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University educational architecture design process - Paths and stages of work by specialists at Ufal, Alagoas

Processo de projetação de arquitetura educacional universitária - Percursos e etapas do trabalho de especialistas na Ufal, Alagoas

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ABSTRACT
This article presents and analyzes the processes of university educational building projects - their concepts, paths, and parameters produced at the Federal University of Alagoas - Ufal (post-Reuni, from 2013 to 2023). This period was defined by the existence of more accurate data on the conduct of these projects. This research sought to bring discussions about the professional practice of architects and urban planners dedicated to public educational works projects that involve large investments, working time, and specific technical knowledge. We sought to contextualize the situation of Ufal's infrastructure, focusing on the work of the architect and urban planner. The theoretical framework addresses the systematic advancement of organized steps that contribute to professional project work. From this, a descriptive analysis was carried out on the designer's role in the public sphere and their activities and responsibilities. To compare the theoretical framework, interviews were carried out with Ufal professionals, to obtain information about the most important aspects of the team's design work. The challenges, procedures, software used, institutional needs, and demands were discussed in the day-to-day lives of these professionals. At the end of the analysis, forms of collective work, design stages, and restrictions of architectural projects were detailed. The article ends with the need to develop more studies, which can explain the difficulties and characteristics of the urban architect's role in public educational architecture in Brazil. Great limitations were perceived regarding legal requirements and investments made available for creation, aesthetic innovation, adequate technical execution, specification of materials, and durable equipment.

Keywords: Educational architecture, Public university, Architectural project.

1 INTRODUCTION

Educational architecture in Brazil is a great challenge that involves several agents, working in the design, planning and execution of works aimed at public education. Until a public educational building reaches the use for which it was planned, the process of this development can take a considerable time and the expenditure of voluminous public resources, destined to the shelter and execution of educational activities, whether in the sphere of municipal, state or federal education.

After the construction period, the use of a school building allows us to observe the establishment of environmental and interpersonal relationships resulting from the students' learning process, impacting on a relationship of reciprocity with peers and teachers. In this sense, architects and engineers specialized in school architecture seek to create spaces that may be able to awaken the potential of different types of learning, whether social, cognitive and/or affective, with the least possible financial impact on the managing institution.

Powell (2015), Kaup, Kim and Dudek (2013), Chan and Richardson (2005), Sarmento et al. (2016), Sarmento and Gomes (2019) agree that student performance is related to the quality of the building. The environment influences them, causing both positive and negative sensations, with different implications varying from person to person (Day, Midbjer, 2007). Therefore, design parameters of environmental quality can greatly contribute to the result of this building.

This article aims to analyze the process of project elaboration of the work of the architecture and urbanism team of Ufal in the last 10 years, more specifically the period of the end of the Program for Restructuring and Expansion of Federal Universities (Reuni), which lasted from 2007 to 2012. The excerpt of the report of this research was started in 2013 and completed in 2023. The competence analysis addressed by Guardavilla (2016) was taken as a path, with regard to the architect's ability to work with constraints and the design processes and methods used by Kowaltowski (2011). To carry out this study, it was necessary to understand the general context of how Reuni interfered in the renewal of the staff and, consequently, in the design in the Brazilian Public Universities and in the Federal University of Alagoas - UFAL.

The methodological procedures used were initially focused on the elaboration of the theoretical framework, through bibliographic and documentary research. Then, we sought to obtain data from the agents involved in the project, through interviews with the architect servers working in the project sector of Ufal. Finally, a descriptive analysis of the projects developed in the historical context of the post-Reuni period was generated, aiming to describe the forms and

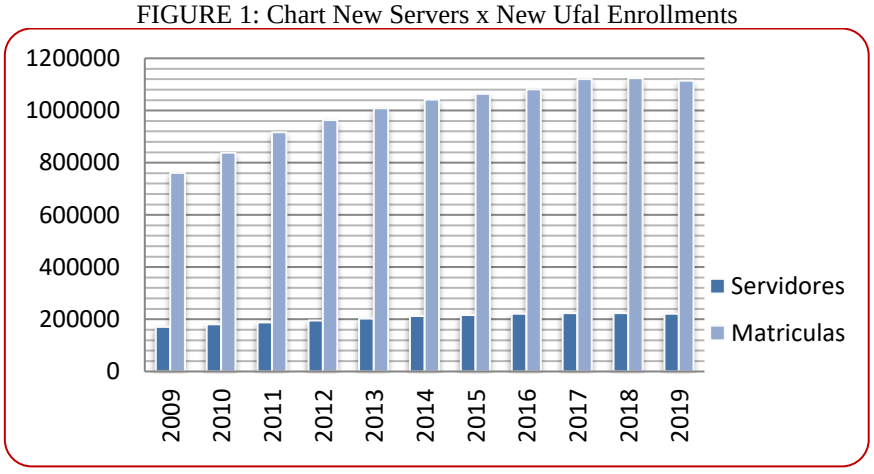
stages of development of the projects already completed, and the overview of the most relevant design aspects in the process of each project.

2 PUBLIC UNIVERSITIES AND THEIR INVESTMENTS THROUGH REUNI

In the context of a shortage of courses and vacancies in public higher education in the mid-2000s, the federal government initiated programs to expand universities in order to increase the supply of vacancies and comply with the National Education Plan, according to Law No. 10,172/2001. The guidelines of these social policies were to increase the supply of places in public higher education by 30%, favoring young people in the age group of 18 to 24 years by the end of the 2000s (Ministry of Education, 2012). One of the actions that are part of the federal government's public educational policy is the Program for the Restructuring and Expansion of Federal Universities (Reuni), whose main objective is to expand access to and permanence in higher education in Brazil.

