- Inclusion of the spatial properties in the set of information about the building;

- Evaluation of the intervention project to ensure that the recommendations were followed;

- Definition of guidelines for conservation and maintenance.

A relevant case

The procedures for programmatic and spatial evaluation discussed will be treated in the context of a significant building of Brazilian modernism, highlighting the analytical procedures and the proposed guidelines of intervention for the case in screen.

The institute of Antibiotics of the Universidade Federal de Pernambuco was designed between 1953 and 1954 by the architect Mario Russo to host a research institution in the fields of chemistry, microbiology and pharmacology (Figure 4 and 5). Its construction was initiated in 1954, and was fully completed in 1955 (UNIVERSIDADE DO RECIFE, 1955). The building has undergone several changes over time, responding to demands of various nature (AMORIM; BRASILEIRO; LUDERMIR, 2009): of social order, it went from a research institution to an university department, also responsible for teaching activities; of scientific and technological order, new procedures of investigation and security concepts introduced new environmental requirements, as well as the needed apparatus for the development of researches introduced changes in infrastructure systems and equipment for everyday use.

Programmatic Analysis

According to Russo, the architectonic solution keeps an affiliation with the institutional organogram and meets the specific demands of the research activities:

> *The parts that complete the architectural body, with laboratories that are basic cells and that were proportionated and systematized according to a seriation logic relative to the phases of research, are the subsidiary elements integrating the main function ad taking into account the self-sufficient contingent: a small specialized library, an auditorium for 50 scientists, workshops for repairs, an administrative*

part as an articulation element with other twin entities, own refrigeration facilities to materials in observation, a photography section and a free zone for resting and a bar (UNIVERSIDADE DO RECIFE, 1955, p. s/n).

These requirements are expressed in the functional zoning of the architecture proposal, with the grouping of activities of same classes in sectors – chemistry, microbiology, pharmacology, administration and support – and sorted vertically. On the ground floor are located the administration, pharmacology and support; on the first, the living areas; on the second, the sector of microbiology; and on the third, the sector of chemistry. The sectorial organization of activities is based on establishing a categorical differentiation between users, according to their category and position in the social hierarchy of the institute. The visitors, for example, have direct access to the reception spaces, but the access to the other floors is restricted to scientists and employees.

The "open" floor plays an important role in mediating the encounter of visitors and scientist. While it insulates the ground floor from the others by spatial depth, two staircases connect to the upper floors directly, for access to the cold rooms, or for direct access to the living space. It is this space that, in formal circumstances, held in the auditorium, which access can be controlled by a direct exterior ramp, which promotes the circumstantial meeting between scientist and visitors.

In the laboratory floors this categorical differentiation is established from two corridors, on for indistinct circulation of people, and other, internal to the laboratories, for the exclusive use of the technical personnel. This solution, together with the spatial continuity between the laboratories and the private circulation, aims to promote the continuous relationship between the various research units.

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Spatial Analysis

Figure 5

Plans of the executed project (1953) and survey of the buildings current state (2007). Source: Prefeitura da Cidade Universitária, UFPE.

While fully taking into account the initial program, a few years after its completion, extensions were needed and begin to be implemented from 1958, when the first one was recorded. Besides enlargements, there was a partial occupation of the open floor, modifications on the roof, as well as the restructuring of the occupation of the floors, mainly with the closing of laboratory units and the occupation of private circulations between laboratories.

PLANTA BAIXA PAVIMENTO TERREO

1 CANTINA 2 BIBLIOTECA 3 TRANSPLANTE 4 CÂNCER EXPERIMENTAL 5 HISTOLOGIA 6 FARMACOLOGIA 7 SALA COM MÁQUINA 8 CIRCULAÇÃO 9 SECRETARIA 10 OFICINA ELÉTRICA 11 OFICINA DE VIDROS 12 OFICINA MECÂNICA

PLANTA BAIXA PAVIMENTO TERREO

1 SALA DE AULAS PRÁTICAS 2 BIBLIOTECA 3 LABORATÓRIO CULTURA DE TECIDOS 4 SALA DE PROFESSOR 5 LAB. PRODUÇÃO DE FÁRMACO 6 LAB. PROCESSOS FERMENT. 7 MESAS AGITADORAS 8 PORTARIA 9 SECRETARIA 10 ADMINISTRAÇÃO 11 DEPÓSITO 12 SALA DE AUTOCLAVE

PLANTA BAIXA SOBRELOJA

PLANTA BAIXA SOBRELOJA

1 SALA DE AULAS PÓS-GRADUAÇÃO 2 SALA DE AULA 3 COPA

PLANTA BAIXA SEGUNDO PAVIMENTO

1 MICROBIOLOGIA PROTOZOOLOGIA 2 CÂMARA DE REPICAGENS 3 LABORATÓRIO 2- PROD. DE ANTIBIÓTICOS 4 LABORATÓRIO 3- EXTRAÇÃO DE ANTIBIÓTICOS 5 LABORATÓRIO 7 6 LABORATÓRIO 4- PREP. DE MEIOS DE CULTURA 7 PROTOZOOLOGIA 8 MICROBIOLOGIA

PLANTA BAIXA SEGUNDO PAVIMENTO

1 ALMOXARIFADO 2 SALA DE PROFESSOR 3 LAB. DE FÁRMACOS E ENSAIOS ANTI-MICROBIANOS 4 LAB. DE PROCESSOS BIOTECNOLÓGICOS 5 MESA AGITADORA 6 LAB. DE GENÉTICA DE MICRORGANISMOS 7 LAB. DE MEDICULTURA 8 LAB. DE BIOQUÍMICA E FISIOLOGIA DE MICRORGANISMOS 9 LAB. DE REPICAGEM 10 LAB. DE COLEÇÃO MICROBIANA 11 COLEÇÃO DE MICROORGANISMOS

PLANTA BAIXA TERCEIRO PAVIMENTO

1 PREPARAÇÃO DE MATERIAL 2 CROMATOGRAFIA 3 ANÁLISE ELEMENTAR 4 SALA PARA MICRO CHN 5 ANÁLISE ORGÂNICA 6 SÍNTESE ORGÂNICA 7 SALA DE BALANÇAS 8 FISICOQUIMICA

PLANTA BAIXA TERCEIRO PAVIMENTO

1 ALMOXARIFADO 2 LAB. DE SÍNTESE DE SUBSTÂNCIAS DE INTERESSE TERAPÊUTICO-LASSINT 3 SALA DE PROFESSOR 4 SALA DE COMPUTADOR 5 LABORATÓRIO DE SÍNTESE DE FÁRMACOS 6 LAB. DE PRODUTOS NATURAIS / SÍNTESE ORGÂNICA 7 QUÍMICA DE PRODUTOS NATURAIS (FITOQUÍMICA) 8 CAPELA

PLANTA BAIXA COBERTURA

1 CAIXA D'ÁGUA 2 UTILIDADES 3 TERRAÇO

PLANTA BAIXA COBERTURA

The most dramatic changes, however, have its origin in the transformation of the institute also in a teaching unit, in the 1970's, when the building begins to house pedagogic activities, which required a new organizational chart, having the director of the institute as the responsible for personnel management, and the pedagogic management would be under the responsibility of the course coordinators, subject to the Academic Dean.

The first class of changes – enlargements – compromised the building's ambience, as well as its integrity, also contributing to the modification of the internal spatial logic. These changes are more present on the ground floor. The second class of changes, possible in large part, by the absence of centralized management regime, were both of personnel and of the building, and has been promoted by unplanned individual actions, altering the significantly the spatial configuration of the building, especially the fluidity and transparency of the laboratory units, which were essential characteristics of the original proposal.

The modernist space is characterized by transparency and spatial flow, made possible by the combination of few barriers and the use of devices, such as changes in floors and ceiling and the introduction of low partitions, capable of delimitating spaces for occupation and movement, without disrupting the spatial continuity (AMORIM, 1999; 2008). One way of describing this continuity is by the *convex fragmentation (fc)*, that is, the degree of spatial continuity, result of the number of convex spaces and those delimited by barriers.

In the initial project, the *fc* corresponded to 2,813, resultant from the 166 convex spaces and 59 closed spaces compromising the Institute of Antibiotics. In 2007, this ratio goes to 212 convex spaces to 135 closed spaces, resulting in a decrease in the value of *fc* to 1,570. In addition, the average size of the convex spaces changes from 25,29 m² to 16,59 m². Therefore, the system becomes less spatially articulated, more closed, and compromising smaller convex spaces, reducing the initially intended special continuity.

The increase in the convex fragmentation has direct consequences on the total depth of the spatial system. The principle governing the spatial structure is the isolation – through depth – of the research activities from the public and the administrative activities, and the integration between laboratories, through high permeability and transparency. The changes are considerable in collective allocated spaces, such as the library, that has its depth changed from 5 to 7 meters, in view of public access.

Larger convex fragmentation, depth and opacity contribute to the loss of integrity of the visibility system proposed by the architect and, consequently, hinder navigation in the building, as can be demonstrated by the isovistas from the connecting corridor of the laboratories. On the second floor, the isovista of the area of greatest visual integration – understood as the average depth of all points to all points – resulting from the 1953 plan (see figure 6) allows the visual grasp of the aisle and two laboratories, in addition to the public corridor, corresponding to the area of 231, 68 m². In total, 12 convex spaces are seen. In contrast, the 2007 isovista presents an area of 139,05 m², 40% less, and only 7 convex spaces seen. As a result of these changes, the visual domain of the floor reached from the corridor with a multidirectional isovista became predominantly unidirectional.

Isovista hall biblioteca, 1953 – Área: 105,19 m².

Isovista hall biblioteca, 2007 – Área 33,14 m².

Isovista corredor segundo pavimento, 1953 – Área: 231,68 m².

Isovista corredor segundo pavimento, 2007 – Área 139,05 m².

Isovista corredor terceiro pavimento, 1953 – Área: 274,03 m².

Isovista corredor terceiro pavimento, 2007 – Área 121,79 m².
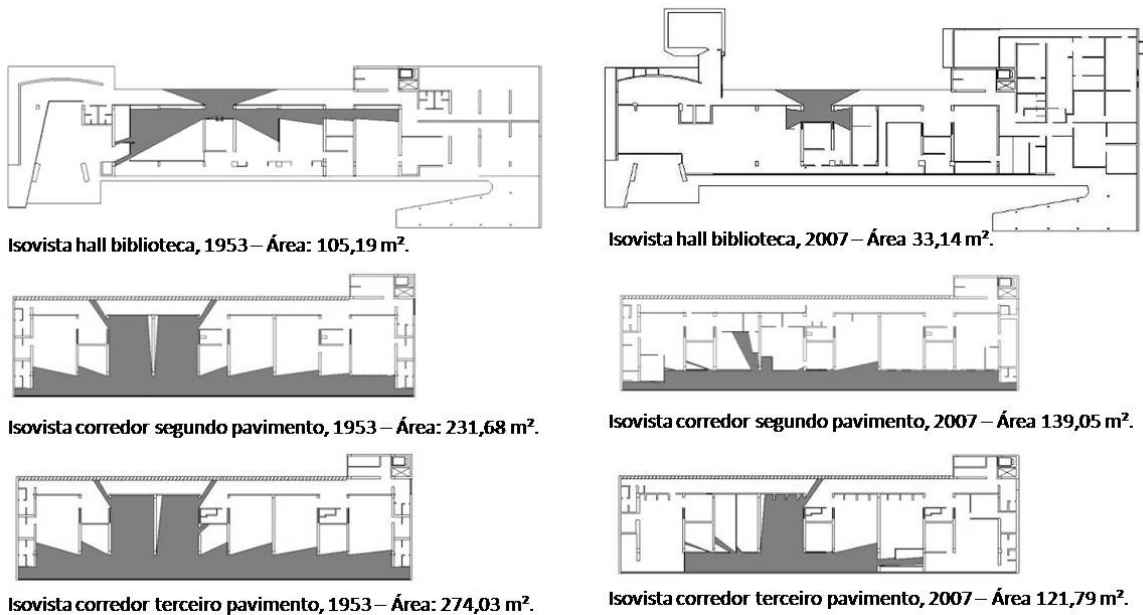
Figure 6

Iso views in 1953 and 2007.

Source: AMORIM, BRASILEIRO, LUDERMIR, 2009

A few considerations

The case of the Institute of Antibiotics of the UFPE is a classic example of conservation of modern architecture. In just 50 years the premises that guided its architectural design were modified more than once, even before the building completed its natural lifecycle. Such modifications, however, do not justify the complete replacement of the building, i.e., despite the changes in operational guidelines, the buildings remain fully usable. In these cases, how to guide upgrade processes in buildings that are still operating, on the one hand, but in the other, are testimonies of a story that deserves to be safeguarded, or better, how to save modern heritage and make it productive?

In the case of works of Russo, it is necessary to reveal the integrative spatial structure, currently hidden by barriers that provide depth, isolation and opacity. The clearance of the barriers would be accompanied by the displacement of laboratory activities whose legal requirement, cannot be met by the building, being replaced by laboratory teaching activities, whose needs are appropriate to the size, conditions of use and necessary integration between students, professors and researchers offered by the original plan. Thus, it restores not only the properties of the spatial structure, but its key role in separating and integrating distinct categories of users, in this specific case, with the assumption of accentuating the potential for encounters between researchers, professors and students, indistinctly.

In fact, since the first works of modern heritage conservation, the theme proved complex, full of nuances and problems. In some ways these are not unlike those faced in any conservation process, but became more explicit since in most cases the buildings are in use, or have suitable conditions for occupancy. In many cases, current uses are those for which the building was designed, being necessary, however, to update the building systems according to new technical and/or legal requirements. The concept of sustainability, for example, has promoted deep changes in social organizations and, consequently, in the way of treating existing buildings whose energetic performance

is inefficient. In other cases, there was the need to expand the physic capacity of buildings to meet the demands of enlargement, as the case of libraries or museums, or schools designed for a particular service capacity.

Some authors attribute the rapid obsolescence of modern buildings to its character of transience (MACDONALD; NORMANDIN; KINDRED, 2007; MARTÍNEZ, 2008) or its functionalist essence, establishing thus, a profound bond with the requirements that originated them (PRUDON, 2008). However it is important to note that the referred obsolescence is not an exclusive condition of this architecture, but rather a condition that is imposed to its various expressions and historical periods. In fact, buildings are expressions of human knowledge and social demand, recognizable in time and space in their socio-cultural premises, whether on its way of construction or its way of occupation. What modern architecture reveals in a more obvious way, however, is how technological advances and significant recent changes in habits and customs required adaptations, changes and enlargements in a short period, making more evident the various cycles that make the life of buildings. Therefore, the condition for obsolescence wouldn't only be in the architectonic object, but in the rapidly changing social demands, be they behavioral or resultant from the proper performance of activities and their construction repercussions.

References

ALMEIDA, M. G.; LEITÃO, D. Metodologia de apoio à decisão em intervenções de reabilitação. In: CONGRESSO NACIONAL DA CONSTRUÇÃO - Construção 2004: Repensar a construção, Dez. 2004, Porto. **Actas ...** Porto: Faculdade de Engenharia da Universidade do Porto, 2004. Disponível em: <http://hdl.handle.net/1822/9115>. Acesso em: 29 jul. 2009.

AMORIM, L.; BRASILEIRO, C.; LUDERMIR, R. Da restauração do espaço da arquitetura: o Instituto de Antibióticos. In: 8º SEMINÁRIO DOCOMOMO BRASIL, 2009, Rio de Janeiro. **Anais ...** Rio de Janeiro: DOCOMOMO-Rio, 2009.

AMORIM, L.; LOUREIRO, C. On the spatial dimension of modern architecture as an object of conservation. In: INTERNATIONAL SEMINAR ON THE MANAGEMENT OF THE SHARED MEDITERRANEAN HERITAGE - 5TH CONFERENCE ON THE MODERN HERITAGE, Mar. 2005, Alexandria. **Proceedings...** Alexandria: ISMARMED, 2005.

AMORIM, L.; LOUREIRO, C. The space of architecture and a new conservation agenda. **City & Time,** Recife, 2007, v. 2, n. 3, p.1-10. Disponível em:<http://www.ct.ceci-br.org/novo/revista/>.

BENEDIKT, M. L. To take hold of space: isovists and isovists fields. **Environment and Planning B: Planning and Design**, v. 6, p. 47-65, 1979.

CABRAL, R. **Mario Russo: um arquiteto racionalista italiano em Recife**. Recife: Editora Universitária da UFPE, 2006.

CHERRY, E. **Programming for design: from theory to practice.** New York: John Wiley & Sons, 1999.

EVANS, R. Figures, doors and passages. In: EVANS, R. (Ed.). **Translations from drawing to buildings and other essays**. Cambridge, Massachusetts: The MIT Press, 1997. p. 55-91.

HANSON, J. **Decoding homes and houses**. Cambridge: Cambridge University Press, 1998.

HARRIS, S. Y. **Building pathology**: deterioration, diagnostics, and intervention. New York: John Wiley & Sons Inc, 2001.

HILLIER, B.; HANSON, J. **The social logic of space**. Cambridge: Cambridge University Press, 1984.

HOLANDA, F. **Arquitetura & urbanidade**. São Paulo: ProEditores Associados Ltda, 2003.

MACDONALD, S. (Ed.) **Concrete**: building pathology. Oxford: Blackwell Pub, 2002.

MARKUS, T. A.; CAMERON, D. **The words between the spaces**: building and language. London: Routledge, 2003, The Architext Series.

PRUDON, T. H. M. **Preservation of modern architecture**. Hoboken, New Jersey: Wiley, 2008. 592 p.

SANOFF, H. Facility programming. In: ZUBE, E. H.; MOORE, G. (Ed.). **Advances in environment, behavior, and design**. New York: Plenum, 1989. p. 239-286.

UNIVERSIDADE DO RECIFE. **Instituto de Antibióticos**. Recife: Escritório Técnico da Universidade do Recife, 1955.

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The exceptional and the exemplary: recent heritage and value

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ABSTRACT

In 1903, Alois Riegl wrote Der Moderne Denkmalkultus, a reading concerning the specific way the modern man "worships" his monuments. The conceptual bases of his interpretation are the results of a very peculiar context which characterizes and is a base for the modern art and architecture. Riegl, along with some historians from Central Europe, proposes a reading or art history as the history of the emergence and the development of purely formal elements which are transformed within an autonomous process. The focus goes from the study of artistic representation to expressive potential. The essential art analysis element is its visual expression, its visuality. The "pure visibility" indicates that the appreciation of a masterpiece depends on the point of view of the one looking at it, it is relative. On the other hand, completing this cultural environment there is Vienna as one of the fundamental European centers of architecture renovation. Otto Wagner, Joseph Olbrich and Adolf Loos are significant names of this fin de siècle culture. It is this same context which leads Riegl to his so important original identification of the reminding values and contemporary values. The first ones concern the genuine monuments and the latter another type of masterpiece or architecture appreciation exposing a coincidence of "art will" and somehow explains the "taste for the new" which arises at the moment. His study object is original: he invests in the assessment of processes intrinsic to the subject concerning the choice of "its monuments". The approach is so productive that the parameters used by Riegl and which served to support the new architecture, also serve to assess this same architecture as heritage. Thus, the idea is to revisit Riegl showing how updated his thinking was based on a specific study about the heritage, mainly the modern one, exposed in the III Master Plan of the city of Pelotas.

Keywords: Alois Riegl. Heritage in Pelotas. Recent heritage. The modern worship to monuments.

Introduction

In the early twentieth century, the Austrian historian Alois Riegl (1858-1905) exposed a series of considerations about the modern sensitivity related to heritage - artistic, cultural - that are considered, until today, a mark of the preservation field.

One of the most fruitful and productive issues that Riegl identifies is the distinction - essentially from a "modern" point of view – between reminiscent and contemporary value - the first relates to the genuine monuments and the second relates to something that does not respond to essential questions of the monument concept, but that explains a number of choices that are made in the heritage field. The background of this distinction will be the crisis of classicism that occurs from the eighteenth century and which has as consequence the indication that in modernity there is no more artistic monuments, but only historical monuments. Assigning a "relative" value and not an "absolute" anymore deprives the monument category of the artistic object.

These issues, exposed in his book *Der Moderne Denkmalkultus: sein Wesenund* seine Entstehung, "El culto moderno a los monumentos. Caracteres y origen[1]", from 1903, are constituted as the culmination of a series of writings which the author had been developing since the previous decade. In 1893, when he published his *Stilfragen, Grundlegungenzueiner Geschichte der Ornamentik* – "Problemas de estilo[2]" – already shows an innovative historical reading by proposing a history of continuous and autonomous ornaments that includes the topic of subjectivity. *Die spätrömische Kunstindustrie* – "El arte industrial tardorromano"[3] - studies a marginal moment and gap between the "great styles" indicated by the histories of art. Furthermore, it takes in an unprecedented way, space as essential reading stylistic element and therefore becomes a fundamental work on the issues of modernity in architecture.

Thereby, the new reading presented by Riegl of art history and architecture will become the conceptual basis for the interpretation of the specific way in which modern man cultivates - and worships - its monuments.

Obviously, the scenario of the modern conception - functionalist, formalist, constructivist - that are setting up in the late nineteenth to the twentieth century is fundamental to build this thought about the cult of monuments by modern subject. Therefore Alois Riegl writes Der moderne Denkmalkultus in the context of gestation of a "new architecture", and it is from this optical perspective of living with a culture that expresses a new sensibility to the cultivate general world, that has to understand the coping of the issue of preservation proposed by this historian.

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1. In the Spanish edition from 2008, used in this article.

2. In the Spanish edition from 1980.

3. Published for the first time in 1901 named Die spätrömische Kunstindustrie nach den Funden in Österreich – "The artistic industry of late Roman Empire according to the findings in the Austro-Hungarian Empire." Here, it's been used the Spanish edition from 1992.

Der moderne Denkmalkultus in the context of turn of the century: new visibility, modern architecture...

Riegl develops a reading of the history of art and architecture that will become the basis of the conformation of the artistic avant-garde of the early twentieth century. Within a line of thought that goes from Konrad Fiedler to Heinrich Wolffflin, passing by Adolf Hildebrand and Wilhelm Worringer, known as "pure visibility", it will claim an interpretation of art history as the history of the emergence and development of purely formal elements that turn within an autonomous process. The focus becomes the representative capacity of art to its expressive potential. The essential element of analysis is its visual expression, its visuality.

The "pure visibility" - "technical analysis of artistic production through perceptual criteria of the subject" (Sola-Morales, 1982, p 71.) - Indicates that the assessment of the work of art is a consideration because it depends on the point of view of the receiver. In this sense, the "pure visibility" points to the importance of experience, subjectivity and perception.

The ideas of progress or decay, as well as the superiority of one style over another that preceded it, are totally rejected. Riegl shows a constant interest in confusing times, considered decadent historical periods such as the Roman Late, Mannerism and Baroque.

On the other hand, Alois Riegl defend the autonomy of art, and indicates Kunstwollen - "artistic will" - as the engine stylistic training. The "artistic will" is a historically contingent tendency, is a way of perceiving and expressing things from each period, the relationship between the subject to the reality in a precise historical moment.

> *In Riegl, the notion of Kunstwollen, artistic will, meant that throughout history the works of art were such not by technical, geographical or building materials as he had always thought, but they were the result of a will, a desire to express a world view, not only through symbols or pictures but also through new and changing spatial experiences. (SOLÀ-MORALES, 1995, p. 113).*

This whole culture that puts the subject as process protagonist of meaning can be perceived when the Austrian historian tackles the issue of the monuments. The Riegl vision of history of styles is the basis of his vision of preservation and enhancement of heritage exposed in Der Moderne Denkmalkultus. By realizing the impossibility of approaching the monument itself, as something objective, he undertakes an investigation into the values accorded to them, not treating the values as eternal categories, but related historical sensitivity to the discretion of each era.

The historian does not propose a doctrine of preservation or intervention. Their study is unique: invests in the evaluation of intrinsic processes to the subject in the choice of "the monuments". Riegl, along with his colleagues of "pure visibility", represents

this way of thinking that modernity that works with subjectivity and with the absence of absolute references, essential for opening and broadening of the vision related to the heritage that occurs thereafter. The focus is not the object but the subject which assigns values and make choices.

The break with ideal models is fundamental to the look that Riegl launches over the works of the past. As explained by Colquhoun (2004, p.205):

> *The past is valued for its "antiquity" and not for provide a prescriptive model for architecture rules or represent timeless architectural values (as represented in 1450 until approximately 1800), nor can be accurately reconstructed as evidence of the organic relationship between the monuments and societies that produced them (as occurred in the nineteenth century).*

This radical shift from object to subject that replace some more or less rigid rules that define styles from visual perception, had influence in the conception of art and architecture of the vanguard architecture of the twentieth century. The question of "subject that perceives", or even the importance of perception in the apprehension and conception of architectural work is already recurring theme, for example, in such an important work as Moderne Architektur by Otto Wagner, published in 1896 and reference to architecture that, at that moment, sought an expression of its time.

In this work, the author, while providing that "can't be beautiful which is not practical" (WAGNER, 1993, p. 72), speech that will be incorporated by the protagonists of modern architecture, talks about the importance of "perspectives effects ".

The chapter "Composition" defends the importance of perceptual issues detailing the peculiarities of a more or further away perception of the objects that is clearly in the speech by Adolf von Hildebrand about a near vision - tactile and analytical - and a distant view - optical and synthetic:

> *The perception of the effect that, for example, produce large monuments can be explained like this: first grasps the overall image of blurred shape, and only a few moments later the eye focuses slowly at one point, even though silhouette, the distribution of color patches, the overall layout, profile, etc., follow influencing perception (WAGNER, 1993, p. 72).*

Figures 1 and 2

Joseph Maria Olbrich, exhibition building of Sezession, 1897; Otto Wagner Pavilion KarlsplatzStadtbahn, 1898.

Fonte: Wikimedia Commons

This turn of the century which Viena is one of the outstanding architecture renovation centers, as well as Otto Wagner, Joseph Maria Olbrich and Adolf Loos are some of the most important exponents. (Figures 1, 2, 3 and 4).

The formalist conception of thinkers from Central Europe is fundamental to this architecture that wants to break with the mimesis and begins to propose a new way of formal construction. On the other hand, the idea of an artistic and architectural expression that responds to a "spirit of the age" - this fundamental theme to this emerging architecture - conceptually has points of contact with the *Kunstwollen* of Alois Riegl

Fundamentally, the reflection of Riegl about human past works, emerges concomitantly with the appearance of the first expressions of what is now understood as modern architecture. The opposition between this new - modern architecture - and that old - works of the past - is at the core of the problems of this *fin de siecle* culture.

Ancient heritage and recent heritage: historical value and artistic value

The Austrian historian indicates in *Der Moderne Denkmalkultus* that the cult of monuments is a modern act that takes place from the Renaissance. But this cult in pre-twentieth century times identified the historical and artistic monument as separate entities. The history was one that featured a unique moment that would never be present in the becoming of events; the artistic was the object of admiration that somehow approached of a canon goal - essentially classic.

According to Riegl, the denial of the possibility of an ideal objectively did that in modernity at the turn of the century there was a fusion of artistic and historic monuments. Or rather, by assuming the intrinsic and fundamental ability of the monument - the recollection - in relation to a work of art, which actually is taking into account is its historical value and not its artistic value and is pointing his interest for the history of art and not to art. Consequently, worshiping an object for their artistry, can no longer consider it a monument.

What Riegl pointed in 1903, proves valid, yet, in an analysis of the cult of monuments from the beginning of the millennium and, in a special way, explains in many aspects

the cult of the modern monument or the already called recent heritage.

After more than 100 years, the "new" at Riegl era is now also heritage, historical and reminiscent. Modern architecture and urban space are already objects of history and its preservation arouses an increasing interest. But these objects are a fairly recent history, presenting the theme, thus, some specifics: specific in dealing with the issue of reproduction of art objects in relation to the idea of authenticity and what is of most interest for this work, specific in relation to the categories of values assigned to them.

In *Der Moderne Denkmalkultus* the Viennese historian identifies two groups of values: reminiscent values - intentional, historical and from antiquity - and contemporary values - instrumental value and artistic value, dividing the latter in novelty value and relative artistic value.

When observing the value assignments in relation to the "ancient heritage", it is perceived that the considered fundamental values are reminiscent and majorly based on the quality of obsolescence. In this category of values that is based on the historical consciousness - in the sense of "passage" of time - the nature of "exceptionalism" is dominant. Be the assigned value of intentioned character, historical, or seniority, the object in question emerges as the representation of a moment, a human fact and thus appears more clearly as a "monument".

In the case of the recent "heritage" is intriguing to explore the potential value of the notion of contemporaneity, specifically with regard to artistic value. In this direction, the assignment of value to modern monuments - in this case from Riegliano point of view, they are not monuments - underlies in its characteristics of "exemplary", is a model with which we come across in our day to day artistic and architectural work.

The exceptionality of reminiscent values is in its representative capacity - to bring to the present-"a particular step, in an individual mode, in the evolution of any of the creative fields of humanity," as defined by Riegl. The exemplary character of the artistic value is in tune between *Kunstwollen* from the time when the work was produced, and now, when it assigns the value in what you do the "choice."

The modern architecture and urban space are still, in many situations - and is evident in the case that will be studied below, the examples listed in the municipal law of Pelotas - able to sensitize the contemporary man in his artistry. In this way, one can say that some buildings and urban areas of recent heritage, despite having already remembering something, sensitize the senses from their artistic value. Value, as already mentioned, that manifests from coincidence, at least in some aspects, between the will of art and present art: "contemporary will", although rejects many of the precepts of modern architecture, is identified, unquestionably, with some of its features.

Monuments in Pelotas: exception and example

The way that has now been addressed the issue of heritage in Pelotas-RS, a city with a long tradition of studying and tackling the issue of preservation of its monuments - especially in eclectic style – serves as an interesting field for investigating the issues that are being addressed here.

In the 3rd Master Plan of Pelotas (MUNICIPAL GOVERNMENT OF PELLETS, 2008), imple-

mented in 2008, the theme of cultural heritage was the fundamental basis of many of its propositions. Following the model of some Brazilian cities and inspired the proposal of the City Statute of the institution of Special Social Interest Zones have been set out in the urban area eleven areas with special development plans, Special Areas of Interest of the Cultural Environment.

The text of the 3rd Master Plan defines the Special Areas of Interest of the Cultural Environment:

> *[...] Are special areas of interest to the cultural environment those that present heritage of peculiar cultural and historical nature, which must be preserved in order to avoid loss, spoilage, deterioration or disappearance of features, of substances or of cultural amd historical ambiences that determine his specialty, aiming at the recovery of representative landmarks of the city's memory and cultural aspects of its population (PREFEITURA MUNICIPAL DE PELOTAS, 2008, p.19).*

The plan also provides Special Focus of Cultural Interest that are "(…) specific points located in Special Areas of Interest of the Cultural Environment with peculiar characteristics that denote greater relevance in the cultural aspect" (CITY HALL OF PELLETS, 2008, p.20).

The creation of these special areas with differentiated legislation and distributed by the city's territory, is an initiative that points to a peculiarity in the methodological strategy planning. This new concept allows an expansion of conservationist point of view who considers not only urban places already quite consolidated as heritage city - the historic center, for example - but also extends the idea of preservation to areas that are not yet widely recognized both spatially and temporally by inhabitants, as is the case in most recent heritage areas.

The legislation gives different qualities that define the indication of Areas and of Focus in general:

> *historical, when they are related to facts or representative periods of training and development of the city; architectural, when feature space constructed with representative features of traditional architecture of Pelotas; urban, when present settings of relevant urban character by their different morphological characteristics or relationship with urban training; landscape, when they present peculiar landscape, characterized by open spaces with potential for sociability through active and passive leisure activities; concerning social practices when presenting related uses and specific and relevant to the local community identity activities (PREFEITURA MUNICIPAL DE PELOTAS, 2008, p.19-20).*

The relationship between these categories of valuation and the ones of Alois Riegl allows realize that the historical and architectural qualities - the text refers only to the traditional architecture - are exclusively reminiscent and the urban attributes, landscape and related to social practices, refer to a cult of "living ideas", still in force, i.e. the contemporary values. This is not only evidence of the actuality of thought contained in *Der Moderne Denkmalkultus*, but also of the importance of contemporary values for the definition of heritage in society today.

On the other hand, it is important to consider that, even if they seek the same criteria in dealing heritage of different "ages", it has been assigned a special identification between certain values and the ancient heritage and the recent one.

In general, in the characterization of each AEIAC of Pelotas, there are several of the qualities outlined above. When analyzing the characterization given by the master

plan from the old heritage (images 5, 6, 7 and 8), one can see that the fundamental values assigned to those areas and foci are reminiscent values highlighting its historical, cultural and architectural importance. Implicitly there is always the quality of oldness then defining an antique value. It is observed that in recent decades a return to the old attraction, recognized by other characteristics than blasting, creates a very positive mood of preservation before all inserted into this category.

But, what was said does not mean that about the old monument, contemporary values cannot be unrevealed - values, as highlighted by Riegl, in a practical way, dayly . The value of something new supports all the demarcation of the areas to be preserved. All areas and foci were defined by the fact they still maintain an "integrity of the form" that adds value when recalling their genesis. It is this unique environment to be "maintained and improved". There is also, in almost all AEIACs and FEICs, an attempted assignment of instrumental value in the sense of the possibility of full recovery of the appropriation of urban spaces restoring original uses or proposing new use.

The relative artistic value also appears in many cases. For example, the area "Linear Park Neighborhood Fragata" is highlighted by its urban and landscape potential; in focus "Port Area", in addition to the historical reference, there is an emphasis on the uniqueness of the relationship between the built environment and the open one, perceived through a set of industrial buildings, roads and docks of the port and the

Figures 5 and 6

FEIC São Francisco de Paula Church.

Source: Author, nd.

Figures 7 and 8

Port Area and Piratinino de Almeida Square

Source: Author, nd.

display possibility of open countryside towards the channel; the "Cipriano de Barcellos Square" is considered a focus of interest for allowing the urban panorama view on the basis of level differences. There is always an attempt to draw attention to the "live", current, contemporary values, which can still be extracted from these places and that translates in reference to a «certain landscape» and «urban and landscape potential,» recurrent expressions in the plan text.

Regarding to the recent heritage, we identified eight areas and/or foci that have char-

acteristics of what can be called modern architecture or urbanism: Heritage of the 20th century, Cohabpel, Cohab Areal, Cohab Fragata, Cohab Tablada, Calçadão, Nossa Senhora da Luz Church and Hippodrome. The first five are the ones that most matter for what we want to show in this paper.

The focus called Heritage of the 20th century, set of a few blocks located in the central area, is mentioned this way in the master plan - especially morphological / urban issues: Square"[...] uniqueness in the relationship between buildings and lots because of the way of the implementation of buildings, predominantly isolated in lots with front and / or side setbacks [...] "(PELOTAS MUNICIPAL COUNTY, 2008, p. 20).

Next to the previous one, that is the focus Cohabpel, housing development built in 1967. The urban instance is highlighted in the text still with reference to social practices:

> *[...] architectural complex of residential use with different characteristics that references the modernist model of deployment on the lot, with gardens between the buildings and common areas. [...] Highlight to the urban morphology, creating a peculiar landscape, with open spaces to enhance the integration between the residents [...] (PELOTAS MUNICIPAL COUNTY, 2008, p. 30).*

Another defined urban set is the allotment Cohab Areal. The text highlights historical and urban characteristics:

> *[...] Housing development implanted in the seventies, important as historical reference. (...) Its peculiar landscape due to the conformation of the non-orthogonal road layout and the set of similar architectural units [...] mantaining the original uses, without conflict with the environment (PELOTAS MUNICIPAL COUNTY, 2008, p. 21).*

The III Master Plan of Pelotas also identifies two areas that are constituted as housing developments of the 1970s, COHAB Fragata and COHAB Tablada. The text is the same for both areas and refers to urban authorities, landscape and related to social practices.

> *Residential area designed in the seventies [...] characterized by an orthogonal road layout with implementation of single-storey houses with front retreat, which make up a set of similar units with residential use preserved without conflict with the environment . Presence of open spaces, predicted as squares, with the potential for deployment of equipment and street furniture (PELOTAS MUNICIPAL COUNTY, 2008, p. 25).*

Regarding this latest heritage (images 9, 10, 11 and 12), reminiscent of the historical value is placed implicitly in the text of the master plan, as well as some of the contemporary values are explicit: for example, in focus "heritage of the 20th century ", there is reference to the value of something new - integrity of the original proposal -; in the characterization of focus "Cohabpel", the assignments values of the new and instrumental appear; in "cohabs Areal, Fragata and Tablada", similar to the prior way, the consideration of instrumental and artistic values of new is put clearly. The instrumental value - of use - is fairly straightforward because the modern heritage is more susceptible to contemporary uses. The artistic value of new, which is reflected in the desire to restore, to establish a closed and unitary whole and that, as mentioned, is attributed in some way to all AEIACs, is important because - as the oldness value - acts

Figures 9, 10, 11 and 12

recente heritage in Pelotas –
RS – FEICs – Heritage
of the 20th century;
Cohabpel; Cohab Areal;
AEIAC Cohab Tablada.

Source: Author, nd.

immediately over people.

But a closer look at the key features of this recent heritage within the city's overall design context proposed in the master plan allows us to reveal the presence of other attributes and valuation elements that are between the lines of characterization that justifies and supports the choice of these areas and "modern" foci as areas and foci of special cultural interest.

And here it refers to the fundamental presence on the relative artistic value, according to Riegl, to the valuation of the Kunstwollen of each time, but that, as it also exposes the Austrian thinker, the choice of works of the past for his "artistry" has to do with the line of artistic willingness from that time with the one from today. And, in this case, some settings of modern urban space coincide with what is expected now of spaces, mainly the residential ones of a city: a "garden-city" is the way of residential growth for excellence in the contemporary city.

The concepts of modern urbanism based in Ville Radieuse and in the garden-city were the conformation reference throughout the city of Pelotas at least for the past 50 years. The first master plan from 1958 had already applied these principles to the city in general - corroborating what had been being applied to parts of it from the beginning of the 20th century. The second master plan from 1980 eases the radical questions of functional zoning but continues the previous one in formal terms: the idea of a city of isolated buildings surrounded by a limitless space.

In fact, the idea of modern space shaped as halfway between the garden-city and the Ville Radieuse - which remains somehow the current proposal to the city of Pelotas - coincides in many ways with a contemporary "artistic willingness" and it is yet constituted as "good living condition" in a very forceful way. Many current residential complexes reproduce the space of CohabPel and neighborhoods on the outskirts of cities - the various economic classes - also follow the model of Cohab allotments and Heritage of the 20th century. And this seems to be the main motivation for identify-

ing and defining these areas as something to be conserved. These areas represent a new way of living, set at the time, which is perceived to have been quite definite if we observe the reality of Brazilian cities.

Despite some defense of a contextual urbanism, it is interesting to note that this type of space setting is a greater reference to the new master plan than the traditional space of Pelotas' heritage - so currently valued. The requirement for landscaping of setbacks throughout the city and side setbacks in some cases is the evidence of what it is being said.

The proposal of the city described in the 3rd Master Plan of Pelotas shows what actually has historical value and what has artistic value. What should be cultivated in its exceptional aspect and what is an example to the rest of the city. It is the general proposal of the city that is setting these values.

In the defense of conservation of the city's traditional space, there is an idea of exceptionality an environment that recalls a past time, but not an urban landscape desired to be reproduced as a backdrop of contemporary life.

Closing remarks

There were two key issues addressed in this article: the construction context of Der Moderne Denkmalkultus and the ownership of revisits to this fundamental writing. Someway, the first justifies and gives foundation to the second one.

The reflection that Riegl elaborates on the cult of monuments is clearly a result of the problems of the time: a culture based on the crisis of the classical model as absolute reference for art and architecture, in the act of perception as a key element to the apprehension of art - and of the monument -, and the idea of art as production, as something generated by the faculties of the subject.

In this context, the distinction between contemporary and reminiscent values bases, somehow, the new architecture that is characterized from its contrast with the traditional architecture. The pair "new" and "old", therefore, belongs specifically to the modern sensibility to which Riegl, of course, is extremely related to (COLQUHOUN, 2004; Sola-Morales, 2006). Contemporary and recall, the new and the old, value of the new and the oldness, the architecture was modern and refreshing when it was put on the background of "oldness".

The genesis of Riegl's thought coincides with the genesis of modern architecture - that wants to preserve the present moment. The contemporary values assigned to the new architecture, the only ones possible at that time, are still valid to think that architec-

ture as heritage, as something to maintain, conserve and preserve.

Thus, if in the old historical heritage the oldness and the historical values - indicating an exception character - are crucial in the search for assigning positive values to the modern legacy in its broad spectrum, the contemporary values - that are characterized as an example, a model - that should set up, at least while this heritage remain "so new" and so present in many of its aspects.

References

BARROS, J. D. Alois Riegl e a visibilidade pura: revisitando a obra de um historiador da arte de fins do século XIX. **Cultura Visual**, Salvador, n. 18, p. 61-72, 2012. Disponível em: <http://www.portalseer.ufba.br/index.php/rcvisual/article/viewFile/6178/4641>. Acesso em: 10 mar. 2013.

BARROS, J. D. Alois Riegl e a visibilidade pura: revisitando a obra de um historiador da arte de fins do século XIX. **Cultura Visual**, Salvador, n. 18, 2012. p. 61-72. Available in: <http://www.portalseer.ufba.br/index.php/rcvisual/article/viewFile/6178/4641>.   Accessed March 10th, 2013.

COLQUHOUN, A. "Novidade" e "valor de época" em Alois Rieg. In. _____. **Modernidade e tradição clássica: ensaios sobre arquitetura 1980-1987**. São Paulo: Cosac &Naify, 2004, pp. 201-207.

COLQUHOUN, A. "Novidade" e "valor de época" em Alois Rieg. In. _____. **Modernidade e tradição clássica: ensaios sobre arquitetura 1980-1987**. São Paulo: Cosac &Naify, 2004. p. 201-207.

CUNHA, C. R. Alois Riegl e o culto moderno dos monumentos. **Arquitextos**, São Paulo, n. 054.02, 2006. Disponível em: http://www.vitruvius.com.br/revistas/read/resenhasonline/05.054/3138. Acesso em: 10 mar. 2013.

CUNHA, C. R. Alois Riegl e o culto moderno dos monumentos. **Arquitextos**, São Paulo, n. 054.02, 2006. Available in: http://www.vitruvius.com.br/revistas/read/resenhasonline/05.054/3138. Accessed March 10th, 2013.

PREFEITURA MUNICIPAL DE PELOTAS. **Lei No 5.502, de 11 de setembro de 2008. Institui o plano diretor municipal e estabelece as diretrizes e proposições de ordenamento e desenvolvimento territorial do município de Pelotas e dá outras providências**. Disponível em: <http://www.pelotas.com.br/politica_urbana_ambiental/planejamento_urbano/III_plano_diretor/lei_iii_plano_diretor/arquivos/lei_5502.pdf>. Acesso em: 24 jan. 2013.

PELOTAS' MUNICIPAL COUNTY. L**aw Nº 5.502, from September 11th, 2008. Institui o plano diretor municipal e estabelece as diretrizes e proposições de ordenamento e desenvolvimento territorial do município de Pelotas e dá outras providências**. Available in: <http://www.pelotas.com.br/politica_urbana_ambiental/planejamento_urbano/III_plano_diretor/lei_iii_plano_diretor/arquivos/lei_5502.pdf>. Accessed January 24th, 2013.

RIEGL, A. **El culto moderno a los monumentos**. Madrid: Machado Libros S.A., 2008.

