

Post-Occupancy Evaluation (POE) in a group of Fundação Oswaldo Cruz (Fiocruz) buildings

The case of Instituto Fernandes Figueira (IFF)¹

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Abstract

This article describes the Post-Occupancy Evaluation on Fiocruz buildings – a Brazilian institution that develops health science and technology –, focusing the Fernandes Figueira Hospital (a Fiocruz's unit) experience. The POE had the objective of identifying the main problems and pathologies of buildings analyzed, enabling Fiocruz to elaborate a building maintenance model, feeding back the project and infrastructural system, and reviewing the projects, methodologies and work parameters. Based on the ISO-6241, the work focused technical factors, including: attributes' check list to be analyzed; walkthrough analysis; collection and analysis of information; and discoveries report. Supported by the discoveries and the users' opinion, Fiocruz will be able to redefine the objectives for buildings in analysis, to elaborate procedures of utilization and maintenance of the buildings, to search more productivity and reduce the operational expenses, and to establish preventive and corrective maintenance.

Conference topic: Case study

Keywords: POE, ISO 6241, Fiocruz

JUSTIFICATION AND GENERAL PURPOSES OF FIOCRUZ'S POE

The Post-Occupancy Evaluation (POE) allows evaluating the performance of a building in use and can be elaborated through several parameters, according to specific aims.

In Fiocruz's case, the purpose was to supply information in order to review and elaborate maintenance plans, by the redefinition of the management guidelines for analyzed buildings; establishment of rules and procedures to building use and maintenance; creation of management plans for analyzed buildings; search of: higher productivity, lower production costs and better work conditions; and, finally, creation of corrective and preventive maintenance plans.

To reach these purposes, we did a classical POE, based on ISO-6241¹ norm and on the methodology applied by specialists like Preiser², Sanoff³ and Ornstein⁴.

SPECIFIC PURPOSES AND METHODOLOGY OF FIOCRUZ'S POE

The Fiocruz's POE's proposal was divided into three modules: Technical Evaluation, Opinion Research and Functional Evaluation.

Because of the urgent problems to be solved in analyzed buildings, the technical focus was emphasized. Through this focus, we intended to identify the main problems and pathologies of analyzed buildings, so as their causes

(project, building or use), in order to elaborate a building and maintenance planning for Fiocruz's buildings.

Technical Evaluation

Based on the norm and mentioned authors, we have created tools for the Technical Evaluation, in order to discover quantity and kind of items.

We used walkthrough procedure, pointing the main discoveries and advices. We also related the quantity, conformity and conditions of electric, hydraulic, sanitary, computer, telephone, special gases and fire installations, as well as coatings, doors and windows kinds and conditions.

Besides the data schedule for each analyzed room, we have produced graphic material, like photographs showing the main problems and technical drawings.

Opinion Research

Focusing specially the comfort and well-being, the Opinion Research intended to discover and compare users' opinions with walkthrough's and technical evaluation's discoveries.

We have created a questionnaire to evaluate users' satisfaction with the building and their working room. From the results, we calculated statistic data and added it to information obtained in informal interviews with the users, showing a kind of behavioral outline of analyzed buildings.

Functional Evaluation

¹ Publicado em *PLEA 2002 Design With Environment Proceedings*. Toulouse, France, 2002. CD-ROM.

This module purpose was to evaluate the performance of built environment according to their activities. We evaluated existent flows, layouts and ergonomic space aspects.

We have drawn the critical spaces' layouts and created comparative schedules among local situations and requests of ABNT⁵ and Brazil's Health Ministry.

CASE STUDY: IFF

IFF⁶ [1] is an institution that gives assistance, teaches and produces researches in the field of women and children health. We have chosen this unit to evaluate due to its demands on urgent spatial interventions.