Decree No. 6,096, of April 24, 2007, established Reuni and lasted from 2007 to 2012. According to the Ministry of Education - MEC (2012), Reuni contributed to a new reality of higher education in Brazil, mainly through the implementation of new universities, university campuses, an increase in the number of enrollments and the interiorization that contributed to the development of the regions, providing the reduction of the regional differences existing in the country. The information contained in the **Erro! Fonte de referência não encontrada.** below, they were taken from the reports of the 360° observatory maintained by MEC and present the evolution of the number of enrollments and the number of new civil servant contracts from 2009 to 2019. The interval of years presented informs the data made available by the researched source.

FIGURE 1: Chart New Servers x New Ufal Enrollments



Source: MINISTRY OF EDUCATION, 2021. Adapted by the authors.

The expansion made possible by the implementation of Reuni forced universities to seek new ways to meet the demand for expansion and reorganization of physical infrastructure, resulting in the need to carry out public works and readjust existing spaces, since public works are an important means (input) for some public policies to achieve their objectives (Bittencourt, 2015).

In addition to the greater offer of enrollments, Reuni brought the need to reorganize the personnel structure through the expansion of the technical staff of professionals that make up a university. As a way to solve the challenges of this new reality, some universities have opted for the solution of hiring their new professionals through public tenders. The vacancies were for teachers and administrative technicians, see **Erro! Fonte de referência não encontrada.**. From this reinforcement in the staff, new vacancies for engineers and architects emerged and who, by virtue of their profession, became specialists in architecture and public educational engineering.

The performance in physical educational infrastructure works was intended to elaborate: complete projects with technical specifications and descriptive memorials, contracts for projects and/or execution of works, terms of reference, supervision of works, procedural instructions, physical-financial schedules, budget spreadsheets, bids based on executive projects, measurements and payments of works, legal analysis, preparation of amendments to works/project contracts, application of sustainability guidelines. All of these services have been deeply developed and improved by the servers over the years. Much of this improvement is the result of the demands that Reuni, which lasted from 2007 to 2012, brought. Universities intensified their architectural production, modified from the existing campuses to the expansions in the interior. The projects and works were developed as the agreed goals were met. Although the Reuni program was finalized in 2012, paralyzed works and project adjustments extended for a few more years, until in fact, all the resources were sent and finished.

Bringing up the issue of access to quality public education, when we cite the situation in the northeast of Brazil, there are greater difficulties than in the southeast and south regions of access and continuity of primary and secondary studies until they reach entry into higher education. The continuous PNAD also points to alarming data in relation to education in the northeast region and in Alagoas. In 2022: illiteracy is the highest among the Brazilian regions, with emphasis on the elderly with 16%, black and brown people - young (7.4%) or elderly (23.3%). Of the total number of Brazilians aged 25 and over, only 53.1% have completed high school, and of these, only 4.1% of Brazilians are pursuing an undergraduate degree in the country.

According to the Semesp Institute (2021), in Alagoas, there were 3.3 million inhabitants distributed in 102 municipalities. With a GDP of 54 billion reais and 26.9 thousand high school graduates, in 2019, the state of Alagoas registered 107 thousand enrollments in higher education – about 3.2% of the state's population. In 2019, Ufal already registered the enrollment of about 26 thousand students enrolled in the face-to-face modality who need infrastructure conditions to develop teaching and learning activities (Ufal, [n.d]). Thus, we can understand the national and regional demand for educational infrastructure in institutions, which enable access to higher education in the country and in Alagoas.

3 REUNI AND ITS CONTRIBUTION TO THE INCREASE OF THE TECHNICAL STAFF

The Federal University of Alagoas, a federal institution of higher education, was founded in 1961, and its largest campus, A.C. Simões, is located in the city of Maceió, Alagoas. In addition to this, Ufal has two more campuses in the interior of the state: Campus Arapiraca and its units in Viçosa, Penedo and Palmeira dos Índios and Campus do Sertão, headquartered in Delmiro Gouveia, and unit in Santana do Ipanema, in addition to the Center for Agrarian Sciences - CECA, which is located in Rio Largo (Ufal, [n.d.]). In 2023, Ufal serves about 30 thousand students enrolled in 84 undergraduate courses, distributed in 23 Academic Units, in Maceió (58 courses), and on the campuses of Arapiraca (19 courses), Sertão (8 courses), Viçosa (2 courses), Penedo (5 courses), CECA (05 courses).

The Arapiraca Campus, in the city of Arapiraca – AL, in the rural region of Alagoas, was created in 2006, and is composed of the poles of Palmeira dos Índios, Penedo and Viçosa. In 2010, a campus was set up in the hinterland of Alagoas, with headquarters in Delmiro Gouveia-AL and the Santana do Ipanema unit. These new campuses and centers were the result of the goals of the PNE 2001 and made possible by the institution of Decree 60096/2007 - Reuni.

To make all this expansion viable, it was necessary to hire new servers - teachers and technicians from various areas. In the area of civil construction, new architects and engineers were hired through competitive examinations to work in the continuity of the physical expansion already started with the Arapiraca campus. Until 2008, Ufal had a technical staff composed of an effective architect and two outsourced contracted architects and 05 effective civil engineers, which for the demand required by Reuni was still insufficient. With the high demand for the development of the projects at Ufal, new professionals were incorporated into the technical staff.

All the new architects who entered through the competition were recent graduates with little experience in project development, and especially in school projects for higher education.

The older architects, despite their sedimented knowledge about the university's design practice, were readapting to the frenetic routine of project development brought by REUNI, unlike what had been happening in previous decades where no investments were made in the University.

Due to this stagnation, the engineering and architecture sectors were not equipped to support this new dynamic. There were no working conditions and no infrastructure to accommodate all that new team. All these aspects added up as another challenge – to integrate old and new servers to work together in a large number of projects and works, seeking solutions so that all demands could be met with quality and time.