RIEGL, A. **El culto moderno a los monumentos**. Madrid: Machado Libros S.A., 2008.

_____. **El arte industrial tardorromano**. Madrid: Visor Dis., S. A., 1992.

_____. **El arte industrial tardorromano**. Madrid: Visor Dis., S. A., 1992.

_____. A. **Problemas de estilo: fundamentos para una historia de la ornamentación**. Barcelona: Gustavo Gili, 1980.

_____. A. **Problemas de estilo: fundamentos para una historia de la ornamentación**. Barcelona: Gustavo Gili, 1980.

SANCHES, P. L. M. Caracterização e Origens do Culto Moderno dos Monumentos**. Memória em Rede**. Pelotas, V. 2, n. 5, 2011. Disponível em: http://www.ufpel.edu.br/ich/memoriaemrede/beta-02-01/index.php/memoriaemrede/article/view/11. Acesso em: 6 de mar. 2013.

SANCHES, P. L. M. Caracterização e Origens do Culto Moderno dos Monumentos**. Memória em Rede**. Pelotas, V. 2, n. 5, 2011. Available in: http://www.ufpel.edu.br/ich/memoriaemrede/beta-02-01/index.php/memoriaemrede/article/view/11.   Accessed March 6th, 2013.

SOLÀ-MORALES, I. de. Del contraste a la analogia. Transformaciones en la concepción de la intervención arquitectónica. In. _____. **Intervenciones**. Barcelona: Gustavo Gili, 2006, pp. 33-50.

SOLÀ-MORALES, I. de. Del contraste a la analogia. Transformaciones en la concepción de la intervención arquitectónica. In _____. **Intervenciones**. Barcelona: Gustavo Gili, 2006. p. 33-50.

_____. Lugar: permanencia o producción. In_____. **Diferencias: topografia de la arquitectura contemporánea**. Barcelona: Gustavo Gili, 1995. p. 109-125.

_____. Lugar: permanencia o producción. In_____. **Diferencias: topografia de la arquitectura contemporánea**. Barcelona: Gustavo Gili, 1995. p. 109-125.

_____. Toward a modern museum: from Riegl to Giedion. **Oppositions**, Nova Iorque, n. 25-28, p. 68-78, 1982.

_____. Toward a modern museum: from Riegl to Giedion. **Oppositions**, New York, n. 25-28. 1982. p. 68-78.

WAGNER, O. **La arquitectura de nuestro tiempo**. Madrid: El Croquis., 1993.

WAGNER, O. **La arquitectura de nuestro tiempo**. Madrid: El Croquis, 1993.

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The cultural heritage in the city of great events and opportunities – reflections on the politics of cultural heritage against the political and administrative context of the of Rio de Janeiro city in the xxi century

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Abstract

This work suggest that thought be given to the political stance of the City Hall, in regards to urban planning, especially the conservation of protected urban areas in the city, facing the social and urban demands related to the current urban functions imposed upon the city by the role of official site of big international events. The City Hall neglects the socio-economic reality of the groups of peoples residing in the city´s protected areas, as well as prioritizes the conservation of the material share of the architectural heritage only, especially those of monumental scale, invariably adapted to cultural usages. The City Hall policy stands against the current world debate on the matter wich gradually expands its perception, initially characterized by concerns with monumental architecture, further onwith modest buildings an all the material aspects of the site on which they are, and lastly the traditional social fabrics and all their contributions to the formation of the Spirit of Place (Genius Loci). The Charter of Venice (1964), Amsterdam (1975), and Quebec (2008), among other documents, register this course that raised more complexity within the matter. This discussion will be based on the case study of "Porto Maravilha" (Wonder Port) – the urban revitalization project of the city´s port area which covers three traditional neighborhoods: Saúde, Gamboa and Santo Cristo, protected by municipal law since 1985. The cited neighborhoods also hold traditional population that reached their protection through community mobilization facing consecutive threats by the construction industry that, again, threatens its permanence.

Keywords: Cultural heritage. Modest architecture. Urban conservation.

Background

This essay presents a critical assessment of Rio de Janeiro's municipal approach to the conservation of local cultural heritage buildings, with a particular focus on "modest buildings", considered by the literature related with the conservation of urban areas as crucial, more so than the monuments, for the preservation of urban environments. The current level of worldwide debate around that theme points at conditioning the conservation of "modest buildings" to the intangible factors that are closely connected with this conservation, which refers to an inescapable consideration of, among other factors, the typical social fabrics that give them sense. The text of international charters and recommendations unveils a clear and gradual shift in the comprehensiveness of the concept of built cultural heritage, initially focused on monuments (Athens Charter, 1931), as it moves on to consider a wide variety of tangible elements that comprise urban environments, including "modest buildings" (Venice Charter, 1964), to date, contemplating intangible aspects attached to the materiality of urban sites, given the Spirit of Place (Quebec Declaration on the preservation of the Genius Loci, 2008).

In face of worldwide advancement in theory, the Rio de Janeiro Municipality incorporated a specific instrument for legal urban protection called APAC (Portuguese acronym for Cultural Environment Protection Area), which was consolidated in the city's first Master Plan in 1992 and introduced a specific degree of protection for "modest buildings", which was that of "preserved goods". The municipality has since established 27 local APACs, which currently protect nearly 13,000 preserved goods.

In contrast, as far as conservation goes, the past two decades have witnessed municipal cultural heritage policy priorities focusing the material conservation of public monuments, while totally ignoring how important the conservation of "modest buildings" and their respective social fabrics can be. There is no effective policy contemplating conservation incentive mechanisms that look at the different social economic realities of owners/tenants in this vast array of protected "modest buildings". Effects therefrom are further aggravated by APACs that are predominantly occupied by populations of low social and economic standards, particularly when submitted to urban conservation interventions, such as the APACs in Saúde, Gamboa, Santo Cristo and parts of downtown (Sagas), which are all neighborhoods adjoining the port zone, the stage for Rio de Janeiro's Wonder Port (*Porto Maravilha*) project.

To accomplish the proposition herein, this reflection initially delves into the theory of the "modest buildings" concept and the contemporary developments pointing at intangible issues thereof. The investigation effort will include repercussions of this concept on the city's legislation, particularly on the two 10-Year Master Plans (1992-2011), and it will also consider the cultural heritage view introduced by the *Rio Forever Rio* Strategic Plan (1993-1996), which radically shifted the city's urban planning capabilities towards major international events. The last portion of this study will assess cultural heritage conservation proposals contained in the Wonder Port project, particularly for the wealth of legally protected modest buildings and respective impacts already observed in the area, by virtue of local intervention proposals that look at building the Olympic Port and an expressive array of corporate buildings.

Modest buildings and social contexts as cultural heritage

Throughout the 20th Century, conservation of urban areas and subsequent attempts at integrating them to the urban dynamic of western cities without sacrificing their traditional social fabrics have become a major challenge that requires new concepts and approaches. A historical milestone in this process was the conservation of Bologna's historical center in the late 1960's, which relied on the principles of Integrated Conservation (IC), characterized by physical, economic and social recovery of the city's historical neighborhoods. IC was acclaimed worldwide in 1975 (Amsterdam's Declaration and Manifesto) as an antidote to gentrification, the undesirable social phenomenon in urban area conservation processes. The Amsterdam Declaration (1975) pointed at how connected the physical and social realities are in urban areas, establishing that, "If principles of integrated conservation are to be applied, they must account for the continuum of social and physical realities in urban and rural communities. The future cannot, and should not, be built at the expense of the past." The freeze scenario is remarkably not being considered, but, rather, new uses ought to be integrated and upgraded, and they must be compatible with the physical and social realities involved in the conservation effort.

Despite the Bologna experience and worldwide stakeholder efforts to perceive the entire physical and social complexity of urban areas, international urban area conservation initiatives have mostly been implemented in western cities, with priorities geared primarily toward the economic sustainability of those areas—considered as the only way to ensure the continued existence of urban areas in the current capitalist context. This approach was responsible for the stigmatization of those areas, which started shifting between two extremes: now, associated in the best case scenario to tourism and the entire service and business apparatus that enables and justifies their economic existence; and then, associated to obsolescence, poverty, and social exclusion. In Brazil, a fundamental contradiction is observed between public recognition of the cultural value in certain urban areas, afforded by the act of legal protection, and a subsequent total transference of the conservation burden over to their occupants. In the case of protected "modest architectures" occupied by populations of low social and economic standards, this situation contributes to further aggravating their general conservation status, which in many cases justifies propositions of new uses that go against their integrity.

In 1999, the 12th General Assembly of the International Council of Monuments and Sites (ICOMOS), held in Mexico, produced a Charter on the Vernacular Heritage that ratified the concept of "modest building" introduced by the Venice Charter (1964), observing that the built vernacular heritage not only is important for a community but it is also a fundamental expression of their culture and the way they relate with the territory, while still a significant expression of the world's cultural diversity. Conversely, it also pointed that the survival of this tradition is threatened, at the world level, by homogenizing economic, cultural and architectural forces that may be understood as a major problem that needs to be addressed by communities as well as governments, urban planners, architects, conservationists, and by a multi-disciplinary team of experts.

In the Latin American context, Gutiérrez (1989) brought relevant contributions to the debate on the conservation of urban areas in connection with their own specific social

and economic issues. The author states that the absorption of urban conservation in South American cities has generated "defensive" legislations only with regards to protecting the tangible parts without any regards to generating development conditions for the local populations that would enable their permanence. Urban conservation, however, must be sided by improvements to housing, infrastructure and employment for the traditional populations, at the risk of gentrification and subsequent freeze of the physical substrates, which the author considers to be "notoriously absurd and anti-historic". In the current context, the dramatic dispute of Gutiérrez (1989, p.138) around urban conservation becomes ever more relevant: "Is it fair for us to have to choose between heritage and people?"

Concerning the current planning outlook for Latin American cities, Ribeiro (2009) states that efforts must be made to integrate, in a single theoretical and empirical purpose, space-time and social action. With regards particularly to urban conservation, this effort is key, as it would contribute to improving the maintenance and integration of both the materiality of historical sites and their traditional populations to the process of city urbanization. At the current stage, the discussion on urban conservation already contemplates, worldwide, the intangible characteristics associated to the materiality of sites, including the preservation of social attributes. The Spirit of Place (*Genius Loci*) characterizes spaces thus transformed into places that are no longer defined by spatial relations but rather by their character or atmosphere, which is thus a total qualitative sensory phenomenon partaken by both their tangibility and intangibility (NORBERG-SCHULZ, 1984).

The Quebec Declaration on the Preservation of the Spirit of Place (2008) considers that, "[...] the spirit of place is complex and multiform", and this is why multidisciplinary research teams must be put together if we are to further understand, preserve and transmit this spirit of place that comprehends, among other factors, traditional knowledge, memories, textures, colors, odors, forms of land appropriation and so on. The theoretical reference herein points at how important these collections of "modest buildings" are to culturally significant cityscapes, forcefully associating them with considerations for their intangible contexts that contemplate contents and meanings that are important to the local populations. That perception must translate into legislation that ought to propose effective conservation policies for this cultural heritage and also the social heritage of the cities, at the risk of losing authenticity and aggravating the social picture.

Conservation of Rio de Janeiro's cultural heritage

As of the 1980's, the Rio de Janeiro Municipality has implemented actions indicating the importance of protecting "modest architectures" that represent the social memory of the city. This is why worker villages as well as avenue and tenement houses were listed, including other cultural goods that had not been appreciated before. Also, an instrument of urban protection was created under the name of Area for the Protection of Cultural Settings (APAC), in compliance with the theoretical assumptions consolidated by the Venice Charter (1964), which represented an expressive conceptual advancement by first introducing cultural environment protection acts in the Rio de Janeiro legislation.

Remarkably, the text defining the nature of the APAC and its enforecement parameters, in the first version of the Rio de Janeiro Master Plan (1992), was totally based on

the contents of Municipal Decree N. 7.612/88, which provided the Rio de Janeiro legislative context with an instrument called Environment Protection Area (APA), as the APACs were initially named. That municipal decree, in its turn, mimetized a previous one, N. 5.459/85, while it created the first protection area of the city comprising Saúde, Gamboa, Santo Cristo and parts of downtown (Sagas), which are all neighborhoods adjoining the port zone. Remarkably, that protection area was created as a consequence of intense mobilization by traditional resident communities who opposed to the established scenario of urban degradation that could be observed in the obsolescence of the local infrastructure, want of transport and other services, decaying cultural heritage, among others. The overall abandonment of the region also paved the way toward a Rio de Janeiro Commercial Association project for the urban renovation of the area, called RIOPART, proposing new condominial parameters ignoring existing social and material contexts. However, definitive legal protection of the three neighborhoods, achieved in 1985-1988 together with unfavorable political and economic scenarios, among other factors, kept the threat of renovating the region at bay for more than 20 years. Facts indicate that, in the dawn of democracy in the country, APACs emerged in the city's urban legislation as from an organized urban social movement that mirrored collective aspirations of the communities as opposed to corporate aspirations. That neighborhood protection provided the conceptual base for an urban protection instrument (APAC) enforceable all over the city, bringing a pioneering initiative into the Brazilian legislative context, one which was followed by various other cities afterwards (Figure 6).

On the other hand, countering recommendations in the Quebec Declaration (2008), the technical staff in the municipal cultural heritage agency is predominantly composed of architects and civil engineers, revealing the municipal emphasis on the conservation of material (architectural) aspects to the detriment of other extremely relevant aspects related with this cultural heritage. This partial perception of the issue ostensibly contributes to consolidating a narrow understanding of cultural heritage—solely architecture and urbanism—charging the municipal executive agency with enforcing the protection criteria for tangible aspects contained in the current legislation. In face of international recommendations, the agency would also be responsible for monitoring intangible aspects, by means of a multidisciplinary team rather than a team composed predominantly by architects and engineers who could perceive and monitor the various social and economic realities comprising the 27 APACs established in the city.

Once the burden of preserving cultural goods invariably befalls owners and occupants, a precise detection of the different social economic contexts of the APACs would welcome proposals of differentiated conservation policies focused on the specificities of each area. Currently, the Rio de Janeiro legislation anticipates but a single conservation incentive mechanism that sets expectations around the right to land tax (IPTU) exemption in exchange for conservation of the protected asset. This incentive requires owners/occupants to immediately contribute the necessary resources for the conservation work, which would, in theory, be reimbursed in the medium or long run by the tax break. What happens is, in case of residential buildings, land tax usually amounts to less than the conservation interventions, particularly in degraded areas, such as the APAC-Sagas. This mismatch discourages landowners from making the necessary construction efforts in compliance with technical requirements, which prevents large scale application of the instrument. When it comes to commercial buildings, whose land tax values are higher, the exemption pays off, requiring, however, expressive initial investments from owners/occupants, which will be reimbursed by the Municipality as small installments in the long run (Figures 1, 2, 3, 4, and 5).

Given the different social and economic realities, the municipality should adopt

tailored cultural heritage conservation policies. Undeniably, the land tax break as a counterpart provided in the current legislation is an important conservation incentive instrument; but it should not be the only one. There should be other mechanisms, including public municipal funds provided in the form of subsidies, for instance, for the cases where occupants/owners of higher are unable to garner the means to conserve those buildings. Cultural heritage would thus be associated with social demands, underpinned by the theoretical aspects brought forth by the spearhead worldwide discussion around urban conservation. It is, however, important to notice that the City's Master Plan provides for a fund that should be put together for that purpose, which would subsidize public policies for the conservation of protected "modest buildings" and could be of a non-refundable nature, to contemplate local population needs.

In 2012, publication of Decree N. 35.879 revived that fund and also created the Mankind Heritage Rio Institute (IRPH). As provided in the decree, the new cultural heritage fund is intended "to provide resources for the planning and execution of projects geared for the City's Cultural Heritage policy", without any further details about where and how to use those resources, which seems to point only at sites that are recognized by the UNESCO as "Cultural Landscape", considering the misguided name choice for Rio de Janeiro's cultural agency. Late last year, the mayor proposed a bill numbered 1.570/2012 to the city council, looking at consolidating the change proposed by that decree. Rabello (2012) observed that the municipality initiative leads to two mishaps. The first one concerns administrative implications as the measure transferred the administrative structure of the previous cultural heritage agency—Cultural Heritage Subsecretariat—to the IRPH, without transferring their respective competencies. The second one concerns the nomenclature mistake made as the UNESCO title of "cultural landscape" was confounded with "mankind heritage", which may generate rather negative consequences for the conservation of Rio de Janeiro's cultural heritage. On this aspect, Rabello (2012) observes that "Rio de Janeiro's cultural heritage is much greater than the site declared by UNESCO as Cultural Landscape of Mankind. The site comprises only the coastal part of the city extending from the downtown area to the southern zone" and a few other specific spots, such as the Tijuca Forest and some mountains. On the other hand, by giving the agency that would be responsible for the city's cultural heritage a name such as "Mankind Heritage Rio Institute", the mayor "induces the misconception that this agency is solely in charge of looking after the site called Cultural Landscape, disregarding the remainder of the City's cultural heritage.

The creation of the IRPH is related with a "package of actions for the preservation of the city's cultural heritage", as the mainstream media would have it in their headlines and official websites. Proposed measures included the creation of new APACs in the neighborhoods of Alto da Boavista, Tijuca and Grajaú, by virtue of their proximity with the Tijuca National Park, one of the landscapes pointed by UNESCO, and the creation of a program called Pro-APAC, encouraging financial participation of the municipality, through channels, in private sector initiatives looking at the restauration of properties located within already existing APACs. If it does comes true, the municipality initiative may definitively and dangerously insert modest architectures protected by the 27 APACs, particularly those in APAC-Sagas, in the real estate market dynamics, which would submit them to the financial interests of entrepreneurs in detriment of the collective interests of local communities. The provision may have rather negative social consequences in APACs characterized by low income residential squatting and small retail businesses, further aggravating the social scenario in the city as a whole.

Figure 2

Article on the conditions of preservation property in the Catumbi-Cidade Nova APAC, pointing at the successful experiences of modest building conservation protected by some owners of high social and economic standing (in business or arts, and others), in contrast with, "What about those who do not have the resources to renovate the property in accordance with the APAC rules, what can they do? Nothing. Most buildings in the region are in terrible conservation conditions […]".

Source: O Globo Neighborhood Magazine (2013, p.8).

Figure 3

Architectural ensemble preserved by Municipal Decree N. 7.351/88, located a couple of hundred yards from the Port, and in poor conservation conditions. Pedro Ernesto street.

Source: Developed by the author.

Figure 4

Article published in the O Globo newspaper, on the inexisting conservation of protected buildings in Rio's downtown area.

Source: O Globo newspaper (2012, p.14)

Master Plan x Strategic Plan

Despite the many positive expectations generated after Rio de Janeiro's Mater Plan was published, the plan's main provisions were visibly boycotted by successive municipal administrations. Preemptying the City's Master Plan was, indeed, one of the repercussions of the world's economic scenario, which led to the triumph of "urban entrepreneurialism" as a city management alternative. In Rio de Janeiro, the 1993-1996 period (mayor César Maia's first administration) marked the beginning of this trend which let go of the Master Plan and took up the strategic plan as the main form of city regulation and planning, along with other mechanisms for diversifying and fragmenting Rio de Janeiro's urban policy (BIENENSTEIN, 2001).

Vainer (n. d.) observes in this context that, "[...] the forms of power in the city are being defined, conducive to a city of exception, which would be no other than declaring,

without mediations, the direct democracy of capital". All of these factors have contributed to developing what Nuno Portas referred to as "negotial planning" ("adaptive" or "negotial management"), which is based on flexibilizing pre-established legal rules and standards, in the case of Rio de Janeiro, provided in the Master Plan, an instrument that is deemed too rigid to accompany the "fluidity of the entire system" (BIENENSTEIN, 2001, p.17). In the case of the city of Rio de Janeiro, this world trend was materialized in the development of the City's Strategic Plan, which virtually buried the City's Master Plan, and was taken as a more adequate instrument for the management of the city. In the official discourse that came after mayor César Maia's first administration (1993-1996), particularly that made by his successor Luiz Paulo Conde (1997-2000), this approach was consolidated, and it libeled the City's Master Plan as "nationalizing", "immobilizing", "generic", and "backward", uncapable of meeting the specificities arising from popular demands. Considering the fact that the Law establishing the City's Master Plan was promulgated in late 1992, it is easy to see that, at inception, the plan was already doomed to die out, particularly for the purposes of urban conservation. The City's Strategic Plan was little by little preparing an urban and financial structure to receive major events, seen by the successive administrators as undeniable major opportunities that would potentially generate important urban infrastructure legacies with social gains.

Called *Rio Forever Rio*, Rio de Janeiro's Strategic Plan (1996, p.18) declares in its "world context" item that the world is going through a profound change whose signs include "a vast population, rapid urbanization, a technological revolution that creates a new spatial reality and the ever-greater importance of preserving the environment and seeking sustainable development". It also points at the "internationalization of problems and the increasing globalization of markets", among other factors that impose dramatic behavior changes to the world's entire society. The Strategic Plan (1996, p.39) boasts seven strategies to achieve the main goal of city integration in today's globalized context. Called "Integrated Rio", Strategy #4 points at building new urban centers and restoring the traditional city center, particularly the port zone, the Praça XV, and the neighborhoods of Santo Cristo, Gamboa, Saúde, and Estácio. Strategy #7, called "Rio 2004 as a regional, national and international center", offers that Rio de Janeiro's traditional center is a potential "cultural market", a status which should be reinforced, apart from the need to exploit tourist activities and international events. In 2009, the Eduardo Paes administration published a new Strategic Plan, named "Rio post-2016—a more integrated and competitive Rio". The new plan incorporates the old neoliberal guidelines established by the previous one, but now they are more objective and focused on preparing the city's infrastructure, land use, and service quality for the major events: the FIFA World Cup, in 2014, and the Olympic Games, in 2016.

In its 5th chapter (Result Areas), the Plan provides ten of the current administrative priorities: Health, Education, Public Order, Jobs and Income, Urban Infrastructure, Environment and Transport, Culture, Sports and Leisure, Social Assistance, and Public Management and Finance. In the urban infrastructure item, actions include the Wonder Port (Porto Maravilha) project as a goal to be achieved, which reveals that the mayor sees the area as worthy of administrative care, if nothing else. The same item also provides other goals, to be achieved by 2012, such as "phase 1 of the Wonder Port project (starting operations of the Pinacoteca, renovating the Pier Mauá, recovering the warehouses, refurbishing the Saúde neighborhood, starting operations of the Praça Mauá underground parking facilities, and building a new roadway access to the port)". At the exception of the Pinacoteca (the Rio de Janeiro Art Museum—MAR) and the Pier Mauá, those goals remain unachieved. Another remarkable point is the focus

on culture, treated together with sport and leisure. Emphasis goes to the production of culture, seeking to expand the Cultural Canvases and Culture in the Street projects. No mention is made, however, of the conservation of the city's cultural heritage, nor of setting guidelines for the development of public policies that would seek to strengthen local and regional identities. From the current municipal administration's perspective, culture is but leisure resulting from the production of cultural shows and spectacles, and the dissemination of artistic activities among the population, which is not enough for a city with such social, historical and landscape characteristics like Rio de Janeiro.

The Wonder Port Project

The part titled Rio post-2016 greatly reinforces the "urban revitalization" project for the port zone and surroundings (Saúde, Gamboa, Santo Cristo) called Porto Maravilha (Wonder Port). The project rescues old urban renovation and real estate appreciation objectives for the region, as provided in the RIOPART project, temporarily sustained by virtue of successive contexts of urban protection and unfavorable economic conditions. The "new" proposal brings about a discourse that appears to contemplate concerns with the cultural heritage, treated as merely an element fostering the industry of cultural tourism, while ignoring any pre-existing social reality in the region. In order to enable and manage urban operation in the port region, the municipality created a company called Rio de Janeiro Company for the Urban Development of the Port Region (CDURP), by means of Complementary Act N. 102. The initiative transformed the port area in a virtually independent district from the city's administrative perspective. The Company's attributions include availing part of the local land to the market (Figure 7).

The Wonder Port project guidelines submit the APAC surrounding area unconditionally to corporate interests, a justification seen as sufficient for the proposed interventions. The Wonder Port project is remarkably well aligned with a world trend of projects that seek, according to Ribeiro (2009), to "bring heritage space up to date" with initiatives encouraged by the globalization of the economy. These initiatives correspond to the general production conditions required by the pace and direction of accumulation in the worldwide scale, generating settings with "efficient circulation and exceptional consumption for some, in contrast with the scarcity experienced everyday by most".

After nearly 30 years since the APACs were established and the RIOPART project was shelved, the Wonder Port runs into a region that has been shaken up and forlorn by the public administration, as far as conservation goes, including the less articulate communities, with regards to their resistance against undesired interventions. In the item called "Description of the Current Situation of the Strategic Initiative" in the Rio post-2016 portion of the plan, there is succinct description of the current state of the region that ignores the existence of an APAC, as it ignores the existence of a local population of residents. Given that scenario, which also reveals unprecedented local political and administrative fine tuning at the federal, state and municipal levels in association with corporate interests, a powerful block of political forces geared to serve corporate interests disguised as public interests is clearly formed, under a shower of beautiful images and promises of legacies that point at future improvements to

the population's quality of life. From this perspective, guidelines in the strategy of choice for the "revitalization" are defined around some supposed improvement that is focused solely on solving traffic and infrastructure problems and hinged on urbanistic parameters conducive to brutal verticalizations and real estate appreciation in the vicinities of the port. Those guidelines are confirmed by a text posted on the project's official website with the clear intention to improve the quality of life for current and future residents by means of restructuring public spaces in general. However, the project does not include any study of the social and economic profile of current residents, nor any mechanisms to mitigate the gentrification that will inevitably befall the area, which leads us to think that the region will be requalified—not for the current residents, though, but for the future ones!

In the item "expected results", the text confirms total disregard for the established legal protection, just as for the pre-existing social fabric that is also entitled to attention. There is expected improvement in the living conditions of local life, but for which dwellers? New homeowners are expected, but there is no consideration for the existing ones, people who occupy buildings that are protected by municipal laws. Remarkably, though, the municipal housing program called New Alternatives proposes to adapt preserved buildings for residential use, prioritizing those ruins (mostly façades only) that are commercialized by a federal program called My House My Life. The initiatives target buildings on streets around the Morro da Providência, a rather degraded area, looking to settle low income populations. Despite the federal support, the project moves at a rather slow pace. In 2012, only nine projects were licensed in the adjacencies of the Livramento street, in the immediate surroundings of the Morro da Providência, contributing to social zoning of the region; that is, nearby the Morro da Providência, low income populations, nearby the Port, businesses and occupation by a population of higher social standing. The item "Expected Results" reads: "Revitalization of the area, with improved local conditions of living, consequently attracting new residents and businesses to the region, while providing for the restauration of cultural and historical heritage and increased tourism locally".

The region will attract real estate and tourist capital investments, thanks to being transformed into a "region of opportunities", which is not extensive, by the way, to most current residents—should they remain! Rabello (2012) argues that the Wonder Port project is a financial project, not an urbanistic one. It is therefore worth pointing that the Wonder Port project proposes major traffic interventions that include demolishing the existing viaduct over the Rodrigues Alves avenue, with subsequent construction of underground roads. Funded entirely by private capital, the initiative is combined with the benefits offered by the condominial legislation proposed for the area, as the municipality has established 30 stories as the top height for coastal lands, which may go up to 50 if the mechanism of selling building rights is used. As a result, a beautiful view of the ocean will be opened only to the skyscrapers located on the coastline, with major impacts on the cityscape.

Concerning local cultural heritage, the Wonder Port project considers only the possibility of conserving large construction works, which can be adapted to house cultural equipment, such as the Rio de Janeiro Art Museum (MAR), built in partnership with the Roberto Marinho Foundaiton, and the Municipal Theater Museum, currently being built in a listed warehouse on the Rodrigues Alves avenue. By contrast, the project also proposes other cultural equipment with brand architecture, such as the Museum of Tomorrow, designed by architect Santiago Calatrava to be built in partnership with the

Roberto Marinho Foundation. These initiatives reveal a major intention to appreciate urban land with total disregard for traditional populations who reside in protected buildings and convey meaning to their historical attributes, which are crucial for the memory of the city. These conservation initiatives contribute to a seductive imagery project that seeks to glamorize the region as a factor of real estate and touristic appreciation, adding to the build-up of an artifitial nature.

Figure 5

APAC-Sagas protection sub-areas.

Source: Municipality of Rio de Janeiro (1990).

Figure 6

Priority intervention area of Porto Maravilha, defined in 1992 by the Technical Chamber created to develop new condominial legislation for the area.

Source: Municipality of Rio de Janeiro (1994).
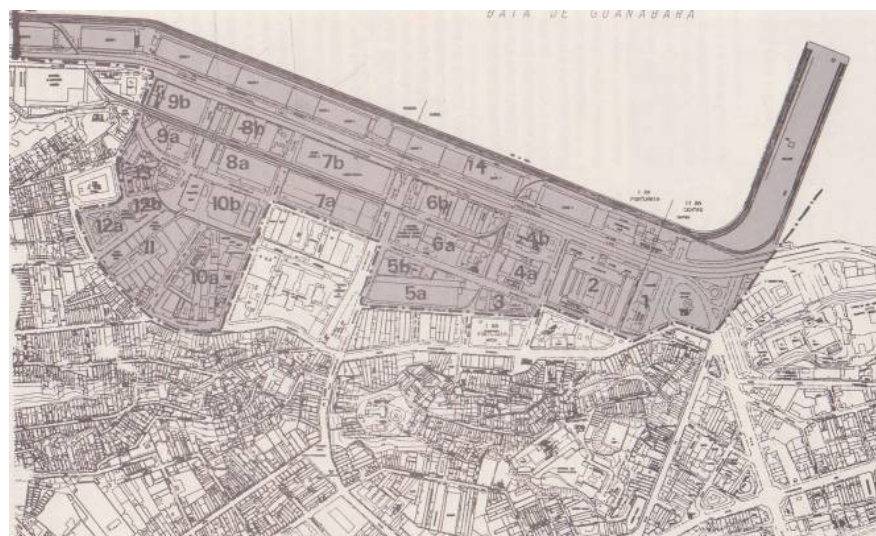
Figure 9

Electronic volume model simulating building heights imposed by the Wonder Port project for the area. The proposed skyscrapers—many of which are already in construction—will "encapsulate" the APAC-Sagas, located between the Presidente Vargas avenue and the port zone.

Source: www.rio.rj.gov.br/smua

Final Considerations

This brief reflection leads to the conclusion that the City's cultural heritage from the 1980's up to 1992, date when the City's 10-Year Master Plan was published, experienced expressive advancements concerning theory alignment with worldwide concepts and trends, which have expanded the heritage concept of cultural monuments to the urban areas, including modest architectures. Appreciation of these works is achieved by means of public recognition afforded by the legal protection provided by both the listing process and the introduction of APACs. The next stage should include conservation policies for this protected heritage that would consider particularities of the social fabrics therewith, which would revert in real gain for the preservation of the city's urban memory; but that next stage never happened. It is also important to highlight that the atmosphere of democratic politics, observed after the country's political opening consolidated in 1985, has been a crucial success factor for the city's organized urban social movements, particularly the one that culminated in the legal protection of the neighborhoods of Saúde, Gamboa, Santo Cristo, and parts of downtown, consolidated in 1987.

Despite the theory evolution of the legislation, and the democratic evolution of the city, a sudden disruption in the process is given by the inconditional compliance of successive municipal administrations after 1993 with neoliberal principles for the planning of cities, as defined by the strategic plans that were drawn. They surfaced a dramatic shift in the interpretation of how important cultural heritage really is, particularly the protected urban areas, which have moved from being a locus of social and urban memory of the city to being but mere input for the tourist industry. Despite the beautiful image treatment of the brochures containing the strategic plans, particularly the Rio post-2016, and the reassured choices made by the administration in favor of the current planning model, there are still many doubts and uncertainties concerning the impacts caused by these interventions and changes on the city's social fabric and particularly on the city's cultural heritage after 2016.

References

BIENENSTEIN, G; Globalização e Metrópole – A relação entre as escalas global e local. In: IX Encontro Nacional da ANPUR, 22., 2001, Rio de Janeiro. **Anais** IX encontro Nacional da ANPUR. Rio de Janeiro: ANPUR, 2001. p.1-22.

CANIGGIA, G., MAFFEI, G. L. **Tipologia de La Edificación** – Estructura Del espacio antropico. Madrid: Celeste Ediciones, 1979.

Fam-Rio. Federação das Associações de Moradores do Município do Rio de Janeiro –. **O Plano Diretor, o Estatuto da Cidade e a Influência que têm na sua vida.** Rio de Janeiro: Fam- Rio/Cese, 2002.

GUTIÉRREZ, R. **Arquitetura latino-americana** - textos para Reflexão e Polêmica. São Paulo: Nobel, 1989.

KÜHL, B. M. **Arquitetura do Ferro e arquitetura Ferroviária em São Paulo:** reflexões sobre a sua preservação. São Paulo: Ateliê Editorial: Fapesp: Secretaria da Cultura, 1998.

NORBERG-SCHULZ, C. **Genius Loci:** Towards Phenomenology of Architecture. New York: Rizzoli, 1984.

PREFEITURA DA CIDADE DO RIO DE JANEIRO. Plano Diretor Decenal da Cidade do Rio de Janeiro. 2011. Disponível em: <http://www.rio.rj.gov.br/smu>. Acesso em: 7 dez. 2012.

_____. Strategic Plan for the City of Rio de Janeiro. Rio de Janeiro: Prefeitura da Cidade, 1996.

_____. Plano Diretor Decenal da Cidade do Rio de Janeiro. Rio de Janeiro: Prefeitura/ SMU/IplanRIO, 1993.

RABELLO, S. **Factóides com Patrimônio Cultural.** Rio de Janeiro. 2012. Disponível em: <http:// www.soniarabello.com.br/rio-patrimonio-de-que/. Acesso em: 7 dez. 2012.

RIBEIRO, A. C. T. Presentificação, impulsos globais e espaço urbano: o novo economicismo. **Le Monde Diplomatique** – Brasil: Encarte CLACSO, Instituto Polis, São Paulo, n.24/jul., p.21-23, 2009.

ROLNIK, R. **Quem ganha e quem perde com essas transformações?**. S/D. Disponível em: http://www.observatoriodasmetropoles.net. Acesso em: 9 mar. 2013.

VAINER, C. **Cidade de Exceção:** reflexões a partir do Rio de Janeiro, s/d. Disponível em: <http:www.opp.ufc.br/urbano04.pdf>. Acesso em: 3 mar. 2013.

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Abstract

This study aims to investigate the nature of architectural production and its relationship with the pre-existing architecture in Rio de Janeiro at the turn of the twentieth century, with special emphasis on the period of the administration of Mayor Pereira Passos, when the city has undergone important urban reforms. The modernizing discourses of that period built this relationship in terms of an opposition between an "old" and a "new" city, producing the idea that an ancient colonial city, with narrow streets and unhealthy houses without art, would be fully replaced by a radiant city, with broad avenues for the circulation of air and traffic, lined with hygienic buildings with fine and renewed architecture. However, this powerful image of the total reform of the city proves to be schematic, because it does not encompass the complexity of the relationship between the new architecture that was being produced and the pre-existing one. This relationship was visible in the division of land, in the construction techniques employed, in the architectural scale of the new buildings, in their functions, and also in the numerous reforms of existing buildings, some of which that came from the same colonial period that was depreciated in discourses that justified the reforms.

Advancing the hypothesis that the idea of the total reform of the city would have concealed a far more complex relationship between the city, its past and pre-existing architecture, the paper aims to show that the production of architecture in that period took place under another building culture, where the production of the new was not incompatible with the preservation of the existing buildings. The analysis of the relationship between the architecture of the period and the pre-existing one constitutes an unusual approach of the theme, since, in general, the researchers emphasize the transformative character of the urban reforms upon the city. The study exposes part of the results of my PhD thesis and was performed by the analysis of the building permits stored at the General Archives of the City of Rio de Janeiro (AGCRJ).

Keywords: Discourse. Modernization. Narrative of the past. Architecture. Typology.

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Introduction

According to Aurelio Dictionary, culture is, among other definitions, "the complex behavioral patterns, beliefs, institutions and spiritual values and of other material transmitted collectively and being a characteristic of a society; civilization [...]". In this sense, the culture of building would be the pattern of behavior linked to the production of the city's buildings, which can be observed from the set of practices surrounding this production in a given historical moment. From this definition, the study aims to investigate the nature of architectural production and its relation to the pre-existing one in Rio de Janeiro at the turn of the twentieth century, with special emphasis on the period of Pereira Passos' administration, when the city underwent important urban reforms.

The main hypothesis advanced is that the powerful image of total renovation of the city, which justified the works in his time, would have concealed a more complex relationship of the city with its past and its material pre-existing. This relationship would happen within another building culture, where production of the new is not incompatible with the preservation of existing. This culture emerged strongly from the documentation consulted, on the contrary to the idea of urban reforms as tabula rasa, that somehow permeates the readings of the period to the present day, reinforcing the interest in the approach proposed here.

Speeches: urban reforms as tabula rasa

The administration of the engineer Francisco Pereira Passos as mayor of the Federal District (1902-1906) was remarkable by the completion of major urban reforms, which reached above all the central area of the city of Rio de Janeiro. The works were undertaken by two different sectors of public administration. The federal government, under the command of President Rodrigues Alves, was the responsible for remodeling the Port of Rio de Janeiro, a development that covered the construction of the final stretch of the Channel Mangue, in the region of the current Francisco Bicalho Avenue and the opening of an avenue that connected the port to the city's commercial center. The avenue was initially thought to turn on Largo da Prainha (current Praça Mauá) to Largo da Carioca, who was then the heart of the city, but in the course of the project design, we chose a path that ran across the sea, linking Largo da Prainha to Largo da Mãe do Bispo, in the current region Cinelândia, at the foot of Castelo hill. This avenue, called Central, was the most emblematic work among all those carried out that time and became the great symbol of urban reforms.

The works in charge of City Hall were condensed in the Improvement Plan of the City of Rio de Janeiro, organized by the commission of the Cadastral Commission Letter, which included the General Directorate of Works and Traffic. The plan was to open new roads and widen and extension of some existing streets, located mostly in the central area of the city, with some branches to the adjacent neighborhoods. The most emblematic work performed by the city was the construction of Beira-Mar Avenue on landfill, connecting the center to the Botafogo Beach. Although it was about two different aspects of public administration, both were well tuned and honed in the main aspect of the speech, which was the need to modernize the capital of the Republic, turning it into a "civilized" city, the radiant destination symbol that Brazil wished for you.

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The set of projected works would reach deep into the city center, the area that concentrated the main services and business, but also the area of older formation, the line of which road came the colonial period and had not undergone substantial changes since then, despite the urban plans and numerous street widening projects developed during the nineteenth century, but never completed. In addition to the road layout, considered unsuitable for air circulation and traffic, technical discourse of the time condemned the old buildings of the city, equipped with alcoves, comfortable sleeping not receiving air or light directly from the outside. The alcoves were considered the villain of unhealthiness of those buildings. For this reason, one of the main reasons of urban reform was the need to clean up the built mass of the city, which should be achieved by the scrapping of older homes and their replacement by modern buildings. The urban scale of interventions and the scale of architectural production appear closely linked in the explanatory memorandum of the document Improvement Plan:

> *Certainly, it is not enough to obtain water in abundance and regular sewage to enjoy a perfect urban hygiene. It is necessary to improve the hygiene at home, transform our building, foster modern building of construction and this desideratum only can be reached ripping into town a few avenues, set as to meet the needs of urban traffic and determine the demolition of the current building where it is presented late and more disgusting. (City Hall of Distrito Federal, 1903. My emphasis.)*

Another important moment in the construction of the official discourse about the urban reforms were the messages that the mayor Pereira Passos spoke at meetings of the City Council. The activities of the City Hall, in those years, were directed significantly to the city's improvements. When we look at the executive decrees issued by Mayor Pereira Passos along its mandate, we see that most of them had for object any work of sanitation and beautification. Thus, the mayor's messages to the Council consisted of an accountability on the budget and administration expenses, but also contained detailed information about the plans organized and then performed by the city, step by step of its implementation, expectations and reading that was being done in the city. These reports also built the relationship between the existing situation and the intervention designed under an opposition between old and new, decrying the "old" city, while pointing the advantages of urban reforms.

The first message was read at the meeting of the Municipal Council held on September 1st, 1903. In the report narrated in first person, the mayor referred to the city to find early in his administration as a place of narrow streets and evil sidewalks lined by unsightly and unsanitary buildings. This site would be attended by a population of barbarian habits, far from what was expected of a "civilized" people.

> *Old habits remained that in many cases, it denied the forums capital and even simple "habitat" of a civilized people. Deficiencies with easy routes for outpouring of intense urban movement, usually bad paving, cleaning public precarious, almost complete shortage of beauty or any attractive thing in public places, putting away from them the population; antiquated building, anti-hygienic, anti-Esthetic and a host of other defects to prove the long and continuous of leaving of the thrilling needs. (MAYOR'S MESSAGE, 1903, p.3-6)*

The second part of the story was related to urban improvements. There is here, again, the same relationship between the "narrow alleys" and the "old-fashioned" architecture of the city that had been present in the explanatory memorandum of the document Improvement Plan.

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I do not lack here to demonstrate the need to improve the road and improve urban hygiene, tearing some avenues, arranged to facilitate the movement of the city and to replace a part , at least , of its antiquated marry and unhealthy for new building hygienic. Fifty, a hundred years ago, Rio de Janeiro aspires for these improvements. It is an unsuccessful question. I must, however, remember that the primary cause of the failure of all attempts due to the patriotism of many of past administrations laid in boldness of conception, out of practical view. Certainly, however unenforceable, disproportionate to our resources. (MAYOR 'S MESSAGE , 1903. p.11 . My emphasis.)

Urban reforms were, therefore, justified through a speech that contrasted sharply two images: on the one hand, the old colonial city, with its narrow alleys and their unhealthy houses and without art. And on the other hand, the new city that was being produced, endowed with wide avenues for air circulation and traffic, lined with beautiful sanitary buildings.

When we observe the contrast of these images, we note that the narrative of the past was a fundamental step towards the construction of the reasons of urban reforms during the administration of Pereira Passos. This is because the meaning of the new word is relative - the act of declaring itself as "new" always occurs when there is something considered old. Thus, the image of the new radiant city that urban reforms intended to produce could only be outlined in its fullness when contrasted with another image, depicting a decrepit city, decadent, unhealthy. How (on the level of discourse, it is good to remember) would only make sense to promote such deep reforms in an urban structure considered decrepit, the image of the new city, sanitized and beautiful, had the necessary and fundamental contrast the image of an old and decaying city. The two images looked at themselves as a mirror in reverse, where one could not exist without the other.

But there was more. The reformist speeches from Passos' period openly condemned the past, but in doing so, covertly condemned the present. This happened because the past would not be condemned as past, but only to the extent that it was recognized that their conditions are considered negative if perpetuated in the present. Urban reforms were justified based on the conviction of the "old" city of Rio de Janeiro - seen as a city of narrow alleys and unhealthy houses and without art - because the reformers designed that image then in this city. From this narrative, the new city should be built through reforms which will reverse the conditions considered at that time evidence of the delay of the city. Thus, the reformist discourse revealed its operative face. Narratives of the past functioned as discursive strategy to criticize the present and justify the city's transformation projects in the future.