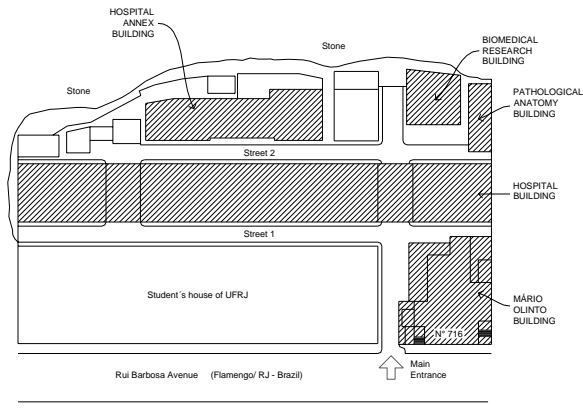


Figure 1. IFF Campus (Fiocruz), Flamengo, Brazil

Because of IFF's functional complexity, we also have proposed a relocation plan, based on valid norms and building needs.

This work, including local research, reports production and presentations, took six months (June to December, 2001).

Evaluation Methodology

- 1st stage: Local research of quantity, kind and possible defects of installations points; coating materials, doors and windows as well as their conditions; evaluation of environments' quality and conformity; technical drawing report.
- 2nd stage: Photographic report of the main identified problems in the first stage; users' questionnaires distribution; layouts drawing report.
- 3rd stage: Interview with some users.
- 4th stage: Production of the technical report, based on collected data, including environment presentation and critical problems description; environments' "discoveries and advices" report; statistic data and users' satisfaction level analysis for each building or floor; photographic report; architectural layout drawings, showing the technical collected data; comparative schedule between valid norms and local situation; and layout drawing of the most critical spaces.
- 5th stage: Final presentation and discussion seminary; evaluation discussion with the users; report reviewing; relocation plans production.

Summary of the guidelines for the campus

- There is only one access for vehicles, with no separation for cars, ambulances or trucks [2]. There are also inadequate flows of litters, incubators and bodies through internal streets. There are no organization or traffic signals to orient drivers and pedestrians, creating dangerous situations. It's necessary to create a hierarchy in the streets to avoid undesirable flows and dangerous situations.
- There are two different external pedestrian entrances, one for patients and other for servants [2]. At patients' entrance, the passage is not large enough for the entrance



Figure 2. IFF's front, pedestrians and vehicles accesses

and exit existing flows. The entrances have stairs, but not ramps. The floor coating is inadequate because it is polished. The roofs do not totally protect the stairs from the rain, so that the floor becomes slipping when it is wet. There are not ramps in the majority of internal accesses to buildings, which do not allow the entrance of physical deficient. The passage of wheel chairs is difficult because of the stone pavement and the gardens at sidewalks. Entrances and internal streets must be signalize and adapted to physical deficient free access.

- The cars usually park at the internal streets, making the maneuvers of service trucks difficult and blocking the sideways up, creating dangerous situations. The external parking is not large enough for the servants' vehicles. The parking at internal streets must be prohibited and another parking alternative must be created, outside the campus.
- The rainwater draining is inadequate in the whole campus. It causes, probably, some buildings' walls' infiltration. The external buildings' coatings are inadequate because they do not allow replacement and cleaning maintenance. The origin of some infiltrations is the difficulty of maintaining the coatings. The coatings need periodical maintenance. Otherwise, the best advice is to change all external coatings, in order to make maintenance easier and to give esthetic unity to the Institute.
- In hospital building, the apparent pipelines injure the coatings appearance and the esthetic of the building. The group of buildings does not have a typological unity. The water, sewerage and gases pipelines are justified by the maintenance facility. Otherwise, their conditions are so precarious that we can observe germination of plants and several leaks. The sewerage pipeline is not long enough, causing bad smell in internal environments. The institute's campus does not have sewer treatment, which is

CEDAE⁷'s responsibility. The elevated water tank does not have any gadget to save water. The toilet flushes spend a great water amount, which contributes to the high expenses with water account. All water and sewerage system is old. It would be interesting if there was a planning on water and energy rationalization. There must be a hospital and laboratorial sewerage treatment and a periodical maintenance in the external pipelines.