The first project of this phase was a new building to house the Faculty of Letters, on the A. C. Simões campus, Maceió. From this milestone, the team began to build clearer and more systematized procedures to define professional teamwork. Design parameters, regulations, environmental comfort guidelines, accessibility, material resources and equipment have become fundamental elements to be considered for the success of the design procedures, aiming at the team's other future actions. During this period, there were sufficient financial resources to provide more design freedom. Although Reuni ended in 2012, the frenetic pace of project development, inspections and other services pertaining to the team lasted until mid-2015, when a drastic decrease in the pace of work began, especially with regard to the preparation of architectural projects for new buildings.

The creation of an architecture focused on higher education meant a huge challenge for the new team. Thinking about the expectations of an entire academic community that had been longing for this moment for decades was a great learning experience, where doing architecture was a collaborative activity between managers, architects and professors.

4 THE ARCHITECT INSERTED IN PUBLIC EDUCATIONAL ARCHITECTURE

Studies on design have evolved since the creation of the profession of architecture and urbanism, and will always be focused on improving design processes. In the 1960s, studies on design methods were based on the intention to solve problems through a systematic and efficient approach (Voordt and Wegen, 2013), with studies of design processes in a technicist manner made by Jones (1963), Alexander (1963, 1964) and Luckman (1967) based on the decomposition of tasks, solving problems separately. In the 1970s, research began to address social issues of the built environment, through the study of local residents and project management, with contributions from Glucksmann Jonge (1960), Sommer (1969) and Canter and Craik (1981). In the 1980s,

Alexander (1971) stood out with his standards-based design studies and on the analysis-synthesis-evaluation design cycle (Voordt and Wegen, 2013).

Nowadays, since the creation of computer systems, the digital tool of computer-aided design has made the design process more complex, however, richer and more adaptable, without the need to redesign elements by manual instruments. The CAD tool *(Computer-Aided Design)* allowed a reconfiguration of the means of project development, and today the adoption of the BIM tool *(Building Information Model)* It brought another layer of complexity, but it allows benefits such as: better understanding of the project, more efficient visualization, agility in production, reduction of errors, preparation of quantities and budgets and improvements in the quality of communication of the work.

The complexity of the architect's work can be understood through the approaches of Schön (1983), Anderson (2011), Voordt and Wegen (2013) and Guardavilla (2016). Schön (1983) defined the professional who designs as the one who "converses with the drawing", further highlighting the function of the materialization of the project as the centrality and material result of the professional knowledge of the architect or designer. Anderson (2011) defines the performance in architectural projects, or environments, as skills to be developed by designers, and Guardavilla (2016) defined the competencies necessary for the role of the designer. They are: Solving complex problems; perform critical judgment so that the best solutions are applied; test and reflect on the solutions and conflicts that may occur; Working with restrictions – which are the application of technical standards and legal impediments.

Complementing the work of Anderson (2011), Guardavilla (2016) explains that the designer's work involves mastering skills related to the design method, previous technical knowledge on the subject, or about the building typology, skills and architectural ideology. Other important elements that imply in the making of architecture are the essential components: the requirements, the physical space, the form, the technology, the contexts (environmental and cultural): the **Requirements** They bring together the usefulness of the architectural object, the capacity for shelter and protection, the efficiency of the conditions for carrying out the activities, the appearance, the qualities that one wishes to apply/perceive in the building. Or **Architectural space** It is an environment to be provided for human beings to live, work, in addition to perceiving their envelope and functionality. The **form** It has to do with the desired sculptural and aesthetic aspects, as a consequence of everything that is visible, resulting in the envelope of the architectural space. The **technology** it is defined as the elements of the construction system and the ways of executing the building (GUARDAVILLA, 2016). These elements are distributed throughout the

stages of the design process, defining in a relevant way the plastic-functional result of the resulting building, as we will describe in the design stages.

5 PERFORMANCE AND PROJECT PROFILE ADOPTED BY THE TEAM

According to Kowaltowski (2011), the quality of the architectural project depends on the team and its experience, as well as on the information available for the development of the project. At UFAL, the architectural projects are developed by a technical team of civil servants, which is currently composed of 7 (seven) architects, one of which is exclusively for activities developed at the University Hospital with architecture focused on public health. Of this picture, 3 architects have a PhD in architecture and 03 have a master's degree in architecture, one of them is in the process of a PhD.

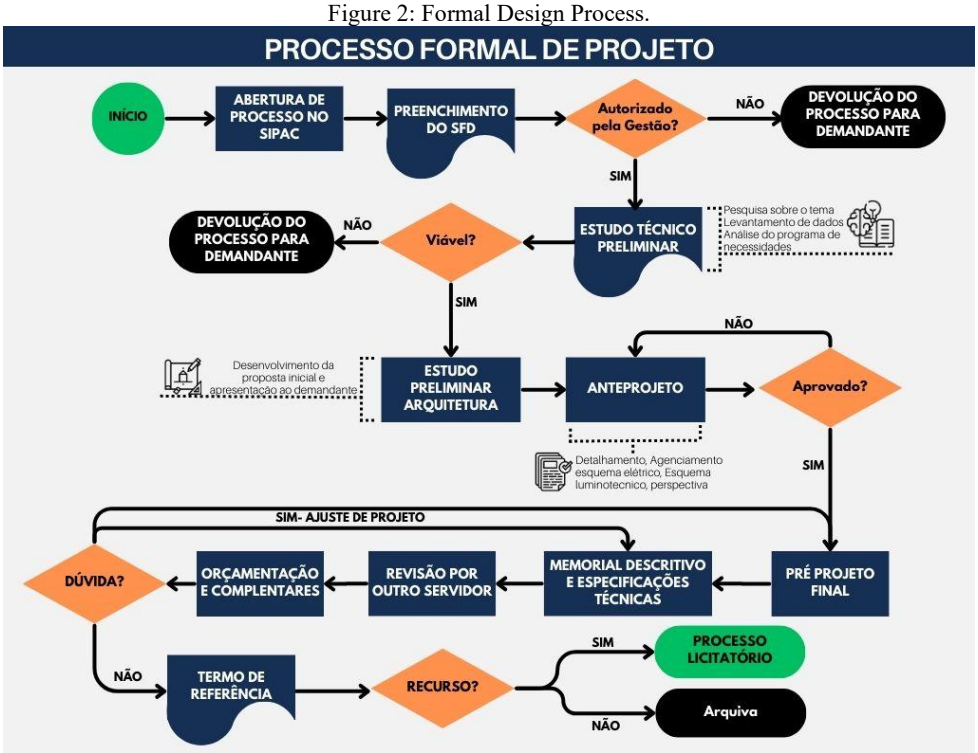
The analysis carried out in this article focuses on the architectural design process developed by the team of architect servers of the permanent staff of Ufal, focusing on the issue of the form of teamwork, the application of restrictions and fundamental parameters for the development of the work, resuming the skills pointed out by Guardavilla (2016) and Kowaltowski (2011), bases of the theoretical study.