Another important moment of the construction of urban reforms' ideas were numerous publications about the press at the time, which was placed as one of the main forums of debate about the works. Periodicals ranged from a more critical treatment of the issue, bringing up the housing crisis and the immense inconvenience to the public caused by the demolitions in the city center, and the enthusiastic support of reforms, becoming important diffusers of the official discourse content surrounding its implementation. One of the journals that defended the reforms was the magazine Kosmos, which had its first issue published in January, 1904. The contrast between old and new that motivated the official speeches in favor of the works appear clearly reproduced in chronic entitled Central Avenue, from Ferreira da Rosa, published in Kosmos edition of November, 1905. The chronic celebrated the inauguration of the Avenue and was accompanied by photographs of the ceremony. The image of narrow, poorly lit streets appears associated to poor architecture - the windowless alcoves and

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overheated shops, remnants of the colonial period that the opening of the avenue that would be the responsible of destroying it.

> *Narrow, winding streets, poorly built streets, bad lightened streets. Cosmopolitan population, sleeping in the alcoves of the houses, working in the greenhouses of the stores. A lot of business, business out of the sea, through the vehicles that fluctuate in the port.*
>
> *So it was Rio de Janeiro for three hundred years. Born colony; growing, found up capital of the Kingdom; was the capital of an empire, and today is the capital of the Republic. Always narrow, winding streets, poorly built, poorly lightened. [...]*
>
> *The population of Rio de Janeiro was caught off guard. In the blink of an eye, there were expropriated hundreds of houses, a legion of workers entered to destroy them, hundreds of carts removed the rubble, from sea to sea, from Ajuda to Prainha, it was seen a huge rip off where ran the air and where spilled light.*
>
> *"What miracle is this?" "Is it possible that we really make the Avenue?" Exclaimed, then. It is possible, yes! There was the Avenue. There it is.*
>
> *There it is, rehabilitating the City reviled by bad taste and bad name. There it is immortalizing an administration, honoring a name, congratulating the people. There it is, thousand and eight hundred meters in a straight line, lined with buildings where the genius of an Architect practiced wonders. [...]*

A general discourse, as it was shown. On the one hand, it confirms the Avenue as a redeemer of all the built mass of the "old" city center - although it constituted only a through line in the existing urban layout, with a real reach very restricted. On the other hand, says the massive obsolescence of the city's buildings, as if they had not gone through any kind of transformation throughout the nineteenth century. But precisely these simplifications, which allow the construction of emblematic images (and as such, extremely persuasive), lies the speech force that defended the modernization of the city, which Kosmos also made up herald. At several points along its pages, we find similar texts, which extol the urban reforms and depreciate all existing mass built in the city, indicated as "old" without asking about their actual condition.

The city's image being "old" and decadent was strengthened by the historiography of the 1980s, who built the idea that those "old" houses had been turned into tenement, this idea that was not one of the official documents of the time of the reforms, but that populates the conception we have today about the period.

> *It was the "regeneration" of the city and, by extension, of the country, the language of the chroniclers of the time. In it, the huge colonial and imperial mansions in the center of the city are demolished, they were transformed into slums that concentrated much of the poor, so that the cramped streets were transformed into wide avenues, squares and gardens, decorated with marble palaces and crystal and dotted with statues imported from Europe. (SEVCENKO, 2003, p.43.)*

The 1980s decade represented a change of course in historiography about Passos' period. Unlike writings published up to that time, which reproduced the boastful tone of the speeches of the era of urban reforms and attributed to positive effects works of the city, were then produced numerous works that had the most striking feature of the social aspect. These works brought a critical view of the reforms, presenting them in a negative way. Pointed out, above all, its high cost to the poorer classes. For the authors who wrote this historical moment, the reforms would have produced an

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exclusive urban space, to the delight of the elite only. What would have involved the eviction of poor residents in the city center, the resulting segregation of social classes in the urban space and the promotion of real estate speculation, further aggravating the housing problem. This would be the nature of the book "Trabalho, Lar, Botequim", from Sidney Chalhoub:

> *Then hidden behind an urban planning policy which would be designed only to "sanitation" and "beautification" of the city [...], an elite businessmen closely linked to the government coordinated a process of urbanization that aimed to guide the use of space urban according to the imperatives of capitalist accumulation. The administration of Pereira Passos was the culmination of this process, when, by a concentration of power in the hands of the mayor, unleashed a very violent period of urban reform in the central areas of the city, tempered by arbitrariness of every order and crushing blows Pick. In just four years, thousands of people had to leave their houses in slums or inns and their rooms in houses of rooms, which were expropriated and demolished by order of the city hall. In their place, there is Central Avenue and other streets in the city center, thus further enhancing the urban space and increasing the process of capital accumulation through property speculation. Concerning the popular, that dwelt in many slums and demolished houses rooms, remained for them just a few options: one was to pay even more exorbitant rents than before the houses or rooms and tenements and houses remaining rooms; another option was to try to move to the suburbs, which brought the serious disadvantage of increasing the distance to be traveled daily to employment; a third option was to go live one of the many hills surrounding the city center. (CHALHOUB, 2001, p.135. My emphasis.)*

In the passage above, as well as in various writings that make up the history of the 1980s, it can also be observed the presence of the sharp contrast between an old and a new time, the narrative of a total transformation of the downtown area, work urban reforms. Despite the social criticism contained herein, the structure of these speeches would be very close to those who advocated reforms in his time. The main difference is in the use of value they do the reforms, and not exactly in shape.

On the other hand, it is important to note the schematic perspective of this theoretical building, the bipolarity that it brings within, reducing the city's myriad possible readings to two still images, as frames. These images were linked to a discursive strategy needs, which the reformers resorted to justify the works (reproduced by the historiography of the 1980s because reflects their critical social objectives). But beyond this strategy, there was the city, inhabited by other subjects with other expectations and worldviews. He was also a whole culture to produce and inhabit the city, shared rest by the technical personnel who prepared the urban renewal projects. The speeches justifying the works in terms of an antinomy between old and new hovered over this city, giving it an extremely emblematic image, so that dominated the further reading about the urban reforms to the present day. But that image, in its schematic way, can not encompass the complexity of the city's construction processes that were taking place in those years. The objective is to go beyond the antinomy present in the reformist discourse, retracing part of the much more intricate framework that underlies the powerful image of total renovation of the city.

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The production of a new architecture (1890-1920)

The architectural production of Passos' period was largely, on a continuum of works that can be seen in a wider time span, covering the last decade of the nineteenth century and the first two of the twentieth century. This is because the production of architecture is deeply linked to cultural aspects that work well in longer periods than the duration of a single administration. In addition, the technicians who worked at City Hall during the administration steps were basically the same as the previous decade, and, as a career civil servants, they continued to act after. Thus, I shall consider the architectural production of Passos' period within a wider time frame, which will from 1890 to 1920, a period that concentrates most of the documentation that makes up the General Archive of the assets of the Rio de Janeiro City. The main search was the building permits. This choice was because the city is made in many ways, the sum of its buildings. The actions of the City Hall in technical licensing of works, on a case-producing town, producing an urban image, very different from that found in the rest of the presentation of the City Improvement Plan. Just the mapping of these differences was the focus of my analysis. This documentation would allow me to contrast the idea that an "old" city would be fully replaced by a "new", analyzing what the old man remained in the reformed city. The survey was conducted by checking all building permits between 1890 and 1920, in two selected streets: Uruguayana street, included in the Improvement Plan of the City and enlarged by the City, and Ouvidor street, the most important street of city before the urban reforms, but not included in the Improvement Plan.

The building permits are precious sources because their grant was subject to proceedings in the Directorate General of Works and Traffic, established procedure by the posture of September 15th, 1892. These processes were instructed with the license request addressed to the Mayor, and the building design or reform, in cases of more complex projects, or just with the license application specifying the nature of the works to be done in the case of simpler works. Also relied on brief advice of municipal engineers. The request was analyzed in the first instance by district engineers was located where the property. In cases of reforms, they performed a small technical visit, which were observed the number of floors, the ceiling heights, the condition of the main walls, floors and roof, the presence of ledge or edge of the roof. His orders are, today, a valuable source for analyzing the nature of the buildings and their conservation status. In some cases, there are still observations as "old building" or "very old property", which allows to evaluate the position of the front technicians to buildings from a more distant past.

If the application was rejected, the applicant could make a reply, always directed to the mayor. The request would be considered and decided by superior, and so on, in an ascending scale that passed by the General Director of Works and Transportation and reached to the mayor in person, who should decide the application in the light of the information and opinions produced in the lower courts. This procedure was observed throughout the study period was not unique management Steps. As for the latter, it is an interesting time, because we can see the very act Pereira Passos, deciding on the nature of architecture that would be the image of the city streets. In this regard, we note that, in most cases, the applications were granted in one of the instances. And often, the mayor granted requests by default of contrary opinions of its engineers and director. In the comings and goings of processes, one can observe the clashes between owners and municipal engineers, visible in the replicas, the arguments used by the parties, the reasons for the decisions, which have almost always in favor of the

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owners, allowing the conservation of buildings the oldest in town. This practice seems to contrast the speech of condemnation of the old buildings that justified the urban reforms in his time.

On the other hand, one of the arguments used by the city to carry out the works was the poor condition of the buildings in this city, which would, at that time, be reduced to infected slums. But the examination of documentation and observation of the buildings still exist in the city center allow us to question the idea that the old houses from the colonial period were degraded, or obsolete.

I begin my analysis showing the projects of two buildings that would house two bank headquarters. Projected in 1890, the two act as a sort of introduction to what would happen during the last decade of the nineteenth century and the first two of the twentieth century, including the period of administration of Pereira Passos. The first project relates to the Bank's headquarters Ibero American United Bank, located at Primeiro de Março street, 27-A, at the corner with Rosário Street (AGCRJ, LO1890, cx.01, doc.32). This is a completely new building - an imposing townhouse of two floors, with the facade decorated by a cornice and Corinthian parastas in the building side (Figure 2). The property had three doors in the smaller dimension of the lot and seven doors in the biggest one.

The second project is about the headquarters of Franco Brazileiro Bank, located at Candelária street, at the corner of General Camará street (AGCRJ, LO1890, cx.03, doc.01). The building had three floors, two doors in the smallest dimension of the lot and eight doors at the biggest one. Therefore, a lot of very similar dimensions to the first bank. But unlike that, this is not a former new construction, but the remodeling facade of a stately townhouse from the colonial period. The works designed consisted in building a parapet decorated with vases and statues, the enlargement four doors downstairs, which had changed the shape of the spars, and adding ornamentation in relief, in the form of parastas marking the rhythm of the facade (Figure 1).

These two buildings may be seen as two paradigms to build different ways that would be employed over the period 1890-1920: "ex-new" and the other, providing a rereading of the existing one. It is important to note that both were able to produce impressive buildings, representation. Buildings that would house offices of banks, and as such, should convey an image of strength, reliability and security. We see here that the existing remodeling - in this case, a very old building, probably from the colonial period - was not considered a mid-sole solution in remedied people, but was also able to produce the new for all purposes - an important building, imposing, modern. Nothing further from the vision of the old houses falling apart, the unhealthy and overcrowded slums that emerges from the 1980s historiography and many other discourses about the time of the urban reforms...

A similar comparison between remaining buildings can be made between two properties located at Ouvidor street - a noble in the city at the turn of the twentieth century. The first (Figure 3), on the corner of Primeiro de Março street was rebuilt in 1907. It is, therefore, a completely new construction. The lot had 20,00m of tested by Ouvidor street and 8,30m by Primeiro de Março street and the project was done by the civil engineer Vicente de Carvalho (AGCRJ, LO1907, cx.04, doc.22). Note, the strip crown, a sequence of embossed ornamental elements that give the front pace, showing certain modules at the same time small elements to visually link the fascia remained of bay windows. Under the branches of the windows, other salient elements establish the visual connection between the windows and doors downstairs.

The second building (Figures 4 and 5) is located on the corner of Mercado street. The

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project was not found but, judging from the yards of the downstairs door format and its location, it is probably an eighteenth century building, refurbished in the early twentieth century. The plot is very close to the first building dimensions. It is observed that the remodeling was made through the construction of a parapet decorated, fitted with devices give a new rhythm to the facade, highlighting some modules. There was also the reconstruction of the building corner, cutting off portions of the corner of two streets, according to the legislation of the time, and the addition of several ornamental elements in relief, according to a formal repertoire very similar to the first floor.

One of the features that most attract in this house are the downstairs doors, lintels in depressed arch, eighteenth-century features. However, it is observed that its proportions are more elongated than the doors of the colonial period. Upon retirement, his shoulder pads, made of a single piece of granite along the original height of the

Figure 1

Remodeling of a colonial townhouse to house the headquarters of Franco Brazileiro Bank at Candelária street, at the corner of General Camará street.
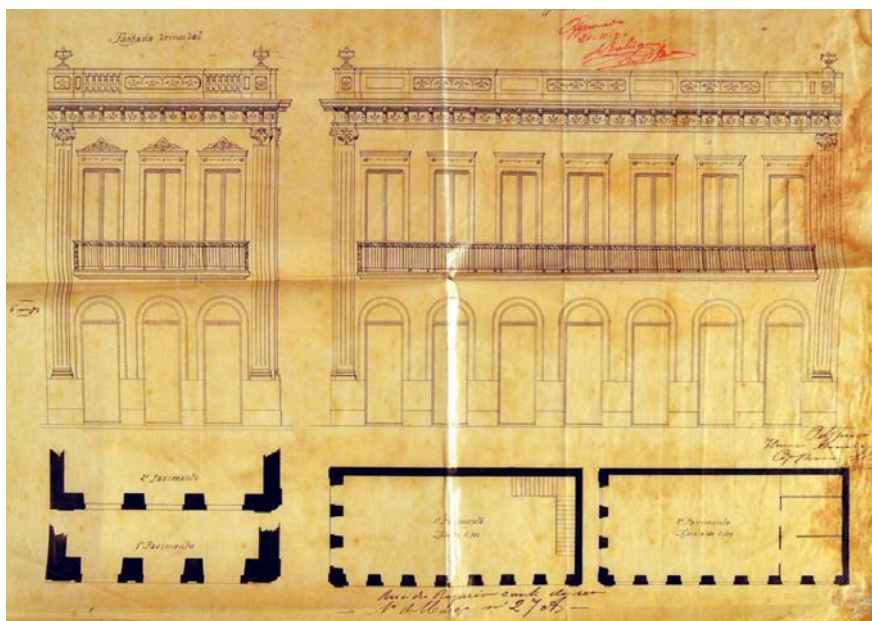
Source: AGCRJ collection

Figure 2

Project for the construction of the Ibero American United Bank, at Rosário street, at the corner of Primeiro de Março street, 27-A

Source: AGCRJ collection

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door, received an increase that led to the elevation of yards to the height of 3,30m determined by the law of that time, and the inclusion of flags vented at the top, now lost. This reuse of the original stonework of doors, visible in the yards, including the reconstruction of the angled corner, was a deliberate gesture designer who planned retirement. He chose to reuse building materials and retain the pre-existing forms, only adapting them to changing times.

As in the case of the two bank headquarters, cited above, we observe that both the construction of the new as existing reshuffle followed a very similar formal repertoire, serving up the same type of decorative elements. The second building would save, after the works, doors with arched lintels shot, which, together with the location of the building, may point out that its construction took place, possibly in the eighteenth century. But this conservation formal elements from the past - denoting unequivocally, the age of the building - was not considered by the designers or the owners incompatible with the new image that was being produced. The building was considered to be new to all effects, as perfectly met the needs and expectations of its owners at the turn of the twentieth century.

This resilience of the buildings from the colonial past, at that moment, stemmed mainly from the typological continuity between these buildings and the new. Both would be raised within the same land subdivision and the same internal distribution scheme under the same construction techniques, and would house the same functions. In the book "Quadro da Arquitetura no Brasil", Nestor Goulart Reis Filho establishes a close relationship between the development of architecture and the parceling of land in which it is located. Land and building constitute an indivisible whole, where the shape of the lots is in direct correspondence with the type of architecture that will receive. In the colonial period, the urban architecture would be based on a division of land into long, narrow lots. The streets were shaped by the buildings tested, which had the main facade on the public highway and side walls constructed within the limits of lots, shared with neighbors (REIS FILHO, 1978, p. 22). This is a very dense form of land use, where the buildings were erected on three of the boundaries of the lots, leaving only a free area in the back, where was located the yard. For the author, the uniformity of the land was reflected in the uniformity of the architectural parties and internal distribution of buildings:

> *As salas da frente e as loja aproveitavam as aberturas sobre a rua, ficando as aberturas dos fundos para a iluminação dos cômodos de permanência das mulheres e dos locais de trabalho. Entre estas partes com iluminação natural, situavam-se as alcovas, destinadas à permanência noturna e onde dificilmente penetrava a luz do dia. A circulação realizava-se sobretudo em um corredor longitudinal que, em geral, conduzia da porta da rua aos fundos. Este corredor apoiava-se a uma das paredes laterais, ou fixava-se no centro da planta, nos exemplos maiores. (REIS FILHO, 1978. p.24)*

> *The front rooms and the store took advantage of the openings on the street, getting the openings of the funds for the lighting of the residence rooms of women and workplaces. These parts with natural light, were located the alcoves, intended for night stay and where hardly penetrated the light of day. The circulation happened mainly in a longitudinal corridor that, in general, led from the street to the back door. This corridor rested on the sidewall, or fixed in the center of the plant, the greatest examples. (REIS FILHO, 1978, p. 24)*

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Figure 3

Building at Ouvidor street,
45, at the corner with
Primeiro de Março street.

Source: the author,
August 8th, 2011.

Figure 4

Building at Ouvidor street,
16, at the cornet with
Mercado street.

Source: the author,
November 22nd, 2011

Figure 5

House at Ouvidor street, 16.
Details of the floor doors.

Source: author,
November 22nd, 2011

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According to Reis Filho, the type of deployment in the lot and the plant type from the colonial period have been preserved intact until the nineteenth century. In the second half of the nineteenth century, there were significant changes in the implementation of the buildings on the lot, with the removal of the construction of lateral limits (REIS FILHO, 1978, p. 44). But these changes occurred within a framework of expansion of cities into new areas, since the side setback of buildings assumed larger lots than those found in the center. Furthermore, these areas of expansion had a more rarefied occupation of land, while in the center, the most valued area of the city, the occupation was denser. The side setback was also associated with an increase in concerns about housing hygiene in the period, as the fact of having a side opening to rinse allowed every room in the house had windows giving out, eliminating the alcoves . Interestingly, the end of the alcoves occurred within the same internal distribution scheme of the colonial period, with the living room in front of the rooms in the middle and the dining room in the back, coupled with the kitchen and the bathroom, another novelty of the period. The distal end of the batch house, on one side, therefore constitute another type of plant from the Colonial variation period than a completely new type.

For Reis Filho, the removal process of the houses of the lot boundaries would deepen in the early twentieth century, with lots of larger homes and isolated in the center of the land, which enabled greater variations in plan, and a detachment of that type. However, these new deployment were exclusively associated with the production of residential buildings in new suburbs. Those who had business function on the ground continued to depend on direct contact with the street to the development of this activity. These typological innovations did not reach the downtown area. Both because of the greater appreciation of the soil, which encouraged a denser occupation and the commercial function of buildings on the ground floor, and by the historical heritage of the place, we should not underestimate, the downtown buildings to retain the same internal distribution colonial period, with the living room in front of the kitchen at the back, connected to the dining room, and rooms in the middle. Although they were not more alcoves, its position in the plant of the houses would remain the same. The maintenance of land subdivision and internal distribution meant that the new buildings did not differ much of the oldest, which in turn, were conserved useful and appropriate to the needs of the time.

The condemnation of alcoves by technical means, from the mid-nineteenth century led to the introduction of an important innovation in plant type from the colonial period, in the more central areas and densely populated city. The houses continue to be built on the lot boundaries and the living room facing the street, the dining room in the back and the rooms in the middle. However, these rooms would not be alcoves anymore, but they would become interspersed with internal areas covered by skylights, allowing its lighting and ventilation. In some cases, there were even more than one area, depending on the depth of the building. It is not possible to know for sure when the internal areas began to be used in buildings in Rio de Janeiro. They became mandatory in 1892, with the posture of September 15th, but its use prior to the posture. In the city center, I could identify the use of internal areas covered by skylights from the 1880s, as evidenced by some works of licenses for the period, deposited in the General Archives of the Rio de Janeiro City.

The project of a townhouse with two floors to be built on São Pedro street, 54, date from 1882 (Figure 6 - AGCRJ, LO1882, cx.01, doc.06). It is seen in the right plant, the ground floor of the building, with the store taking up almost all the space and the free open area at the back. Access to the upper floor is via a separate entrance, which opens onto the ladder leaning against the side wall of the property. This ladder

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position is a pattern that repeats itself in buildings of Rio de Janeiro. The projections of the areas covered by skylights that illuminate some of the rooms upstairs are also observed in this floor. The left plant shows the top deck. The rooms do not have any name, only the areas have been designated. In addition to the open area in Lot funds, there are two intermediate indoor area covered by skylights that illuminate the rooms that are not open to the street or to the funds. These rooms are arranged in line along a corridor through the whole building, along the side wall disposed in continuation to the access ladder. This internal distribution would be the standard in the city center, as the lots, long and narrow, did not allow wide variety of internal rules.

Figure 6

Building to be built on São Pedro street, 54, in which we can see two internal areas covered by skylight.

Source: AGCRJ collection.

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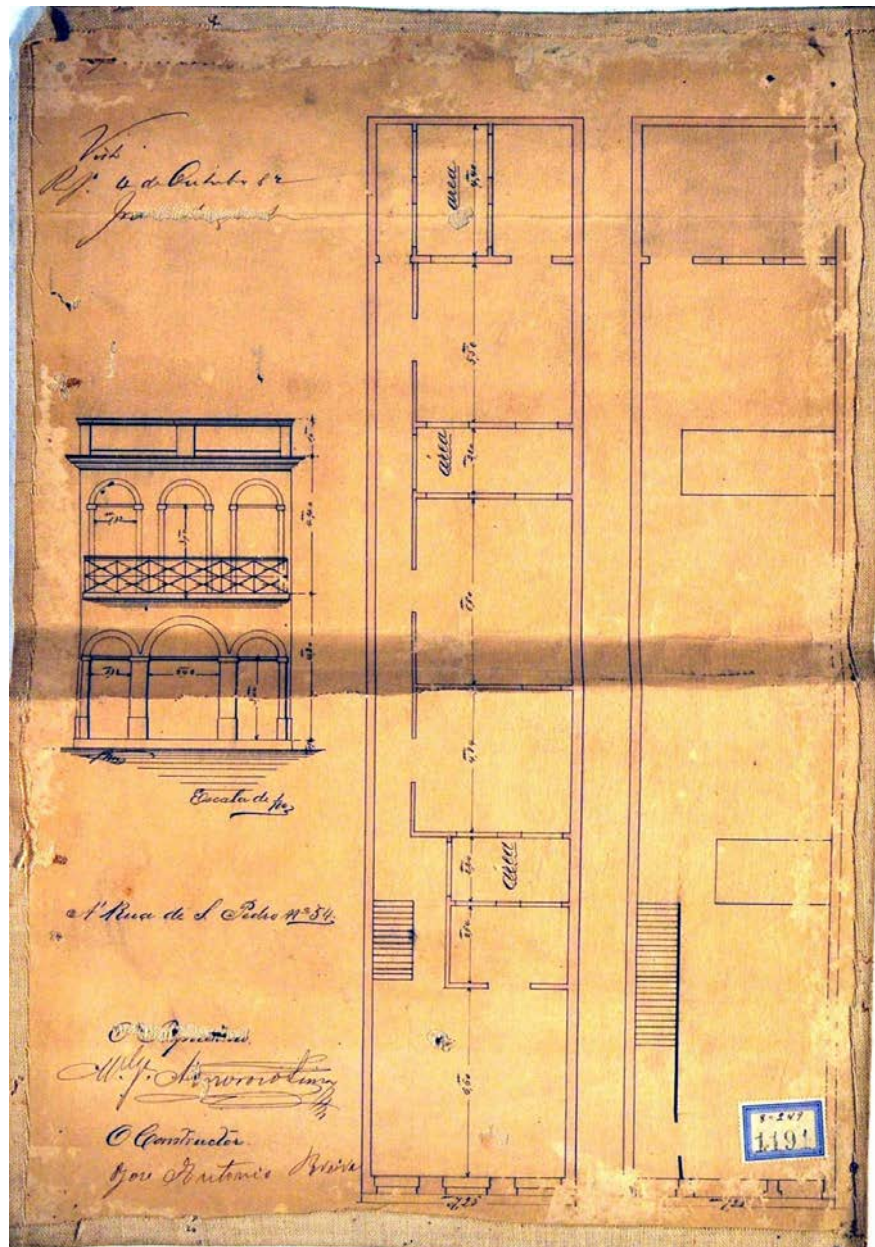
The buildings erected between 1890 and 1920, including the ones from Passos' period, follow this same type of plant, with, however, some variation in larger lots, where skylights would be the center, with rooms arranged around and not by the side wall of the building. Thus, the buildings erected during Passos' period, but met the new health standards, were direct descendants of the buildings from the colonial period. Precisely because there is no typological break from the more distant past, the old buildings could be preserved and preserved so extensive mode now. The typological continuity caused the colonial buildings were well accepted by society then. Those buildings met the expectations and needs of the people of the time, needing to spend only a few adjustments to be considered current. These adjustments could be so much more highly technical nature (such as the installation of sanitary equipment and pipes in general, and the opening of skylights) and aesthetic, through the numerous facade of reforms that added ornaments eclectic to pre-existing buildings, operations allowed update the look and operation of buildings, adapting them fully to the new times. The typological continuity, coupled with the continuity of building techniques, was a major factor to establish a culture of building that was a residence culture.

Moreover, even in the cases of former new architectural production were numerous situations of commitment and continuity with the pre-existing. This question would be visible in the parceling of land, which was determined from the colonial period, and on which the study period did not cause major changes. Those long and narrow lots were still fulfilling the standard of the buildings of the time, so that their owners did not see reason to modify them. (It follows from this prohibition to subdivide lots, present in the sale notices of land in the streets improved by administration steps and rules for buildings in Central Avenue, where the increase in the size of the lots had to be imposed on owners of compulsorily). The question would be visible even in the architectural scale of new buildings, which would have the same number of floors of the old, the construction techniques employed in property plant type, and the reuse of building materials in the production of new buildings. This is a new one without tabula rasa, a new that remains on the edge of a secular tradition.

Suspected buildings of threatening to ruin

On the other hand, the turn of the century marked a hardening of City Hall actions in relation to the oldest buildings of the city, which is visible in the procedures relating to buildings suspected of threatening ruin. (It is worth noting, however, that the legal provisions which reflect this hardening prior to administration steps, that is, were not designed as a support to urban reforms.) In the space of two years, two decrees were promulgated whose effects, combined, significantly broadened the possibilities of condemnation of those buildings.

Suspected buildings threatening ruin were the subject of surveys since the nineteenth century, in compliance with the Code of Postures of the provisions of 1838. But the administrative inspection procedures have gone through a process of progressive legislation, making it more complex from the end of that century. The vast majority of administrative surveys that studied followed the procedures regulated by Decree 506 of January 3rd, 1898, which established an important distinction between cases of impending doom, which would require the immediate demolition of all the property or parts of it, and cases of ruin deemed repairable. These cases did not require any demolition, but only the completion of the repairs indicated by the Directorate of

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Works. Thus, the fact that a building has gone through the administrative inspection procedure did not imply necessarily in their condemnation. But based on the inspection report, the City had the authority to order full or partial demolition of buildings affected, so that the decree gave the government of life and death power over the property. Although these powers have been used very few times fact, they existed, which made the survey procedure very threatening to the owners of the affected buildings[1].

The effects of Decree 506/1898 were also boosted by the provisions of Decree 762 of June 1st, 1900. These provisions restricting the repair possibilities in existing buildings, which could derail the repairs determined in the inspection report. Often, condemning the property for demolition was not the report itself, but the provisions of this decree, which prevented the required repairs. All legal provisions studied during the research, from the 1838 Code of Postures to Passos' period, had the buildings to be constructed or rebuilt should conform to the new legislation. The concept of reconstruction applied to all buildings whose reach repairs to more than half of constructed area, which means that existing buildings that needed more consistent repairs should have feet minimum rights required by law. This amounted, in practice, a retroactive application of the law, since its provisions would extend to buildings erected before

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1. In general, buildings suspected of threatening ruin were sentenced to complete demolition only in the streets included in the City Improvement Plan, and only in years when the plan was being actually implemented (in particular, in 1904, the year of expropriations of buildings necessary to streets of enlargements). On the streets that were not included in the Improvement Plan, even if it were a noble street as Ouvidor street, a tolerance of behavior in relation to buildings suspected of threatening ruin by the technicians of the City Hall was observed, and the reports of the administrative inspections held there showed a maximum carrying out partial repairs. Also, these streets such repairs have always been allowed, although sometimes smite the Decree nº762 / 1900, reaffirmed by Decree 391/1903. But even in the years of implementation of the Improvement Plan, was observed only a small number of cases of buildings at risk of collapse, both in broad streets and in the not extended. In Street Uruguayana, enlarged by the city, three cases were observed in 1904 and two in 1905. At Ouvidor street, there were two cases in 1904 and three in 1905. This shows that even at that time, the administrative inspection procedure was one Except for action, not an instrument used in large scale for the condemnation of existing buildings.

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its enactment. What, in theory, would force many buildings that lacked only repairs (although consistent) to be totally redone, since the increase in ceiling heights could not be achieved without the full reconstruction.

Decree 762/1900 has further amplify these provisions, as established (Art. 44) which could only be repaired buildings whose external walls were properly plumb, and whose coverage does not require complete replacement of the tiles or the timber. It could also not be repaired or even decorated the facade of the building that did not have at least four meters in height on all floors. These provisions are not referred only to the repairs that they met more than half the floor area of the buildings, but any repairs, which increased, and much, the power of action of the law on pre-existing buildings. If a property was constantly prevented from being fixed, it ended up being ruined, leading to replacement. In addition, the Decree prohibiting the repairs that reach more than half of the area in buildings with less than four meters in height, and the buildings would be, in this case, subject to the total reconstruction.

The effects of these two decrees should always be seen together, because the repairs required by the engineers of the City Hall based on Decree 506 could be prevented by the provisions of Decree 762, what, taken to its ultimate consequences, might lead to the final sentence of the affected property. The provisions of both decrees were reiterated by Decree 391 of February 10th, 1903, the law of buildings enacted by the administration of Pereira Passos, which further expanded the powers of the City Hall in the demolition of buildings condemned by surveys. It was maintained, however, the distinction between those who threatened imminent ruin and repairable judged, so the fact undergo an inspection not necessarily behave the property condemnation, although the repairs were often unable by the provisions thereof decree.

Despite this apparent hardening, administrative procedures relating to buildings at risk of collapse were somewhat ambiguous, as it allowed a wide range of positions when your application. On the one hand, gave the Hall very broad powers in the evaluation of real estate and in the immediate demolition of those tried in the worst conditions. On the other, it was a choice of the owners the right to appeal (although the appeal was decided by the mayor, while the City Hall, once again, the final word) and distinguished properties between repairable and non-repairable, giving rise to numerous discussions on actual condition. This means that the scope and meaning of these provisions at all of the shares of City Hall would largely depend on the way they were applied.

Although all the threats and the powers that the law gave to the City Hall (in the condemnation of the property) the outcome of cases of buildings subject to administrative inspections was favorable to the owners in most cases studied during the research, as can be seen in the following example. On January 8th, 1904, the Directors of Santa Casa de Misericórdia asked permission to replace the rafters and timber needed to be done in building Ouvidor street, 52 (AGCRJ, cod.23.2.7, fls.111-130) . Obeyed, so the report of an administrative inspection carried out three days earlier. However, Backheuer, the engineer who reviewed the request, manifested itself contrary to grant a license, because according to the Decree 391/1903 (Art. 42), the building could not be repaired because the repairs demanded full replacement coverage, and this had no feet minimum rights required by law. Which, in a way, contrary to the result of the survey, whose report indicated that the ruin was partial (was restricted only to cover) and repairable. The fact of the "ruin" of the building have been considered repairable is a valuable information as it indicates that this was undergoing regular maintenance - was not degraded, much less was decrepit.

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On the other hand, Decree 391/1903 to determine that the buildings that did not have the legal rights feet could not undergo certain repairs, allowed to harden the application of the results of surveys in addition to what had been established in their own survey. What condemned the building in question was not the survey itself, but the provisions of the Decree. Given their low ceiling heights and the presence of the eaves, we can assume that it was a very old building, possibly from the colonial period. A similar building could not be tolerated in the main street, in the engineer's view, and the request for repairs was rejected. The demolition of coverage, without the owner was allowed to build another in its place, did not allow the use of the building, whose reconstruction behold would be mandatory, even by indirection. Before this decision, the tenant of the building presented on February 8th, a new petition requesting the relief of the imposed fine and license to rebuild the roof of the building. He argues that the law was unfair because condemned a building in good condition only because he had no feet the rights.

Honorable and Excellency Dr Mayor of Distrito Federal [...]

The Construction Directory can not directly order the reconstruction of the building determined the demolition [coverage] and denied license to make it again, so putting the owner in contingency let time destroy the walls of your building or if it wants to rebuild it according with the new municipal postures.

[...] No one can agree that it is fair to require an owner to rebuild your building for the simple fact that the heights of your floors a few centimeters less than that required by new municipal postures; causing this major rebuild losses to the owner and the tenant in him established with your credit signed that necessarily can not in Facilities Policies in which it is the city, completely works, because the avenues for your Excellency projected and the Government of Union, find a building well located to install, you will have to settle their business.

[...] Confident that your Excellency should reveal to you the fine to which lies exposed and grant him leave to arrange for the replacement of the roof of that building, in the parts on the report of the experts [... asks approval.]

The application was dismissed by the mayor in person, and the City issued a summons for vacating the property, on which the lessee has submitted a new application, with the same content. At this time, the insistence of the lessee started winning the arguments of City Hall, and all subsequent petitions, with very close dates were deferred. The tenant was allowed to reform the coverage, building a parapet and to promote reform in the property ornamental facade, as well as internal changes, such as opening a skylight (AGCRJ, cod.23.2.6, fls.56-59) - despite all these works contrary to the provisions of Decree 391/1903. Thus, despite the legislation and all the comings and goings of the process, the City allowed the adaptation of a very old building to the needs of modern life, both from a health point of view, by opening the internal area covered by skylight , as aesthetics, with the addition of modified ornamentation it appear. And this building, so updated, was considered fully modern in the sense that perfectly met the expectations of its occupants in the period.

This case shows an example of owner who won the City by insisting. But this victory also means that the City did not apply the law in all its rigor, even in the period of maximum advertising production of the new architecture. This means that the permanence of some buildings from a more distant past was not considered incompatible with this production. On the one hand, held administrative surveys were very

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few throughout the city, which shows that it was an exception action by the City Hall. Second, the surveys, even when they had their effects amplified by the requirements of Decree 391/1903 led to effective condemnation of very few properties, and only in the areas directly affected by the Improvement Plan, the extended streets. This shows that that instrument was used with all its power only in a few isolated cases. It was a surgical, timely intervention, not an instrument used for the mass condemnation of the old buildings of the city.

We can interpret this in the light of typological continuity between the new buildings and the pre-existing ones, even those from a more distant past. This continuity caused the buildings that were to be eventually rebuilt were not very different from those previously existing in the same place. For this reason, it is quite possible that city government technical staff were not fully convinced of the need to replace them, and accept applications for a license for repairs, even in those cases where the buildings did not meet all legal requirements. But the decision to retain the properties not limited to the issue of typological continuity, although this is crucial for conservation. Several factors - among them the very continuity typological, but also the division of land and the construction techniques used in buildings - contributed to the formation of a culture of building it was a property conservation culture. Only this culture explains the frequency with which applications for work permits were granted, even when the property did not meet all legal requirements. For this reason, the building permits analyzed during the research pointed to the production of a new no tabula rasa, a new that always carries a thread that connects to the tradition, although the reformist speeches Steps period affirm the opposite.

Figure 9

Building under construction at the corner of Senado street and Inválidos street. The huge contrast with the buildings from the past that we observe here did not exist during Passos' period, when the new architecture was produced within a continuity of scale, type and construction materials in relation to pre-existing.

Source: author, November 22nd, 2011.

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Final thoughts

The strength of antimony images that justified the urban reforms and its so remarkable stay in the later historiography about the period make the analysis of Passos' administration works licenses surprise to today's reader because of them emerges another city, very different from touted in speeches. Perhaps what most striking in the picture that emerges of licenses is precisely the coexistence of a new production emphatic speech with a culture of building based on stays, a period that sets out how profoundly transformative city. How to interpret the fact that the design of urban reforms in action during the administration Passos have incorporated many elements from the pre-existing city? It would have been incomplete in its purpose? Or would there have been reforms in some way incompatible with those stays?

I think we can interpret this in two complementary ways. First, we can not overlook the power of discursive strategy that justified the urban reforms, which makes you believe that there is a break with the past for a total renovation of the city, when what actually happens is a very partial transformation of its mass built. It is the reformist discourse that fills the space between reality and the idea of total renovation. The opposition between old and new that gives shape builds thus a way of looking at reality - builds in some respects, reality itself. In this sense, the absence of a total renovation of the city, in its materiality, would not be evidence of an imperfect realization of speech in practice, but evidence that the speech enhances and amplifies the meanings of real reform and increases the total renovation status that she was not and had to be. For this reason, we should not think the design of urban reforms put in place in Steps period under the "actual application" of an "idea" (which precede the "application"), because both act simultaneously. Practical actions that the project has on the city and the level of ideas feed and interpenetrating, constituting an indivisible whole.

A second issue to be highlighted in the interpretation of urban reforms during Passos' period is that we have been accustomed to think of the urban renewal process in terms of tabula rasa - the culture of building the latest twentieth century and the Modern Movement led to this. Thus, we simply cannot see the new character of those colonial buildings that went just by adding fascia, keeping his features. But for people in the early twentieth century - including city government technical staff which granted the building permits and the mayor himself - those colonial buildings reinterpreted through more or less extensive reforms were also new, in another culture build that incorporated the elements of the past to the production of the new.

It is interesting to note that it was not about an equity value. Old houses built to the city modernized by these readings, or simply by being inhabited follow in this, were not seen as historical heritage. It was a value of use which made them current. This happened because those houses fully met the expectations and needs of its inhabitants in Passos' period, both in terms of land subdivision as functions, internal distribution and number of floors. The architectural scale and the plant typology of old and new buildings were very close. This also applies to the most monumental buildings, erected on the new lots in areas expropriated. They also have the same number of floors, the same functions and the same type of those smaller plant and would be raised to the same constructive technique and same materials. For all these reasons, the architecture produced during the urban reforms was known largely by continuity with the pre-existing architecture, which in turn, was not old or decrepit, but was going through a continuous process of renewal, both through maintenance and reforms as reconstructions, throughout the nineteenth century.

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Thus, we must reassess the enormous distance that seems to exist between the image of the new gift in City Improvement Plan and the subsequent literature, and the image of permanence and continuity that emerges from the building permits, the other side of the City Hall action in that same period. The most intriguing player for today is that the speech in the new production of defense lived at that early twentieth century with a culture of building it was a stay of culture, building a new no tabula rasa. But there is no ambiguity between the speeches and actions of the administration in its various levels. The incongruity is in the eye of the beholder. The surprise that the new no tabula rasa in question derives much of our own culture to build, where the "new" is incompatible with pre-existing and the old may exist only in the city in the form of ruins, in degraded areas, or heritage than any incompleteness or inefficiency in the implementation of urban reform project of the administration of Pereira Passos

References

AUTHOR. **Title**. Rio de Janeiro: UFRJ, 2012. xii,p. 591. Doctor's thesis – Program of Post Graduation in Urbanism, Architecture and Urbanism College, Federal University of Rio de Janeiro, Rio de Janeiro, 2012.

CHALHOUB, Sidney. Trabalho, Lar, Botequim: o cotidiano dos trabalhadores no Rio de Janeiro da Belle Époque. (1ª ed. São Paulo: Brasiliense, 1986.) Campinas: Editora da UNICAMP, 2001.

FERREIRA, Aurélio Buarque de Holanda. **Novo Dicionário da Língua Portuguesa**. Rio de Janeiro: Nova Fronteira, s/d.

Message from Distrito Federal mayor read in the Council County session of September 1st, 1903. Rio de Janeiro: Typographia da Gazeta de Noticias, 1903.

DISTRITO FEDERAL CITY HALL. **Melhoramentos da cidade projectados pelo Prefeito do Distrito Federal Dr. Francisco Pereira Passos**. Rio de Janeiro: Gazeta de Noticias, 1903.

REIS FILHO, Nestor Goulart. **Quadro da Arquitetura no Brasi**l. São Paulo: Perspectiva, 1978.

Kosmos Magazine, 1904-1906.

SEVCENKO, Nicolau. **Literatura como missão. Tensões sociais e criação cultural na Primeira República**. (1st ed. São Paulo: Brasiliense, 1983.) 2nd ed. magazine: São Paulo: Companhia das Letras, 2003.

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The *eclectic-academic* experiences of Lucio Costa - a gap in the history of architecture in Brazil

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Abstract

So-called modern Brazilian architecture has for a long time been interpreted as constituting a break with the eclectic and neo-colonial architecture that preceded it. This view stems from the discourse that was constructed to legitimize and justify the implementation of modern architecture in Brazil. Lucio Costa, who was one of the cornerstones of modern Brazilian architecture, and its main theorist, produced eclectic and neo-colonial works before his modern period which have frequently been ignored or disesteemed in publications about the architect. This article explores Lucio Costa's experiences in the 1920s: his training at the National School of Fine Arts and some of his designs classified as "eclectic" and "neo-colonial", as well as texts he wrote at that time. The purpose of this research is not only to touch on the oft-cited rupture, but to establish relationships between the architect's experiences during this period and the architecture he developed in the decades to come, classified as "modern", in an effort to reincorporate this period into the process of his theoretical and architectural evolution.

Keywords: History of Brazilian architecture; Lucio Costa; Decade of the 1920s.

Introduction

The discourse in defense of modern Brazilian architecture, formulated by Lucio Costa in the 1930s, condemned eclectic and neo-colonial architecture. According to the modern doctrine, architecture should be looking to the future and producing new forms that correspond to its era – these were based on ideas of progress and evolution, arising from the historical determinism of Hegelian historicist philosophy, which shaped the international modern movement[1]. However, modern Brazilian ideology also embraced other precepts which linked contemporary architecture to the traditional architecture from the colonial era. More recent interpretations have been highlighting the fact that many of the issues contained in eclectic architecture and academic teaching at the time contributed to the development of so-called modern Brazilian architecture.

The trajectory of Lucio Costa, one of the most important architects and theorists of Brazilian architecture in the twentieth century, is marked by an apparent contradiction between production classified as "eclectic", usually associated with academic production, and another classified as "modern", often viewed as a break with his previous production. It was because of this rupture, which historiography has established and deemed to be true, that most publications on Lucio Costa have excluded his production from the 1920s.

We believe that, due to this condemnation of certain features of eclectic architecture advocated by the modern precepts, an entire period was theoretically discarded, and that the discourse built by Lucio Costa in favor of modern Brazilian architecture, which was founded on tradition and continuity, needed to discredit eclectic and neo-colonial architecture in order to tie the project of implementing modern architecture in Brazil to a proposal of national identity based on Luso-Brazilian colonial architecture.

On the basis of these assertions, the primary objective of this research is to identify the relationships involving continuities and transformations between so-called modern Brazilian architecture and the architectural context that preceded it. It was with this goal in mind that Lucio Costa's "eclectic-academic" period, as coined by the architect himself, was examined, based on an understanding that it was part of a process that continued unfolding in the decades to follow.