- The final advice for the hospital building is the creation of a strategic interdisciplinary planning, in order to orient buildings and civil maintenance generally and not punctually as we can observe nowadays.

General summary of the guidelines for hospital building [3]

In the five floors of hospital building there are 397 rooms of Pediatric, Gynecologic and Obstetric departments and their concerning support areas, restaurants and audiences.

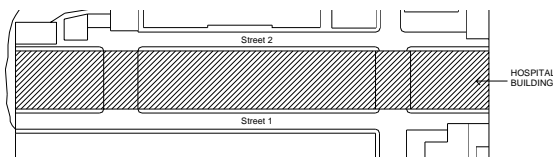


Figure 3. Hospital building

The most critical problems of the hospital building, reported by the technical evaluation team are:

- Infiltrations caused by rainwater in the external walls, inflamed by the wrong installation of parapets. We advice verifying the parapets installation and protecting the walls' surfaces with waterproof material. The internal walls must be recovered and painted again.
- Inadequate coatings. We advice changing the existing coatings for easy materials to maintain, with better durability and esthetic results, indicated by valid norms.
- Leaks in water and sewerage systems. We advice verifying all system and repairing the existent leaks.
- There is no humanization in assistance environments in general. We advice using colors, figures and exploring landscapes and pleasant views at sick rooms.
- Single passages in hospital areas, without separation of clean, dirty and restrict flows. These passages do not obey the minimal dimensions required according to the Health Ministry norm. They are also frequently used as waiting rooms, pantries or deposits. We advice elaborating a relocation plan to minimize the flow problems and creating different passages, deposits and adequate waiting rooms.
- The building is inadequate to the security norms, there is no bio-security signals or emergency exits, there are also no fire detection gadgets and ramps. We advice creating a signalization planning, including bio-security and fire security signals, installation of fire detection gadgets and building of external ramps, with adequate inclination to physical deficient.
- Critical conditions of coating materials. At internal environments, almost all the walls have marks and painting peelings. The floors' coatings are also damaged. We advice installing protection pieces in walls and edges and changing the existing coatings to adequate materials to maintenance and cleaning procedures.

According to the users, the critical problems of hospital building are: physical deficient accessibility; number of bathrooms; internal signalization; fire security; security against strangers and coatings quality.

Summary of the guidelines for Pathological Anatomy building [4]

The three floors and 22 rooms of this building are occupied by the Pathological Anatomy service.

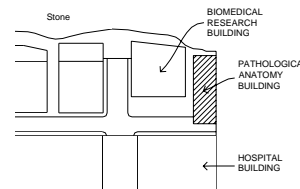


Figure 4. Pathological Anatomy building

The most critical problems of this building are:

- Intense smell of chemical products used in exams, inflamed by the deficient ventilation and exhaustion system. We advice installing an exhaustion and air filtering system in the building.
- Deficient natural and artificial illumination and ventilation, because of the position of the building in the campus. Illumination is damaged also because of the large amount of damaged lamps. We advice installing new light points and a refreshing and air filtering systems.
- Inadequate layout because of the inadequate storage of working material. We advice removing the material to an adequate room.
- Inadequate or damaged coating conditions. The coatings have marks, spots and chinks. We advice searching for chinks' and infiltrations' causes, studying the need of a structural project or pipelines substitution. Repaired these problems, the roofs and walls must be painted.
- Electric, telephone and computer cables in rooms are not well fixed. We advice installing adequate cables to fix these spinning.

According to the users, the critical problems of this building are: physical deficient accessibility; internal appearance; internal signalization; fire security; internal temperature and coatings quality.

Summary of the guidelines for Biomedical Research building[5]

In this building there are two floors and 17 rooms with laboratories that produces researches and exams in Pediatrics, Gynecology and Obstetrics.