The projects developed by the team range from the architectural projects of new works to the renovations and adaptations of spaces. The definition of which projects will be elaborated comes from the university's upper management, and the technical team is responsible for the development of architectural projects always based on the provisions of the law, such as the regulations and technical recommendations that involve: Anvisa, the fire department, the **spatial and furniture accessibility, sustainability recommendations** ABNT, among others. These legal requirements, linked to the resources made available, have the greatest weight in the act of defining architectural solutions that will result in the final layout of each project elaborated.

It is common for the demand for architectural design to be the result of specific needs of each academic unit, research projects or political interests, especially with regard to interiorization. The public university is made up of several courses, each with its own specific knowledge and application. Therefore, each course will always have a specific environment that requires the architect to deepen his technical knowledge. The initial research to develop creative, accessible and aesthetically interesting solutions requires a lot of study, and time to mature the ideas, because it is from these environments that students will explore the learnings that are the basis for professional life.

In the case of universities, unlike public kindergarten and high schools, there is no rigidity of needs programs, nor standardization established by agencies linked to secretariats or to the Ministry of Education itself. Universities have the autonomy to create and manage their projects and built spaces. Thus, the team's way of working follows the demands received by the Superintendence of Infrastructure, which in turn receives the demands of the Upper Management. In order for the understanding of these processes to be clearly described, a summary table has been developed that demonstrates the process of design and development of the projects. Figure 2.

Figure 2: Formal Design Process.



Source: the authors, 2023.

5.1 DESCRIPTION OF THE DESIGN PROCESSES ADOPTED

Projects are initiated individually, by an architect member of the team. In some jobs, there is a need for effective participation of the entire team, which depends on external factors or the short time to deliver the project at the executive level. The design process is initiated from the legal prerogatives, that is, before thinking about any layout, it is necessary to strengthen the legal framework. The following is a brief description of each step:

5.1.1 Formal Request for Demand - SFD:

Any and all interventions of works and renovations at Ufal must have a formal request for demand - SFD. This document supports the completion of the preliminary Technical Study. In it,

the plaintiff inserts information about the program of needs, the characterization of the intervention, the justifications, the possible source of appeal, the legal motivations, among others.

5.1.2 Technical Feasibility Study - ETP:

In addition to the activity of designing, the team of architects and engineers has to make several technical pieces that are essential and mandatory in the public sphere. As an example, and as an initial piece is the elaboration of the Technical Feasibility Study (ETP). This document is currently filled out directly on the federal government's platform: compras.gov and is called ETP Digital. According to Normative Instruction No. 58, of August 8, 2022, in its Art. 3, item I, I define ETP as:

> "Document constituting the first stage of the planning of a contract that characterizes the public interest involved and its best solution and provides the basis for the preliminary project, the term of reference or the basic project to be prepared if it is concluded that the contract is viable.

Much of the composition of this document is based on the answers contained in the form. It is from this document that the technical team evaluates whether the project request or civil interventions are feasible in view of the reality of Ufal and the legal provisions, in addition to serving as a basis for the next steps. Many initial projects are considered viable, but most of them do not yet have the financial resources to execute them and it is up to the upper management to seek such feasibility. For the composition of this piece, it is necessary to have an ordinance that designates a technical team, which can be composed of engineers and/or architects.

5.1.3 Synthesis Phase – Preliminary Architecture Study:

The evaluation phase, analyzed here as the preliminary architectural study, is the moment in which the main constraints related to the project problem will be identified. At this point, the team lists the main objectives and goals to be achieved and defines the concept of the building (Kowaltowski, 2011). All the information collected in the SFD will be extremely important for this phase, as it is from them that the information and data provided by the plaintiff will be managed.

At this stage, the management defines the architect or architects in charge. The team has free will to start its conception, but according to the answers of the interviews applied, it is evident that some of them use paper and others already use the electronic medium, even for the initial studies. From there, the following information is considered:

- Program of needs: projection of the possible areas of each environment. This phase is characterized by a more direct contact with the plaintiff
- Whether there are existing projects executed that are more current in other locations. When possible, a technical visit is carried out, especially when it comes to environments with greater specificity.
- Cataloguing of normative information regarding: number of toilets, need for environmental licenses, needs for specific projects (acoustic, lighting, safety, etc.), tree pruning, interference or interconnection with other buildings, etc.
- Evaluation of the possible locations of implantation of the building and verification of the orientation and possible volumes.