We will then study the architectural milieu of the period that preceded the modern discourse in Brazil, identifying the issues that architects were grappling with during that era, in order to understand how this context, which includes eclectic and neo--colonial architecture and academic teaching, is related to modern architectural production and its discourse. For this purpose, the designs chosen were from Lucio Costa himself, who completed his studies in the architectural milieu of Rio in the 1920s. The architect achieved renown with designs that were completely in line with the production of that era; however, after the modern discourse was introduced and modern architecture proclaimed, his works from that earlier period were cast aside by historians and the architect himself. Complementing the analysis of his designs, Lucio Costa's writings from the same time period are also studied.

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1. COLQUHOUN, 2002 e 2004.

Lucio Costa as a student of the *beaux-arts* system

Lucio Costa was just 15 years old when his father enrolled him[2], in the General Course of the National School of Fine Arts (ENBA). The School's teaching methodology was very linked to the origins of the academic system, based on the study of history and examples from the past; the exercise of drawing and copying "great masters"; the studio, where masters passed on their methods and practical knowledge to their disciples; composition and thought in the three-dimensional whole as a design method; competitions, comprised of the sketch stage and development stages; the final designs; the annual exhibitions; and lastly, the prizes (with money, medals and trips).

Beaux-arts education, whose origins lie in French classical thought, was tied to a fixed and unchanging ideal; however, over time, historicist relativization was being assimilated. Therefore, the ideology that oriented the School at the time was closer to historicist than classical. The fact that the Brazilian relationship with the classical tradition is quite different from Europe's, where a deeply-rooted tradition exists, probably helped make the relativization of the cultures easier to assimilate. Brazilians never relate to classicism as Europeans do, in a nostalgic sense, but more with the way in which it was manifested in eclecticism, where the forms of the past were used with a symbolic intent and to appropriately tailor a building to the purpose for which it is intended.

In Lucio Costa's designs, one can note from early on a large degree of flexibility with respect to the very strict standards of classical architecture, but at the same time, the essence of classical composition can be found in his works. It's as though they stemmed from the classical, with different types of concessions added to them. This tendency toward relativism and flexibility in Lucio Costa can be associated with the thoughts of Guadet, but it was also being cogitated upon by students of the School in general, as can be seen in the technical specifications of former student Nêreo de Sampaio in his design for the competition with the prize trip to Europe in 1920, whose theme was a Big Luxury Spa[3], in which the architect said he chose "a picturesque effect" for the facades that to him seemed "pleasant, preferring it over any neo-classical application"[4], and justified his choice on the basis of the typical, traditional arguments of the milieu and refers to the theory of Guadet:

> *As seen, although the facade is symmetrical, there are asymmetries in the details of the main masses. I followed the counsel of Guadet when he says that symmetry is an intelligent regularity and shows how the picturesque can be combined with it with endless parts[5].*

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2. According to Lucio Costa, his father "surprisingly always wanted to have a child who would be an 'artist'" (COSTA, Lucio. "À guisa de sumário". In: COSTA, 1995, p. 12).

3. *Revista Architectura no Brasil*, Year I, No. 1, Oct. 1921, pp. 13-16 (Apud. LEVY, 2003, pp. 97-100).

4. Ibid., p. 16 (Apud. LEVY, 2003, p. 99).

5. Ibid., p. 16 (Apud. LEVY, 2003, p. 99).

Lucio Costa's eclectic production

While he was in his third year of the General Course of the ENBA, Lucio Costa got his first job[6], as a designer at Rebecchi[7] and afterwards worked in the "Heitor de Mello Technical Office"[8]. For a time after Hector de Mello had already passed away[9], the office was coordinated by the architects Archimedes Memória, a professor at the School[10] and Francisque Cuchet. Memória would be Lucio Costa's instructor in the Architecture Composition course the following year, when he would start the Special Architecture Course. During the year he worked in the office of Memória and Cuchet, the designs were probably underway for the Centennial Exposition, and according to Paulo Santos, Lucio Costa collaborated in the design of the Major Industries Pavilion, currently the National History Museum[11].

That same year, in 1921, Lucio Costa began his first built design: a house and studio for painter Rodolpho Chambelland[12] [Figure 1], who had been his professor at ENBA for the course "Figurative Design Principles and Live-Model Principles", in 1919, during the third year of the General Course.

Figure 1

Lucio Costa, House of Rodolpho Chambelland (demolished), 1921 [photo and floor plans].

Source: COSTA, 1995, p. 14
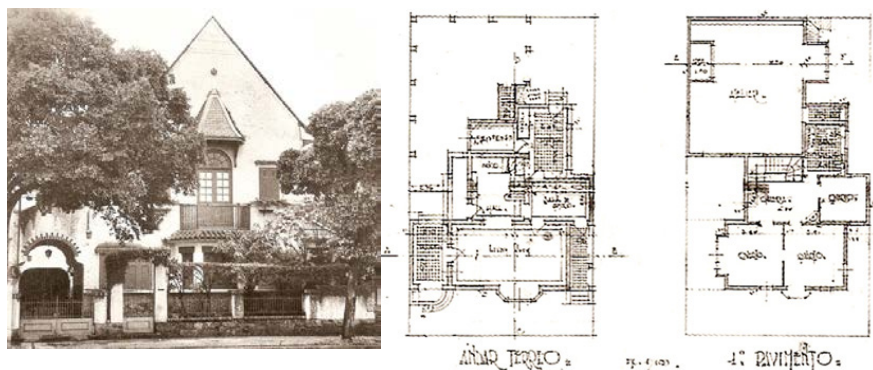
6. COSTA, Lucio. "À guisa de sumário", in COSTA, 1995, p.12.

7. Probably in 1919 or 1920, since he did third-year subjects in 1919, 1920 and 1921, according to his transcript.

8. According to Paulo Santos, probably in 1921 (SANTOS, 1962, p. 10).

9. Hector de Mello was one of the most important architects in Brazil during the first two decades of the twentieth century and he died in 1920. Besides being the professor of the studio course of the architecture program at ENBA, his studio generated an extensive number of eclectic works in Rio de Janeiro

10. After Hector de Mello's death, Memória, as an interim professor, took over the Design of Ornaments and Elements of Architecture course from the second year of the General Course. In 1921, after passing the public examination, he definitively assumed the Architecture Composition course (UZEDA, 2006, pp. 233-234.)

11. SANTOS, 1962, pp. 10-11.

12. According to Lucio Costa, in 1921-1922 (COSTA, Lucio. "À guisa de sumário", in COSTA, 1995, p.14). According to Alberto Xavier, the house is from 1923 (XAVIER (org.), 1976). We believe it is actually from 1921, since in 1922 Lucio Costa started his company with Fernando Valentim (COSTA, op. cit., p.15; SANTOS, 1962, p. 4) and this design was done in collaboration with Evaristo Juliano de Sá, according to Lucio Costa (COSTA, op. cit., p.14).

The following year, in 1922, after a two-year delay[13], he started the Special Architecture Course and opened his own office in partnership with Fernando Valentim[14].

It was also during this phase that he first came in contact with José Mariano Filho[15], while participating in the competitions sponsored by this enthusiast for the Rio architecture nationalist movement, through the Brazilian Society of Fine Arts. In 1922, under the pseudonym *Alguém* ("Someone"), he participated in the *Mestre Valentim Prize*, obtaining second place with his design for the Gate [2] and first place with his design for the Bench[16]. In 1923, his design for *A Brazilian Mansion*, under the pseudonym *Rolls-Royce*, won second place in the *Hector de Mello Prize*[17]. [Figura 3].

Figure 2

Lucio Costa, Gate Design ("Mestre Valentim Prize"), 1922.

Source: COSTA, 1995, p. 25.

Figure 3

Lucio Costa, design of a "Brazilian mansion", 1923.

Source: Magazine: "O Lápis", September 1931, p. 31.

13. According to Lucio Costa (À guisa de sumário, in COSTA, 1995, p.15), as well as his school records. According to Paulo Santos: "During this period at the School, due to his intense professional activities, he attended few classes, often only showing up for exams, in which his performance did not always measure up to the level of his talent" (SANTOS, 1962, p. 4).

14. COSTA, Lucio. À guisa de sumário, in COSTA, 1995, p.15; SANTOS, 1962, p. 4.

15. SANTOS, 1962, p. 8.

16. SILVA, 1992, pp. 397-398.

17. SANTOS, 1962, p. 14.

According to Paulo Santos, "The designs by Bruhns [awarded first place] and Lucio Costa were highly acclaimed and placed their authors at the forefront of the neo-colonial movement"[18]. The impact caused by Costa's design yielded him an opportunity to publish his first article in a newspaper (on the front page!), on March 19, 1924, in *A Noite*, under the title "The soul of our homes", which could also be considered his first theoretical text.

The ideas presented by Lucio Costa in this article were directly associated with the thoughts being expressed in *Revista Architectura no Brasil* by José Mariano and other architects from the era in their frequent discussions about the "colonial style". The reflections of architect Armando de Oliveira in the same journal[19] are a good example of this similitude. As in the article by Lucio Costa, he uses terms such as "the people", "the unique architecture of a nation", "climate", "customs", "culture", "temperament", "genuine individuality which is sincere and hospitable" and finally, "the simplicity of the colonial house"[20].

Also in 1924, Lucio Costa and Fernando Valentim enrolled their designs in the General Exhibition of the School and received the Silver Medal[21]. And so his name once again appeared in the Rio press[22].

The designs developed by Lucio Costa at this time were eclectic in style, borrowing references from European architecture and beaux-arts methodology and standards, some of which manifested a nationalistic slant, by seeking references in Brazilian architecture from colonial times.

In the design for the home and studio of painter Rodolfo Chambelland, Lucio Costa says he used the "English style"[23]. Apart from the facade and decoration elements, some compositional features also appear to have been drawn from the English-style house for the design. In the sixteenth and seventeenth centuries, the traditional architecture of the picturesque and asymmetrical English mansions started assimilating the standards from the classical traditions of Italian, French and Dutch architecture, introducing order and symmetry, which contrasted with the freedom of traditional English design[24], but in the nineteenth century there was a return to a freer design oriented more by functional purposes and adaptation to local features[25], which likewise presented greater freedom in the mixture of elements from different eras[26].

In Lucio Costa's design, there are characteristics which can be associated with the beaux-arts system, since the design is conceived from the perspective of an observer standing before the building – the house is parallel to the boundary of the lot, there is an axis of equilibrium in the front facade, and it can be clearly and directly grasped as a whole.

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18. Id., ibid.

19. Reflections by Armando de Oliveira in Revista Architectura no Brasil, Year 1, Vol. 2, No. 9 and 10, p.1, Jun-Jul 1922, p.36 and No. 7 and 8, April-May 1922, (Apud. LEVY, 2003, pp.85-87).

20. Revista Architectura no Brasil, Year 1 Vol 2, No. 9 and 10, Jun-Jul 1922, p.36 (Apud. LEVY, 2003, pp.85-87).

21. Lucio Costa and Fernando Valentim were the only winners from the architecture section that year (Catalog from the XXXI General Exhibition of the ENBA, 1924).

22. "Our salon of 1924," in A Noite, September 4, 1924; "National School of Fine Arts, Salon of 1924", in Terra do Sol, No. 9, Sept-Oct 1924, pp. 416-417.

23. COSTA, Lucio. À guisa de sumário, in COSTA, 1995, p.15.

24. PEVSNER, 1943, p. 265.

25. FRAMPTON, 1997, pp. 43-44.

26. PEVSNER, op. cit., pp. 338-340.

However, this first impression metamorphoses upon closer observation. The apparent stiffness of the composition gives way to flexibility. One notices that there is a main organizational axis in the facade which does not, however, divide it symmetrically; and that the volume is not as easily grasped as with the first initial view of the front facade. In contrast, a touch of casualness and flexibility is adopted that breaks the rigidity that could have been rather monotonous and less interesting. However, other sub-axes are created in an effort to restore symmetry to fragments and, especially, balance, with a constant tension existing between order and disorder, rigidity and flexibility. This apparent symmetry that does not become absolute will be repeated often in Lucio Costa's designs.

His first designs to use references from Brazilian colonial architecture were for José Mariano Filho's competitions. These designs effectively demonstrate the continuity of neo-colonial architecture in relation to the eclecticism prevailing at the time and how the differences between the architecture commonly practiced and so-called new neo-colonial architecture only entailed mere nationalistic ideological issues, since, in practice, the elements of colonial architecture were applied to architecture in the same way that other styles were.

In the gate design [2], symmetry predominates, common in academic design as well as the Brazilian colonial style. Once again, this symmetry is not formalized, since the pedestrian gate is placed on one side of the main gate, and a bench is proposed for the other side, in an effort to compensate the asymmetry created by the door, thereby restoring balance to the whole. Essentially, what distinguishes this design from Brazilian colonial buildings is the monumentality and pomp assigned to the main gate of the residence, along with the blending of so many decorative and material elements, characteristic of eclectic architecture. The elements from colonial architecture are quite different from each other and were largely drawn from religious architecture. Volutes are mixed with finely crafted wood doors, stone and tiles, in addition to sculptures that have no connection with colonial architecture.

The "Brazilian mansion" [3] has a typically academic and classical composition, as was common in many eclectic buildings – it's absolutely symmetrical and monumental volume is tied to well-defined main axes and consists of a large rectangular prism, from which a central body projects. The houses from the colonial period consisted of pure volumes and were not, as Lucio Costa's mansion, united with other volumes. The design is then embellished with elements from Luso-Brazilian architecture, in a collage of civil and religious elements, including windows, doors and balconies, in addition to other elements from Spanish-colonized countries, which were used under the name "mission-revival style". The ceramic hipped roof, with an overhang, was taken from colonial architecture; however, to adapt it to the volume, different roof planes were applied and, thus, the building, likewise in this aspect, digresses from the simplicity of the colonial style.

Other references, further removed from neocolonial architecture, recommended by José Mariano, continued being used. The design of a castle for the residence of Barão Smith de Vasconcellos, in Itaipava [4], was the most talked about and praised architectural design of the Exhibition of 1924 and its watercolor sketc[27] was the image that accompanied the articles published about the awards[28].
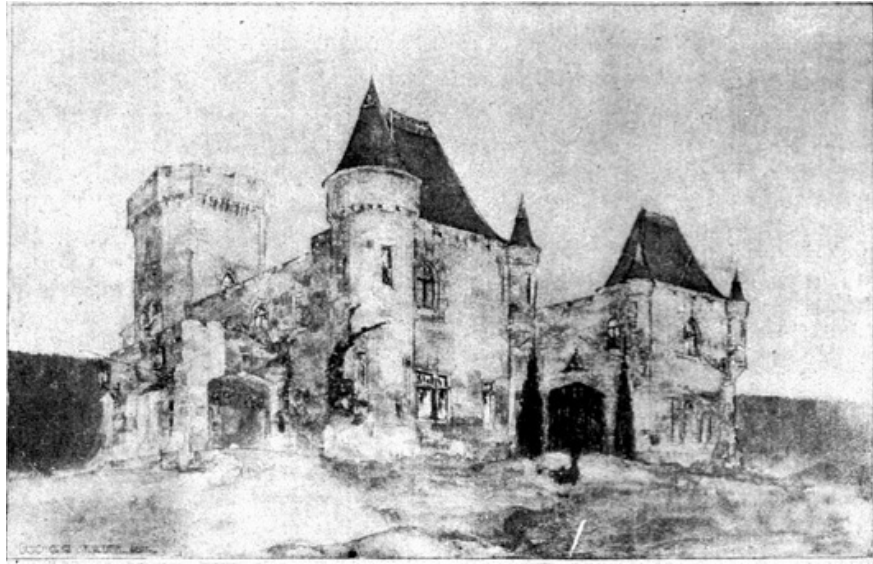
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27. According to Paulo Santos, was a watercolor by Lucio Costa over a sketch by Fernando Valentim (SANTOS, 1962, p. 5).

28. *A Noite*, Sept 4 , 1924; Terra do Sol, No. 9, Sept-Oct 1924, pp. 416-417.

This design exemplifies how architecture was open to all kinds of references, provided they were justifiable in relation to the character of the building. Being a baron's residence, outside the city, nestled in the hills, with mountain scenery and cool climate, the castle was a perfectly justifiable solution.

However, in a text about his partner Fernando Valentim[29], Lucio Costa, in a reproachful tone, attributed the choice of style to the client and the design more to his partner than to himself. But, at that time, a castle design did not raise any eyebrows – other castles and mansions had been built around the city[30], which were well received by the public and esteemed by critics, the salons and the press.

The volumetry of the Itaipava castle can be compared to the "Brazilian mansion" in the sense that, despite Gothic references in the ornamentation, the doors, windows and roofs are very classical in composition, due to the use of pure volumes with clearly delineated axes which, although not defining an absolutely symmetric whole, do display concern for the balance and proportions of the whole. This demonstrates that the conception of architectural volume was often not tied to the style chosen for the building.

Another house that was extolled among the designs displayed in the Salon was the residence for Arnaldo Guinle, in Teresópolis[31] [Figura 5]. As with the castle, it could be said that the building was an imitation of a European style totally unrelated to Brazil and its culture, but that it could be associated and justified by the "mountain climate" and since it was a country house.

This is a strictly symmetrical composition and, unlike the Rodolfo Chambelland house, the design does not appear to make any concessions to functionality or creative freedom on the part of the architect, but rigorously adheres to the standards of a

29. COSTA, Lucio, Fernando Valentim, in COSTA, 1995, p. 431.

30. For example: the Palace which houses the Oswaldo Cruz Institute in Manguinhos, built from 1904-1918; the small French Castle by Heitor Mello on Oswaldo Cruz Avenue, in 1913; and the Smith de Vasconcellos residence on Atlântica Avenue, by Virzi.

31. Although Bruand claims that this house was built (Bruand, 2002, p. 44), and Alberto Xavier included it in his list of built designs [XAVIER (ed.), 1976], no photos of this building, nor any reference to its location, have been found.

symmetrical composition that follows certain axes and, thus, any stylistic references are limited to ornamentation. There is significant movement in the volumes of the house, both in term of the facades, with volumes that project and recede, and in the arrangement of the rooftops. Once again, we are dealing with a typically *beaux-arts* composition with Gothic-based ornamentation, such as the apparent timberwork on the facade, which in Gothic architecture was the actual construction technique, while in this building it was probably just ornamental.

Based on the study of these designs by Lucio Costa, one can conclude that his production was totally in keeping with the other designs in his midst, namely those done at the School and by the major studios that were designing and building in Rio de Janeiro. The learning assimilated via the *beaux-arts* teaching system, his professors, local architects in Rio and also José Mariano Filho, appeared to be complete, as he had demonstrated his ability to produce renowned architecture with flair and sensitivity, resulting in prestige and clients.

As was seen in these designs, the stylistic issue was very important in architecture and the style adopted in each design needed to fit the characteristics of the building being created. However, the question of style was quite independent in relation to the type of building, whose volumetry was determined according to non-stylistic criteria, whether based on stricter rules or with greater freedom, but the style of the building was often confined to architectural elements inserted after defining the volumetry, which was essentially based on the beaux-arts compositional system.

Therefore, neo-colonial during this period was inserted into eclectic architecture as one of the stylistic possibilities that architects could choose from, depending on the characteristics of the design in question.

One can also see that, depending on the design, the rules of classical composition were highly adhered to, while on other occasions greater concessions were permitted for the sake of functionality and the creativity of the architect, thereby resulting in greater compositional freedom.

Reflections and experimentation after the trip to Minas Gerais

For the young architect (and still student), 1924 was a very busy year. In addition to the award in the General Exhibition of the ENBA and the two newspaper articles mentioned above, Lucio Costa was invited by José Mariano Filho, as president of the Brazilian Society of Fine Arts, to travel to Minas Gerais to do research on colonial buildings and create material that architects could refer to when producing their designs.

So, Costa Lucio embarked upon his trip to Diamantina, which took "around thirty hours by train"[32]. For the first time, he visited a colonial city in Minas Gerais. He also went to Sabará, Ouro Preto and Mariana.

In a more recent extract from his autobiographical book, Lucio Costa recounted:

> *Upon arriving, I stumbled totally into the past in its freest, purest sense; a past that was entirely brand new to me. It was a revelation: houses, churches, a cattle herder's inn, all made with wattle and daub, in other words, strong wooden frameworks – studs, strip foundations, roof beams – framing mud walls, the so-called rammed-earth, or wattle [...]*[33].

Figure 6

Lucio Costa, Erection of Gate, Diamantina, 1924.

Source: COSTA, 1995, p. 28.
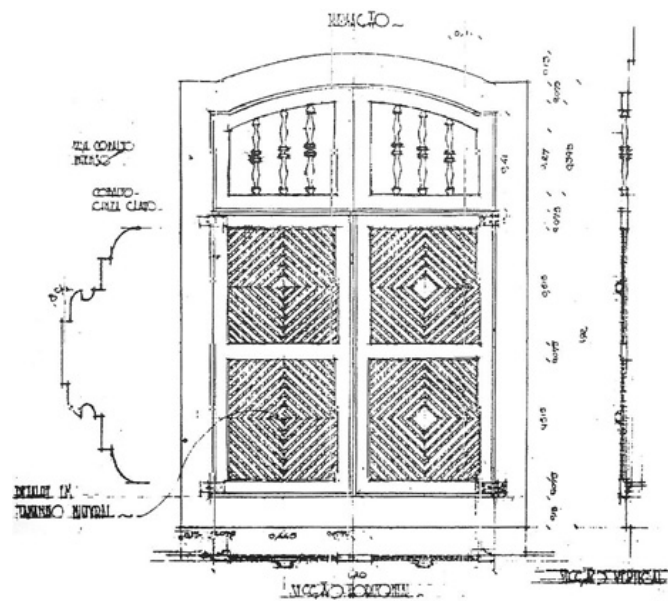
When he returned from Minas, he noted his impressions in the article "Reflections on our taste and style," published by the newspaper A Noite, on June 18, 1924.

Lucio Costa's discourse, on that occasion, was significantly different compared with the thoughts he had expressed in the past. The architect appeared to be stating his own personal position – the beginning of a critical view of the architecture that was being produced and the discourses that were being presented.

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32. COSTA, Lucio. Diamantina, in COSTA, 1995, p.27.

33. Id., ibid.

If in "The soul of our homes" Lucio Costa appeared to be parroting the discourses of the architects from Rio and José Mariano Filho, he was, in this one, criticizing the way in which neo-colonial architecture was being produced, deeming it to be at odds with the true colonial style:

"I came across a style that is completely different from this greenhouse or laboratory--produced colonial style which has emerged in recent years and with which people have, unfortunately, become accustomed, to the point that the true colonial style is classified as an innovation"[34].

The architect also appeared to be very interested in other aspects, besides the form of colonial buildings, such as the "intelligent solution" provided by colonial civil architecture, which is quite significant in the sense that, until then, only isolated colonial elements were drawn from, and then applied to typologies and construction techniques that could be used with any of the stylistic options. This observation on the manner of construction in colonial architecture introduced into the architectural milieu, therefore, a different concern than that being expressed by architects who defended the neo-colonial style.

His discourse also created an awareness of the distinction between the religious and civil architecture of the colonial period, as well as between elements drawn from Portuguese architecture and those stemming from Spanish architecture, demonstrating concern for a more comprehensive procedure for defining Brazilian architecture:

I found in these cities [...] a multitude of very interesting details [...], as well as certain elements of Hispanic-Arabic influence that, take note, must be used very carefully so as to avoid any improper trace of orientalism in our buildings[35].

He also took a clear stand, inherited from his training in the beaux-arts system, related to the anti-stylistic rules of composition and the importance of the rules of proportions:

In his creation, the architect must take into consideration both the present and the past, as well as future trends. We need to take advantage of what we have inherited from our forefathers. But in doing so, conserving, above all, the beauty of the proportions: general proportions – where horizontal lines dominate, thereby imparting an impression of calm and tranquility to the whole; minor proportions – such as the spans, for example, making them less elongated and closer to the overhang. Conserving, in essence, this set of little nothings which, ultimately, represent everything, and which bear in their insignificance, an intangible something, a certain something which a work of art contains that you can't define, but which moves and attracts[36].

Lastly, he presents a discourse of a rational nature, advocating once again architecture based on solid criteria, but opposed to any element that does not have a justified "function" in the architecture. He also assumes a different position regarding the application of styles:

[...] Everything in architecture must have a reason for existence, a role to play, whatever it may be. We must put an end to the inconsistencies and absurdities which we constantly see in our houses – balconies, where a chair barely fits; skylights that

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34. COSTA, Lucio. Reflections on our tastes and style, A Noite, June 18, 1924.

35. Ibid.

36. Ibid.

do not illuminate anything; small roofs that do not shelter anything; window boxes in inaccessible locations; props incapable of supporting any weight. Put an end to these little intricacies which, under the pretext of embellishment and decoration, every builder believes he has the right to 'create'.

[...] There is no need to be concerned about creating a national style. Style comes on its own. It's not necessary to go about stylizing parrots and pineapples ... every architect and owner must simply have a sincere desire to create a work which fulfills, in the best possible way, the purposes for which it is intended. A composition that is delightful to the eye, and where the spirit can rest. Let's be simple. Let's be sincere. Let's avoid lies. Let's avoid the ridiculous. Let's avoid all these excessive intricacies in the architecture of our houses[37].

The designs from the period that follows also indicate changes in the ideological stance of the architect after his trip to Minas Gerais.

That same year, in 1924, Lucio Costa and Fernando Valentim designed a residence for Olga and Raul Pedrosa on Rumânia Street, in Laranjeiras[38] [Figura 7]. This residence has many references from colonial architecture and does not adhere to any European style, which may be an indication that Lucio Costa, after returning from Diamantina, had discarded other stylistic options. However, some changes of another order also appear to have taken place, as can be seen in a morphological analysis of the house.

Figure 7

Lucio Costa and Fernando Valentim, Residence on Rumânia Street, 1924.

Source: BRUAND, 2002, p. 57.

The disposition of the volumes of the house in question is very different from the Chambelland house. In the plan, there is no juxtaposition of rooms creating a jagged volume, but rather an arrangement of rectangles within which the rooms are organized – a manner of conceiving a design that resembles colonial houses, usually contained in rectangular prisms. But, like the "Brazilian mansion", it differs from colonial houses in that it does not consist of a single prism, but combines more than one volume.

The first impression, when viewing the house, is definitely not one of a typical beaux-

37. Ibid.

38. According to Alberto Xavier's listing, the design is from 1924 [XAVIER (org.), 1976]; according to Bruand, it's from 1925 (BRUAND, 2002, p. 57); according to Lucio Costa, Fernando Valentim was already designing the house when they started the company (COSTA, Fernando Valentim, in COSTA, 1995, p. 431). The design (drawings) was published in Revista Architectura no Brasil, No. 27, Feb-Mar 1926. From the information obtained, it would seem that the design was done between the General Exhibition of the ENBA, of 1924, and the publication in Revista Architectura by Lucio Costa and Fernando Valentim, as indicated in the publication of the Revista and the original drawings of the design. The information from Lucio Costa appears to be yet another of his attempts to avoid assuming authorship of his designs from that period, since the company that he opened with Fernando Valentim was in 1922, and if the project had been initiated before the company it probably would have been displayed in the Exhibition of 1924 , and it was not. The house still exists and was for over thirty years the headquarters of Rio Arte, after which it taken over in 2006 by the United Nations Habitat Program.

-arts ensemble, which is easy to grasp, such as in other designs examined above. The way in which the juxtaposition of volumes is organized demonstrates great compositional freedom: there does not seem to be any normative relationship between them, no axis or symmetry that orders the composition as a whole, and the positioning of elements such as doors and windows on the facades might appear odd to someone accustomed to more rigid and ordered compositions. But if the design is broken down into fragments – each room, each masonry work, extensions of facades, if each part is studied on its own – then, criteria, organizational axes and even symmetries can indeed be found.

The Rumânia Street house can be seen as Lucio Costa's first attempt to design architecture in a different way than what was being practiced, i.e., applying a style, be it English or colonial, to a traditional beaux-arts typology. It seems that, in this house, Lucio Costa was seeking after architectural freedom, along the lines of what he expressed in his text – without any concern about creating a national style, trusting that the style would emerge "on its own". And thus he demonstrated greater freedom both in relation to beaux-arts compositional standards (without abandoning them, however) and in relation to using a predefined typology or "ready-made" style. He continued using elements of colonial architecture, including trappings from religious architecture and the "mission-revival style", which could no longer be attributed to lack of knowledge or discretion, but as conscious choices on his part.

In the same period, he participated in the competition for the Brazil Pavilion for the Philadelphia Expo[39]. José Mariano Filho's efforts to impose the neo-colonial style also continued full steam and at his suggestion all competitors were obliged to use the "traditional Brazilian (neo-colonial)"[40].

Lucio Costa's design was awarded first place[41] [8] eand its configuration was quite different from the house he had just been working on. It was an absolutely symmetrical building, both in its facades and floor plans, whose composition displayed a strict and harmonious geometry, guided by well-defined major and minor axes, as though it were Percier at his best. That is, architecture with classical and academic features, commonly used in eclectic architecture, but which also lent themselves to neo-colonial architecture.

Figure 8

Lucio Costa, Design for the Brazil Pavilion for the Philadelphia Expo, 1925 (front view and floor plan of the ground floor).

Source: Revista Architectura no Brasil, No. 28, April-May 1926.

39. The Competition Notice was published in *Revista Architectura no Brasil,* No. 25, Nov. 1925, and the six best designs were published in *Revista Architectura no Brasil,* No. 28, Apr-May 1926.

40. *O Jornal,* Sept 9, 1925 (Apud. SANTOS, 1962, p. 24, footnote 63).

41. José Mariano Filho was part of the jury for the competition, along with Adolfo Morales de los Rios Filho, Sylvio Rebecchi, A. Monteiro de Carvalho and João Moreira Maciel (Jornal do Brasil, November 14, 1925, Apud. SANTOS, 1962, p.24). Five more designs were selected: F. Nêreo Sampaio; Elisário Bahiana; Gabriel Fernandes; Angelo Bruhns and Raphael Galvão with Edgard Vianna (*Revista Architectura no Brasil,* No. 28, Apr-May 1926).

The main changes that can be noted in this design in relation to the neo-colonial designs done before the trip to Diamantina, such as the Mansion, are the greater sobriety and simplicity conferred by the harmony of the volumes.

However, the fact that Lucio Costa manifested much greater freedom in his design for the house than in the design for the pavilion can be attributed, once again, to the character of the building, which was expressed through the compositional rigidity – in the symmetry and monumentality achieved through that architectural typology. Although the building's character was not expressed through stylistic choices, this does not detract from the fact that it was fulfilled in other non-stylistic aspects of the composition. The issue involving character had also not been dropped from his discourse, and in the last article he recommends that a work "fulfill in the best possible way the purposes for which it is intended"[42].

This demonstrates that, as with composition and typology, the concept of character of an architectural work was not necessarily tied to stylistic choices. Style needed to meet the requirements related to character, and therefore the English style, for example, was considered appropriate for a house, and the French classical style for an expo pavilion (as Memória and Cuchet did with the Events Pavilion). However, if stylistic choices were being abandoned, this does not mean that character had ceased to be an important aspect in architectural design. Typologies and compositional possibilities started fulfilling the function of adjusting the character of a building. Therefore, compositional freedom and a more informal and dynamic arrangement of the volumes seemed to be more appropriate for a residence, such as with the "English style", which also displayed more freedom, whereas greater compositional rigidity, as found in the "French style", seemed more appropriate for an Expo pavilion. Thus, if the application of styles was being abandoned, the same cannot be said for typology, composition and the idea of character, which were precisely (and not style) the pillars of the beaux-arts system.

In 1926, Lucio Costa worked on some designs for other house[43] and, in May that same year, he completed the Architecture course at ENBA, winning the Small Gold Medal in the Maximum Level Competition[44]. In September 1926, he traveled to Europe, as he said "taking advantage of the round trip ticket [...] that Lloyd used to generously award to students from the School of Fine Arts as a prize"[45]. And he stayed there for almost a year, traveling through Portugal, France and Italy[46].

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42. COSTA. Reflections on our tastes and style, A Noite, June 18, 1924.

43. According to Alberto Xavier's listing [XAVIER (org.), 1976].

44. According to the chronology in Maria Angélica Silva's dissertation (Silva, 1992, p. 460), Lucio Costa completed his education at ENBA in May 1926. However, in his handwritten transcript, it's not possible to be sure whether the year is 1925 or 1926. According to Paulo Santos, Lucio Costa finished the course in 1925 (SANTOS, 1962, p. 4, footnote 9), but the newspaper articles he refers to, which published the ranking of the students in the Maximum Level competition and includes Lucio Costa's name, is dated July 1926 (A Pátria, July 27, 1926, apud. SANTOS, 1962, p. 4, footnote 9).

45. COSTA, Lucio, "Cartas", in COSTA, 1995, p. 33.

46. Id., ibid., pp. 35-47.

From Europe to Minas Gerais

After returning from Europe in 1927, he spent a month in Caraça, and then some time in Sabará, after which he returned to Mariana and Ouro Preto. In a text written later by the architect, he shared his feelings in relation to that time:

> *To this day I am ashamed not to have known then how to properly appreciate the masterpiece that the church of São Francisco represents [...]. I then began to understand the error of so-called neo-colonial architecture, that unfortunate blend of religious and civil architecture, with details belonging to different eras and techniques, when it would have been so easy to take advantage of the traditional experience in those aspects wherein it has validity today and forever[47].*

It was in Caraça that he worked on the two designs for the competition for the Embassy of Argentina in Rio de Janeiro. The first, which was submitted under the pseudonym of *Jeca Tatu Junior*, was classified as *neoclassical* style and was awarded first place [9] and the other, under the pseudonym *Arquiteto Boticelli*, classified as *Florentine style*, took fourth place [10 and 11][48].

Figure 9

Lucio Costa (*Jeca Tatu Junior*), design for the Embassy of Argentina in "Neo-colonial style", 1927

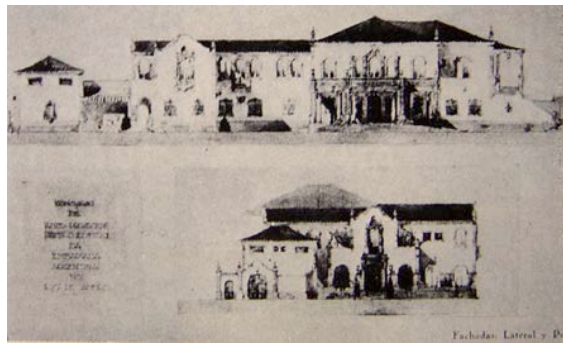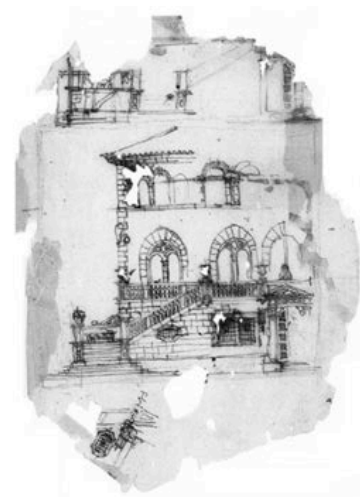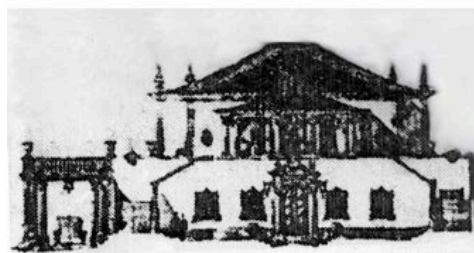Source: ZANINI, 1983, p. 837.

Figure 10 and 11

Lucio Costa (Arquiteto Boticelli), Design for the Embassy of Argentina in "Florentine style", 1927

Source: [facade] SILVA, 1992, p. 403. / [sketch]: COSTA, 1995, p. 31.

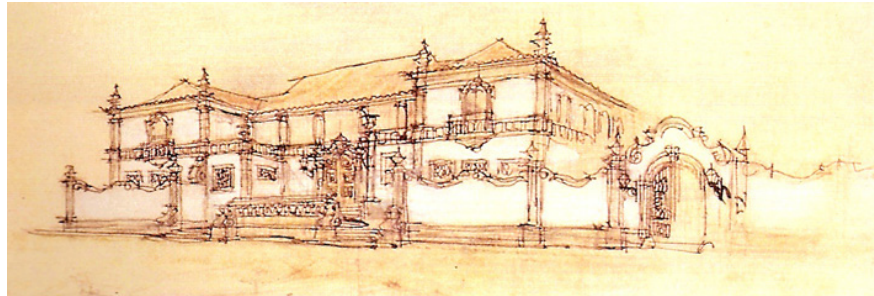47. Id., "À guisa de sumário", in COSTA, 1995, p.16.

48. Id., ibid., pp. 35-47.

That same year, in 1927, Lucio Costa[49] did another embassy design, which also recei-ved first place in the competition for the Brazilian Legation in Peru[50] [12]. The format of the design is very similar to the previous buildings.

A certain unity can be noted between these latter designs by Lucio Costa – the way in which he handled the stylistic issue was different from his previous designs. The European styles seem to have been cast aside, with the exception of the Embassy of Argentina. In general, there is a greater lack of definition in regards to establishing a stylistic option. The concepts assimilated in the academic milieu are still very present, but coupled with a greater freedom, whether in the choice of typology, the frequent concessions related to rules, or the mixture of references which now revolve around civil and religious colonial and "mission-revival". With the houses, it seems that the intention was much more along the lines of creating a new architecture, an architec-ture rooted in the present, as opposed to duplicating examples from the past, as was often the case with eclecticism. Colonial architecture, which appeared to be used as a style, seems to have assumed another place during this phase of Lucio Costa.

At that time, Lucio Costa gave an interview to the newspaper O País in the series entitled "The skyscraper and Rio de Janeir"[51]. His answers revealed the latest develop-ments of the architect with respect to definitions of architecture. First, he redoubled his criticism, already set forth in the previous text, of imitation of styles from the past and then presented his new position in relation to what style is:

> *Style is not a fanciful idea that is invented or copied, but it emerges naturally as a function of the construction system, the materials used, the climate, the environment, the era. It's tied to the constructive framework and at times to a simple ventilation and hygiene requirement[52].*

His discourse is a continuation, in a way, of what he had been arguing in the previous article, when he stated that "style comes on its own". Both sets of writings advocate

49. According to Maria Angélica da Silva, Lucio Costa did this design in partnership with Fernando Valentim (SILVA, 1992, listing of works, p. 402).

50. Lucio Costa's book says that the design was for the Peruvian Embassy (COSTA, Ecletismo acadêmico, in COS-TA, 1995, p. 30), but both Maria Angélica da Silva (Silva, 1992, listing of works, p. 402) and Alberto Xavier [XAVIER (org.), 1976, listing of non-executed designs] identified the design as the Brazilian Legation in Peru.

51. In the first edition on July 1, 1928, the responses of Lucio Costa and Preston & Curtis were published; on July 8, 1928, Cypriano Lemos and Archimedes Memória; and on July 14, 1928, Cortez & Bruhns and Joseph Gril. The questions were always the same ones: 1 - How do you justify the existence of the skyscraper?; 2 - Do you believe that skyscrapers have generally come to stay in major cities?; 3 - Do you feel that the skyscraper is prone to new architectural manifestations?; 4 - What construction process is most appropriate for skyscrapers?; 5 - What style should be used for skyscrapers?; 6 - Do you think that skyscrapers are compatible with our environment?

52. Ibid.

that architecture should be built on the present (even if elements are drawn from the past) and that past styles are not to be copied. In this article, however, Lucio Costa introduces the belief in science and the relationship of architecture with structure and construction technique[53].

> *Style does not change according to the whims of a more or less arbitrary fashion; its variations are nothing more than those of the processes [...] and the logic of the methods determines the methodology of the styles*[54].

His discourse appears to be stricter, bent on establishing a more cohesive and rational way of thinking about parameters for obtaining a national identity. This feature of his discourse will also be found in the designs that follow.

In 1928, Lucio Costa designed a house for the family of his fiancée Julieta (Leleta)[55] in Correias, a town close to Petrópolis. The Modesto Guimarães house [13] displays much greater sobriety and simplicity than any other design for a residence previously done by Lucio Costa. Stripped of any ornaments, the house seems to be an honest reflection of what Lucio Costa had been advocating – that there should be no other elements other than those which fulfill a certain function. So, he opted for the straight lines of the white colonial prism, with a hipped ceramic roof, and only added an open veranda, which also resembles the balconies from colonial estates. Its pillars are free of any ornaments and only serve to support the roof. The windows and doors are enclosed in a simple stone frame to finish the spans, without any decorative ornamental work. There is no further reference to colonial religious architecture, but only civil. Only a trace of ornamentation can be noted in the open triangles of the low wall surrounding the veranda (identical to those in the Rumânia Street house), which refer back to the "mission-revival style" and not Brazilian colonial.

Figure 13

Lucio Costa, Modesto Guimarães House, [1929?].

Source: COSTA, 1995, p. 51.

53. Otavio Leonídio Ribeiro underscores the radical nature of Lucio Costa's thoughts in relation to the milieu in which he was immersed, and proposed making a comparison, for example, with the ideas presented by Archimedes Memória in the same interview. He then quotes the answer from Archimedes Memória to the question "What style should be used for the skyscraper?" "Intuitively, we feel that for very tall buildings with a small base the predominant architectural lines should be vertical. Among Western styles, the ogival or Gothic style is the one that has this characteristic. I don't mean to say that the ornamentation should only be inspired by the ogive, as this will depend on the architect doing the design, who will have to imprint upon the face of the building his own sentiments. In any case, I think that the architectural approach for these constructions should be vertical." (MEMORIA, Arquimedes. Skyscrapers and Rio de Janeiro (interview), O País, Rio de Janeiro, July 8, 1928, p. 1., apud. RIBEIRO, 2005, p. 43, footnote 66).

54. CHOISY, Auguste. *Histoire*, apud: BANHAM, 1975, p. 40. (Apud:RIBEIRO, 2005, p. 42 nota 65).

55. The date of the design is indicated by Lucio Costa [COSTA, Lucio, Correias, in COSTA, 1995, p. 51 and Maria Angélica da Silva (SILVA, 1992, p. 403)].

In 1929, other important events would mark Lucio Costa's trajectory, such as his contact with Gregori Warchavchik and his "modernist house"[56] as well as all of Le Corbusier's doctrine. However, during this period, he appeared to be increasingly drawn to European trends of modern architecture, averse to ornamentation and with a strong belief in construction technique; and his manner of relating to the past appeared to be based on increasingly stricter criteria. Little by little, his position, which would become even more pronounced in the 1930s, was shifting toward the exaltation of the technical dimension and the rejection of the architecture that prevailed up until then, accusing it of not corresponding to structure and for its misuse of foreign references and decorative ornamentation, which culminated in the famous battle with José Mariano Filho, when Lucio Costa started directing the School in 1931

Final Considerations

The changes studied in the architecture from Rio, particularly the architecture of Lucio Costa in the 1920s, understood in this article as being inserted within a process, were seen in very different ways in the context of the era. The discourse of Lucio Costa, once he assumed a new position with respect to architectural production, as well as his ideas, presented on architecture in the early 1930s, have consistently been interpreted by modern historians and critics as representing a break with the work he had been producing until then. Statements such as the one by Abelardo Souza are quite common: "We can divide the history of Brazilian architecture into two very distinct eras: before 1930 and after 1930"[57] as though a radical change had taken place at that juncture. Other authors, such as Paulo Santos and Yves Bruand, also took the same tack. Paulo Santos describes this moment as Lucio Costa's passage "to the other side", out of what he called a *romantic traditionalism*, which had its eyes on the past" and into a "rationalist and modern" architecture, which gazed into the future"[58]. Bruand's discourse is no different, in which he refers to Brazilian eclecticism in a pejorative tone, characterizing it as "lack of originality and an inferiority complex taken to the extreme", nothing more than an imitation of foreign architectural examples, especially French ones. He then goes on to extol modern architecture, as something completely different and separate. This modern evolutionary discourse discredits eclectic architecture, treating it as an aberration, and legitimizes modern architecture, as the appropriate response for its era[59].