At this stage it is possible to obtain basic technical drawings such as: zoning, possible façade sketches, cadastral surveys of the areas, volumetric study.

Synthesis/Evaluation Phase: Architectural Preliminary Project:

According to Kowaltowski (2011), the synthesis phase, which is linked here to the preliminary study phase, is associated with the creative phase of the decision stages. In this phase, the architects conceive ideas and possible solutions to achieve the objectives, take advantage of the opportunities and consider the constraints that will be in the next steps.

It is in the preliminary project that the team uses the skills of architectural ideology, developing a repertoire and critical sense about architecture, its functions and its various forms of expression and style, in addition to the ability to do and reflect, where the most diverse design possibilities are presented to reach the final decision-making stages. It is at this point that it is necessary to test, that is, to propose and reflect on the proposition in test cycles and take time to mature until the best proposal is reached, in addition to solving problems through the understanding of the issues in depth Guardavilla (2016).

In every project, multiple initial solutions are presented, due to the set of requirements and characteristics pertinent to the space that will be designed, and the needs pointed out by future users (project demanders). The designer in charge elaborates these ideas, based on the experience and repertoire of the team, proposing solutions for the program of the applicant's needs. This allows the claimant to also expand the initial possibilities, beyond what was planned. Through discussions of the representations in sketches, drawings and computer simulations, the project matures, becoming an architectural preliminary project. Architecture: with the first documents finalized, the preliminary architectural study begins.

At Ufal, it is at this moment that the design of the project begins, considering that the first technical pieces will be carried out such as floor plans and schematic sections, facades and possible volumes, adjusting and changing as needed.

Based on the free will of design, the division of labor is defined by the architect or the team. At this stage, the rooms will already be leased, the information collected in the preliminary architectural study is already incorporated and greater attention is paid to compliance with the legal parameters that must be mandatorily considered.

In addition, the location of all toilets, possible emergency exits, corridor widths, accessibility, guardrails and handrails, heights, water supply, technical details that must compose environments, mandatory environments, among others, are defined. The most used standards are the Construction and Maceió Codes, the São Paulo Construction Code, avivisa manuals, RDCs, NBR 9050, NBR 9077, NBR 14718, NRs, among other documents and standards.

It is also considered that the parameters of environmental comfort, orientation, and internal flows begin to be established in a defining way. The reconciliation of all the aforementioned parameters represents one of the biggest challenges of this phase.

At the end of this stage, the plaintiff is invited to the sector so that the intermediate product can be presented and thus the necessary adjustments can be made. Each requested adjustment is carried out and is presented once again to the plaintiff until its approval. At the end of this cycle, the Executive project begins.

Representation Phase: Executive Architecture Project

The executive project is characterized more profoundly by technical knowledge: mastery of history, construction techniques, typologies and materials, technical standards, forms of representation, ergonomics, environmental comfort will be applied and reviewed.

It is at this moment that all the pieces of design will be made, which requires an in-depth technical knowledge of how to do it, how to represent it and how to adjust the specifications to what is most current in the market. Each of the technical pieces must be represented in a detailed, precise and clear way so that the next professionals involved in the process can budget, design and execute the architectural projects autonomously. According to Kowaltowski (2011), this is the phase that communicates with the others and the way in which this communication is carried out can directly interfere in the project.

The entire architectural project at Ufal is still developed on the CAD platform - Computer Aided Design - in conjunction with Sketchup. In CAD, the XRef tool is used to reduce the rework rate.

5.1.4 Preparation of the Project Memorial and Technical Specifications

Memories and technical specifications are of paramount importance, as they document in writing what is represented in the project. At Ufal, for any and all works or renovations, these documents are prepared regardless of whether there will be a need for bidding. In the memorial, there is a brief description of the building, characterizing the areas, the possible adaptations and motivations in the case of the renovations, the location, among others. And in the product specification, all the specifications are described and sometimes how specific services are to be performed.