However, Lucio Costa's apparent rupture with his experiences in the 1920s is illusory. This period simply represented yet another phase of experimentation, which, like earlier phases, was part of the process of developing his architecture and, in turn, Brazilian architecture – the concept process being understood here as a succession of non-evolutional and nonlinear states and changes, involving complexities and, many times, inconsistencies, ambiguities and contradictions.

It would seem that the path embarked upon by Lucio Costa in the late 1920s was focused largely on untangling the stylistic issue. Ornamentation, elements from the past, the rules of proportion, composition and typology would forever be his allies.

56. Id., Gregori Warchavchik, in COSTA, op. cit., p. 72.

57. SOUZA, Abelardo. ENBA, before and after 1930, in XAVIER (org.), 2003, p. 63.

58. Id., Gregori Warchavchik, in COSTA, op. cit., p. 72.

59. BRUAND, 2002, p. 57.

The analysis of the designs he worked on during this period demonstrates the diversity of architecture from that era and the fact that it's not possible to look at eclectic architecture or neo-colonial architecture as though it were a single block, just as the same could not be applied to modern architecture. The set of quite heterogeneous designs that were examined was the fruit of a reflective process of the architect who, as he grappled with issues pertaining to the era, was seeking answers to the search taking place in Brazilian architecture. And, as with any process, Lucio Costa's architecture during those years did not always match up with his theoretical ideas, just as it did not always manifest linearity, since sometimes it displayed more compositional freedom, sometimes greater strictness, sometimes ornaments were used and at other times he suppressed them – basically, a natural process of architectural experimentation and conceptualization that marked the beginning of the process of Lucio Costa's architecture, and which continued into the 1930s and lasted his entire life, representing a piece of the history of Brazilian architecture.

Thus, it can be said that, as with the experiences of the 1920s, the contact with the architecture of Le Corbusier was important for the direction of Lucio Costa's architecture and for Brazilian architecture, whether modern or not.

Acknowledgments

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References

AMARAL, Aracy (org.). **Arquitectura Neocolonial: América Latina, Caribe, Estados Unidos**. São Paulo: Memorial Fondo de Cultura económica, 1994.

BANHAM,Reyner. **Teoria e projeto na primeira era da máquina**. São Paulo: Secretaria de Ciência e Tecnologia do Estado de São Paulo; Perspectiva, 1975.

BRUAND, Yves. **Arquitetura Contemporânea no Brasil**. São Paulo: Perspectiva, 2002.

COLQUHOUN, Alan. **Modernidade e Tradição Clássica: ensaios sobre arquitetura 1980-1987**. São Paulo: Cosac&Naify, 2004.

_____. **Modern architecture**. Oxford: Oxford University Press, 2002.

COMAS, Carlos Eduardo Dias. Teoria Acadêmica, Arquitetura Moderna, Corolário Brasileiro. In**Gávea**. Revista de História da Arte e Arquitetura da PUC- Rio, Rio de Janeiro: vol. 11, pp. 80-193,1994.

_____. Uma certa arquitetura moderna brasileira: experiência a reconhecer. In**Arquitetura Revista.** Revista daFAU-UFRJ. Rio de Janeiro:n. 5, pp.22-8, 1987.

COSTA, Lucio. **Lucio Costa: registro de uma vivência**. São Paulo: Empresa das Artes, 1995.

_____.**Lucio Costa: sobre arquitetura**(org. Alberto Xavier). Porto Alegre: Centro de Estudantes Universitários de Arquitetura, 1962.

CZAJKOWSKI, Jorge. A Arquitetura Racionalista e a Tradição Brasileira. In **Gávea**.Revista de História da Arte e Arquitetura da PUC- Rio, Rio de Janeiro: vol. 10,pp. 22-35, 1993.

FRAMPTON, Kenneth. **História crítica da arquitetura moderna**. São Paulo: Martins Fontes, 1997.

GALVÃO, Alfredo. **Subsídios para a história da Academia Imperial de Belas Artes**. Rio de Janeiro: Universidade do Brasil, 1954.

LEVY, Ruth Nina Vieira Ferreira. **A Exposição do Centenário e o meio arquitetônico carioca no início dos anos 20**. Rio de Janeiro: PPGAV- EBA. [Tese]. Universidade Federal do Rio de Janeiro, 2003.

MARTINS, Carlos Alberto F. Arquitetura e Estado no Brasil. **Elementos para uma investigação sobre a constituição do discurso moderno no Brasil**; a obra de Lucio Costa (1924-1952). São Paulo: FFLCH-USP. [Dissertação]. USP, dez. 1987.

NOBRE... [et al.] (org.), **Um modo de ser moderno: Lucio Costa e a crítica contemporânea**. São Paulo: Cosac &Naify, 2004.

PATETTA, Luciano. Considerações sobre o Ecletismo na Europa In FABRIS, Annateresa (org.). **Ecletismo na Arquitetura Brasileira**. São Paulo: Nobel; Editora da Universidade de São Paulo, 1987, pp. 8-27.

PEREIRA, Sonia Gomes.Desenho, composição, tipologia e tradição clássica - uma discussão sobre o ensino acadêmico do século 19. In FERREIRA, Glória, VENANCIO FILHO, Paulo. (org.). **Arte & Ensaios**.Revista do Programa de Pós Graduação em Artes Visuais da Escola de Belas Artes da UFRJ, Rio de Janeiro: n. 10, pp. 40-49, 2003.

PEVSNER, Nikolaus. **Perspectiva da Arquitectura Europeia**. Lisboa: Pelicano, 1943.

Revista Architectura no Brasil- engenharia e construção. Rio de Janeiro: M. Moura Brasil do Amaral, 1921-1926.

RIBEIRO, Otavio Leonídio. **Carradas de razões: Lucio Costa e a arquitetura moderna brasileira (1924-1951)**. Rio de Janeiro: Departamento de História da PUC-Rio. [Tese]. Pontifícia Universidade Católica do Rio de Janeiro, 2005.

SANTOS, Paulo F. **Quatro Séculos de Arquitetura**. Rio de Janeiro: Instituto de Arquitetos do Brasil, 1981.

_____. **Presença de Lucio Costa na arquitetura contemporânea do Brasil**. Manuscrito inédito, Arquivo Paulo Santos, Paço Imperial do Rio de Janeiro. 131 páginas datilografadas, [1962?].

SILVA, Maria Angélica da.**As formas e as palavras na obra de Lucio Costa.** Rio de Janeiro: Departamento de História da PUC-Rio. [Dissertação].Pontifícia Universidade Católica do Rio de Janeiro, 1992.

TELLES, Sophia S. Lucio Costa: monumentalidade e intimismo,**Novos Estudos 25**. São Paulo: Cebrap, pp. 75-94, 1989.

UZEDA, Helena Cunha de. **O Ensino de Arquitetura no Contexto da Academia Imperial de Belas Artes do Rio de Janeiro: 1816 – 1889**. Rio de Janeiro: PPGAV, EBA. [Dissertação]. Universidade Federal do Rio de Janeiro, 2000.

_____. **Ensino acadêmico e modernidade: O Curso de Arquitetura da Escola Nacional de Belas Artes: 1890-1930**. Rio de Janeiro: PPGAV, EBA. [Tese]. Universidade Federal do Rio de Janeiro,2006.

WISNIK, Guilherme (org.). **O risco: Lucio Costa e a utopia moderna**. Rio de Janeiro: BangBang Filmes Produções, 2003.

XAVIER, Alberto (org.). **Depoimento de uma geração - arquitetura moderna brasileira**. São Paulo: Cosac &Naify, 2003.

_____ (org.). **Levantamento sobre Lucio Costa**, Brasília:1976.

ZANINI, Walter (org.). **História da Arte no Brasil**. São Paulo: Instituto Walter Moreira Salles, 1983.

MAÍSA VELOSO

Conception of ideas in architecture and urbanism workshops: an analysis of two international experiences

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Abstract

This paper presents reflections on two international architecture and urbanism workshops experiences, identifying their potential and limitations for learning design or more precisely to the conception of ideas for future projects. These are the EQUI-NOX - International Atelier of Urban Creativity, held in São Luís, Maranhão (October, 2012), and the Workshop International *d'architecture, urbanisme, et paysage: Mer, Port, Ville - L'Estaque: un territoire habité*, held in Marseille, in July 2013, in which we were direct participants, in the first case as one of the professors/mentors, and as external observers in the second case. These workshops, with their distinct approaches and working methods, have in common primarily pedagogical goals - they are performed with formal support from educational institutions and involve mainly undergraduates and professors – however, they also propose the participation of professional (architects, landscape architects, engineers) and social (communities) representatives. They are also similar due to their intensive (two weeks followed by work on two or three shifts a day) and multicultural/national (participation of schools from at least three different countries) character. Our participation in both events is linked to our projects on research productivity which is done in partnership with CNPq and, in the recent Marseille case, with the postdoctoral research project financed by CAPES. We seek to identify and analyze the objects, aims and methods employed in the project workshops, the relationships between the actors, the potential for the development of architectural and urban design and the quality of processes and products. In this article, through a qualitative analysis of materials collected through interviews as well as observations in loco, we will focus on the issue of the conception ideas from the students and the level of participation of the actors at play in the decision-making process. We would like to point out that in the EQUINOX 2012 the emphasis was on the creation of abstract ideas, then progressively achieving the materiality of the urban proposal, while the 2013 WS Estaque followed the opposite path, with the focus on the concrete and particular materiality of the area. In the EQUINOX 2012 the semantic (abstract concept) and formal symbolic (formal analogies related to concepts) scales were those most involved in the conception process, while in the WS Estaque/Marseille the technical (constructive materiality) and functional (uses and urban functions) scales were clearly dominant, with little emphasis on the concepts and indirect references via analogue features. The latter, if they existed at all, should be sought primarily in their own sites. We conclude that, despite methodological differences and the products generated, both experiences enriched the student's learning, especially regarding the development of sensitivities, analytical reasoning and a critical sense of their realities, and in the Brazilian case, more autonomy for the students to create new ideas.

Introduction

The workshops, or temporary work centers, have been increasingly frequent in the area of Architecture and Urbanism (AU), especially in universities, as already noted by Hanrot (2012) and Lassance (2012)[1]. They sometimes occur alongside or linked to scientific or merchandising events, but its practice is most common in the academic environment, as a way of bolstering the participation of several actors (teachers, students, professionals and society representatives) around a specific project (thematic and/or instrumental/methodological). In this context, the main objective is eminently pedagogical and, therefore, what is (or should be) at stake is first of all the student's education. Ineichen (2012)[2] conducted a characterization of various types of workshops in the AU area, where a relatively formal and thematic diversity is evidenced. However, two common features can be seen in almost all of them: the intensive character, of short duration (which may vary from one to fifteen days), and the collective work, done in teams.

From an educational point of view of Architecture and Urbanism Design, we are interested in knowing to what extent these workshops contribute positively to student learning. And also knowing the process for the conception of ideas (as defined by Boudon et al, 2000)[3] for projects in this kind of specific situation which has interaction between the college and the occupational environment, and what is the quality level of the processes and products generated (VELOSO, 2003).

This paper presents reflections on the experiences of two international workshops of Architecture and Urbanism, trying to identify their potentials and limits for the conception of ideas for future projects. It is about the EQUINOX - International Workshop on Urban Creation, held in São Luís, Maranhão (September / October 2012), and the International Workshop *d'architecture, urbanisme, et paysage: Mer, Port, Ville - L'Estaque: un territoire habité* held in Marseille, in July 2013, in which we were direct participants. In the first case as one of the professors/mentors, and as external observers/critics in the second. These workshops, with their distinct approaches and working methods, have in common primarily pedagogical goals - they are performed with formal support from educational institutions and involve mainly undergraduates and professors – however, they also propose the participation of professional (architects, landscape architects, engineers) and social (communities) representatives. They are also similar due to their intensive (two weeks followed by work on two or three shifts a day) and multicultural/national (participation of schools from at least three different countries) character.

Our participation in both events is linked to our research on productivity project which is done in partnership with CNPq, and, in the recent Marseilles case, with the post-doctoral research financed by CAPES[4]. In them we try to identify and analyze the

1. HANROT, Stéphane (2012). The workshop: between educational and social engagement. LASSANCE, William (2012). The workshop as a platform for teaching project. Papers presented at the round table on workshops at the II ENANPARQ, in Natal, September 2012.

2. INEICHEN. Julien (2012). The workshop – classification of a globalized educational practice. Article resulted of his doctoral research, developed under our guidance in a co-tutorship regime with Stéphane Hanrot, from ENSA – Marseille, with which our IES has an agreement for carrying out this and other exchange activities.

3. BOUDON, Philippe et al. Enseigner la conception architecturale: cours d'architecturologie. Paris: Éditions de la Villette, 2000.

4. Evaluation of architecture and urbanism projects in the context of integration between academia and the socioprofessional environment (PQ/CNPq Project), in the post-doctoral case, research is focused more specifically on the experience of the France workshops.

objects, aims and methods employed in the project workshops, the relationship between the actors, the potential for the development of architectural and urban design and the quality of the processes and products. In this article, through a qualitative analysis of materials collected through interviews as well as in loco observations, we will focus on the issue of the conception of ideas by the students, and the level of participation of the actors at play in the decision making process. To do so, we will briefly discuss the issue of the conception ideas in the UA project. Next, we will outline the features of both of the case studies, in order to proceed to the analyses and present the main conclusions of the research.

On the conception of ideas and the UA project

For some time, design conception has been the subject of scientific studies based on various approaches, linked to numerous fields of knowledge such as semiotics, linguistics, psychology, and, most recently, neurobiology, which takes into account the "genetics of the project". It is their main focus to identify the origins or sources of ideas of the designer(s), and their evolution, not only from the formal point of view, but also from the discourse level. The approach proposed by Philippe Boudon and team (Boudon et al, 2000), is one which has some of the most serious and theoretical foundations. They seek to seize design conception from categories intrinsically linked to architecture in its complete sense (building and city), which configures what they call *"architecturology"*, or the science of architectural conception. Although there may have been some criticism and reservations regarding this approach, it is, undoubtedly, the most "architectural" of approaches regarding design conception. According to these authors, the notions involving conception are essentially idea, system, perception, representation and discourse.

The idea is based both in perception as in the knowledge that the designer(s) have about the object, which is the result of their cultural background and experience, as well as the analysis of the site characteristics, and expertise on technical, functional and usage aspects, among others. All these pieces of information are important, and some of them may even be collected by third parties in the programming phase; however, it is always the designers, based on their own references, who will end up making the decisions and arrangements which would influence the conception. Conception, involves images (which are called "stimulus"), impregnated by experiences and diverse references, be they individual or from a group (in the case of collective proposals), something very similar to the lefebvriana triad where inhabited, perceived and conceived spaces interact mutually. It is important to note the distinction the authors make between idea (in the singular) and the ideas that designers may have throughout the creation process. The first is the result of intellectual work, based on experience and knowledge, linking intellect with concrete material production. And, that is the main interest in *architecturology*. While, the latter (*the ideas*) refers to a more artistic concept which may emerge at any given moment with any "creator", based on their inspiration, beliefs and convictions.

Regarding the analysis of the conception processes themselves, Boudon and staff proposed a method essentially centered on the concepts of scale and model, embedded in a complex system, but capable of comprehension through categories that aim to explain the intellectual work of the architect. In conception, one or more scales would

be the reference elements, giving "measurement" to the project, and the model is that which is reused, reproduced and measured in the project. They propose 20 possible architectural scales of operation in the conception process, ranging from the most well-known, like the human, technical, functional, formal-symbolic, geographic scales, to the most complex, like the global, representation, and different levels of conception scales. In any case, according to this approach, the design would be based on references from pre-existing models and their transformation through one or more processing operations, based on the notion of scale. An aspect which reinforces what other authors state, in other words: conception does not originate from a tabula *rasa*; conception occurs through processes of referrals/associations, therefore, analogical reasoning is of utmost importance (Chupin, 2012). We should note the importance *architecturology* gives to designers having autonomy when it comes time to make decisions and at the moment for the conception of the idea (or set of ideas) which will be the basis for the project.

Regarding conception through collective work in a studio, this was one of the pillars of the pedagogy of Bauhaus, and although it is no longer a hegemonic practice in design studios of some architecture schools, it is still widely practiced, especially when it comes to complex and/or large-scale projects (notably, regional and urban). However, in general, the work developed in the studios is overseen by professors/professionals who share the same training/approach (architect, urbanist, or landscaper), whereas the combination of diverse views in a studio which integrates architecture, urbanism and landscaping is less frequent. It is important to note that group projects are very common in schools with large numbers of students per class, and/or where there is a strong student/professor relationship. Conception using "many heads" raises questions regarding levels of autonomy, collaboration and participation of the players at hand, as well as others, such as conflict management and leadership among people of the same group or between groups. Our view of conception in workshops is one of architecturology and also of the theory of education in specific regards to the role of the instructor and the instructed, in other words, the processes of the conception of ideas coming from models and references, and the relationship between professors/professionals and students, especially in relation to the degree of autonomy of the latter. In this field, when it comes to the emphasis on learning through knowledge which comes from real/concrete problems (problem based learning) and from reflection on the action itself (in this case, the project production), Dewey, Freire, Vygotsky and Schön are our main references[5], and it is up to the instructor(s) to show the instruments and possible avenues the learners should use when making decisions.

The UA workshops are studios of intensive idea creation, action plans, and, in some cases, projects, where the professor/student relationship is modified when compared to the traditional studio (in the classroom), mainly by the presence, which may be at times disturbing, of outside agents, adding new conditions and perspectives to decision-making, as well as the guidance offered by project professors to which students are accustomed to. Moreover, the presence of students from other schools and even other cultures modifies the relationships between groups of students, "demolishing" the hegemony of some teams accustomed to working together, and inserting "less integrated" students into groups of students with whom they would normally not work. Hence, there are some issues which arise in those situations such as, the need for: i) the management of diversity among students – people who know each other

5. DEWEY, John (1979). **Democracy and education**. FREIRE, Paulo (2000) **Pedagogy of Autonomy: necessary knowledge for educational practice**. Vygotsky. K. (2011). **Construction of Thought and Language**. Schön, Donald (2000). **Educating the reflective practitioner**.

little, and that have different backgrounds, experiences and perceptions, hence needing constant dialogue and negotiation; ii) the management of academic/pedagogical orientation, given the participation/involvement of professors who share different backgrounds/visions; Who is the main advisor? Who should the students hear? How should one make project decisions based on this context?; iii) the short term management of the perception/comprehension of the intervention sites and the problems presented therein, and of the conception of ideas that might provide answers to these problems, as well as the stress/expectations/frustrations/joys that arise as a consequence of the these temporal nature tensions. In short, how should conception take place when faced with those situations? And what types of teaching/learning can be drawn from these experiences?

The 2012 Equinox (São Luís) and the 2013 WS Estaque (Marseille)

The fourth version of the International Workshop on Urban Creation – EQUINOX was held in São Luís do Maranhão – Brazil, between September 24th and October 5th, 2012. The EQUINOX 2012 was organized by the professors of the College of Architecture and Urbanism from the Maranhão State University (CAU/UEMA) and had the participation of 04 other guest schools, 03 of which were international – the Paris-Est Marnela Vallée University of France (with 12 students and three Urban Engineering professors); the University of Rome La Sapienza (with 15 students and 02 landscaping professors), the Superior National School of Architecture of Marseille/France (with 05 students and 01 Architecture professors) -, and a national one – Universidade Federal do Rio Grande do Norte(UFRN) with 21 students and 04 teachers from the 7th period of the Architecture and Urbanism Course. From UEMA, 57 students and 08 professors participated, as well as 12 observers and 12 monitors. In total, there were 110 students participating and 18 professors, members of the educational committee. The students were divided into 11 teams, with half of each team formed by UEMA students, as required by the institution.

The teams worked in three strategic locations in São Luís city, all of which share a common element, the Anil River basin: i) the Historic Center of São Luís, listed by UNESCO, and considered of strategic character to the city, both for its historic and sociocultural attributes, as to its relation to the composition of the cultural landscape related to the Anil River (04 teams); ii) the Liberdade neighborhood, an area neighboring the city Center, historically occupied by descendants of slaves, and which is currently undergoing a series of investments in housing and urban infrastructure. (03 teams); and iii) the Vinhais Velho district and its surroundings, also a holder of historical value, notably due to the presence of an ancient Tupinambá village (Eussaup) which was occupied over 400 years ago, and which was, at the time of the event, threatened by the construction of a freeway that would leave the current inhabitants homeless and have a great impact on the environment of the Anil River basin (04 teams).

According to the organization of EQUINOX 2012, the objective of the workshop was:

> *Elaborate a project (highlight added by author) for the three sites in the city of São Luís, with Brazilian, French and Italian students from the five universities involved, (….) and thus foster the exchange of integrated urban diagnosis methods and design-based procedures applied to the creation of strategic long-term[6] urban projects.*

The proposed format included activities in three shifts, virtually every day of its two--week duration, with the morning and evening shifts devoted to visits to the sites and work at the UEMA studios, and the night shift to lectures from invited guests, round-tables of thematic discussions and presentations of partial and final products. The methodological approach consisted of different procedures that can be summarized in the following, not necessarily linear, steps: contact with data, maps and images of the sites, material previously provided by the UEMA team through the shared electronic website (pre-workshop stage); direct contact with the intervention areas (site perception) and their inhabitants; questioning/diagnosis; formulation of abstract concepts; search of references for the intervention; development of ideas; preliminary study proposal, accompanied by schematic detailing presented with informational and media resources in the UEMA auditorium on the last day of the event. The professors were divided for the supervision of the teams, under the three study areas. These professors met daily to assess the accomplished work and to (re) program the steps that would follow; and the schedules and procedures were open to constant updates/adjustments.

The International Workshop *d'architecture, urbanisme et paysage - Mer, Port, Ville - L'Estaque, unterritoire habité*, henceforth simply called WS Estaque 2013 – was co--organized by the École Nationale Supérieure d'Architecture of Marseille (ENSA-M), the Institut d'Urbanisme et d'Aménagement Régional(UAR-Aix en Provence), and the École Nationale Supérieure de Paysage (ENSP-Marseille), with the participation of the non-governmental organization called COLLECTIF Etc. in the first of two weeks of work, which began in June 30th and lasted until July 13th, 2013. This was one of three workshops held in parallel at the ENSA-M campus this European summer, bringing together over 150 students and professors from various schools, besides professional experts of the three training areas – architecture, urbanism and landscape – which, in the French context, are done separately in specific schools for each of these subjects.

The WS that we analyzed was focused on the neighborhood of Estaque, located on the northern coast of Marseille, a beautiful setting composed of several natural and constructed landscapes that include the Mediterranean Sea and a set of hills called "La Nerthe", portrayed in the past by famous painters like Cézanne and Braque. There also lies the industrial port of the region (fully functioning) and a set of ancient mineral exploration and pottery industries (were the famous French tiles were produced), and are currently deactivated and undergoing an environmental cleaning process. The 2013 WS Estaque brought together 30 students (divided into 10 mixed teams of 3 students – each one from a different background), and several professors from 8 schools, 4 of them French (the 3 co-organizers along with the Génie Urbain de Marne la Vallée school), one Italian (La Sapienza-Roma) and two Brazilian ones, the UEMA and UFRN. The presence of professors and students in these last four IES in Marseille is already an extension of the experience at the Equinox of São Luís.

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6. EQUINOX 2012. **International Workshop on Urban Creation. Disclosure Material**. São Luís: CAU/UEMA, 2012

According to the educational event coordination:

> *Ce workshop ambitionne d'aborder la question du projet urbain et territorial selon un mode différent de ce qui se pratique habituellement, à savoir un projet élaboré par référence à des modèles urbains bien formés, porté par une puissance publique, soumis à la concertation, amendé puis réalisé. Ce que l'on peut appeler une démarche top-down. Nous voulons tester une démarche inverse, bottom-up, qui partirait d'une connaissance du terrain par des interventions concrètes sur l'espace public avec le public. A l'occasion de ces actions, nous souhaitons faire remonter des thématiques qui intéressent la population résidente et les acteurs associatifs et institutionnels. Puis, prenant un peu de recul, il s'agirait de rendre convergentes les différentes thématiques dans une sorte de plan-guide qui, sans se présenter comme un projet ficelé, serait un support au débat public et citoyen[7].*

This reversed proposal for the design process (known as bottom-up) would also affect professionals invited to attend the workshop, generally accostumed to the opposite type of practice(top-down).[8]

The proposed format for this workshop was very interesting taking into account that in the first week, the students were housed directly at the site where the intervention would take place (in a campsite at the seaside neighborhood of Estaque), which, according to the organization, made them feel a bit more like "locals". Based on results from previous studies in the area, three sites were identified for intervention (the vicinity of the railway station, a small abandoned square named Malot and the old "factory route"), where the students made small interventions conceived right at the spot using "their own hands" (street furniture insertion, signposting and a ladder recovery). The weekend after exhaustive in situ work, there was a discussion about possible topics for urban and territorial projects in the neighborhood, which was attended by representatives of the community and guest professionals. On the second week, these themes were developed by groups in the workshops of the ENSA-M project, and through a sucessive convergence process, the various proposals from 10 groups constituted, in the end, a single master plan for the entire district, which was submitted to the public in the form of a large scale model on the last day of the event, in an open area in Estaque.

Conception under the two workshops: a comparative analysis

As we said earlier,the *architecturological* approach considers conception a transformation of preexisting models which are used as reference and adapted to the conditions of the new problem/object, framed into one or more scales (semantic, human, symbolic and formal-symbolic, geographic, etc.), whether private or global, until they generate a new model. When a model taken as an initial reference (substrate) is the same as the proposed model (teleological), there is no conception ; it would be the case of copying or plagiarism. The semantic scale, for example, is crucial to conception when a word or main concept is the definer of the adopted party. The same is true for a

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7. Workshop International d'architecture, urbanisme et paysage – Mer, Port, Ville – L'estaque, un territoire habité. **Programme Pédagogique**. Marseille: ENSA-M/UAR/ENSP/COLLECTIF ETC, 2013.

8. However, this practice, which was proposed in the WS Estaque, is not so new to the AU area. Planning processes and inductive type design, 'bottom up', in other words, those coming from the detail, from the micro, and expanding progressively until there is a global or macro scale synthesis, have led to concrete positive results of real approximation experiences between government, academia and society, performed in various countries.

previsouly adopted form – a cube, for example, and so forth, according to the regarded values and priorities assigned by the designer(s). Also according to this approach, although different actors might interact in the conception process, the basic idea of the project always belongs to the project designer(s). Taking this theoretical benchmark as our "model" or initial support point, we will now turn to the comparative analysis of the conception processes in the two workshops discussed here.

First of all, it must be registered that one thing both cases had in common was the necessary previous definition of the areas to be worked on, as well as the execution of surveys and diagnostics in the pre-workshop programming phase, data that is then passed on to students early on or even before, allowing them to go straight to the perception stages of the site and local problems. In other words, there is an intense and critical work in the pre-workshop phase and without it the final activity itself would not be possible in such a short amount of time. These surveys were made by undergraduate students from the two schools were the activities were being held (UEMA and ENSA-M, respectively), under the guidance of faculty members of the organizing committee or pedagogical coordination. In Marseille's case, for example, the Estaque neighborhood was worked on for two years in the design studio and in final course assignments (Master 2), directed by Prof. Stéphane Hanrot, who provided all the material for the workshop attendees.

Also in both cases, after initial explanations about the purpose of their workshops, visits to the sites were less guided, leaving students more at ease to collect their first impressions and perceptions. And that is where similarities between the proceedings end. In the EQUINOX 2012 case, the community consultation was done in an informal manner by the students (conversations during the *walk through* or testimonials from UEMA students, who resided in the neighborhood) and, in the case of the Estaque/Marseille 2013, although there were informal conversation with residents, the query was more formalized, having been carried out previously by Master students and by the Dispositif Etc., who were providing support to the workshop at the programming stage and throughout the completion weeks.

This query was done in order to identify problems/needs and possible priority actions, however, in the case of the first week of Estaque this participation in the decision making and conception of ideas for the proposed plans or in the creation of urban projects did not happen. In the latter case, a more significant participation in the early stages was expected, due to the proposed method (bottom-up). However, we should highlight the participation of the estaque community representatives in the presentation and discussion of what was gathered after the two weeks of work, something which did not occur in the case of EQUINOX 2012.

The participation of outside professionals in the schools was also handled differently in the two studied cases. In the EQUINOX, the participation of these outside agents was exclusive to lectures and thematic roundtables held in the evening, with virtually no direct interference of these agents in the studio work. In the case of Estaque/Marseille guest professionals had a more direct involvement in the critical review of the students' proposals; however, they also did not attend the workshops during the period for decision-making and conception of ideas. Nevertheless, we must emphasize the importance of these lectures and round tables to the general reflection of the areas or themes worked (urban mobility, accessibility, preservation of the natural landscape, the memory of the place, as the case may be). Some of them served as theoretical and empirical reference for the studio work, as stated by a number of students. The critical reviews made during the partial presentations (in this case both

from outside professionals as well as professors) contributed to the improvement of the proposals, but in both cases it was evident that the differences in perceptions and approaches were influenced by the particular areas in which each critic worked. Each critic "pushes their own agenda and we're stuck in the middle of it", said a student in San Luis. Despite our uncertainties regarding the critical reviews, in the end, it became clear to most students that they are important and enrich their learning, and it is up to them to them to take advantage of these moments of public presentation to progress in their process of maturity in design.

As for mentoring within the studios, whether conducted in the field or in the halls of the schools, there were also significant differences between the two events, especially regarding the conduct of the proceedings. The EQUINOX, although conducted by UEMA, allowed guest professors from other schools to also participate in the overseeing of the studio work, since there were students from the institutions of these professors attending the workshop. This allowed the students from one country to have more direct contact with the approach used by professors from other countries, and although there were comprehension issues due to language barriers (English was the language used, but not all participants were able to speak it fluently), both students and professors involved considered it an enriching experience. As mentioned before, the EQUINOX has a more open methodological proposal allowing it to be reviewed by the educational committee with the participation of representatives from all the schools involved. In the case of the Estaque/Marseille workshop, the overseeing of the studio work was restricted to professors from the three schools organizing the event with a methodology that had to be strictly followed, only allowing the guests of the other schools to act as observers and critical reviewers of the work when it was being presented. The latter were also invited to write comments in the blog of the workshop. The 2013 Marseille Workshop also demanded that the participants be fluent in French

The design process during the EQUINOX 2012 began on the first days when, after visiting the sites, each team was asked to elaborate an abstract concept about the place of intervention, which would then be used as the keyword for the project. They were also asked that this concept be associated to an image. UEMA and Marne la Vallée students were already used to this type of abstraction exercise, however, the other ones not as much, therefore the group leaders at that moment were the ones who were more accustomed to the environments or to the conceptual exercise requested. French professor Serge Berthelot's lecture on the first night made the suggested methodological approach very clear: start from an immaterial concept of the project and then gradually reach its materiality through analogical exercises. After some initial tension in the groups, the products shown in the first conference presentation in the middle of the first week proved to be very popular. Examples of concepts formulated by students in São Luís were: "*Musical Score*" and "*Ribbon Hat*" for the historical center; "*Hands*" and "*Wish Cube*" for the Liberdade neighborhood; "Chameleon" and "*Watercolor*" for Vinhais. It is important to point out that the interference from the professors during the formulation of the concepts was very small, being more significant when it came time for the collective group presentations.

In our opinion, the opposite process was seen in the design process in Marseille: the starting point was the concrete materiality of the sites themselves, no abstract concept or reference imagery was worked. Moreover, in the work of rapprochement with the ground through the manufacture of small objects (park benches, murals, etc.), the types of equipment and materials to be used in the execution had already, in a sense, been pre-defined by the Collectif Etc. team, who were in charge of the organization of the field experience during the first week of the event. At each site, there was a

technical officer from the institution, which was primarily comprised of young architects, who supervised and guided the students' work in the field. The professors of the French schools would pass by to check on the progress made, but, we believe that the main orientation that week was of the Etc. group who has their own work methodology, which is rather empiricist and tied to the material foundations of the project. As far as we're concerned, there was discussion in the group, but with little participation from the population and a strong influence from the Etc. technicians in the decision making. The empiricist/pragmatic approach was also undoubtedly dominant in the round tables that took place on the night shift, which is an indication of a strong leaning towards working in that manner.

At the Equinox 2012, once the concept was formulated, they then moved on to the definition of the program and the reference for the proposals (or analogies, as they were often called). This last support resource to conception was also not observed at the Marseille workshop. As to the program, in the Marseille case, one could say that there was more of a defining of themes and strategic areas for intervention in a macro scale (collective transportation, leisure areas, and connection between strategic points) rather than an urban program per se. This thematic discussion was very fierce and had the participation of experts (urbanists, landscapers), and frightened the students a little in the beginning. The supervising professors from the organizing schools had to manage the conflicts throughout the second week, and ended up giving the projects a "final path", in a clearly more directive approach when compared to most of the supervising professors from the EQUINOX.

Only at the beginning of the second week of the two events did they begin to work on the first drafts for the intervention in the areas, drafts which were done with drawings, sketches, and in the ENSA-M case specifically, with a big plan tab done on a gigantic image, printed on a canvas and placed on the floor (Picture 01), and where the students could step on after removing their shoes. A "top-down" view of the area, so to speak. However, at the EQUINOX, although sketches were used in the initial conception of the groups, the information technology resources, which the students were much more accustomed to, were used(AutoCAD, Sketchup and Power Point presentations with a multimedia projector) (Figure 02). We should note that, in Marseille, apart from the big model of the aerial image built collectively on cardboard, the final products were also displayed on banners with a small summary text, made during the

Figure 1

Marseille/Estaque Workshop, 2013. Aerial view of the Estaque neighborhood printed on a canvas and displayed on the floor to aid the students in the conception of the proposals.

Source: Picture from the author

last two days of the event.

In the São Luís case, some groups had a lot of difficulty transferring the semantic (concept) and formal reference (through analogies) scales to the urban proposal project plan; whereas in other groups, this association between scale and concept was more evident. In any case, despite the difficulties the students had in transposing the abstract to the concrete, we should emphasize that the students were given much more autonomy when it came to making decisions (something evident during the internal group discussions, which were a bit heated, at times), whereas in the Marseille groups, there was much direction and adjustments coming from the overseeing professors. This directional posture was attenuated when foreign guests, who had more liberty to question some of the aspects of the proposals, participated.

Figure 2

Equinox 2012, São Luís. Presentation of the Concept of the "Mãos" ("Hands") team

Source: http://atelierequinox. wordpress.com/

Final Considerations

Therefore, we can conclude that, although the students from the São Luís workshop had a more "traditional" or "academic" methodological process – field visits, concepts, analogical references, design concept and *master plan*, they were nevertheless more autonomous when it came to time to formulate the proposals. However, there was less direct contact with the terrain and the population of the area, as in the case of the Marseille workshop, where the details were a more integral part of the process. In this last case, perhaps due to the format chosen for the final presentation, it was difficult to visualize the description of the specific proposals in a more systemic, comprehensive manner. And the short amount of time invested in the preparation of the final presentation certainly contributed to that as well. Neither case, gave much priority time to economic questions (the cost of the proposals); and the question of employment and income, a central problem to most of the researched areas, was also not discussed at length in most of the groups. Some critics mentioned the economic unviability of some of the proposals, particularly in the Equinox case, where the "wings of imagination" were deliberately "free to fly", which wasn't the case of the WS Estaque case, where the economic question had to be at the foundation of all of the planning and proposal decisions. There was great emphasis on transportation/urban mobility and on the integration of fragmented or dispersed areas on both cases reflecting a worldwide trend/concern nowadays.

Looking back on the two conception proposals with an architectural view, one can say that the EQUINOX emphasized the creation of abstract ideas to then gradually reach the materiality of the project, whereas the WS Estaque 2013 followed the opposite path. At the EQUINOX 2012 the semantic (abstract concept) and formal symbolic (formal analogies related to concepts) scales were the ones which interfered the most in the conception process, while at the WS Estaque/Marseille the technical (constructive materiality) and functional (urban uses and functions) scales were clearly dominant, with little emphasis given to concepts and indirect references through the use of analogous resources. The latter, if there were any, should be sought at the site themselves.

Regarding a supposed top-down process, which fits the EQUINOX case more closely and its opposite (the *bottom-up* project) clearly embraced by the Marseille schools workshop, it would be hasty to conclude that these labels could be pertinently attributed to the either of these processes. Firstly, because from a pedagogical point of view, these idea conception processes (and not projects) took place under strong influence of the academic environment (even though part of the physical work was done externally), an environment where the influence of the professors still prevails and learners do not yet feel fully capable of making their own decisions. An atmosphere, which when it comes to learning, is not conducive to a *top-down* relationship. Secondly, because at the end result of the Marseille workshop the transfer from particular to general, and micro to macro was not very clear, something difficult to do when working with a short amount of time, in an extensive and complex area, with many hands and heads. Time, as far as we're concerned, is an aspect which interferes with the nature of the process and, in some cases, the quality of the products of a workshop. Especially if we consider that the conception of ideas requires time and sometimes a certain necessary detachment which the intense and back-to-back activities at these type of events do not allow.

Finally, we should note that the distinct methodological paths did not result in products of superior or inferior quality, but rather simply different. And since the processes (the exchange of experiences, the contact with the realities being worked on, the development of sensitivities, logical reasoning and a critical sense) are more important to learning than the products themselves, all the students (as well as the professors) who participated in the events were able to "score" with the experience and believe me, given the prevailing atmosphere during the final presentations and closing parties, everyone enjoyed themselves. A sense of "mission accomplished", knowing that in the end the joint effort prevailed. As the French say, *tout est bien quand finit bien*!

Acknowledgments

References

BOUDON, Philippe et al. **Enseigner la conception architecturale**: cours d'architecturologie. Paris: Editions de la Villette, 2000.

CHUPIN, Jean-Pierre. **Analogie et théorie en architecture**: **De la vie, de la ville et de la conception, même**. Gollion: Infolio Éditions. Collection Projet & Théorie, 2013.

DEWEY, John. **Democracia e educação**. Trad. Anísio Teixeira. São Paulo: Companhia Editora Nacional, 1979.

EQUINOX 2012. **Atelier Internacional de Criação Urbana**. Material de Divulgação. São Luis: CAU/UEMA, 2012.

FREIRE, Paulo. **Pedagogia da Autonomia: saberes necessários à prática educativa**. 15 ed. São Paulo: Editora Paz e Terra, 2000.

HANROT, Stéphane. O workshop: entre pedagogia e engajamento social. In. **II ENANPARQ – II Encontro da Associação Nacional de Pesquisa e Pós-graduação em Arquitetura e Urbanismo, Anais**. Natal. v.1, sp, set 2012.

INEICHEN, Julien. O workshop – tipificação de uma prática pedagógica mundializada. In. **II ENANPARQ – II Encontro da Associação Nacional de Pesquisa e Pós-graduação em Arquitetura e Urbanismo, Anais**. Natal. v.1, sp., set 2012.

LASSANCE, Guilherme. O workshop como plataforma para o ensino de projeto. In. **II ENANPARQ – II Encontro da Associação Nacional de Pesquisa e Pós-graduação em Arquitetura e Urbanismo, Anais**. Natal. v.1, sp., set 2012.

SCHÖN, Donald. **Educando o profissional reflexivo um novo design para o ensino e a aprendizagem**. Trad. Roberto Cataldo Costa. Porto Alegre: Artmed, 2000.

VYGOTSKY, Lev. **Construção do Pensamento e da Linguagem**. São Paulo: Martins Fontes, 2011.

VELOSO, Maísa. Assessment of the quality of the project in the context of integration between the academia and the socioprofessional environment: an analysis of the experience of workshops. Nata /Brasilia: UFRN / CAPES, 2013 21p. [Research Project]. Federal University of Rio Grande do Norte/Coordination for the Improvement of the Higher Education Personnel, Natal/Brasilia, 2013.

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Introduction to the use of systems BIM (building information modeling) for thermal energy simulation

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Abstract

Energy consumption is one of the largest costs over the lifetime of a building. In Brazil, the subject of energy efficiency became relevant in the last decade, as laws and technical regulations published in the Brazilian Labeling Program (PBE) of INMETRO in order to reduce the electricity consumption by Commercial, Public and Residential buildings. The rise of new technologies brought many changes in the design process. The BIM software was developed among these new technologies, and it was quickly widespread throughout the world. In order to combine the facilities afforded by BIM to the perspectives of reducing energy consumption of buildings, this research aims to study the possible interoperability between BIM softwares and thermal and energy simulation softwares, focusing on EnergyPlus and Daysim. Two different methodologies were used for the analysis, using two building models with the climate of Viçosa - MG. The literature and the performed simulations identified which input data of Archicad could be inserted in EnergyPlus and which EnergyPlus outputs could be inserted in ARCHICAD model. Thus, it was found that 70% of the basic input data of EnergyPlus can be directly inserted in the thermal model usging ArchiCAD modeling. Later, the potential of interoperability between ArchiCAD and Daysim was analyzed by importing an ArchiCAD model in Daysim. The comparison of a model created in Sketchup (conventional method) and an identical model created in Archicad showed no significant differences in theis results. Therefore, it is concluded that the interoperability between energy simulation softwares and BIM is possible, although it still requires some adjustments..

Keywords: BIM. Energy Efficiency. Interoperability.

Background

Professionals from a number of different areas have now realized the pressing need to reduce energy consumption. That has led many agencies all over the world to create laws and regulations that would reduce energy consumption.

In 2009, partnering with the federal government, Brazil's National Institute of Metrology, Standardization and Industrial Quality (INMETRO) published the RTQ-C, or Technical Regulation for the Quality of Energy Efficiency Levels in Commercial, Service and Public Buildings (BRASIL, 2010a), and in 2010, the RTQ-R, or Technical Quality Regulation for the Level of Energy Efficiency in Residential Buildings (BRASIL, 2012), intent on reducing electrical power consumption by commercial, public and residential buildings.

With the advent of new technologies, the building design process has also suffered major changes, moving from former ink and paper to 2D computer tools and, currently, 3D tools, which speed up the design process because the building is conceived as a whole while floor plans, sections, elevations and volumetric studies are developed simultaneously.

A currently widespread design tool is the computer-based BIM platform. Many building contractors and other companies in Brazil and around the world are using it to facilitate the design process.

In order to add the facilities a BIM platform provides in the design process to the current perspective of reducing energy consumption in buildings, this paper intends to show the interoperability between a BIM platform software and environmental performance simulation programs, in terms of both thermal and energy performance and natural lighting, because designers are thus capable of creating a project that abides by performance evaluation criteria, which is one of the objectives of the BIM project process.

Literature Review

Performance Evaluation

The theme of reducing energy consumption levels has been broadly discussed these days. The need for energy consumption reductions has become consensus not only for scholars and experts, but also for the population in general. The participation of architects who are concerned with the issue of sustainability and energy use is therefore crucial, because minor design decisions can significantly affect energy consumption in a building (HETHERINGTON et al., 2011).

In Brazil, the issue of energy efficiency picked up intensity in 2001, when the first federal law was approved for efficient allocation of energy resources and preservation of the environment (BRASIL, 2001). And in 2009, the PBE Edifica was launched as a Technical Regulation for the Quality of Energy Efficiency Levels in Commercial, Service and Public Buildings (BRASIL, 2010a), currently Technical Requirements (BRASIL, 2010a), as part of INMETRO's PBE (Brazilian Labeling Program), after the example provided by many other countries.

Since then, many civil construction programs focused on saving energy in buildings are either being developed or already in use (MITCHELL, 2011). PBE Edifica examples to assess performance include programs studied by Mendes, Lamberts and Neto (2001), such as the EnergyPlus program, and the analysis made by Ramos and Ghisi (2010), with the same program.

The EnergyPlus program simulates thermal and energy performance of buildings with all the systems that comprise the building and are relevant for the performance of the building, such as climatization (cooling, heating, and ventilation), lighting, internal loads, thermal properties of material and other elements that take part in thermal exchanges (CARLO,2008).

As required by the RTQ-C, EnergyPlus is approved by the ASHRAE Standard 140-2004 BESTEST method. It offers simulation tools and options that allow for methodology flexibility in accordance with the simulation objectives and EnergyPlus resources may facilitate future analyses due the large amount of output data (CARLO, 2008).

Pedrini et al. (2010) used simulations to show that classification of the envelope by means of the RTQ-C prescriptive method may bypass architectural solutions of proven energy efficiency due to the standardization of the variables that influence energy consumption resulting from the building envelope. They also mentioned the potential of using a computer simulation method as a tool to analyze energy consumption in buildings in order to overcome limitations of the prescriptive method, and underlined the importance of bioclimatic recommendations in early design phases to ensure good the thermal and energy performance of a building.

DaySim, in its turn, is a lighting simulation software intended to provide lighting parameters such as artificial lighting system automation and daylight factor on previously determined points and surfaces inside the building. An assessment of the visual comfort of building occupants can thus be made that will encourage reducing the consumption of electrical power (REINHART, 2010).

According to Ramos and Ghisi (2010), DaySim/Radiance uses the raytracing method and EnergyPlus uses the split-flux method. However, since the in split-flux method the reflected part is equally divided in the space, some points will eventually receive a larger portion than the actual one. Therefore, the EnergyPlus program is not recommended for the calculation of internal illuminances when natural lighting is used because values are shown to be much higher than the measured values, whereas DaySim is usually the best choice to compensate for that limitation.

BIM Platform

The design representation model of floor plans, sections and elevations had changed very little over the centuries, until the latter half of the 20th Century started to introduce major changes to the design process. New technologies are brought to the market nearly every day to facilitate the sharing of information among professionals from the various disciplines involved in designing a building. The Building Information Modeling, or BIM, is one such new technology whose design process enables the so-called *performance based design*. In this process, building characteristics are the outcome of systemic evaluation whose criteria include environmental—thermal, luminous, acoustic—and structural performance, among others.

According to Corrêa and Ruschel (2010), the three fundamental aspects of BIM are the parametric modelling for the development of a "unique model", the interoper-

ability for integration and collaboration in information exchange among the parties involved, and the possibility for systemic management and evaluation throughout the life cycle of the project. This allows for a systemic perception of problems and the use of imaging techniques for potential solutions.

The BIM platform is a work system that integrates architects, engineers, and building contractors (AEC) for the development of an accurate virtual model that generates a database containing both topological information and the necessary subsidies for estimating budgets, energy use and construction phases, among others. For specific functions as well as others that are complementary to the main program, some researchers create program extensions, or plug-ins, that can be gradually installed on the base program (MENEZES, 2011). These are usually the outcome of studies regarding BIM platform and performance evaluation software interoperability, developed to facilitate the design process by including a step where performance criteria are determined. Among those criteria, this paper focuses on the energy efficiency of buildings according to the PBE Edifica, which Menezes (2011) argues to be incipient still. Despite the BIM promises of developing a complete model for the energy analysis purported by manufacturers, program interoperability is still problematic. Therefore, if implementation proves to be feasible, there will still be much left to be done.

Mitchell (2011) pointed at the creation of thermal zones in the BIM platform, which is the EnergyPlus program base for modeling and analysis, as the main problem. Natural ventilation systems are also considered as a modelling difficulty because of their complexity. Hetherington et al (2011) also address the issue of thermal zones and the fact that the BIM platform is focused primarily on the building geometry. As to building use, patterns of hours and occupation data can easily be inserted through the IFC (*Industry Foundation Classes*)[1] capability.

There has been much research and software development to improve program interoperability, such as the *IFCtoIDFProgram*, developed by the Lawrence Berkeley National Laboratory (LBNL) between 1999 and 2004 with support from the *US Department of Energy* (USDOE) (MITCHELL, 2011). And the gbXML extension, developed to transform the information needed by the energy simulation (HETHERINGTON et al., 2011).

Additionally, various international organizations such as International Alliance for Interoperability (IAI), Building SMART *Alliance and Building SMART International* (BUILDINGSMART, 2011) have been created to implement the use of the *Building Information Modeling* (BIM) through integration of the software used by various professional disciplines (MITCHELL, 2011).

Objective

The objective of this paper is to present the interoperability potential between a BIM-based software and the energy simulation EnergyPlus and DaySim software.

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1. Output file for programs that adopt the BIM platform, which Mitchell (2011) says is rich in geometric representation information classes.

Method

The method comprised defining the computer model to be analyzed, modelling, running the simulation, and finally processing and analyzing the results.

For analytical purposes, two fictitious buildings were used in the city of Viçosa, state of Minas Gerais: an artificially conditioned bank and a naturally conditioned shop, with cross-ventilation between different settings. The bank has potential energy savings in the automated lighting system, which was also exploited.

The first is a standard bank model (Figure 1), composed of three main settings, automated banking facilities and customer service, located on the ground floor, and administration facilities on the second floor. The model has five openings to the outside, three of which are windows that allow light only into the setting and two automatic doors. The different settings are cooled by a central air conditioning system that feeds two 39 cm high plenums, located above each floor (FRIAS, CARLO and PAIXÃO, 2012).

The building is considered a commercial type building, with working hours between 10am and 6pm, with no breaks for lunch or rest.

Figure 1

View of electronic model of the bank, developed with Legacy OpenStudio for Sketchup.
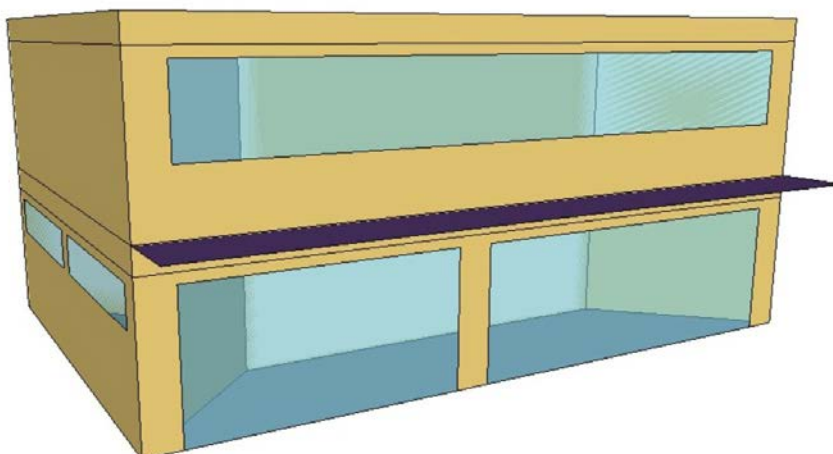
The second is a shop model (Figure 2) with three different settings: customer service, bathrooms and a kitchenette, all interconnected by a corridor, on a single floor. There are 11 openings to the outside, one of which is an automatic door and the others are windows that allow for both light and natural ventilation. Internally, the connection between settings is made through simple doors. The building floor is in direct contact with the ground.

Figure 2

Vista da maquete eletrônica do modelo da loja desenvolvido com o Legacy Open Stucio para Sketchup.

Fonte: Elaborado pela própria autora.
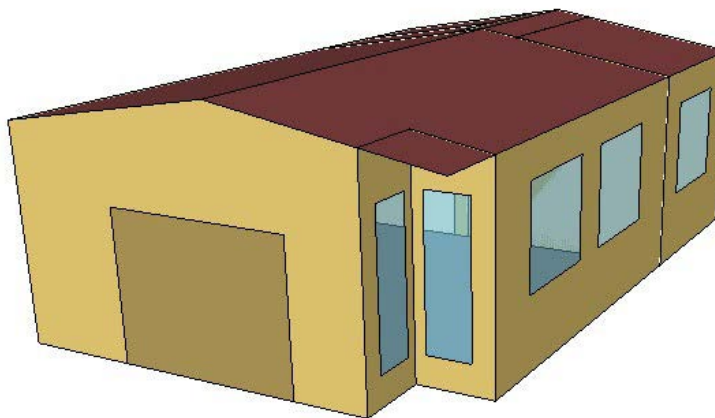
The interoperability between ArchiCad 15, developed by Graphisoft, EnergyPlus version 7.2 and DaySim version 2.1 was assessed with the aid of plug-ins, OpenStudio and the Sketchup software. Erro: Origem da referência não encontrada shows the models used in each analysis.

Figure 3

Tabela 1: Analytical methodology used in the research.

Source: Developed by the author herself.

Analytical Methodology		
	EnergyPlus Software	**DaySim Software**
Model used	Bank and Shop	Bank
Modelling Software	Archicad and Sketchup with plugins OpenStudio, EnergyPlus	Archicad and Sketchup
Simulation Software	EnergyPlus 7.2	DaySim 2.1
Analysis	Archicad output data; input data for EnergyPlus; output data for EnergyPlus; input data for Archicad. (critical analysis)	Archicad output data; input data for DaySim. Archicad output data; input data for DaySim.

Method of analysis for the EnergyPlus softwares

Energy Plus comprehends a range of data and information that are necessary for the simulation (CRAWLEY et al., 2008). For the purpose of this research, basic data enabling EnergyPlus simulation were selected to allow for a typical performance evaluation of commercial buildings during the design phase of a project. They include: location, usage pattern, materials, windows, geometry, occupation, lighting, electrical equipment, natural ventilation, air conditioning, and infiltration of air. Therefore, local energy generating systems (wind and photovoltaic), complex air conditioning systems (central with economizer cycle, ice banks, cooling towers), freezers or triple-generation (radiation, steam, electrical power), innovative materials (PCM – *Phase Change Material*), advanced calculation methods (such as finite differences) are some examples of the additional resources that were not tested. The bank was used for the simulation of artificially conditioned settings, and the shop was used for the simulation of naturally conditioned settings by the EnergyPlus network ventilation model (GU, 2007).

Both projects were modelled in the ArchiCad program and software tools were exploited to check which EnergyPlus entry data could be inserted during the building design process.

They were also developed initially in the Sketchup program with OpenStudio plugin (geometry and materials) and later simulated in the EnergyPlus software (remaining modelling and simulation). The output variables obtained by the simulation were

analyzed to check which could feed the ArchiCad software, for process completeness.

Therefore, the analysis looked at which ArchiCad variables could feed EnergyPlus and which EnergyPlus variables could feedback into the ArchiCad modelling, thus operating in a cyclic process (Figure 4).

Figure 4

Schematic drawing of the cyclic evaluation process between ArchiCad and EnergyPlus.

Source: Developed by the author herself.

Method of analysis for the DaySim software

Reinhart (2010) shows the feasibility of feeding DaySim with a model by using three different programs: Sketchup, Ecotech, and AutoCad, where 3ds formats can be saved. Additionally, the ArchiCad software is known to have the capability of saving projects in the 3ds format. The reliability of this procedure was verified by running a simulation of the same project in two different software models: Sketchup and ArchiCad. The building used was the standard model of the bank, because that typology presents greater automation potential for natural light ushering, which is one of the resources in the DaySim.

In the Sketchup modelling, wall, floor and lining thicknesses were accounted for, since ArchiCad also takes those variables into consideration. Even though the DaySim does not need this information for simulation purposes, because modelling may be simplified with the input of surface only, thicknesses were included in order to render uniform ArchiCad and Sketchup geometries. The Viçosa climate file type TMY (GUIMARÃES and CARLO, 2011) was used with time steps calculated at 15 minutes for both simulations. The grid used to obtain output data was the same for both files.

In the ArchiCad modelling, only building geometry and the reflectance difference between materials in the various elements were considered.

Data were analyzed to check for potential distinctions among DaySim outputs resulting from the use of different modelling methods. As such, this method has proven to be a parallel process between ArchiCad and Sketchup, and both are in line with DaySim (Figure 5).
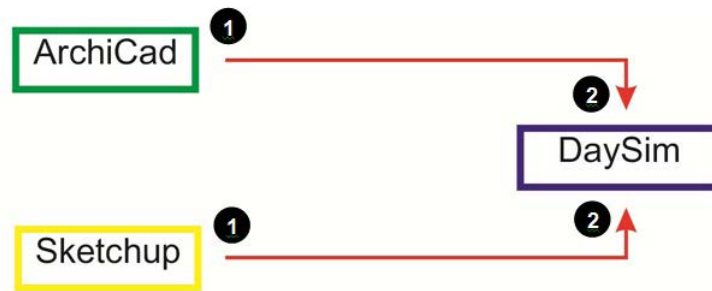
Results

ArchiCad x EnergyPlus

The Chart in Figure 6 provides basic input simulation data for the EnergyPlus software and shows those that can be exported directly, those with export potential after some adaptation, and those that have not been able to export to date (February 2013). This information may subsidize the creation of an ArchiCad plugin to EnergyPlus and vice-versa.

Important for the EnergyPlus simulation, the city's climate file cannot be inserted in the ArchiCad software, nor can climate data be inserted individually. Only the altitude, latitude and longitude of the city where the simulation building is located can be inserted.

An analysis of the Chart in Figure 6 reveals that data referring to opaque and translucent materials, such as material type, properties and location can be easily inserted in the ArchiCad software without remodeling in EnergyPlus.

Given the complexity of natural ventilation and air conditioning systems, ArchiCad does not provide fields for all necessary information. Only basic data, such as the characteristics of openings, air flow, and some other climate related data can be inserted. Concerning air conditioning in the simple system[2], only location, power, and air flow through can be specified.

Concerning occupation, lighting and electrical equipment, ArchiCad only allows for location (zone) and total power specifications. When it comes to occupation, though, the number of people per thermal zone can be stated since modelling..

Information concerning pattern of use by people, lighting system and electrical equipment, meaning the number of activity hours in any given setting, cannot be inserted. ArchiCad does not provide a field for this type of detail.

ArchiCad does allow for the creation of thermal zones, as it also allows for height specification. However, different software make different readings of zones. ArchiCad represents zones as the architectural space set by closures such as walls, ceiling and floor. While modelling in EnergyPlus abides by the same definition, that is, the creation of thermal zones is set by walls or partitions, ceilings and floors. Nevertheless, a thermal zone represents one or more thermal spaces submitted to the same conditions of

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2. O sistema simples de condicionamento de ar refere-se àquele que utiliza um equipamento independente para realizar o condicionamento do ambiente.

thermal balance, regardless of any closures. Though the ArchiCad model can be simulated as an architectural model with original closures, this option may increase modelling and simulation time thus voiding software interoperability advantages. That condition depends on the building and on the systems that are being modelled. So, the different programs must be made more adequate and compatible, or the simulator will have to make either a reflection or some active interference.

Figure 6

Chart 1 – Basic EnergyPlus input data and interoperability with ArchiCad

Source: Developed by the author herself.

Location	Latitude	Longitude	Altitude	Climate file		
Pattern of use	Operating hours					
Materials	Thickness	Density	Specific heat	Thermal absorptance	Solar absorptance	Thermal transmittance
Windows	Material	Thickness	Transmittance	Reflectance		
Constructions	Each layer of material in each element can be specified					
Geometry	Zones					
Building — Walls	Material	Location				
Building — Roof	Material	Location				
Building — Floor	Material	Location				
Building — Windows	Material	Location				
Building — Doors	Material	Location				
Occupation	Location	Pattern of use	Number	Radiant fraction	Type of activity or Metabolism	
Lighting	Location	Pattern of use	Total power (W)	Radiant fraction	Visible fraction	
Electric equipment	Location	Pattern of use	Total power (W)	Latent fraction	Radiant fraction	Lost fraction
Natural ventilation	Pressure coefficients	Coeficient direction	External nodes	Characteristics of the opening	Pattern of use windows and doors	Location windows and doors
Natural ventilation	Air flow volume	Mass of air	Temperature	Humidity	Pressure	Discharge coefficient
Air conditioning	Simple system	Complex system				
Infiltration	Infiltration rates per zone					

Caption

Archicad para EnergyPlus
- direct export possibility
- need to adequate
- no export possibility; manual data input is mandatory in EnergyPlus

After the Figura 7, the percentage of data that can be exported to EnergyPlus is perceived to be predominant (70%) in comparison with those that cannot be exported (28%). If the model already exists in ArchiCad, modelling time savings can be achieved in EnergyPlus by exporting the model; the same applies if the project has not been developed yet. if ArchiCad is chosen, simulation can be made in less time than if the project is represented in 2D.

Later on, another analysis was made, considering EnergyPlus output data that could feed back into ArchiCad. As the bank and shop models were simulated, 288 output variables were found to be possible, 29 of which can feed back into ArchiCad, that is, only 10% of EnergyPlus output variables. In Tabela da Figure 8, the main variables can be verified.

Figure 8

Table 2 – Basic EnergyPlus output data.

Source: Developed by the author herself.

Dados climáticos	Umidade						
Ocupação	Número	Carga Térmica					
Iluminação	Potência Total	Carga Térmica					
Equipamentos Elétricos	Potência Total	Carga Térmica					
Aberturas Translúcidas	Transmitância Solar	Carga Térmica					
Zonas	Temperatura do Ar	Umidade	Temperatura do Termostato	Carga Térmica			
Ar Condicionado	Potência Total Produzida	Fluxo de Ar	Umidade	Pressão	Entalpia	Temperatura de bulbo úmido	
Ventilação Natural	Fluxo de Ar						

ArchiCad x DaySim

Initially, there was an attempt to import the 3ds file saved on ArchiCad directly for DaySim; however, the program could not receive the file. Therefore, the ArchiCad 3ds file was primarily imported to Sketchup, changing only the scale of the model, and then it was saved again in the 3ds format. Only then could it be imported to DaySim, and the software recognized the file. However, though ArchiCad saves the file in the 3ds format, DaySim does not read it directly, where the Sketchup becomes necessary as a "bridge" between the different interfaces.

Reflectance and transmittance values for the building elements were inserted manually, according to the Table in Figure 9. The table also shows the colors for each component used as an element in the program. The language was maintained as listed by the program.

Relation reflectances and materials				
Type		Reflectance	Transmittance	Sketchup	Archicad
Wall		0,8	1,937	Cor D04	Paint 01
Floor		0,3	2,998	Cor F21	Surf-Concrete Dark
Window	Glass	0,075	0,837	Cor Translucent _Glass_Blue	Glass_Clear
	Frame	0,85		Wood_Board_Cork	Wd_Pine Horizontal
Lining		0,3		Cor 000	Surf-Stucco
Shades		0,3	3,585	Cor A11	Roof-Tile Dutch
Color		0,8444		Cor J11	Mtl-Aluminium

Though the simulation of the bank model coming from both the Sketchup and the ArchiCad was run, the former took more time than the latter. Table 4 from Figure 10 shows a summary of the results from both simulations.

Results from both simulations were very similar (Figure 10). The conclusion was thus that the file imported from ArchiCad has the same accuracy of information as the file imported from Sketchup. So, a lighting analysis can be performed on DaySim software for a building modelled on the BIM platform without major difficulties with reliable results. One should be reminded that Sketchup is necessary to adjust the ArchiCad 3ds model, which may present minor differences, though the labor involved with them is less than the labor involved in modelling the building again on Sketchup

	Daylight Factor	Daylight Autonomy	Continuous Daylight Autonomy	Daylight Autonomy Maximo	Useful Daylight Autonomy <100	Useful Daylight Autonomy 100-2000	Useful Daylight Autonomy 100>2000	Daylight Saturation Percentage	annual light exposure
	DF [%]	DA [%]	DA_{con} [%]	DA_{max} [%]	$UDI_{<100}$ [%]	$UDI_{100-2000}$ [%]	$UDI_{>2000}$ [%]	DSP [%]	annual light exposure [luxh]
Averages of the model generated on ArchiCad	0,0	43,5	44,8	34,9	54,4	6,4	39,5	0,0	45819217,6
Averages of the model generated on Sketchup	0,0	43,5	44,8	34,9	54,4	6,4	39,5	0,0	45821628,1
Absolute difference	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	2410,5
Percentage of averages	0%	0%	0%	0%	0%	0%	0%	0%	0%

Final considerations

AThe interoperability between thermal energy simulation software and the BIM platform presents great potential, but further research and studies are necessary so that the process can be totally viable.

In an analysis between ArchiCad and EnergyPlus software, a major interoperability potential was observed that may facilitate design work, so professionals can consider sustainability and energy consumption reduction issues as they develop their projects.

However necessary, this interoperability needs adjustments. This research has shown a potential 70% of the basic EnergyPlus input data that can be directly inserted with the ArchiCad software, by means of a plugin. Remarkably, this research covered only the basic EnergyPlus input data, whereas specific data, for instance, those concerning solar panels, have not been analyzed and not accounted for these calculations. However high, these percentages can be reduced when specific building systems are considered.

Also, ArchiCad and DaySim software interoperability has proven to be possible. A comparison between the usual import process for the Sketchup model to the DaySim software and the import process for the ArchiCad model has shown no significant differences, though there were differences in the simulation time.

The only adaptation needed is some ArchiCad or DaySim software modification to enable direct reading of the ArchiCad model.

This shows the great potential offered by the BIM platform to facilitate a performance evaluation based design process. The increased use of this computer tool allied with thermal energy simulation software is greatly encouraging for building contractors and companies, which will be able to optimize their time, adapting their projects to sustainability ideals.

Agradecimentos

Referências Bibliográficas

ASHRAE – AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIRCONDITION-ING ENGINEERS. ANSI/ASHRAE **Standard 55.2004: Thermal Environmental Conditions for Human Occupancy**. Atlanta, 2004.

BRASIL. Lei n. 10295, de 17 de outubro de 2001. Dispõe sobre a Política Nacional de Conservação e Uso Racional de Energia. Lex: **Diário Oficial da União**, Brasília, 2001. Disponível em: <www.inmetro.gov.br/qualidade/lei10295.pdf>. Acesso em: 17 jan. 2011.

_____. Instituto Nacional de Metrologia, Normalização e Qualidade Industrial (IN-METRO). **Portaria 372, de 17 de setembro de 2010**. Requisitos Técnicos da Qualidade para o Nível de Eficiência Energética de Edifícios Comerciais, de Serviços e Públicos. Rio de Janeiro, 2010a. Disponível em: <http://www.inmetro.gov.br/legislacao/rtac/pdf/RTAC00 1599. pdf>. Acesso em: 01 out. 2010.

_____. Instituto Nacional de Metrologia, Normalização e Qualidade Industrial (INMET-RO). Portaria nº18, de 16 de janeiro de 2012. Requisitos Técnicos da Qualidade para o Nível de Eficiência Energética de Edificações Residenciais. Rio de Janeiro, 2012.

CARLO, J. C. Desenvolvimento de metodologia de avaliação da eficiência energética do envoltório de edificações não-residenciais. Santa Catarina: UFSC, 2008, 196 f. [**Tese**] (Doutorado em Engenharia Civil) – Centro Tecnológico, Universidade Federal de Santa Catarina, 2008.

CARLO, J.C.; LAMBERTS, R. Parâmetros e métodos adotados no regulamento de etiquetagem da eficiência energética de edifícios – parte 1: método prescritivo. **Revista Ambiente Construído**, Porto Alegre, v. 10, n. 2, p. 7-26, abr./jun. 2010.

CORRÊA, M. V. G.; RUSCHEL, R. C. Tendências da Colaboração em Arquitetura, Engenharia, Construção. In: FABRÍCIO, M. P.; ORNSTEIN, S. W. (org). **Qualidade no projeto de edifícios**. 1 ed. São Carlos/Porto Alegre: Rima Editora/ANTAC, 2010.

FRIAS, F. T. C.; CARLO, J.C.; PAIXÃO, A. C. C. S. Título. In: XIV Encontro Nacional de Tecnologia do Ambiente Construído, **Anais...** Juiz de Fora: ENTAC, 2012.

GU, L. Airflow Network Modeling in EnergyPlus. In: **Proceedings**... of Building Simulation: IBPSA, Beijing, September 2007, p.964-971.

GUIMARÃES, I.B.B.;CARLO, J. C. Caracterização bioclimática da cidade de Viçosa, MG. In: XI Encontro Nacional de Conforto no Ambiente Construído e VII Encontro Latino Americano de Conforto no Ambiente Construído. **Anais**... Rio de Janeiro: ENCAC & ELACAC, 2011.

HETHERINGTON, R.; LANEY, R.; PEAKE, S.; OLDHAM, D. INTEGRATED BUILDING DE-SIGN, INFORMATION AND SIMULATION MODELLING: THE NEED FOR A NEW HIERAR-CHY. In: **Proceedings of Building Simulation** 2011: 12th Conference of International Building Performance Simulation Association, 2011, Sydney.

MENDES, N; LAMBERTS, R.; NETO, J. A. B. C. Building Simulation in Brazil. In: **Proceedings**... of Building Simulation: Seventh International IBPSA Conference, 2001, Rio de Janeiro.

MENEZES, G. L. B. B. Breve histórico de implantação da plataforma Bim. In: **Cadernos de Arquitetura e Urbanismo,** v.18, n.22, 21° sem. 2011.

MITCHELL, J. BIM & BUILDING SIMULATION. In: **Proceedings of Building Simulation** 2011: 12th Conference of International Building Performance Simulation Association, Sydney, 2011,.

NASCIMENTO, L. B. P.; BARBOSA, M. J. Análise da influência de variáveis construtivas e de variáveis de uso e ocupação no consumo de energia em edifícios de escritório. In: X Encontro Nacional e VI Encontro Latino Americano de Conforto no Ambiente Construído, **Anais...** Natal: ANTAC, ENCAC, 2009.

PEDRINI, A. et al. Análise comparativa da eficiência energética de envoltórias segundo o regulamento de etiquetagem de edifícios. In: XIII Encontro Nacional de Tecnologia do Ambiente Construído, **Anais**... Canela: ANTAC, ENTAC, 2010.

RAMOS, G.; GHISI, E. Avaliação do cálculo da iluminação natural realizada pelo programa EnergyPlus. **Revista Ambiente Construído**, Porto Alegre, v. 10, n. 2, p. 157-169, abr./jun. 2010.

REINHART, C. F., **Tutorial on the Use of Daysim Simulations for Sustainable Design.** Harvard University Graduate School of Design, Cambridge, MA 02138, USA, April 28, 2010.

MARCELE ARIANE LOPES GARBINI AND DOUGLAS QUEIROZ BRANDÃO

Analysis on the implementation of bim technology in four architectural offices

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Abstract

This paper deals with the design process using BIM (Building Information Modeling) which is proposed to benefit architectural offices. The concept of BIM has been around for over 30 years, but it has been released more comprehensive in construction market just in the last ten years. The advantages of its use are visible in projects which were developed using this technology, considering the indisputable increase in the speed and quality of design and other benefits described in this work. Thus, the aim of this work is to verify how the architectural firms are migrating to BIM technology listing the main problems, difficulties and barriers to this implementation. This research was conducted on multiple case studies methodology applied to four architectural offices located in the cities of Cuiabá, Goiânia and São Paulo, resulting in a comprehensive number of qualitative data. In preparing the study a research protocol issues for data collection was designed and the conduct of the case studies followed an exploratory order through documentation work, interviews and direct observation in the offices. The steps for the interview were prepared in accordance with information about the company, the development of projects, the planning for implementation of BIM, the information technology used, the design process adopted and the work procedures. After validation a comparative analysis of the whole information was performed and it was possible to identify significant changes in the design processes, in the work procedures and in training the technical staff of the offices, in the four cases studied.

Key words: Architectural offices. Building Information Modeling. Design process. Design quality.

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Introduction

Despite the construction problems, failures and pathologies originated by the absence of greater care with the project in its many dimensions , it is seen that the community of the construction went on to raise awareness about the importance of improving the project's process .

The dimensions of the quality of the project are presented organized by Fabrício, Melhado and Ornstein (2010), being the management's quality of the project's process one of the eight dimensions classified. The work of these authors synthesize the totality of quality concepts in building projects.

Ayres (2009) explains that the process of the project is essentially a sequence of enhancements to a set of information to be transmitted to subsequent stages. Even small projects in the construction industry produce a huge amount of information and, because of that, the benefits of using Information Technology (IT) are many.

A good project's process, conducted with the aid of appropriate information technology tools is an essential basis to the quality of the construction processes and the resulting buildings (MOUM, 2006).

BIM technology

Building Information Modeling (BIM) is, according to Eastman et al. (2008, pg.13), "a technology for modeling and an associated group of processes for production, communication and analysis of the building model." This concept involves the technologies and processes to be used in production, communication, and the analysis of building models.

According to Andrade and Ruschel (2009a , 2009b), the use of a BIM based practice can play a decisive role in improving the stages of the project, assisting in the generation of proposals coherent with the requests of customers, in the integration of projects, including between themselves and with the construction, and reducing time and cost of construction. In summary, BIM is an integrated and collaborative practice project in which those involved in the process converge their skills to develop a single model.

There are three fundamental aspects of BIM: parametric modeling for development of this "single model"; interoperability for integration and collaboration and exchange of information of the people involved and the possibility of management and evaluation of the project throughout its life cycle. This ability to manage and assess many aspects of the project allows, by means of technology, to treat the project as a truly multidimensional one (RUSCHEL et al., 2010).

The use of virtual model BIM-based as a single repository of project's information, where several entries - made by different specialties and designers - are automatically translated into multiple outputs as spreadsheet documents, technical drawings and data for digital construction, which provides what is called "single model" - from conception to production (Oliveira, 2011).

Ruschel et al. (2010) explain that among the possibilities presented by BIM, the ones of great interest are the interactions between technology and the project's process. Among them, the main one is the changing forms of knowledge acquisition in the project's process, i.e., the process of solving particular problems. According to these authors, BIM is not just a form of representation subsequent to the creation or syn-

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thesis activities, but it is set as a technology that modifies its own way of developing the dynamic of projecting.

As a result of the early diffusion of BIM technology in Brazil, there is a need to formalize and develop knowledge on this topic. Furthermore, according to Koskela et al. (2011), the implementation of BIM is not only considered as a simple technological innovation, but more than that, it is about changes in the socio-cultural environment of the construction industry.

Changes in the project's process

Fabrício, Melhado and Grilo (2002) explain that with the increasing computerization of project's offices, there is a trend, or at least a possibility, of extending the earlier simulations in the project's process, involving calculations and electronic models that can, with the aid of the computer, be performed more quickly and less expensively. The same authors also comment that this change denotes new possibilities in the project's process that allows to separate part of the projective skills related to intuition for the simulation possibilities and comparative analyzes of their consequences.

Tzortzopoulos (1999), whose work presents a detailed organization proposal of the whole process, argues that the systematic development of the project activities as well as the necessary information in each stage are key factors for improving the process. With the advent of BIM technology, this way of thinking remains and gets stronger, though, requiring new models to guide the process as a whole.

The change in the project's process through BIM technology is meaningful and is directly reflected in the architectural offices, since they initiate the process and, in many cases, mediate and coordinate other specialties. Thus, the problem of this research is related to the demonstration of the importance of the design process through BIM, more precisely in the planning and implementation of this technology in the offices of architecture projects.

Objetive of this study

Applications of this new technology were raised in four architectural project offices, located in three Brazilian capitals. Based on the knowledge of the conventional design process, already well organized in the decades of 1990 and 2000, in works such Melhado (2005) one, among others, there were collected and analyzed the problems and difficulties for the implementation of BIM in the offices studied, which is the goal of this article.

The research was conducted at the Federal University of Mato Grosso, as an integral activity of the Master's degree in Building and Environmental Engineering. The authors are part of the Multidisciplinary Group Housing Study (GHA).

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Implementation of BIM technology

According to Andrade and Ruschel (2009b), many international institutions and governments have been investing in the last years in researches about BIM. Among the international organizations, we can cite: *Building Smart*, *National Institute of Building Sciences*, *Associated General Contractors of America* (AGC), *General Service Administration* (GSA) and *Innovation in Building and Construction* (CIB), among others.

According to the same authors, in some countries, government agencies have encouraged the massive use of BIM technology, either through investments in research agencies, either by regulations for the construction or discussions about the use of BIM technology.

According to McGraw-Hill Construction report, American association that conducts research on the adoption of BIM by professionals, in 2009, 49% of respondents were using BIM tools. The transition to BIM is recent, since two thirds of users had adopted it in the past three years. Another important fact is that in 2007, the year of the last survey, 14% of the users consider themselves at an advanced level of learning, and this number grew to 42% in 2009, a threefold higher rate.

Implementation guide

Abroad, to drive the professionals, there are several implementation guides or manuals prepared by the construction associations, universities and government agencies. Clearly, they are unable to meet the specific demands of each project or of each company, but they help to prepare professionals, showing the necessary paths for the efficient implementation of BIM technology in their offices. Usually, they begin with the organizational transformation of the office going to the way of elaborating the project.

Most of these guides was developed in the United States, country in which BIM is in a more advanced stage. It is important to highlight Autodesk guides, from the Association of U.S. Contractors (AGC), the Association of the UK Construction Industry (AEC UK) and guide of the University of Pennsylvania in partnership with the Building Smart Alliance, the agency responsible for developing the National BIM standard in the USA .

Another important guide is the Association of the UK Construction Industry (AEC UK), an association that was established in 2000, initially to improve the process of information management, production and exchange of files in construction. In 2009, new members and consultants decided to address the topic BIM, given the growing need within the UK construction industry, contributing to a unified system. This guide is part of a BIM standardization work in the UK.

This manual has its importance as it describes all the details of implementation, more targeted to Autodesk software, now directing the planning for who will take the Revit® software, creating the standardization work, files, exchange of files and patterns The fourth guide to be highlighted is the one that was the result of a partnership of Penn State - University of Pennsylvania with the Building Smart Alliance, the body responsible for developing the National BIM Standard in the USA. To deploy BIM technology, according to this guide, it is necessary that the project team run in a comprehensive and detailed manner. The Plan of Implementation of BIM project must ensure that all parts of the project are aware of the opportunities and responsibilities associated with the implementation of BIM on the project. This planning must define appropriate to

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BIM project (authorship of the project, cost estimating, project coordination). Once the plan is created, the team can track and monitor your progress and get the maximum benefits from the deployment of new technology.

The guide shows a structured process, divided in 4 steps:

- Identify BIM value, during the project, planning, construction and operational stages.
- Create maps of the project's process to run the project in BIM.
- Define how the project's delivery and exchange of information will be done.
- Develop infrastructure of how will be made the contracts, communication procedures, technology and quality control of the technology implementation.

One of the most important steps in the planning process is to clearly define BIM's potential value on the project and team members. This is accomplished by defining the overall goals for the implementation of BIM. of organizing names in many locations, maintaining an efficient standardization.

Implementation in Brazil

The process of implementation of BIM in Brazil is under development and still needs improvement so that it can in fact provide advances to the Brazilian civil construction. According to Covelo (2011), there is a delay of 15 years compared to developed countries about taking notice, knowing what is to integrate supply chain, and train professionals to work for implementation. Within this reality, there is still the challenge of enabling designers for the new job, and in some cases, overcome cultural resistance, especially from professionals who are more used to working with older technologies, such as Autocad.

We still need to invest in softwares that manage the different stages of work and more powerful equipment currently used in the design offices, for which not all are willing to pay. Also, another problem is pointed out by companies: there are no virtual libraries for the purchase of ready items that are used in modeling. In other countries, like the U.S., where technology is now more widespread, it is possible to acquire all the specifications of sanitary parts, electrical components, while in Brazil it is still necessary to model these items.

Another important issue to be solved is how the project areas relate to each other, concerning planning, budget and construction. Today the processes happen sequentially, and when an office works with BIM, it becomes this whole process simultaneously (COVELO, 2011). As BIM is a simulation of reality and this simulation happens from the physical point of view, the design, cost and time, everything happens at the same time, still comments the same author.

According to Eastman et al. (2008), in the conventional process, the workload of the architects would be lower in the preliminary studies and would increase as the project nears the executive. When considering BIM, the curve is inverted, decisions are anticipated and a higher workload is shifted to the previous project (Image 3).

According to Reis (2011), this change makes that some technical information need to be set in previous steps to the usual one. Some offices have resorted to the aid of

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consultants from different areas to fill the gap in information flow. According to this author, the project must be developed in BIM from preliminary studies because the 3D model allows tests and simulations, and provides more accurate information to the basis for initial decisions. However, even the few builders who already work with BIM still do not do it fully. In practice, the integration between projects, budgets, schedules, and work is not yet complete, and the market should take some time to evolve accordingly .

Soibelman (2011) says that the implementation requires a clear definition of the needs of each incorporator, for the purpose of BIM is to improve the process of how the company manages its works, and it depends on the goals of the company. The same author also explains that despite the countless possibilities offered by BIM, revenue implantation is not unique to each company. The company has to first find a goal, decide what is important to it, and from this, develop a set of software that will implement this point of view.

Figura 3

BIM implementation.

Source: Adapted from Eastman et al. (2008).
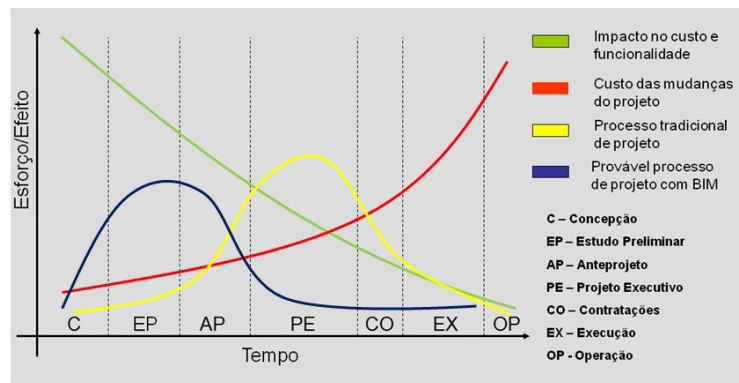
Perspectives for BIM

The successful application of new technologies based on BIM in product development should take into account human and organizational factors, and "fail to consider any of these factors during the implementation of the modeling results in an investment that generates low returns or even injury" (AYRES, 2009).

Kymmel (2008) states that the construction industry will only evolve toward BIM more concretely when it becomes necessary, either by requiring the contractor or by competition between the designers and builders, which will lead to deployment in order to maintain their survival on the market.

However, only the introduction of the new software alone will not be able to produce effective changes in the processes of the construction industry. It is necessary a collaborative approach by all involved in the chain, from the integration of the agents involved in the planning, design, construction and supply, seeking a more widespread adoption, seeking greater use of the possibilities offered by BIM (KYMMEL, 2008).

The ideal situation for defining the elements of design, for example, the situation would be that providers make available their catalogs in a neutral format so that it was possible to download Internet object with all specifications, including them di-

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rectly in the project. The availability of components by manufacturers could reduce the time spent by designers with modeling, allowing more detailed and effectively aligned to products available in the market inserting objects.

Leusin and Lyrio Souza (2009) also say that manufacturers would be responsible for the consistency of the information provided, which could be updated constantly.

Another big trend, with the expansion of the use of BIM, is the emergence of new complementary software linked to the structure, building facilities, construction planning, cost estimates and many analyzes that can communicate with the architectural model, taking it as reference to accomplish a specific task (LEUSIN ; SOUZA ; Lyrio , 2009).

Research done in four architectural offices

Characteristics of the chosen companies

The research was done in four architectural offices: two of them in São Paulo, one in Cuiabá and another in Goiânia, according to Chart 1.

Chart 1

rchitectural offices and its location, application script and research date.

Source: Garbini (2012).

Office	City	Script for the research application	Month/Year
A	Cuiabá	First questions. Creation of a semistructured interview, by attendance.	11/2011
B	São Paulo	Creation of a semistructured interview, by attendance.	12/2011
C	Goiânia	Creation of a semistructured interview, at a distance.	02/2012
D	São Paulo	Creation of a semistructured interview, at a distance.	02/2012

In cases A and B, questionnaires were used and the observations could be conducted in person, while in cases C and D the collection was done via web. Furthermore, in case (which also served as a pilot study) it was possible the presence of the first author in design activities in research participant format.

Company A is a project office of midrange architecture and is in the process of BIM implementation. It had an advantage over the others, because it had advice from a specialist company in the area that has contributed with some information to the project team.

Company B is also large, it is at an advanced stage, with consolidated process and schedules defined. This office has demonstrated that it is possible, through a good plan, achieving efficiency in projects developed with BIM, despite the difficulties found at the beginning.

Company C, an office, small business, is a great part of architectural companies in the architect's office owner and who also develops all projects, with the help of interns. This type of office tends to find more difficulties because it is not financially prepared to invest in new technologies, equipment and training. However, Company C has shown that it is possible to get information and advance the use of BIM in architectural projects.

Company D is an architecture company that has achieved great results in its projects. It has a specific project using BIM to be developed. This allows for a quick return in terms of results, since professionals were qualified and trained.

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Approach method

This research methodology has been adopted to study multiple cases, which, to Yin (1994) is the most convincing and solid type. To choose the number of necessary cases, the researcher should reflect on the number of reps if you like to have in the study. If there are more than two cases, it may produce an even stronger effect than just a case study.

The use of multiple cases must follow a replication logic, not sampling. The cases should work in a similar way to multiple experiments with similar or contradictory results explicitly foreseen in the beginning of the investigation. In summary, the rationale for multiple cases derives directly from their understanding of literal and theoretical replications (Yin, 1994).

Instruments and issues for the research orientation

The questions that guided the survey in each office (Chart 2) allowed the identification and implementation of how BIM was performed, which are the difficulties, changes in the project and standardization of procedures for project development process.

A preliminary research conducted at company A was defined as the first step towards the establishment of criteria for selection of other case studies. Thus, the procedures used for data collection, structuring, description of information and analysis of this study provided support for carrying out searches in the other case studies.

Questions about the implementation of BIM technology were addressed as the initial planning was adopted as the training took place and how the patterns were defined. Issues were therefore addressed, related to the data of the existing information technology, on the plan of acquisitions of new computers and the real need for machines with greater capacity for storing files. Chart 2 shows the complete list of questions that were used to guide the interviews and observations in the offices studied.

As a final point, there were presented the working methods and the dynamics of the development of projects with BIM, mapping the model of the design process.

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Results and analysis

The qualitative analysis was obtained by data compilation of each company, its activities and planning accomplished. Chart 3 shows the synthesis of the results, comparing the companies.

Chart 2

Questions for the interviews and observations in the offices.

Source: Garbini (2012)

Topic	Questions
Instruments for the company's planning (mission, objectives and expectations with BIM implementation)	• What are the company's main objectives to adopt BIM technology?
Instruments for the staff's planning (guides, training and consulting)	• Did the company look for a guide to implement BIM in the company? • How it was defined the staff to be trained? • Does the company always maintain the staff updated, looking for new courses, lectures and seminaries in the field?
Difficulties in the implementation	• How was the choice of the first Project to be developed using BIM? • What were the biggest difficulties when developing this first project?
Software used	• What was the software used to create the projects in BIM? • Did you know at first about the need for the acquisition of hardwares and softwares?
Steps of the traditional project	• Did the composition of the staff change after BIM implementation? • How it was your project staff before BIM's implementation?
Steps of BIM project	• Is it necessary a bigger amount of information in the first stage (preliminary study) with the implementation of BIM technology?
Professional qualification	• In order to work with BIM projects, was it identified the need of professionals with higher qualification? Why?
Standards (templates[3] and libraries)	• Was it developed a unique template to be used in the projects? • Was it created a unique library? • Was it adopted a standard for the families and objects' names to be developed?
General difficulties and perspectives	• Main barriers for BIM implementation. • Reflections about BIM tendencies for the future.