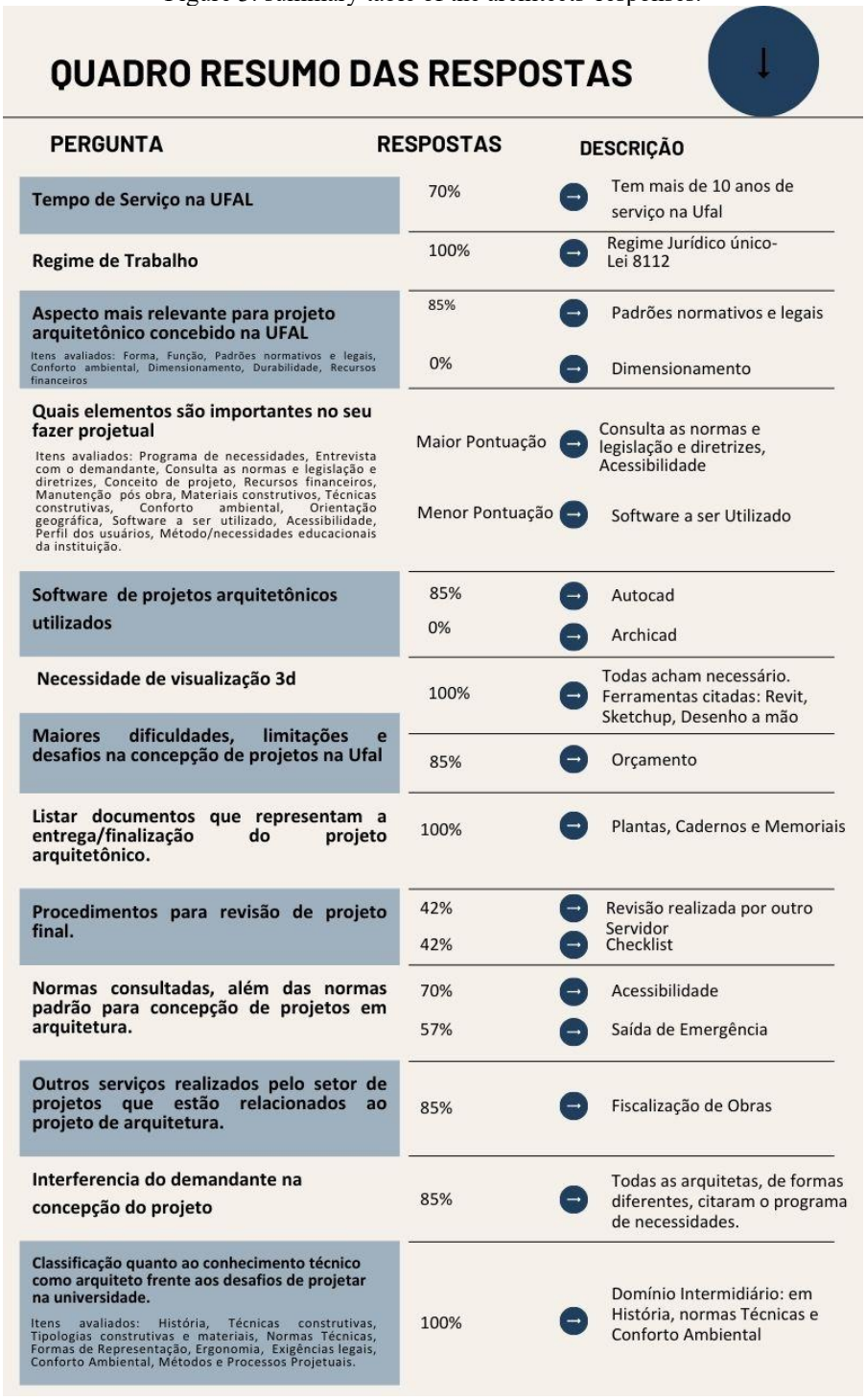
Term of reference:

Technical piece of legal requirement for bidding procedures, supported by the bidding laws: Law No. 8,666/93 and the new bidding law Law 14,133/21. The document in which the requester clarifies what he really needs, bringing the definition of the object and elements necessary for its perfect contracting and execution. For the composition of this piece, it is necessary to have an ordinance that designates a technical team, which can be composed of engineers and/or architects. It is worth noting that the steps described here do not always follow a continuous flow. Architects recurrently interrupt the development of a particular project to deal with emergency demands, breaking the flow.

6 THE INTERVIEW WITH THE ARCHITECTS

In order to understand how the team perceives the work it develops, from the point of view of a systematized process, which results in a large volume of work and relevant investments for the institution, this study applied an online questionnaire with these professionals in the sector. The data on the self-perception of the development of the projects were directed to this post-expansion moment (Reuni) at Ufal. The questions were closed-ended and open-ended. Open-ended questions will follow the procedure of naming the general response patterns. And the closed ones were based on the Likert scale method, where, in one of the questions, numerical values were assigned to each point (SAMPIERE, 2013, p.235). The 6 effective architects who are assigned to the Superintendence of Infrastructure and another 1 architect who is assigned to the University Hospital were consulted. The data obtained were tabulated and are presented in Figure 3 below.

Figure 3: summary table of the architects' responses.



QUADRO RESUMO DAS RESPOSTAS

PERGUNTA	RESPOSTAS	DESCRIÇÃO
Tempo de Serviço na UFAL	70%	Tem mais de 10 anos de serviço na Ufal
Regime de Trabalho	100%	Regime Jurídico único- Lei 8112
Aspecto mais relevante para projeto arquitetônico concebido na UFAL Itens avaliados: Forma, Função, Padrões normativos e legais, Conforto ambiental, Dimensionamento, Durabilidade, Recursos financeiros	85% 0%	Padrões normativos e legais Dimensionamento
Quais elementos são importantes no seu fazer projetual Itens avaliados: Programa de necessidades, Entrevista com o demandante, Consulta as normas e legislação e diretrizes, Conceito de projeto, Recursos financeiros, Manutenção pós obra, Materiais construtivos, Técnicas construtivas, Conforto ambiental, Orientação geográfica, Software a ser utilizado, Acessibilidade, Perfil dos usuários, Método/necessidades educacionais da instituição.	Maior Pontuação Menor Pontuação	Consulta as normas e legislação e diretrizes, Acessibilidade Software a ser Utilizado
Software de projetos arquitetônicos utilizados	85% 0%	Autocad Archicad
Necessidade de visualização 3d	100%	Todas acham necessário. Ferramentas citadas: Revit, Sketchup, Desenho a mão
Maiores dificuldades, limitações e desafios na concepção de projetos na Ufal	85%	Orçamento
Listar documentos que representam a entrega/finalização do projeto arquitetônico.	100%	Plantas, Cadernos e Memoriais
Procedimentos para revisão de projeto final.	42% 42%	Revisão realizada por outro Servidor Checklist
Normas consultadas, além das normas padrão para concepção de projetos em arquitetura.	70% 57%	Acessibilidade Saída de Emergência
Outros serviços realizados pelo setor de projetos que estão relacionados ao projeto de arquitetura.	85%	Fiscalização de Obras
Interferencia do demandante na concepção do projeto	85%	Todas as arquitetas, de formas diferentes, citaram o programa de necessidades.
Classificação quanto ao conhecimento técnico como arquiteto frente aos desafios de projetar na universidade. Itens avaliados: História, Técnicas construtivas, Tipologias construtivas e materiais, Normas Técnicas, Formas de Representação, Ergonomia, Exigências legais, Conforto Ambiental, Métodos e Processos Projetuais.	100%	Domínio Intermidiário: em História, normas Técnicas e Conforto Ambiental

Source: the authors

The answers obtained in the forms answered by the architects were compiled in order to characterize this professional in the institution:

- The technical staff of architects is mostly formed (05 of them) by professionals with more than 12 years of service and those who in the private labor market would be framed as possible senior professionals;

- There are no third-party architects, all of them are framed in the legal regime of civil servants of the direct administration, municipalities and foundations, established by Law No. 8,112/90;
- The capacity of all the architects is in the city of Maceió and is distributed in three locations and they work in different work areas, being the following division: 05 architects at the A. C. Simões Campus, 01 at the University Hospital, 01 in the Dispersed Units (Units outside the Maceió Campus);
- About 43% of female architects start the design process through manual drawings. Although all of them already use digital tools. The need for 3D design visualizations is also clear.

It is noticeable that normative issues play a role of great influence, presenting themselves as one of the guiding principles of the project. Guardavilla (2016) discusses the use of the ability to design with constraints, as well as Kowaltowski (2011) indicates that this is an important factor in the evaluation phase. As the university has a very diverse scope of projects, these professionals are currently faced with the need to verify and apply normative issues throughout the design process. Specific projects, such as laboratories, have legal and safety requirements that cannot be disregarded or relegated to the background.

The number of regulations and legal requirements for application in architectural projects is enormous, so when analyzing the issues pertinent to technical knowledge, 80% of them were classified as intermediate mastery in the items evaluated. These answers, possibly, are anchored in the weight of the knowledge of these legal requirements and the new construction technologies available in the market, which may bring a certain uncertainty, common to any professional in the private sphere.

7 DEVELOPMENT OF ARCHITECTURAL PROJECTS AT UFAL

To exemplify part of the application of the design methods and their components, a selection of the architectural production carried out without the frenzy brought by Reuni was made. The cut-off is established in the period from 2013 to 2023, this period was defined because there is more accurate data on the conduct of these projects. During these last 10 years, important events such as the end of Reuni, political changes and the Covid-19 pandemic were factors that influenced the architectural production at the institution.

To carry out the analysis, the projects were gathered in chronological order of the bidding, in order to facilitate the understanding of how the aforementioned events directly interfered in this production. Figure [4]. In addition, it is worth noting that the projects analyzed are only those that have been or are being executed, as there are architectural projects in the sector's archives that, although completed, were not executed due to lack of financial resources.

Figure 4: Summary table of the bidded projects developed by the technical team - Ufal

PROJETOS ARQUITETÔNICOS - 2013 A 2023
DESENVOLVIDOS PELA EQUIPE TÉCNICA DE ARQUITETOS DA SINFRA

	Projeto	Área	Valor (inclui aditivos)	Descrição	Imagens
2013	ENSENFAR (Maceió)	445,00m²	R$ 920.112,45	Edificação Térrea licitada primeiramente em 2010 e depois em 2013. 06 Laboratórios para o curso de Farmácia mais sanitários. Interligado a edificação do Bloco de Saúde já existente.	
	Sala de Armários Odontologia - FOUFAL (Maceió)	156 m²	R$ 112.830,44	Edificação Térrea para abrigar ármarios dos estudante de odontologia + área de convivencia. Edificação fica na parte interna do Bloco de Saúde já existente.	
	Garagem (Maceió)	648,30 m²	R$ 254.226,47	Edificação Térrea para abrigar o frota de veiculo. A edificação estava sem uso e foi reformada, atualizada e ampliada.	
	02 unidades Residência Universitária (Maceió)	539,36 m² (01 unidade)	R$ 1.070.051,75	Edificação de dois pavimento com 9 Suítes, cozinha,área de serviço área de convivência, no estilo de casa de moradia.	

Source: The authors

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2014	1a. Fase Campus Santana do Ipanema	2938m²	R$ 7.311.207,38	Implantação de 02 unidades do projeto do Instituto de Computação ja executada anteriormente no Campus Maceió. Edificações: 02 pavimentos composta de salas de aulas e laboratórios e pequena parte administrativa.	
	Comunicação Social - COS (Maceió)	1385,45 m²	R$ 2.089.876,52	Edificação modelo do Instituto de Computação ja executada anteriormente, repetida para o COS. Edificação: 02 pavimentos composta de salas de aulas e laboratórios e pequena parte administrativa.	
	Instituto de Ciencias Sociais - ICS (Maceió)	1385,45 m²	R$ 2.140.160,03	Edificação modelo do Instituto de Computação ja executada anteriormente, repetida para o ICS. Edificação: 02 pavimentos composta de salas de aulas e laboratórios e pequena parte administrativa.	
	CALÇADAS (Maceió)	19.171m²	R$ 1.537.822,88	Conjunto de 5 projetos de trechos de calçadas externas. Calçadas em concreto desmpolado usinado.	
	Complexo Esportivo (Maceió)	43.945,44 m²	R$ 28.393.801,95	Projeto de recuperação de ginásio poliesportivo, pista de atletismo e piscina semi-olimpica. Construção de: Campo de futebol, piscina de reabilitação, quadra de volei e futebol de areia e quadra coberta.	
	Eixo Saúde (Arapiraca)	3290 m²	R$ 12.131.384,60	A edificação é composta de 02 blocos, sendo um administrativo com 03 pavimentos composto por salas de tutoria e administração e outro tem 02 pavimentos com laboratórios de saúde.	
	Medicina Administrativo FAMED (Maceió)	1263m²	R$ 2.928.685,38	A edificação de um pavimento térreo com salas de aula, laborátorios, salas de professor e administrativo, integrado a outra Edificação do Curso de Medicina.	
	Bloco de Licenciaturas (Arapiraca)	1633m²	R$2.578.107,87	Edificação modelo do projeto da ENSENFAR ja executada anteriormente, repetida em dois Blocos unidos. Edificação: 01 pavimentosque abriga apenas laboratórios de diversas áreas.Esta Obra é retomada em 2022.	