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	COLLECTED INFORMATION	STUDY A	STUDY B	STUDY C	STUDY D
COMPANY'S DATA AND STRUCTURE	Foundation year	1992	1981	2000	1962
	Location	Cuiabá/MT	São Paulo/SP	Goiânia/GO	São Paulo/SP
	Services more frequently done in the office	- Building projects. - Urban projects.	- Residential projects - Commercial buildings - Health buildings - Urban projects	- Residential projects - Commercial buildings - Industrial projects	- Urban projects - Commercial buildings - Health buildings - Cultural projects
	Technical staff	- 13 architects - 05 trainees	- 65 architects - 20 interior designers - 21 designers - 10 trainees	- 01 architect - 02 civil engineers - 03 trainees	- 70 architects - 10 trainees
BIM IN THE PROJECT'S DEVELOPMENT	BIM project's coordinator	There was consultancy of a coordinator for the developed Project during the research.	BIM leader	There is not	BIM coordinator
	Definitions of the modeling plan	- Model objectives - Detail level - Steps to be developed - Classification of the details - Responsibles for the model - Quality control	- Model objectives - Model name - Content - Project's training - Project's author - Creation of the project - Detail levels - Classification of the details	- Stages that Will be modeled. - Detail levels - Classification of the details	- Model objectives - Way of delivering the Project - Responsible for the model - Communication procedure - Information exchange - Detail level
PLANNING FOR BIM'S IMPLEMENTATION	Objectives for the implementation	- Minimize errors in modification of the Project - Increase the speed and quality in the project's process - Make the disciplines involved in the project compatible	- Enhance the project's quality - Help in the project's modification - Automatize work flows - Make the disciplines involved in the project compatible	- Diminish the deadlines - Enhance the projects' presentation - Help in the project's modification - Make the disciplines involved in the project compatible	- Enhance the project's quality - Make the disciplines involved in the project compatible
	Implementation guide	There is not.	Technology department developed a guide for the office.	It was developed a guide based on information researched	Technology staff developed a guide based on information researched
	Training of the staff	- Architects took Revit course - Difficulties in maintain themselves updated	- Architects took Revit course - Weekly meetings for Exchange of information	- Architects took Archicad course - Difficulties in maintain themselves updated	- Architects took Revit course - Training each 3 months
	Difficulties found	- Understand the new work process - Lack of concluded projects for research - Lack of template and organized libraries	- Understand the new work process - Difficulties concerning the software	- Understand the new work process - Difficulties concerning the software	- Understand the new work process - Difficulties concerning the software
PROJECT PROCESS	Setting of the technical staff before BIM technology	- Disperse staff, many people working in the same project. - Lack of communication with many mistakes in the project.	- Lack of communication; - Long time to change the projects. - Project's mistakes only observed during the construction.	- Slow work flow, - Less quality when finishing the project.	- Disperse staff, with many mistakes during the project's development. - Lack of communication, making the work be done more than one time.
	Setting of the technical staff after BIM technology	Staff working together.	Managers creation of models that define all the steps of the project's development and guide the technical staff.	- Relations ship with the client got better through 3D Project. - Staff develops project in less time.	- Staff working together - It was created a support staff with four people for the continuous improvement of the projects
	Demand of more qualified professionals	Yes. More knowledge in Project and execution.	Yes. More technical knowledge.	Yes. Professionals with modeling strategies.	Yes. Professionals with knowledge about new Technologies.
WORK PROCEDURES	Template development	No	Yes	Yes	Yes
	Library development	No	Yes	Yes	Yes
	Standard development for files, libraries and families' names	No	Yes	No	Yes
	Modeling planning	Being structured.	Yes. Preliminary study (LOD 100)[4], First project (LOD 200) and Executive (LOD 300).	According to the Project, it is defined what Will be modeled.	- Initial stage - Development stage - Documentation stage

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	COLLECTED INFORMATION	STUDY A	STUDY B	STUDY C	STUDY D
INFORMATION TECHNOLOGY	*Software* used	Revit	Revit	Archicad	Revit
	New equipment	Acquired new equipment.	Acquired new equipment.	Acquired new equipment.	Acquired new equipment.
WORK PROCEDURES	Barriers for the implementation	- High cost for the acquisition of new machines. - Need of the creation of a template - Lack of encouragement by the architects directors to train a BIM staff - Difficulty in the software use	- High cost for implementation - Difficulty in comprehending the Word BIM by the contractors	- High cost for the acquisition of new machines	- Need of high investment - Removal of all of the employees involved in the Project that were in comfort zone
	Reflections about the future	- Tool that Will reduce mistakes in the Project and the construction - It is easier to make compatibility and create quantification charts	- Enhancement of its use, making it popular - New way of working in irreversible, with many advantages, enhancing projects' quality	- Tool that Will reduce mistakes in the Project and the construction - It is easier to make compatibility and create quantification charts	- Work flow more helpful and with new Technologies that Will allow interactivity among areas, as corporation, Sales, after-sales etc.

Quadro 3

Quadro comparativo

Fonte: Garbini (2012).

The results presented in Chart 3 show that the project's process through BIM has suffered meaningful changes when compared to the traditional one. Throughout the next sections, these changes will be shown.

Companies' structure

The four companies analyzed have different structures, which identified that despite the size of the office, the difficulties, goals and search for better quality of the projects, they have some similarities.

Comparing the four companies, it can be concluded that the offices with more physical, financial and human resources, obtains higher return employing new technologies in architectural designs.

Another conclusion is that there is a cultural barrier that often ends up being stronger than the actual condition of the office investment in training or equipment. This means that small architectural offices need to understand that any new process eventually brings early cost overruns, but that does not stop the progress in project development. Thus, the volume of initial expenses should be treated as investment.

Characterization of the traditional project process

With respect to the traditional design process, we identified the need to provide such information as the offices still use the traditional design process as a basis for making the necessary changes.

Image 4 shows the flow of the design process of the four companies investigated. Similarities are noted in many cases, since most of the architectural companies uses the defined steps proposed by the Brazilian Association of Architecture process - AsBEA (2000).

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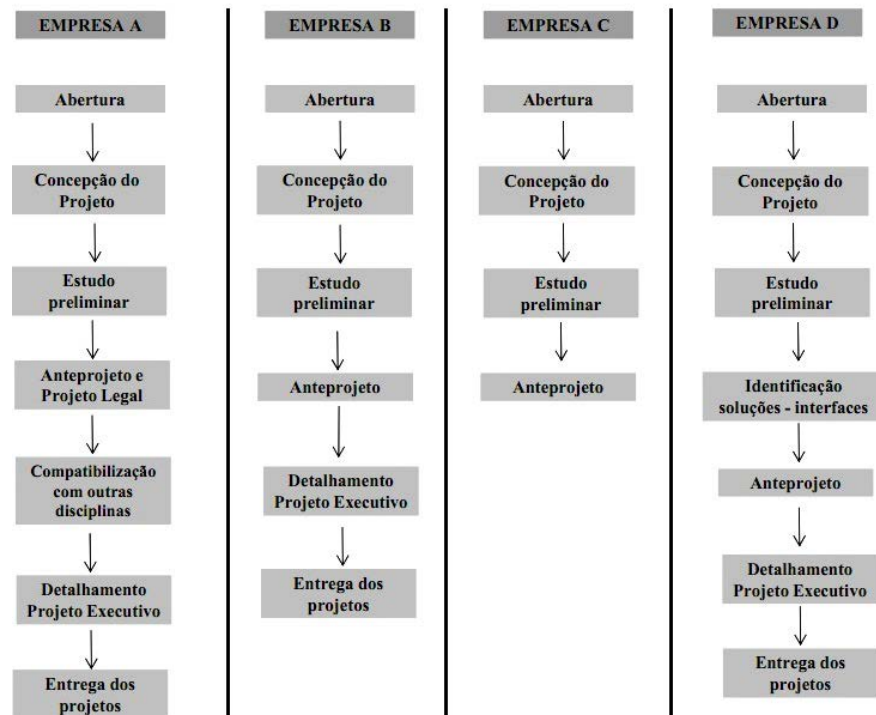**Development of the projects with the use of BIM technology**

The role of a BIM coordinator project exist in companies A, B, and D. In company B, this professional is identified as BIM Leader. In company C there is no specific charge related to BIM functions. As it is a small office, this role is played by the director architect.

At Company A, hiring a BIM coordinator came at a time when the office received the guidelines for the coordination of projects for a construction company hired by the client. With this experience, the main architect identified the need to hire a BIM coordinator for the office .

One can conclude from these data that for an efficient implementation of BIM technology is fundamental to the existence of the role of BIM Leader , it is this professional who will coordinate the development of projects, technical staff and identify the needs of the project, and what needs to be modeled.

Furthermore, it is its function to create levels of detail and control the project team architecture for the architecture model is completed with quality. In small offices, this function may be exercised by the main architect of the office, as he is the ones who creates and develops planning projects.

Figure 4

Process of the traditional project in four cases analyzed.

Source: Garbini (2012).

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The definition of the modeling plan, the company has a plan with the large amount of information to be defined for the model. Because the company is receiving the advice of an expert company, it is already in the design process to create your own plan modeling .

Company D has a plan of complete modeling, which defines the project's stages: initial, development and documents. It is believed that due to the fact that the office be large and have a more developed BIM department .

Company C does not have a plan modeling . However, often define the phases of the project to be modeled according to the needs of each project. In addition, company C set which will be detailed and sought to set a rating for the detailing to be performed. As Company D is a large office, it developed its plan modeling since the early deployment of BIM. This process involved the creation of levels of detail: Preliminary Study (LOD 100) Draft (LOD 200) and Executive (LOD 300) .

It was found that the larger offices , precisely those that have a BIM coordinator , are the ones who already have a detailed plan of modeling, with all information related to the project development . This shows the great importance , for it is through this plan that the office should be able to identify where changes occur in their work process and how the architecture models should be developed.

So to create this new planning stages we identified the need for an important professional: BIM coordinator. This professional is doing the planning of the implementation of BIM technology, coordinates the development of the projects, the technical team and identifies the needs of each project, especially what will be modeled. It is also their role to create levels of detail, control the project team so that the model is finished with high quality.

Planning for the implementation of BIM technology

As it can be seen in Chart 3, the four companies investigated BIM defined objectives: (a) improve the quality of their projects; (b) carry out the compatibility between disciplines and (c) increase the speed of development projects . Company B adds the objective to (d) automation of workflows .

The major difficulties encountered by four companies during the implementation of BIM are: (a) understand the new working process (new definitions , new requirements); (b) the change of office work process; (c) does not have the domain to use the software , and (d) delays in delivery of the first projects .

Regarding the use of deployment guides available , none of the four companies used them , not even partially. All of them created their own guides, seeking information on academic studies and experience of the team itself. In case A , there was the help of a company that provided advice . This consulting company has developed the guide tab of adopting concepts from Penn State University.

In companies B and D that have team and looking to upgrade through courses , forums and exchange information with other users to keep updated . However, companies A and C , which are smaller , prefer to rely on professional experience , which is usually the architect responsible for the project .

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With the training of the project team , companies A and C demonstrate difficulty in keeping themselves updated by not offering continuing education to architects . As a result, the architects have sought their learning in BIM individually. On the other hand, Company B , which has a technology department , promotes weekly meetings to exchange new ideas and information with all office users . Company D, which has a team of technology and provides training every three months , keeps all his crew always updated.

Information Technology

About softwares and applications, enterprises in cases A, B and D, adopt Autodesk Revit ® software to develop their architecture models. The company adopts the C Grafisoft ArchiCAD ® software.

However, the investigated companies feel the need to exchange equipment for use of BIM technology, since the files of the models contain a lot of information and make it slow computers, which consequently increases the waiting time for completion of the rescue or opening files. The forecast purchase of new equipment to support projects in BIM should be provided in the deployment plan, hence its importance.

The project's process using bim technology

About the design process, the architects of directors offices characterized their teams before the implementation of BIM, as scattered and there lack of communication between staff, leading design errors.

With the implementation of BIM in the development of projects, the report was that the teams work in collaboration, as technology requires, resulting in less errors in projects and thereby, increasing their quality.

Companies A, B and D characterized their technical staff before the implementation of BIM technology as dispersed, there was a lack of communication and various design errors. In company C, project development was slow and less quality presentation.

Regarding the implementation of BIM technology, the company's team works jointly, by the very necessity of the software to offer the possibility of multiple designers work on the same file. In company B there was a need to create an administrator of models to define the development of the project and pass the guidelines for the staff.

In Company C, the relationship with the customer became clearer as the virtual model of the project was presented from the beginning to the client. Company D created a team to better support project development. In general, the use of BIM is enabling the formation of teams whose members are more integrated and collaborative.

Concerning the design process, companies A and B now require professionals with greater knowledge in design and execution. Company C has identified the need for quality professionals to develop architecture modeling comprehensively, achieving the necessary information to the project. In company D, there was no need for professionals with knowledge of new information technologies.

It can be concluded that the architectural companies feel the need to hire professionals with a new profile. That is, designers of architecture with construction experience and knowledge of construction methods and architectural modeling.

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After the completion of the mapping to understand how the office worked to develop projects in the traditional manner, also stood up the design process, using BIM (Image 5) technology.

The main result, regarding the design processes, is that the market is demanding, increasingly, professionals with greater technical capacity to develop projects. To use BIM, it is required knowledge in building systems, material specifications and reasonable grip on costs.

Work procedures

Only companies B, C and D templates developed with specialized professionals seeking information and according to the needs of the office. These companies have also developed libraries for their projects. Only companies B and D have developed standards for filenames, libraries and families, creating these standardizations and keeping files organized since the beginning of the implementation of BIM.

Figure 5

Project process using BIM technology in four analyzed cases.

Source: Garbini (2012).
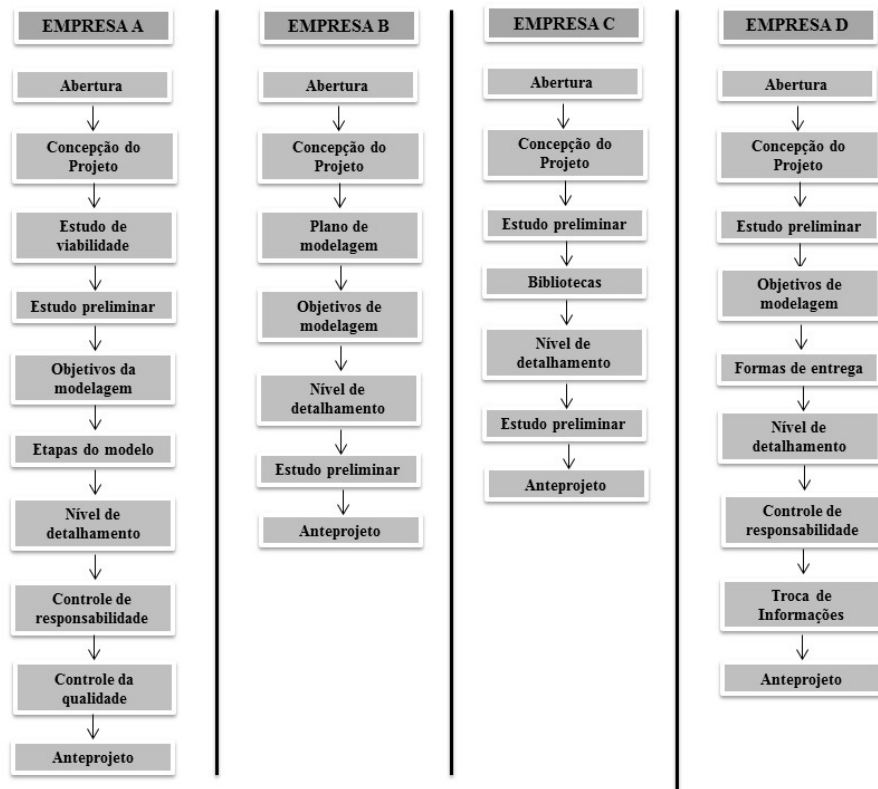
We conclude that it is necessary to develop standards before the beginning of the development of the pilot project, which should be a project already built and own office. In this pilot project the project team can develop the template according to the standards of the office, identify the main libraries that needed to be created and do the planning of the names of these libraries, files and families.

With the creation of a pilot project, it is easier to develop a new BIM project, once the standards are developed, making easier the development of future projects.

Final considerations

With the benchmarking analysis, we identified the need for an architecture company, and planning and development of projects in BIM. Several points raised show that it is necessary to know the concepts of BIM technology before its implementation. The professional responsible for implementing BIM should seek information related to new work processes, new equipment acquisition, development of BIM standards and training for the project team.

If the designers of architecture do not understand the concepts of BIM, use this technology only as a tool that can automatically generate drawings and consequently, these designers do not take advantage of its full potential.

It is important to educate the owners of architectural companies that the use of new technologies brings benefits. At first, this deployment will generate costs and project delays, however, in the medium term; it may become the most competitive office in such a competitive market.

Despite the difficulties found in the initial implementation, companies investigated are unanimous in stating that the adoption of BIM is irreversible, not only for the offices to increase the quality of their projects, but above all to survive new market demands.

The application of the interview contributed to a qualitative analysis of the cases. With the compilation of all the information, it was possible to confirm how BIM is changing the development of the design process in architecture offices. In the four companies analyzed, the staff commented that with the use of BIM technology development projects started to be developed collaboratively. With professionals working in the same file, it was verified errors decreasing in projects, increasing the quality and productivity of the office.

The interviews made it possible to understand how these architectural companies are starting to work with BIM technology, what types of planning are being made to implement it. It is confirmed, in the cases studied, the stage of adoption of BIM technology is still early, because all offices analyzed further develop only architectural projects, not existing joint participation of architects to designers and other areas of engineering so that the compatibility can be made. Furthermore, analyzes such as adequacy of lighting, energy efficiency, thermal comfort, among others, are not likely to be made.

As an assumption of this research, it has to be that the offices of architecture do not use a formal and thorough planning to start developing your projects in BIM. This assumption was verified and confirmed, as no company has full planning for the early development of their projects with BIM. In the only office where there was planning (case A), this was not developed by architectural company, but rather by a project coordinator, hired by the client.

Overall, there is a tendency of project offices did not develop adequate planning for implementation of BIM technology. In the cases studied, it was found that the professionals know the existence of guide's deployment, however, are rarely adopted. It was observed that there is even a lack of knowledge of a foreign language by the staff, which can be considered as lost opportunities, since, with the globalization of the world and with great evolution of information technology over the past decades, the possibilities of developing joint projects with designers from other countries were increased.

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It seems that the implementation and development of projects using BIM technology is still at a preliminary stage in Brazil, and there are few exceptions, such as large architectural offices, which, by having a more structured team can advance the use of technology.

The architectural companies are involved in current design practice , in which hardly comes to the executive design stage, so as to draw all the detailing required for the execution of work. Such practices collaborate for the poor quality of the projects and still constitute obstacles to the introduction of process improvements.

Clearly offices yearn for increasing the quality and productivity of their projects, and aim to achieve these advantages with the use of BIM technology. However, without having knowledge about changes in the work process that will occur and the needs of the office in terms of crew and equipment, BIM bit will contribute to the improvement of their projects.

Clearly note that, in general, architectural companies have difficulty in changing their approach, with emphasis on the use of new software, especially those that use their platform in BIM. The software is still being underutilized, because information concerning other members of the case are not being added to the model.

We conclude that there is a great way to go for the project construction industry. Greater participation of suppliers and other designers in the process as a whole for the biggest advantages are achieved with technology is required. Align the development of the design process using BIM, with the real needs of architectural companies, can still be considered a great challenge for the construction industry.

Surely, they are changes that will also impact the courses of architecture and engineering in our country. The architecture students need to broaden their knowledge about the technological building materials, systems and processes of construction field. An integrated curriculum is expected to reach these courses, as well as internship possibilities throughout graduation.

On the other hand, professionals with desirable to operate within this new way of developing interdisciplinary profile projects are unlikely to be formed quickly and complete the universities, so that the difficulties of the offices should not be resolved in the short term. Transposing financial difficulties for the acquisition of hardware and software, probably, will be easier to solve the gaps of skills of the project's professionals.

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References

ANDRADE, M. L. V. X; RUSCHEL, R. C. BIM: conceitos, cenários das pesquisas publica-das no Brasil e tendências. In: SIMPÓSIO BRASILEIRO DE QUALIDADE DE PROJETOS, 1., 2009, São Carlos. **Anais...** São Carlos: RiMa, 2009a. pg. 602-613.

_____. Interoperabilidade de aplicativos BIM usados em arquitetura por meio do for-mato IFC. **Gestão & Tecnologia de Projetos**, v. 4, n. 2, pg. 76-111, nov. 2009b.

ASSOCIAÇÃO BRASILEIRA DOS ESCRITÓRIOS DE ARQUITETURA (AsBEA). Roteiro básico de desenvolvimento de projetos de arquitetura. In: **Manual de contratação de serviços de arquitetura para espaços empresariais**. São Paulo: Pini, 2000, chapter 5.

AYRES, C. F. **Acesso ao modelo integrado do edifício**. Master's thesis. Universidade Federal do Paraná. Programa de Pós-Graduação em Construção Civil do Setor de Tec-nologia. Curitiba, 2009.

COVELO, M. A. Especial BIM. **Revista AU**, São Paulo, ed. 208, jul., 2011.

EASTMAN, C. M. et. al. **BIM Handbook**: A guide to building information modeling for owners, managers, designers, engineers and contractors. New Jersey: John Wiley & Sons, 2008, 490 p.

FABRÍCIO, M. M., MELHADO, S. B.; GRILO, L. **O ensino de projeto e a prática projetual em equipes multidisciplinares**. 2002. Available in: <http://leonardogrilo.pcc.usp.br/revista_risco.pdf.>. Accessed in: October 5th, 2010.

FABRÍCIO, M. M. ; ORNSTEIN, S. W.; MELHADO, S. B. Conceitos de qualidade no projeto de edifícios. In: FABRÍCIO, M. M.; ORNSTEIN, S. W. (Org.). **Qualidade no projeto de ed-ifícios**. São Carlos: RiMa, ANTAC, 2010. pg. 5-22.

GARBINI, M. A. L. **Proposta de modelo para implantação e processo de projeto utili-zando a tecnologia BIM**. 2012. 182f. Thesis (Mestrado em Engenharia de Edificações e Ambiental) - Programa de Pós-graduação em Engenharia de Edificações e Ambiental, Universidade Federal de Mato Grosso, Cuiabá.

KOSKELA, L. et al. Technology adoption in the BIM implementation for lean archi-tectural practice. **Automation in Construction**, v. 20, pg. 189-195, 2011. Avaiable in: <http://www.sciencedirect.com/science/journal/02934532>. Accessed in July 2nd, 2011.

KYMMEL, W. **Building Information Modeling:** Planning and managing construction project with 4D and simulations. McGraw-Hill, 2008.

LEUSIN, S. R.; SOUZA, L. L. A.; LYRIO, A. M. Impactos do uso do BIM em escritórios de arquitetura: oportunidades no mercado imobiliário. **Gestão & Tecnologia de Projetos**, v. 4, n. 2, nov. 2009. Disponível em: <http://www.arquitetura.eesc.usp.br/jornal/index.php/gestaodeprojetos/article/viewFile/26/130>. Accessed in February 22nd, 2010.

MELHADO, S. B. (Coordenador). **Coordenação de projetos de edificações.** São Paulo: O Nome da Rosa, 2005.

MOUM, A. A framework for exploring the ICT impact on the architectural design pro-cess. **Electronic Journal of Information Technology in Construction**, v. 11, pg. 409-425, 2006. Available in: <http://www.itcon.org/data/works/att/2006_30.content.07890.pdf.>. Accessed in november 12th, 2010.

OLIVEIRA, M. R. **Modelagem virtual e prototipagem rápida aplicadas em projetos de arquitetura.** Thesis – Masters). Programa de Pós- Graduação em Arquitetura e Urbanismo, Escola de Engenharia de São Carlos. Universidade de São Paulo, 2011.

REIS, M. D. Especial BIM. **AU**, São Paulo, ed. 208, jul., 2011.

RUSCHEL, R. C.; ANDERY, P. R. P; MOTTA, S. R. F.; VEIGA, A. C. N. R. *Building Information Modeling* para projetistas. In: FABRICIO, M. M.; ORNSTEIN, S. W. (Org.). **Qualidade no projeto de edifícios**. São Carlos: RiMa, ANTAC, 2010. p. 137-162.

SOIBELMAN, L. Especial BIM. **AU**, São Paulo, ed. 208, jul., 2011.

TZORTZOPOULOS, P. **Contribuições para o desenvolvimento de um modelo do processo de projeto de edificações em empresas construtoras incorporadoras de pequeno porte**. 1999. Dissertação (Mestrado em Engenharia Civil) - Programa de Pós-Graduação em Engenharia Civil, Universidade Federal do Rio Grande do Sul, Porto Alegre.

YIN, R. K. **Case study research**: design and methods. Sage Publications Inc. 1994.

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HOST - Smart Technologies for Personalized Services to Support Independence of Older Tenants of Social Housing

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Abstract

HOST - Smart technologies for self-service to seniors in social housing is an on-going project funded by the European Commission within the AAL (Ambient Assisted Living) Program, Call 3, aiming at providing a "social housing connectedness" network in three partner countries: Italy, France and UK.

A technology package is being built upon continuous feedback with the tenants, who will start from their needs and expectations for daily life to suggest possible solutions in a "self-serve" basis as a pre-requisite of the funding programme.

The final outcome is an easy-to-use technological package for social housing allowing a better quality of communication and access to different services. After the deployment in the three countries, a trial will take place testing a European model of "connected flats" for elders with specific equipment enabling easier relations with family, service providers and housing operators. HOST is intended to bring more comfort of living to the older tenants, reinforce social inclusion, allow a longer stay in their house, implement house management functions, and enhance human participation to home-related activities.

This paper will give an outline of the project by describing its current state, including the activities that are currently being carried out to reach the expected goals, notably the co-design process, related to software development, and the implementation phase, which constitutes the actual benchmark for assessing the impact of the technology developed by the project on all its target users, that is, elderly tenants and their carers, as well as social housing operators.

Keywords: Independent living. Software as a service. Social housing

Introduction

HOST is a research project launched in May 2011 within the framework of the European programme for research funding Ambient Assisted Living (AAL). It is coordinated by the French public entity Opac du Rhône, that manages social housing in the Rhône Region; the full partners' list, along with their role in the project and the country they're from, is summarized in Figure 1.

The project addresses the field of social housing, which the European definition is referring to residential housing, which may be either public or cooperative, but has a central focus on affordable housing. Social housing is an interesting field for the application of service provision connected with new information technologies, and dedicated to people with special needs, such as elders or people with disabilities. In fact, these users usually are not able to find adequate services on the market, both because of generally high costs and because of interfaces which are not user-friendly enough, being therefore too complex to be easily operated. In the case of older residents, these problems are even more serious.

In this context, HOST intends to provide senior users of social housing with safe and easy technologies and remote devices, so as to assure an efficient and reliable access to service packages and a better quality of communication, through the experimentation of a European model of network-connected flats.

In the European Union there are various organizations representing social housing: many of them belong to the European Federation called CECODHAS (http://www.housingeurope.eu).

As a general rule, the field of social housing doesn't only provide a dwelling, but is concerned with supporting residents, most of all the frail ones, such as elders and people with disabilities, by offering a broad range of services like call centers, house management and maintenance, social activities and so on.

Figure 1

HOST Partners' list.

Source: Opac du Rhone, 2011, pp. 1 of AAL HOST project.

Name	Type	Country	Role
Opac du Rhône	Users organization	France	Social housing
Finabita	Users organization	Italy	Social housing
NCHA	Users organization	United Kingdom	Social housing
Adama/Avizen	SME	France	Technologist
bioresult	SME	Italy	Technologist
tripleplay	SME	United Kingdom	Technologist
Erasme – Conseil Général du Rhône	Research institution	France	Research
CNR-ITC – National Research Council, Construction Technologies Institute	Research institution	Italy	Research
Polibenestar – Universita de Valencia	University	Spain	Research
AGIM – Université Joseph Fournier Grenoble	University	France	Research

Services

With these objectives, HOST aims at defining a "software as a service" distributed as a Web platform hosted by a specific server for each group of flats, relying on dedicated databases with information and support data.

More specifically, the services that the project intends to deploy belong to the following four macro areas:

- home management: providing the elders with easy access to information related to the residential structure (e.g. cost, maintenance, deadlines);
- direct relationship with the local "Circle of Support": to manage a contact list of service providers and operators for home management, shared among the elders, their relatives and acquaintances, the social housing operator and the volunteer organizations;
- house and condominium maintenance: to report malfunctions and to ask for support and maintenance services to the social housing manager, who is in contact with a group of trusted professionals (e.g. electricians, plumbers);
- access to e-commerce services by the means of simplified procedures: to access special offers and shop in a secure environment.

For each group of flats, a server will provide to each tenant a set of services specifically tailored to his/her needs, both for what concerns contents and user interface. To do so, each tenant will be asked about which kind of services and contents she/he would like to access from his/her home. Moreover, special needs will also be recorded, such as simplified user interfaces for visually impaired people, or speech-recognition interfaces.

This kind of information will be stored in the dedicated database and automatically fetched to configure the services directed to a specific user.

In this way, it can be offered a component-base platform represented by a common core of functionalities and utilities that is extended with additional components, i.e. more complex and personalized services. The main advantages offered by component-based platforms are interoperability, easiness of maintenance and product evolution, reusability of components, and cheapness (SZYPERSKI, 2002).

The effectiveness of the use of adaptable and customizable component-based systems has been proved by many documented real cases (GINIGE, 2003, p. 1-8, STEVENS *et alii*, 2006, p. 269-294), and by the growing spread of this approach in the world of software development. The elders can choose to interact with the services offered by the platform by the means of devices such as PCs, TVs equipped with a dedicated set-top box, smart screens or tablet PCs with haptic interface, depending on what the residents prefer. The system aims at meeting the requirements and needs of older residents, by facilitating their choice of custom solutions and providing technological support to help them live as independently as possible. Implementing the service is intended to deliver the following objectives:

- making older people's life more comfortable, by making easier recurrent tasks such as bills' payment or planning simple home maintenance activities;
- improving social inclusion by installing smart screen devices in public areas to exploit on-demand digital contents or to get updates about ongoing maintenance activities. Furthermore, the presence of common digital equipment enables a digital tutoring between inhabitants in the residence and it creates sociability and assistance around the digital space. This configuration will be tested, and the real impact on collective trade will be measured;
- extending their permanence in their home as much as possible, avoiding unnecessary hospitalization, by allowing the elders to easily keep in touch with their "Circle of support", that is their relatives but also volunteers and nurses. Moreover, a tele-assistance service will, in response to a phone call, return information on the elder's screen. At the question "can you give me passing bus schedules?", the answer could be "they are displayed on your screen, you now have time to review at your convenience".

Stakeholders of the system

The main stakeholders of the system described above are:

- residents, particularly elderly and vulnerable people: the system as a whole, the services offered and the interaction styles implemented are all conceived, designed and developed according to their needs that will be gathered in various phases of the project. Initially, they will be interviewed about their needs and expectations, offering them different choices and solutions. Later, during the project, the services will be activated and their usability, together with their actual adherence to the elders' needs will be verified by the means of usability tests and interviews;
- the managers of the social housing structures will host the system in their structure and will report problems and malfunctions to the ICT operators;
- ICT operators will install and maintain the platform, and provide the infrastructures needed to link to the telecom operator;
- telephone operators will provide the infrastructure to offer tele-assistance services delivered by volunteers' associations;
- trader services and contents providers will offer specific services under special commercial terms (e.g. online shopping, movies or music streaming).

A representation of the system, the services offered and the relationships linking them to the main stakeholders involved, is depicted in Figure 2.

Figure 2

HOST platform.

Source: Opac du Rhone, 2011, AAL HOST project.
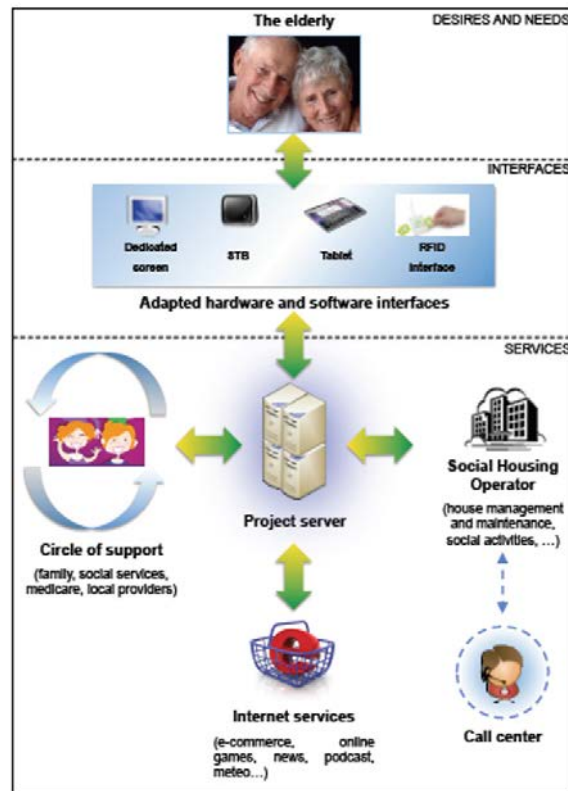
Work plan description

The activities of the HOST project are structured into five work packages (WPs), four of which are dedicated to research and development, while the fifth is devoted to project management and dissemination.

The first WP concerns the definition of user requirements.

A direct assessment of specific requirements will be performed by using active contributions from residents, according to criteria considering two main categories of needs:

- general needs: comfortable life style, independence and self-esteem, safety, usability of spaces and home equipment, social support network/services, need for specific aids related to sensory impairments, participation in social activities and relationships;
- technological needs: they include awareness in choosing custom services based on needs and confidence with the human-machine interaction process.

Furthermore, during WP1 home maintenance services will be defined to the purpose of supporting older people in keeping their home efficient or helping them in carrying out daily activities. The services might be different between countries, according to the specific needs shown by users.

Another task belonging to this WP is the development of the project website http://www.host-aal.eu (see Figure 3) for dissemination, which is already partly completed and includes a private section that can be accessed by project partners for the exchange of information concerning the progress of project activities. In the public area, people can gather information about the HOST project, its objectives, and the services it intends to offer to the elders, as well as information about the partners, and all the stakeholders involved.

Figure 3

HOST website.

Source: http://www.host-aal.eu/
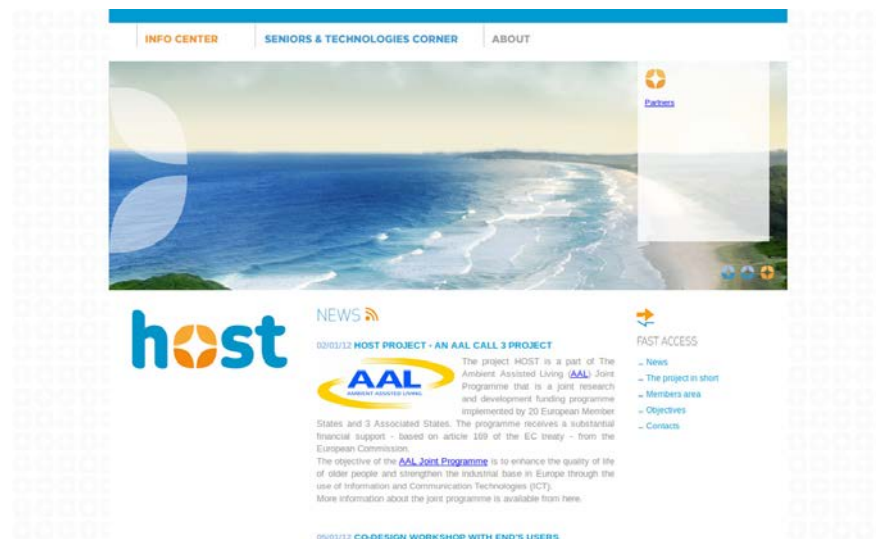
The second WP deals with the definition of system architecture, the specification, and development of all services supplied to the residents; the project aims to offer applications based on locally defined user groups. Each application is implemented with an interface allowing users to interact with the system in order to activate functions for performing designated activities, such as:

- interaction between an older resident and the social housing manager (information, expenditure, new services, agenda);
- interaction between an older resident and his/her circle of support, which includes relatives and friends, as well as neighbours and volunteers;
- interaction via messaging, pictures;
- interaction within the circle of support (information exchange among formal and informal carers).

The third WP aims to integrate the system, i.e. assemble the software components and check their connectedness and functioning, so to enter the trial stage. In accordance with the specifications of the general system architecture and local applications, devices and programs for connecting to the social housing manager are installed. Moreover, an assessment activity shall be carried on, based on TEMSED (Technology, Ergonomics, Medicine, Society, Economics, and Deontology) approach, a specific social and economic efficiency-based assessment method for the HOST system.

The WP4 includes the dissemination of the outcomes, communication, and marketing strategies. On this purpose, the CECODHAS network, as subcontractor and together with the partners, will ensure a valuable support in such activities. Moreover, since AAL projects must outcome a quickly marketable product ("two year time to market", as AAL program recommends), this WP includes also a market exploitation plan with the potential market scenario and size, the buyers and the projected growth in the short run, and finally the potential end users of the services.

System Architecture

Figure 4

The system architecture
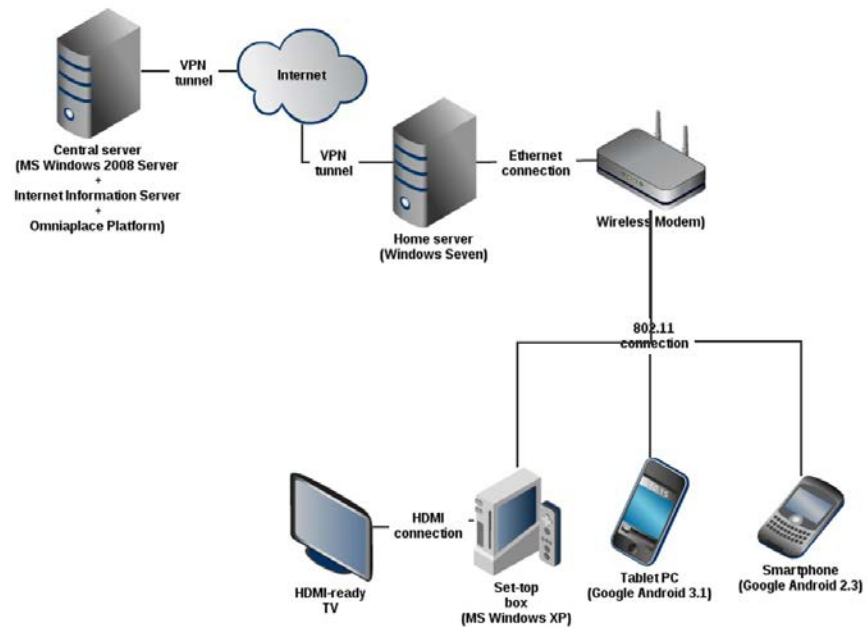
The system architecture is shown in Figure 4. Users can access the services offered by the platform by exploiting different devices: a set-top box connected to a television, provided with a special remote control, a tablet PC or a smartphone.

As for what concerns Italy, users have chosen to use the tablet PC, in some cases configured as a set-top box connected to the TV. This choice, as well as allowing users a faster adoption of the system (providing them with well-known and simple tools, such as a remote control) is also particularly advantageous from the economic point of view.

The set-top box can be in fact connected directly to the network plug without the need of a wireless modem and the home server, since all of the functionalities implemented by the latter are implemented by the system embedded in the set-top box.

The only requirement that must be met is the presence of an HDMI Interface on the TV which the set-top box will be connected to. In this way, users will interact with a graphical user interface displayed on the screen of their TV using the buttons on their remote control, to activate and access the services provided by the platform, implemented as Web Services on the central server.

The central server is the heart of the whole system: it contains the user profiles, the configuration parameters of the interface devices, features and data related to the services offered, and the profiles of all the operators interacting with the elderly, whether they are employers of the social housing cooperative that houses the platform or volunteers working for associations that offer external services such as "il Filo d'argento AUSER", which provides social services through the phone for the elderly (http://www.auser.it/).

The communication between the tablet PC/set-top box and the central server is made possible by a Virtual Private Network, or a virtual network with restricted access achieved by adopting specific client-server communication protocols supporting data encryption and users authentication mechanisms. The VPN is also used for temporized synchronization between the central server and the tablet PC/set-top box. In fact, the latter maintains locally the data that will have to be stored in the central database, then sends its IP address to the central server, so that it can access the device's local database and generate PUSH events to transfer the data.

This strategy allows to efficiently exchanging data between the client devices and the central server, and to modify and update it in real time. Real-time data updating is used to send data and instructions in PUSH mode, so that the central server can send data and commands to the tablet PC/set-top box, which executes them immediately. Common data synchronization is managed with a polling strategy instead (i.e. through periodical interrogations), to ensure an efficient use of network bandwidth.

Finally, the Omniacare platform developed by BioResult (a project partners) is used server-side to manage all the details related to the services offered to end users, together with the data and information needed to configure and customize them, and all the information related to users who are in charge for the platform's administration. The platform, which is implemented as a Web-based application, can be accessed only by authorized users, via a login procedure. In this way, based on the category to which the logged in user belongs to (administrator, manager, tutor, service providers, or user), he/she will have access to different information and functionalities offered by the platform.

Figure 5

An example of the client side interface

The client-side application user interface can be seen in Figure 5: it has been conceived and implemented so that it can be easily adopted by older users. Services are hierarchically organized by typology, with a graphic icon of suitable dimensions associated to each one of them, which clearly indicates the kind of service that will be activated by pressing it. A brief textual description is also displayed when the icon is selected. During the various co-design meetings (also see "Co-design phase" section), the elderly made suggestions to change icons that they considered unclear or confusing, so to implement a user interface more adherent to their needs. The services are then chosen by interacting with a horizontal scrolling menu that is browsable using the left and right arrows on the remote control or through the Tablet PC touch screen. Once the desired service is selected, all the necessary information is specified with the same style of interaction. The hierarchical organization of menus allows keeping only the necessary information on the screen at that time, avoiding confusion and fatigue to the user.

Co-design phase

The activities involving co-design have been carried out during 2012, with the aim of enabling the actual end users of the system, i.e. the elders, to actively participate in the development process, by giving feedback about the set of services that they would like to have access to, as well as about aspects involving user interfaces and user experience in general. Therefore, the older tenants have been directly involved in workshops and meetings, that were held in the three partner countries developing the platforms, that is France, Italy, and UK.

In France, the co-design process involved a total number of 15 users, all located in Lyon (in two different neighbourhoods) and living in social dwelling provided by Opac du Rhône. At first, users were informed about the scope of the project and the nature of their involvement, and then a series of almost 20 workshops followed. Users were divided into two groups consisting of 6-8 people for each workshop, in order to facilitate interaction. A gradual approach was adopted in order to introduce users to the technologies that would be used, notably the iPad and the Internet (web platform). This led to the definition of a set of 30 types of needs that would be reflected by services, grouped into the following categories: organizing/memory exercise, communication/sharing, food and cooking, health and medicines. This also helped defining recommendations for the implementation phase, as well as improving the evaluation and assessment protocol to be followed.