2016	Adequação e Reforma da Escola Mun. Manoel Soares (Penedo)	637,42 m² (reforma e ampliação)	R$449.996,62	Escola Municipal existente reformada e ampliada para abrigar provisoriamente os cursos de Engenharia de produção e sistema de Informação.	
	Letras e Libras FALE (Maceió)	817,20 m²	R$ 1.634.219,35	Edificação de um pavimento composta de salas de aulas e laboratórios e pequena parte administrativa. Seve como complemento a Faculdade de Letras e Libras.	
2017	Reforma do Auditório Guedes de Miranda - ESPAÇO CULTURAL (Maceió)	455 m² (Reforma)	R$ 733.901,50	Reforma do Auditório do Espaço cultural, edificação que fica fora do Campus A.C.Simões. Localizada no bairro do entro Maceió. A obra já foiiniciada em 2017, abandonada e relicitada em 2020 e continua em obra.	
2018	1ª Etapa da Sede Campus Penedo	1469m² (área construída) 26946m² (agenciamento)	R$ 8.702.963,46	Implantação do Campus Penedo - AL. Assim como o do Campus Santana do Ipanema, este implantou 02 unidades do projeto do Instituto de Computação, além de agenciamento. Edificações: 02 pavimentos com salas de aulas e laboratórios e pequena parte administrativa.	
2021	NUPAQBIO (Maceió)	1391 m² (Reforma)	R$ 663.867,12	Reforma e ajustes de obra inacabada dos Laboratórios de Quimica licitada em 2016 e retomada pela equipe da Sinfra Inicialmente o projeto foi desenvolvido por professor arquiteto fora do quadro da Sinfra. Edificação Térrea de laboratório de quimica.	
	Farmácia Escola (Maceió)	147 m² (Reforma e Ampliação)	R$ 532.825,69	Edificação para abrigar a Farmácia Escola. Projeto desenvolvido em 2010 sobre área existente e inutilizada do Campus, sendo necessária sua ampliação em 67m². Licitada em 2021.	
2022	Reforma e ajuste do Bloco de Licenciaturas (Arapiraca)	1633 m²	R$ 3.014.065,13	Projeto de 2014 que fora abandonado, é retomado com inclusão de agenciamento, ampliação e ajustes de acessibilidade e novos usos.	
2023	Centro de Música (Maceió)	1300 m² (estimativa)	Sem orçamento	Projeto em desenvolvimento, one será implantado o curso de música. Estimativa de área 1300 m	Em desenvolvimento. Não licitado

In the figure presented, the great variety in the typologies of projects developed is remarkable, which translates an enormous dynamic of knowledge that encompasses several areas of architecture. These projects required a huge amount of technical knowledge on the part of the

team. The projects presented show buildings of health laboratories, chemistry laboratories and sports complex, in Olympic standard.

It was possible to perceive the need for reuse of two specific projects: the Institute of Computing, tendered in 2011, and the pharmacy laboratories project (ENSENFAR) tendered in 2013. This was due to the fact that architectural projects can only be bid with the other bidding pieces that make up the basic project, namely: complementary engineering projects, budget, preliminary technical studies, risk maps and terms of reference. Since Ufal did not have enough engineers in its technical staff to prepare complementary projects, it was necessary to reuse this project, with due changes, so that the works could take place in a timely manner.

The useful areas of the projects are very varied, from small areas of renovation and expansion, such as the school pharmacy, to gigantic areas such as the sports complex. These projects, in particular, required a lot of study due to their specificities.

The project of the sports complex was developed in 3 months, during this period the studies and architectural projects were carried out at the same time. As the area to be designed was large, it was necessary to divide the equipment to be designed among the architects. Thus, it was possible to deepen the technical knowledge of a specific sports equipment that contained its precise normative requirements, which, if not established within the project, could make its certification unfeasible.

The school pharmacy followed the same path as the Complex, where the non-precise insertion of the regulations could cause harm to users and make it impossible to operate authorization before Anvisa.

As for the aesthetic development of the projects, the team has to follow project definitions that, after being executed, can allow the proper maintenance of the buildings, this factor being one of the requirements of design restriction, in addition to the standards and resources, which prevent greater boldness in the use of more innovative materials, or of higher cost.

8 FINAL THOUGHTS

Based on the analyses carried out, it can be concluded that the design by the architects of Ufal has a deep interconnection with the technical requirements and these represent an important guiding factor of the projects. The technical work developed by the architectural team requires concentration, time, in-depth study of the project themes, leading the technical team to an exhaustive and sometimes very specific work. It can be an aspect that differs from professional architects in the market, who deal with private and commercial projects for the most part.

- Although it has not been mentioned as a restriction factor, it is known that the conditions for the execution of the maintenance of buildings by Ufal directly influence the definitions of finishes and construction techniques, being, therefore, a point to be investigated from the perspective of the hindrance of the projectual making.
- There is a need to update the team in relation to the design processes – BIM, equipment and other means that help in the design process. Although Decree No. 10,306 of April 2, 2020 determined that as of January 2021 the first phase of implementation in public projects would begin, universities were not linked to BIM dissemination actions, bringing difficulties in applying policies and investments in this regard. In the face of this. There is another struggle of the technical staff of these institutions to raise the awareness of managers about these needs. Therefore, it is possible to perceive the importance of investigating how these aspects can have repercussions on the elaboration of projects.
- There is a need for more in-depth studies that can more accurately assess the development conditions of the projects, the design parameters adopted, the restrictive factors and the university management policies that focus on infrastructure and planning issues and that directly influence the work of the technical engineering and architecture teams.

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