In Italy, five sites distributed over the entire national territory, and involving five different social housing operators, had been previously identified for both co-design activities and implementation. A total number of 20 users were engaged in the process, by recruiting them on a voluntary basis with a first step consisting of mainly information activities.

For each site, two workshops were then conducted: one involving representatives of the social housing operator (who would then pass on information to tenants), and one with the elderly users, as well as their relatives and/or carers. The co-design process was carried out with the aid of three questionnaires, which were previously developed by partners Finabita, AeA, and CNR-ITC as deliverables of WP1, denoted by letters A, B, and C. Questionnaire A is intended to be used with older people, questionnaire B with social housing operators and questionnaire C with caregivers and volunteers.

The topics addressed by the questionnaires are related to, mainly: information about the living and social situation of the elderly users, needs and preferences in terms of services, status of the habitations, preferences in terms of technology devices to be used, including interface characteristics, and degree of familiarity with ICTs. The co-design workshops provided useful data concerning the possibility for integration of the HOST system within the framework of existing services being provided by the social housing operators, in addition to feedback and requirements to be implemented in the development of the platform itself.

In the UK, the co-design phase involved 24 residents of the Muskham View residential Home in Newark and started in August 2011. The main aims were to: understand the needs in terms of communication and information that could be delivered via digital interactive TV, as well as define appropriate ways to deliver and present related information services. In order to achieve these goals, a participatory approach was taken, therefore senior users were engaged and guided through the process of defining the content and functionality of the system. Workshops with seniors where then organized, in a total number of 16 spanning almost a year. This enabled the project staff to regularly gather the views of the users and implied their active participation in the project activities as co-designers, which leaded to an increasing level of acceptance of the system. The contribution from users to the development process consisted mostly in the definition of GUI requirements, especially regarding the drawing of menu icons.

Implementation and experimentation phase

The implementation and experimentation phase is one of the most important project activities, since it provides an indispensable benchmark for testing the technological output of the project in a thorough way, by monitoring its use by the seniors, both in terms of technical aspects involving the running of the various features, and in terms of further development issuing from user feedback, thus continuing co-design with a progressive approach.

The first step of the implementation consisted of setting up the technological devices to be used, by configuring appropriate user profiles, in order to make sure that each device would correspond to individual user needs. These profiles were defined in the central database of the server-side platform which client application is connected to in order to download updates, and can be therefore easily modified and integrated in time by system administrators, in order to ensure that user requirements are met continuously.

Devices were then delivered to users in plenary meetings, where also first training was provided for enabling them to effectively use the basic features of both the device and the HOST application. This stage also led to establish some of the elderly users' preferences in terms of features and modalities of interaction with the device (for example, in Italy, when the tablets were first distributed, it became clear that seniors were not comfortable in using a small remote control for the tablet - which had been initially considered - and did not want to connect the tablet itself to the TV screen - that was suggested as an option - so both these features were dropped from the implementation). Users were also provided with a series of tutorials and guides for reference, detailing various aspects related to technological features, as well as performing tasks with both the tablet and the HOST system, which were arranged according to their difficulty level.

During the implementation, a monitoring procedure was established in order to check progresses made by the users, evaluate their needs, as well as provide helpdesk assistance when system failures, bugs or other malfunctioning occurred. The former was accomplished by asking the seniors specific questions on a regular basis, aimed at assessing the quality of their fruition of the HOST package, while the latter was carried out by dedicated project staff who were available to be contacted by seniors (usually via communication facilities provided by the application) and perform interventions, both remotely and in person when needed.

The types of features that were tested, and are still being tested, in the implementation differ between the partner countries conducting the experience.

In France, mostly communication services are being deployed in the form of a simplified social network-style web platform, named "Host Comm", through which the seniors can share information and documents (such as pictures or links) between them, and also communicate with their social housing operator. Another application ("Host Org") is being tested as well: it is an iPad application that provides the seniors with aids and facilitations for organising and performing their house management activities, mostly related to paying bills and rents.

In Italy, the implementation revolved around home delivered services that were provided by local entities in cooperation with Auser volunteers, who previously agreed to join project activities and committed to physically deliver the services to the senior tenants. However, a major role was played by the communication features of the HOST Android application, which allow users to send each other text messages and initiate Skype calls and video calls, through system aid. The contacts which each senior can communicate with are those forming his/her own circle of support, that is, a group of friends, relatives, carers, as well as HOST users, who participate in the social life of the individual. This list of contacts is customizable by the user, since new contacts can be added at any time directly through the application itself. The services that have been tested so far are mostly home delivery of pharmaceuticals, carried out in conjunction with local pharmacies, and accompaniment by car. In the next future, it is planned to test and deliver a set of home maintenance services, directly involving social housing cooperatives.

In the UK, the system provides users with information about their condition as tenants of the social housing facility, enabling them to communicate with the operator, as well as with each other. However, service provision has not been implemented as yet, since development and updating of the application has been recently suspended.

Final considerations

The integration of services and technologies for older people's independence is increasingly necessary in housing and particularly in social housing. In this paper we have presented HOST, an on-going European project aiming at providing a "social housing connectedness" in social housing structures hosting older tenants. HOST offers to the elders a software platform establishing a better quality of communication between them and their circle of support (i.e. formal and informal carers), as well as their housing owners, and giving access to various services focused on allowing a longer and safer stay in their house.

At present, three different prototypes of the HOST platform are being tested and assessed in France, Italy, and UK, and a final evaluation of all these experiences is expected to show results coming from a comparative analysis of experimental data. Finally, since the platform has a modular structure, it will be possible in the future to develop and deploy additional services and features, even after the end of the project, so that users will be able to profit a more and more complete and customizable system.

References

SZYPERSKI, **C. Component Software. 2nd ed.** London, Addison-Wesley Professional, London, 2002

GINIGE, A. **Re-Engineering Software Development Process for eBusiness Application Development.** In: Proceedings of Software Engineering and Knowledge Engineering, pp 1-8, 2003

STEVENS, G., QUAISSER, G., KLANN, M. **Breaking It Up: An Industrial Case Study of Component-Based Tailorable Software Design.** In: Lieberman H, Paternò F, Wulf V (eds) End User Development. Springer, Dodrecht, pp 269-294, 2006

HOST project website available at http://www.host-aal.eu/

HELOÍSA HELENA COUTO

Recycled aggregates using in house's revitalizations

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Abstract

The boom of the construction industry is responsible for the production of debris which is added to the municipal waste collected and sent to landfills. The irregular disposal of debris, disregarding established technical standards, brings huge losses to the environment, shortening the lifespan of landfills. The purpose of this work is geared towards the management of construction and demolition waste, aiming at its application and use in urban residential rehabilitation. To examine this possibility, we proceeded to gather the sample of raw material, processed and screened at a recycling plant in Belo Horizonte, with the goal of a technological laboratory study. The method used was inductive. The X-ray Fluorescence test results showed similarities between the chemical constitution of the powder which served as the basis for the mortar used in the mixtures and the traditional mortar used in construction. Once the aggregates A and B has high concentrations in its constitution of the active elements also present in the cement binder, to use this aggregate material instead of the common sand in mortars should greatly decrease the amount of cement and silica in mixtures. Solid construction and demolition waste has the potential to replace conventional raw materials used in construction. The big question is how to use them sustainably. Thus, this study attempted to use material derived from this waste as a possible tool for the revitalization of social housing units.

Keywords: Architecture. Recycled aggregates**.** Revitalization.

Introduction

With the growth of the construction sector, the send-outs of illegal dumps in the outskirts of cities in vacant lots and ring roads have caused pollution of public spaces, compromising the environment and shortening the life of landfills, and cause degradation of the urban landscape. Romero (2006) points out that, in Brazil, is discarded as municipal waste, the equivalent of US$ 40 billion, of which only the construction industry accounts for US$ 13.2 billion, corresponding to 33% of this amount, in cash. This construction waste – along with the plaster, paints, glues, sacks of cement and metal materials in general – come from reforms, repairs, demolitions and the resulting materials from the preparation and excavation of sites.

Fiuza (2009) shows that the construction industry accounts for 5% of the GDP and 40% of the waste production. In Belo Horizonte, in 2007, 1.618.000 tons of waste were sent to landfill; 700.000 tons of construction waste, equivalent to 43% of this total. 20% of the construction material is lost to waste, which is equivalent to throw away one story for each five-story building that is constructed.

In construction, waste recycling is an attempt to bring it closer to the concept of sustainable development, with a process that leads to new directions regarding the exploitation of resources, the direction of investments and the proper orientation of technological development. The construction waste seems to have potential in replacing conventional materials used in construction, thus being the issue raised in this paper precisely how to deal with construction waste in a sustainable way.

The study also finds support in the National Solid Wastes Policy (2010) – Law nº 12.305, of August 2nd, 2010 – amending Law nº 9.605 of February 12th, 1998 (Brazil, 2010). This law features on its principles, objectives and instruments, as well as on the guidelines for the integrated management and management of solid waste, including the hazardous, and other measures that provide a set of actions, beyond the liability model shared by produced special waste – reverse logistic –, to return the waste to their generators facilitating its treatment and reuse in new products. Industries and shops should maintain a consensus on the liability of each part – other measures such as funding and encouraging the recycling market, to the products manufactured with high recycling taxes and to the lines of research on recycling.

To address this broad question, this study chose to explore the construction waste processed in sand and gravel in the Recycling Plants of Pampulha and on the highway BR 0-40, respectively inserted in the Pampulha Regional, north zone and northwest zone of the city of Belo Horizonte. These recycled aggregates were used in the development of mortars for external and pigmented coatings and coatings for interior walls, seeking to create a new material to be applied in the design of architectural and urban revitalization. Thus, here are treated the management of application and use of mortars derived from waste construction classified as Class A by the National Environmental Council (CONAMA) and the Brazilian Association of Technical Standards (ABNT).

The study aims to explore the potential use of construction waste processed in the Recycling Plants of Construction Waste, as coating material to be used in urban and architectural interventions, replacing conventional materials.

The method used was inductive, with chemical, physical and mechanical quantitative laboratory tests, based on the standards of ABNT-NBR.

Data Collection

Initially, a broad literature survey and a documentary research with the Pampulha Regional Administration were done. In parallel, a straight record was developed, with field visits and photographic record in the three recycling plants and municipal agencies.

Grading tests and tests for physic-chemical characterization of powders.

That was followed by the size classification of the material collected and milled in laboratory, analyzing the chemical composition of the fine powder, through X-Ray fluorescence, in an attempt to find the ideal blinder for the mixture, and the proportions of each aggregated material in the mortar composition to be used as coatings on internal and external walls.

Technological Studies

To meet the project objectives, some technological procedures were done, such as a laboratory comparative analysis of the chemical composition of the powder and the mechanical properties of the ceramic cookies of the specimens, coated with a film of the studied mortar. The chemical composition of the powders was observed by the analysis of tests, using the X-Ray fluorescence in the EDX-800 equipment. The mechanical properties of mortars were tested using the scratch test, according to *Revetest® Software User's Manual*, (1995). The scratch test was developed to test the ability of a coating to resist the mechanical stress shear at the interface with the substrate. Callister (1991) was the reference source on the processes of composites by the use of different kinds of powders. Finally, as a case study, pigments were added to these mortars, and practical tests were carried out, by employing them as coating on interior walls of houses in a cluster of the Pampulha Regional and in a residence in the northeast region, facilitating logistics.

Here it is also worth noting that the first phase of the work was based on the experiences of the "Rubble Good" of Cassa, Carneiro e Brum (2001); Callister (2001) and on several Brazilian standards quoted in this work (ABNT-NBR 10004:2004 regarding the classification of solid waste; ABNT-NBR 7200:1982 and NBR 13529/95 which determined the formation and execution of the traces of "traditional mortar plastering; the classification of grain size according to ABNT-NBR 7217/1987; the terminology of rocks and soils, according to ABNT-NBR 6502/1995; the dimension of specimens and the compression strength specified by NBR 13279/95), besides the work of Miranda (2000), John (2000), Pinto (2001), Sabbatini (1989) and Gomes (2008) in which the possibilities of reuse of building waste in developing materials were analyzed giving rise to pigmented spackling, developed for the use of coats of textured finish, in settlements of blocks and plaster in construction.

As stated by ABNT-NBR 7200 (1982, p.1) "the execution phase of the coating is the major responsible for the observed pathological phenomena". Then, in order to understand the mechanical properties of the blends, tribological physical testing was also made, by means of which were identified the mortars of higher strength and better adhesion for wall coverings.

The parameters from the work of Cassa, Carneiro, e Brum (2001) were taken for the tests of the mortars. The adopted procedure in the study of the mortar, in order to de-

velop new composites for coating as a way of recycling construction waste, was based on experiments with the powder resultant from the screening process mentioned above, mixed with binder material (lime, cement and plaster). The resulting mortar from the mixture of aggregates with binders formed the film of the specimens, which went through the physical tests in laboratory, followed by ABNT-NBR 14050.

Five grams of the mixture was prepared, and weighted in a previously zeroed scale, forming a film of the mixture in specimens of prismatic substrate of different ceramic bricks, according to NBR 13279/95. All samples were tested with the same applied load. The samples that presented the best result of shear, not occurring large cracks or peeling, showed up with better compactness, better resisting the applied shear stress in relation to others, and were chosen for another test: the application of the studied mortars in weather.

From the group of analyzed samples, firstly were chosen those that had extreme concentrations of binder (the highest and lowest concentration) aiming to analyze the workability in weather according to Gomes (2008), who argues that this is the main property of fresh mortar, followed by consistence, plasticity and cohesion. Such properties are the result of several variables, subject to subjective qualitative analysis, ranging from worker to worker, and not only from the measurements of empirical data. The interferences affecting the work of the mortar are on the application method adopted in construction, whether manual or mechanical, known by the worker through his handling and personal evaluation.

The application procedure of the samples of the studied groups (I, II, III, IV and V) was performed with different techniques, having the experiment lasted from January to November 2010, during which the six samples coated on the wall of the School of Design became subject to the weather. There, we observed the different qualities of adhesion, cracks and disorders caused by many variables: different application technique; different thickness, due to the constructive technique; different types of binder material; different concentrations of the material in the mixture; amount of water in the mixture; conditions of relative humidity, among others.

It has been recorded in some samples the appearance of cracks at the moment of the "merger", due to the mortar's loss of water caused by a relative humidity under 100%, which contributed to accelerated evaporation. Another factor for the mortar's loss of moisture was the fact that the base of the substrate presents a high suction power (clay brick), causing the molecules crystals to form voids, which retain free water and are not fixated to the structures of hydrated products. Also, it has been concluded that other factors for plastic shrinkage such as aeration and temperature produce cracks in the mortar.

Miranda (2000) and Gomes (2008) explain that in solid state the mortar loses the free water retained in the macro pores through evaporation, causing a small initial retraction because the water is still held to the structure of the molecule by weak physico-chemical bonds. From the loss of free water and the beginning of the output of the absorbed water and the water retained in small capillaries, begins more accentuated retractions of the mortar.

All material tested throughout the development of the project was executed by the Technological Center of Minas Gerais (CETEC-MG), according to relevant methods to each specific sample of the used material, and the results are due to the applied testing method, leaving him, exclusively, the choice of the best material to be applied in wall finishes.

Results Achieved

Grading and Analysis of the Powder

In the recycling plants of construction waste two types of crushed materials (sand and gravel) are produced from the aggregates A and B; the material A is composed of residual concrete and cementitious material, and the material B is composed of a mixed ceramic type material. After sorting, the waste is loaded into the crusher, which has an engine of four hammers, which, by impact, breaks the debris into smaller parts of different granulometry.

During the field work samples of this crushed material were collected and taken to the laboratory for the first experiments, proceeding to the milling of the raw construction waste in ball mills, turning them into fine powder to be used as components of the mortar. The particle size and the quality of the final product depend on the milling duration. These samples passed the first experiments regarding the classification of particle size, with milling and sieving procedures in an attempt to achieve good quality products.

The material collected at the Pampulha Recycling Plant was sieved in a regular mason sieve, separated and taken to the ball mill to investigate the powder. The milling process of the aggregate B and A last approximately 30 minute. Then, the construction waste powder (A and B) pass through the sieving process, in sieves of mesh # 100, 150, 200, 325 and 400, according to ABNT-NBR 7217/1987 and ABNT-NBR 6502/1995.

The X-Ray Fluorescence tests – non-destructive technique that enables both the qualitative analysis (identification of the elements present on the samples), and quantitative (to establish the proportion of each element) – were done at CETEC-MG. These testes determine, ultimately, the chemical composition of the samples type A and B, ground in a ball mill and classified by grain size, by the sieve of mesh # 100.

Figure 1 presents the semi-quantitative results for the powder A sample, the aggregate A, from cementitious material (masses of concrete, stones and mortars). In this sample, a great percentage of CaO (Calcium Oxide) was found, about 60%; this element is predominant in the composition of the *Portland Cement* and is related to the characteristic of the lime, responsible for workability and durability of the mortar. The other elements found – silica or SiO, and ferrous sulfate – are also constituents of *Portland Cement*. According to the Brazilian Association of *Portland Cement* (ABCP), the raw materials used in cement production are: limestone, clay, iron and plaster ore, consisting of CaO, SiO2. Fe2O3, Al2O3.

On the same graph, one can see the similarity between the chemical composition of the analyzed sample (aggregate A) and the traditional cement mortar, and the large percentage of elements with active molecules present as: CaO (53.071%); SiO2 (13.097%) e de Fe2O3 (11.710%).

For the semi-quantitative results of sample A, X-Ray fluorescence was used in a vacuum atmosphere created by the EDX-800 equipment, of collimator 10mm, with the time set at 200s. For the semi-quantitative results of the sample A plus plaster waste, X-Ray fluorescence was also used in a vacuum atmosphere created by the EDX-800 equipment, of collimator 10mm, with the time set at 200s.
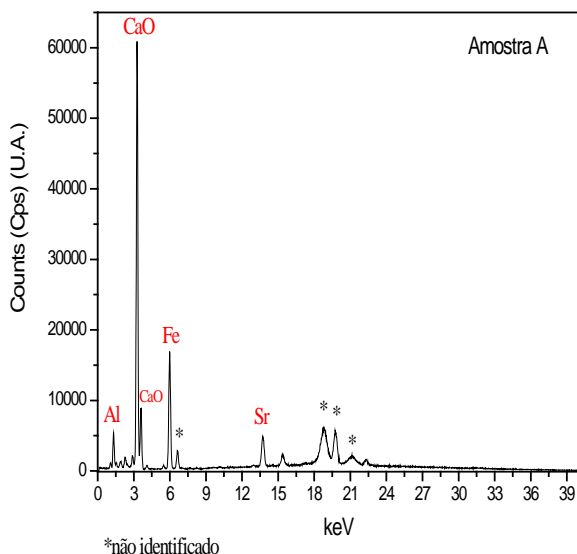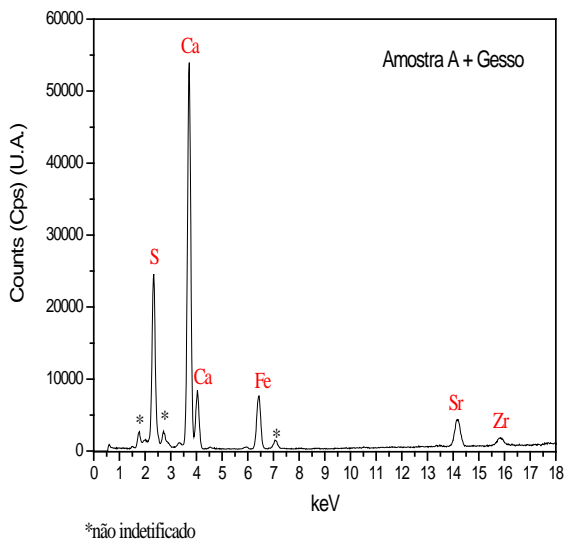
The plaster waste may be a binder element to be associated with interior mortars, mixed to the powders of aggregate A and/or B, in an attempt to correct its disposal. According to the requirements of the Superintendent of Urban Cleaning – SLU – oriented by the Handbook of Solid Waste Management for Construction (2005) and by CONAMA 307 (BRAZIL, 2002), plaster, cement sacks and mortars, paints and asbestos tiles are considered of toxic nature, being refused by the recycling plants of construction waste and dumps, because they have chemical elements which react with garbage leachate and other materials harmful to groundwater and the environment in general.

Also according to the standard of CONAMA 307, 2002 Art 3º, plaster is classified as a "Class C" waste, "for which it has not been developed technologies or economically feasible applications that allow its recycling/recovery."

Figure 2 shows the results of the analysis of the aggregate A mixed with plaster waste. In this case, high content of CaO (Calcium Oxide) was recorded in the analyzed sample, since this substance is present both in the aggregate material A, and in the used binder, plaster. The other elements appear in small proportions.

For semi-quantitative results of the sample of recycled aggregated B, the same X-Ray fluorescence was used in a vacuum atmosphere created by the EDX-800 equipment, of collimator 10mm, with the time set at 200s.

Figure 3, in turn, shows the result of the sample of recycled aggregated B, from ceramic material, which unlike the sample of the recycled aggregate A, has in its composition higher concentration of SiO or silica and PbO (lead oxide) in addition to Fe2O3 and CaO. The lead element, which is considered highly toxic, is present in this sample as part of the aggregate, due to the composition of ceramic tiles, which receive varnish as waterproofing treatment and, further, the residues of various paints from grout mortar that use lead in its constitution for fixing pigmentation.

Figure 3

X-Ray Fluorescence of sample from Material B.

Source: CETEC (2009).

*não identificado
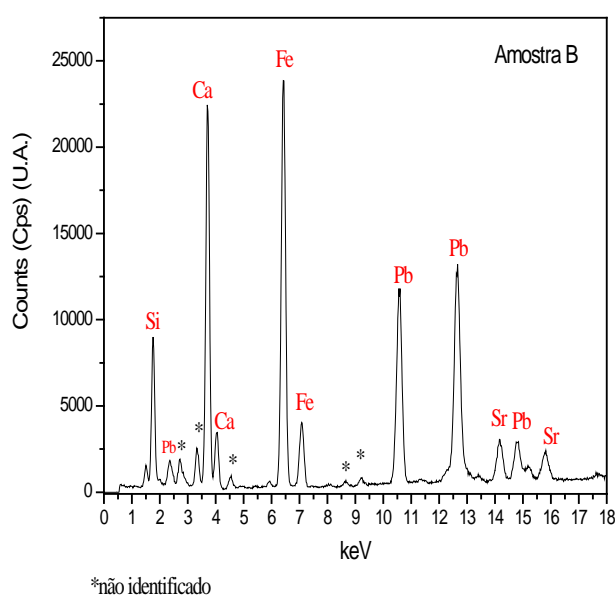
Study and analysis of the development of the mortars with recycled aggregates A

Based on the standards of ABNT-NBR 7200/82 and NBR 13529/95, the traces of traditional mortar of plaster coatings were taken as parameter. According to these standards, the ratio was 01:08 (in that order, cement and sand). The used cement was Champion III CP 32 / Lafarge, as standard NBR-7215, which determines the resistance of *Portland Cement* and fine sand used for plaster according to NBR 7200/82.

The hardness of the surface was measured by the scratching test. It is worth noting that ABNT has no normative method for determining the surface hardening of coating mortars. According to Revetest® Software User's Manual (1995), the scratching test was developed to test the ability of a coating to resist the mechanical shear stresses at the interface with the substrate, exerted by a penetrator in unidirectional relative movement. Thus, the scratch test consists of a test which imposes to a surface a flaw process, moving a penetrator with a diamond tip, *Rockwell C* type, on a covering with constant and progressive load, causing a scratch. The critical load is associated with well-defined flaw event. The critical load of the movement is obtained, during the scratching, when the covering is partially or completely detached from the substrate.

In this work the CETEC-MG sought a correlation of this property, evaluating the performance of the coating in specimens, based in the scratch test, in a fixed solid

body of greater mass which in contact with the moving body of smaller mass will travel a distance under a pressure that determines the hardness of the surface of the fixed bodies in the specimens samples. For the scratch test of the samples evaluated in this work, a conic penetrator was used, with a tip radius of 3 mm made of steel SAE 10200 Normalized.

In this new test, after the determination of the trace to be used in the mixtures, the samples were prepared and applied as tests on the external walls of the Prototyping Plant of the School of Design of UEMG, monitoring its behavior, its moisture absorption and its adhesion to the substrate, in weather conditions. Randomly, 10 Kg of mixture were prepared, which is a standard quantity for each sample to be evaluated. In the preparation of mortars the hydrated lime was used as binder; plaster waste and plaster in natura (industrialized) were mixed to aggregate A; the fine sand from the recycling plants passed the mason's sieve mesh # 8; and the percentage, as a criteria of installment, of each component of the mixture.

Groups of samples and its proper proportions were defined as follows: Group I: Aggregate A and plaster waste; Group II: Aggregate A and virgin plaster; Group III: Hydrated lime and aggregate A; Group IV: Cement, hydrated lime and fine sand for plastering; Group V: Cement, hydrated lime and aggregate A.

In the samples of group IV, based on the standard of ABNT NBR 13529/95, the parameter with trace 1:2:6 were adopted for the others. In the samples of group V the aggregate A was used in replacement to the fine sand for plaster, with the same trace defined by NBR 13529/95 for the traditional mortar.
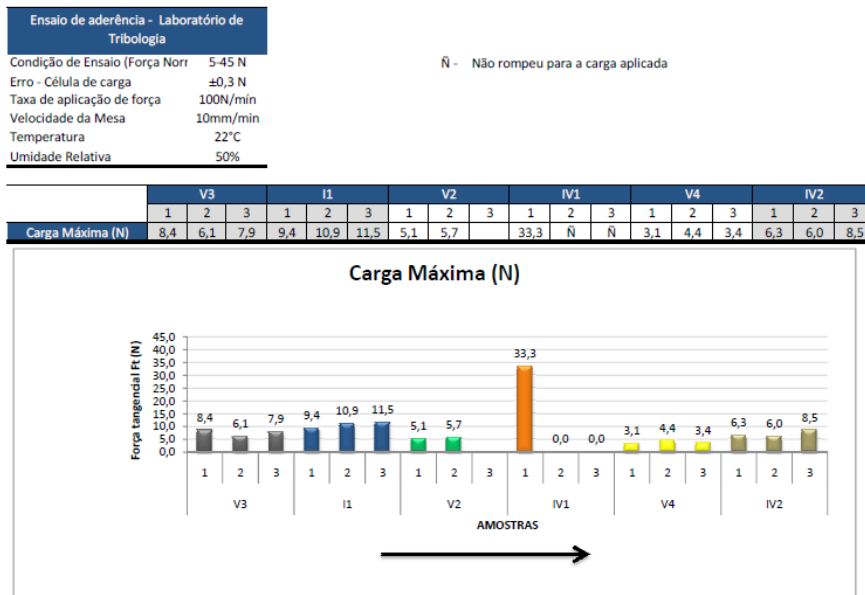
In the sample's application on the external wall of the School of Design, the behavior of the mixtures was monitored considering the daily temperature, rainfall and relative humidity index during the period of its application (January 2010 to November 2010) according to data provided by the National Institute of Meteorology (INMET). One of the mixtures without the addition of hydrated lime evaluated on the external test (V.2) was selected for the intervention practice, and used as mortar in the settlement of the blocks, roughcast and plaster substrate. This was elaborated with the sand of aggregate A from the debris recycling plant, replacing the traditional sand of construction, plus cement with trace 1:7.

The presented mortar result, in the set function, corresponded to expectations, as they relate to the quality of finish and endurance. Regarding its response to the handling technique and deployed application, it presented a faster grip than traditional mortars, relying more on the worker's effort and agility. Regarding the finishing plaster and coating, this new material demanded more experience and agility. It should be stressed that from the previously analyzed samples of the mixtures exposed to weather, those that best responded to bad weather passed over again analysis and tribological tests, in laboratory, now in different proportions. Their properties and mechanical behaviors were observed, according to the standards of ABNT, aiming to find solutions of lower rates of cement for mortars, through Adherence Test, a tribological test which involves scientific investigation of all kinds of friction and wear that a material may suffer. As is shown in figure 4, bellow.

Figure 4

Tribology test, adhesion test, results of samples evaluated in laboratory.

Source: Faustino (2010).

Ensaio de aderência - Laboratório de Tribologia	
Condição de Ensaio (Força Norr	5-45 N
Erro - Célula de carga	±0,3 N
Taxa de aplicação de força	100N/min
Velocidade da Mesa	10mm/min
Temperatura	22°C
Umidade Relativa	50%

Ñ - Não rompeu para a carga aplicada

	V3			I1			V2			IV1			V4			IV2		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Carga Máxima (N)	8,4	6,1	7,9	9,4	10,9	11,5	5,1	5,7		33,3	Ñ	Ñ	3,1	4,4	3,4	6,3	6,0	8,5

Study of Pigmented mortars with recycled aggregate A

In this work, other evaluations were also held for the practical use of the produced mortar. Thus, were added to the chosen mortars (V.2 and V.3, with hydrated lime) color pigments (red and yellow) to test its use as coating substrate of eco concrete blocks (10x20x40) – made with fine aggregates A and cement – and employed in the construction of masonry furniture.

It had been decided to work the mortars with the following traces, described below, plus pigments directly applied on the substrate without finishing. As a parameter for calculation of the prepared samples, 125g of Xadrez powder pigments were used, for each 10.000g of mixture, to give it the desired color.

- Cement 10%, Hydrated Lime 20%, Aggregate A 70% and 125g of yellow pigment.
- Cement 10%, Hydrated Lime 25%, Aggregate A 65% and 250g of red pigment and 125g of blue pigment.

The results obtained were, in general, satisfactory both referring the tonality and the workability of the mortar, under conditions of mild temperature (about 27Cº) and relative humidity above 55%. The work aimed to obtain a homogeneous mixture with higher water content in it, keeping it moist, wetting the substrate and seeking a thinner finish. Largest particle size was chosen for the mixture in order to obtain a more rustic finishing.

At some points there was the appearance of micro cracks, pathologies associated, in this work, to the lack of technical ability with the mixture, due to the quick grip presented by the evaluated material. Another cause for the appearance of micro cracks may be associated to the increased thickness of the applied mortar, appearing in spots

where there was an attempt to compensate imperfections of the plumb, improving the quality of the finishing of the walls used as substrate.

Regarding the adhesion of the mortar to the substrate, the results were also satisfactory, and good results were obtained both in the mortars applied directly on the concrete blocks, without finishing, and to the wall that received the plaster.

In figure 5 (a) and 5 (b), one can monitor the results obtained from the pigmented mortars, as rustic finishing of wall with grafiato-type texture.

Figure 5 (a):

Wall that received texture finishing, made with the red and yellow pigmented mortars.

Figure 5 (b):

Micro cracks, pathologies presented on the same.

Source: Elaborated by the author.

Study and development of mortars with recycled aggregates B

Other studies for wall coverings were performed, this time using cement mortar and soil in the mixture of recycled aggregate B, from the ceramic material. This material was donated by the SLU and collected at the Recycling Plant of BR-040, in Belo Horizonte.

Just as with the recycled aggregate A, the base parameter adopted for the traces of traditional mortars of plaster coatings, were the standards of ABNT-NBR 7200/82 and NBR 13529/95. According to these standards, the proportion of cement and sand is, respectively, 01:08. The cement employed was the Champion III CP 32 / Lafarge, as standard NBR-7215, which determines the resistance of *Portland Cement* and fine sand to be used for plaster, according to NBR-7200/82.

The objective of the study was to evaluate the strength and workability of mortar coating for exterior and interior walls, from the mixture of parts of recycled aggregate B and fine washed sand, with a reduction of the cement binder and the association of hydrated lime, seeking greater stability in the mixture.

For external walls it was decided to use a mixture of recycled aggregates B, hydrated lime and cement, in this order and proportion (8:1.5:0.5) applied over masonry ceramic bricks.

For the coating of interior walls two mortar studies were performed. The first based on the recycled aggregated B associated to the mixture: fine washed sand in the same proportion of aggregate B and cement binder (in that order and with trace 4:4:1). In the second study the same mixture was used, associating to it, hydrated lime (trace 4:4:1:1). It is important to note that the recycled aggregate B, from the debris recycling plant, passed through the common screening process, using mason's sieve mesh # 3, 5 and 8, as desired finish.

Figures 6 (a) and 6 (b) - external mortars; Figure 6 (c) and 6 (d) – mortars for internal coating illustrate the application of the respective coating mortars

Figures 6 (a, b, c and d)

Application of the external mortars with recycled aggregate B, hydrated lime and cement in small proportion; Figures 6 (c) and 6 (d): Mortars applied in the interior of a house, with recycled aggregate B and fine sand in the same proportion, associated with hydrated lime and cement in the mixture.

Fonte: Elaborated by the author.

The technique used by a professional mason in this study was not very different from the one used with the conventional aggregates, only requiring greater care regarding the coating thickness and to maintain the mixture wetter than conventionally, aiming to improve its workability during grip, that is, from fresh to hardened state.

Due to the season at the occasion of the work, presenting good cloudiness and high relative humidity (70 % relative humidity and temperature around 26° C), the external and internal coatings showed no significant crack pathologies, its behavior was very satisfactory.

Pinto (1998) attributes to the concentrations of active molecules (non-inert) of binders, still present in recycled aggregates, as well as the presence of ceramic waste with pozzolanic characteristic and to the porosity of the particles, the good performance of the mortars from these mixtures.

Study of pigmented mortars with recycled aggregates B

Continuing the work with the mortars of the recycled aggregates B, the same pigmentations were associated aiming to present a decorative rustic finishing of interior walls. Figures 7 (a) and 7 (b) illustrate the interior spaces of a house that received grafiato-type finishing, achieved by a technique applied with the movement of a trowel always on the vertical position, and of larger particle sizes of the recycled aggregates in the mixture.

It is worth remembering that for the trait of pigmented mortar, the recycled aggregate B was used with a thicker granulometry, sieve mesh # 8, for desired finish presented in figure 7 bellow.

Figures 7 (a and b)

Walls that received texture finishing with grafiato-type technique with pigments in pink tones mixed to mortar of recycled aggregate B.

Fonte: Elaborated by the author.

In preparing the mixtures, 20.000g of material were used as a parameter for calculating the quantity of pigmented mortar to obtain a homogeneous cover of the whole area of the wall. The mortars were applied directly on plastered wall and previously wet.

The following trait was prepared for 20.000g of material, plus pigments:

- Recycled aggregate B 70%, hydrated lime 20%, cement 10% and pigment 300g.

The figures 8 (a) and 8 (b) illustrate the study of the proportion of pigments in order to mix them to the mortars applied to interior walls, as grafiato-type rustic finish. A study of the pigmentation was made, mixing in a godet (egg cartoon) small proportions of powder, to obtain the desired hue. After the desired hue was chosen, a graded glass was used to, considering the grade for flour in grams, as a meter to prepare the correct concentration for the trace.
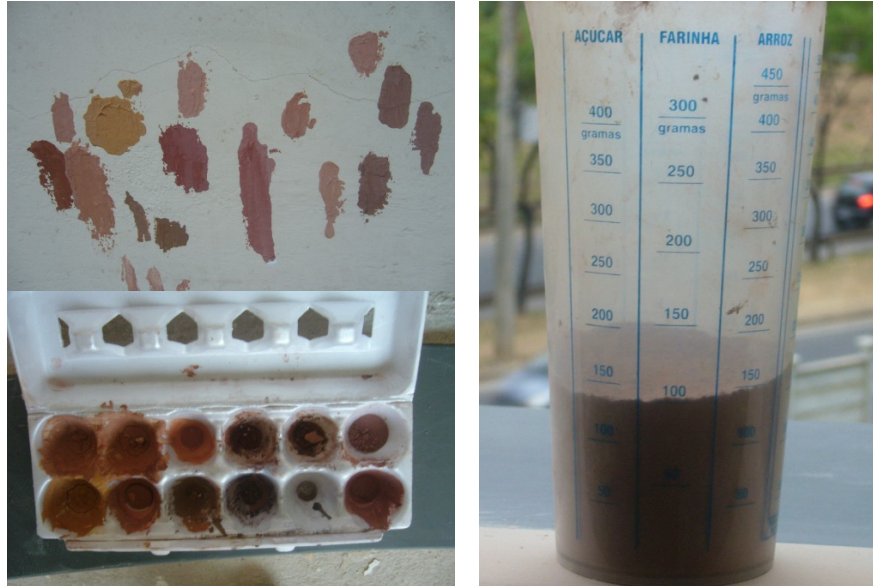
Final Considerations

Firstly, the work contributed to the identification of the chemical constitution of the construction waste in the north region of Belo Horizonte. It was found there, that the aggregate A has a high concentration of active elements, CaO, SiO_2, Fe_2O_3 present in the cement binder; thus, if used in replacement of common sand, in mortars, this material will help to significantly reduce the amount of cement and silica (sand) to be employed in the mixtures. In the constitution of the aggregate material B it was observed the presence of PbO (lead oxide), considered toxic, and usually employed as part of paints in the fixation of pigments. Based on this fact, the study started from the hypothesis that the powder of aggregate B could be exploited as pigment of mortars and natural paints, constituting an adjuvant in wall finishes in construction.

Two aspects can be highlighted from these results: the ecological/environmental and the economic. The first is addressed by the reuse of recycled aggregates A and B and plaster waste – materials discarded by construction that impact the environment. Regarding the second aspect, economic, it should be noted the low cost of the product, which makes it economically viable, due to the reduction of the use of cement binder, beyond promoting the return of discarded plaster to a productive cycle, which until now had no applicability besides the cement industry.

It was also observed in the course of the experiments that the samples with recycled aggregate A applied without wetting to the substrate and a thickness exceeding 150 mm presented crack pathologies due to water absorption by the substrate mass. This pathology can be easily corrected, by observing the amount of water in the mixture, the evaporation conditions of the place and the substrate suction. The hydrated lime is also an adjuvant in this study, enhancing the water retention power of the mortar, minimizing the pathology due to its high moisture retaining power and the adsorption capacity of their crystals, as well as by its specific surface.

As to the results of experiments made from the mixture of recycled aggregates B, mortars presented superior workability in comparison to that of the mixture of recycled aggregates A. It presented good adhesion to the substrate, and showed no cracks on its fresh and hardening state. Its behavior was satisfactory and homogeneous, both for external and internal coatings, whether pigmented or not.

The superior result observed among mortars with aggregates A and B, is due to the improvement of application techniques, corrections relative to the humidity of the substrate and the mixtures applied to it, besides the finishing of the masonry being properly plumbed with applied layers not exceeding 150 mm of thickness.

Here we should remember that the main objective of these studies of more technical foundation is to generate materials that may be used as a tool in the revitalization of deprived houses in the Vila Paquetá, in Belo Horizonte, which was, in fact, achieved by offering the opportunity to experiment in practice the results obtained. It is important to note that approaching the issue of sustainability in various dimensions we could combine here a technological research to the possibility of a future patent.

The above work was presented as a research object of the description and analysis of this process related to contemporary forms of governance, and which has been worked from the perspective of popular participation and the achievement of public-private partnerships.

References

ASSOCIAÇÃO BRASILEIRA DE NORMAS TÉCNICAS. **NBR 6502:** Rochas e solos – Terminologia. Rio de Janeiro: ABNT, 1995.

_____. **NBR 7175**: Cal hidratada para argamassas. Rio de Janeiro: ABNT, 1992.

_____. **NBR 7200**: Revestimento de paredes e tetos de argamassas inorgânicas – Procedimento para execução. Rio de Janeiro: ABNT, 1982.

_____. **NBR 10004:** Resíduos sólidos – Classificação. Rio de Janeiro: ABNT, 2004.

_____. **NBR 13528:** Revestimentos de parede e tetos de argamassas inorgânicas. Determinação de resistência à atração – Método de ensaio. Rio de Janeiro: ABNT, 1995.

_____. **NBR 13749**: Revestimentos de parede e tetos de argamassas inorgânicas – Especificação. Rio de Janeiro: ABNT, 1996.

_____. **NBR 15114**: Resíduos da Construção Civil – Áreas de reciclagem – Diretrizes para projetos, implantação e operação. Rio de Janeiro: ABNT, 2004.

BRASIL. CONAMA, 2002. Disponível em:

<http://www.cetesb.sp.gov.br/licenciamentoo/legislacao/federal/resolucoes/2002_Res_CONAMA_307.pdf>. Acesso em: out. 2008.

_____. Lei 12.305 de 02 de agosto de 2010. **Diário Oficial da União** – Imprensa Nacional, ano CXLVII nº147. Brasília, DF, 3 de agosto de 2010. Disponível em: <http://www.abinee.org.br/informac/arquivos/lei12305.pdf>. Acessado em: Jul. 2011.

CALLISTER, W. D. **Materials Science and Engineering:** An Introduction, Wiley, New York, 1991.

CASSA, J. C. S. In: CARNEIRO, A. P.; BRUM, I. A. S. **Reciclagem de entulho para produção de materiais de construção:** entulho bom. Salvador: EDUFBA; Caixa Econômica Federal, 2001. 312 p.; il.

CENTRO TECNOLÓGICO DE MINAS GERAIS. CETEC-MG. **Testes de Fluorescência de Raios-X**. Belo Horizonte, 2009.

FAUSTINO, F. X. **Teste tribológico, ensaio de aderência, resultado das amostras avaliadas em laboratório.** Belo Horizonte: CETEC-MG, 2010.

FIUZA, Sandra Machado. **Gestão Urbana Sustentável.** Belo Horizonte (MG). Painel I, In: V SEMINÁRIO EDUCAÇÃO AMBIENTAL: A cidade sustentável**.** Escola de Design: Universidade do Estado de Minas Gerais; Centro Mineiro de Referência em Resíduo, 2009.

GOMES, A. O. **Propriedades das Argamassas de Revestimento de Fachadas.** DCTM da Escola Politécnica da UFBA, Salvador, 2008.

INSTITUTO NACIONAL DE METEOROLOGIA (INMET). **Estações Meteorológica-Capital.** Disponível em:

<http://www.inmet.gov.br/sonabra/dspDadosCodigo.php?QTUyMQ>. Acessado em: abr. 2010.

JOHN, V. M. **Reciclagem de resíduos na construção civil:** contribuição à metodologia de pesquisa e desenvolvimento. Tese (Doutorado). Escola Politécnica da Universidade de São Paulo, São Paulo, 2000. 113 f.

REVETEST**. Software User's Manual,** Versão 2.0, CSEM Instruments SA, Suíça, 1995.

MIRANDA, L. F. R. **Estudo dos fatores que influem na fissuração de revestimentos de argamassa com entulho reciclado**. Dissertação (Mestrado). Escola Politécnica, Universidade de São Paulo, São Paulo, 2000.

PINTO, T. P. **Manual de uso dos resíduos de construção reciclados**. São Paulo: I & T, 1998.

_____. **Entulho de construção:** problema urbano que pode gerar soluções. Construção, São Paulo, 1992. n 2325, p. 11-12. Reciclagem de entulho para produção de materiais de construção / CARNEIRO, A. P.; BRUM, I. A. S.; CASSA, J. C. S. Salvador: EDUFBA; Caixa Econômica Federal, 2001. 312 p.; il.

SABBATINI, Fernando Henrique. **Argamassas de assentamento para paredes de alvenaria resistente.** São Paulo: Associação Brasileira de Cimento Portland – ABCP. 1989.

ROMERO, T. C. M. T. (org.). **Nivelando as informações para gestão integrada de resíduos sólidos**. Vitória – ES: Oficina editora, 2006. Disponível em: <http://www.bandesonline.com.br/menuazul/estudos/documentos/analise_situacional.pdf>. Acessado em: out. de 2008.