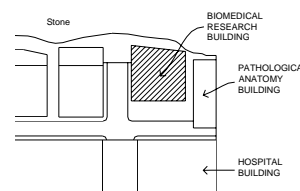


Figure 5. Biomedical Research building

The most critical problems in this building are:

- The laboratories do not obey the bio-security norms. We advice changing the existing coating to adequate materials

and installing security signals and equipments. There must be a sensible bio-security evaluation.

- Apparent infiltration signals (bubbles and spots) in roofs and walls. We advice searching the infiltration causes and applying waterproof protection in roof's flag.
- Other identified problems: damaged lamps, few sockets, and deficient ventilation. We advice changing damaged lamps, installing new sockets and a refreshing system.

According to the users, the critical problems of hospital building are: physical deficient accessibility; rooms' size; rooms' layout; fire security; security against accidents and strangers, tightness.

Summary of the guidelines for Hospital Annex Building[6]

The Hospital Annex Building has three floors and 90 rooms, where are the storeroom, the clothroom, administrative rooms, pharmacy and other assistance departments (physiotherapy, neurology).

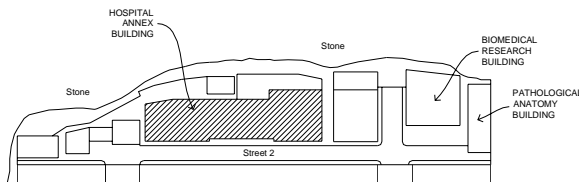


Figure 6. Hospital Annex Building

The most critical problems of hospital annex building are:

- The assistance rooms do not have enough space and are not soundproof. We advice the redistribution of activities in the building and the installation of acoustic coatings in these rooms.
- The access ramp is very sloping and inadequate for physical deficient. We advice installing an elevator for patients and servants.
- The electric, telephone and computer cables are not well fixed in many rooms. We advice fixing these cables in appropriate pipes.
- There are not sockets enough; damaged sockets; damaged windows and inadequate extinguishers. We advice installing more sockets, changing damaged sockets and windows and the inadequate extinguishers, according to the Fire Guard Norms. We also strongly recommend installing emergency sinalization.

In the users' opinion, the most critical problems in this building are: fire security, physical deficient accessibilty, internal sinalization, rooms' size and security against strangers in the rooms.

There must be great spatial interventions to adequate this building to the existing activities. So, we advice a relocation planning for the assistance departments, taking in consideration the hospital building's spaces.

Summary of the guidelines for Mário Olinto building [7]

The Mário Olinto building is the administrative building of IFF. There are Administrative Rooms, the Teaching Department, the Library, the Nursery, the Statistics Department and the Human Milk Bank. The building has six floors and 104 rooms.

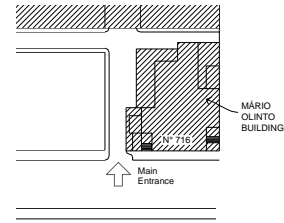


Figure 7. Mário Olinto Building

The most critical problems in this building are:

- The spatial structure of this building is not adequate to its several activities. We advice a relocation planning for the whole Institute, including this building, in order to adequate the activities to their spaces.
- There are many damaged lamps, which causes a deficient illumination. We advice changing all damaged lamps.
- The air-conditioned machines are not correctly installed. We advice reinstalling the machines, using aluminium sections and silicone to stop up the holes.
- Many sockets and switches without caps, with their wires apparent, causing dangerous situations. We advice installing caps to isolate these wires in the sockets and switches.
- Damaged walls, with paint peeling and marks caused by the furniture. We advice recovering, painting and installing protection pieces in the walls and edges.
- Damaged doors and baseboards, with paint peeling and marks. We advice painting these items.
- Tangled and non-fixed wires, without adequate isolation. We advice installig adequate pipes to fix these cables in the baseboards.

In the users' opinion, the most critical points in this building are:accessibility to physical deficient, internal sinalization, number of water points, number of gases points, number and localization of other infrastructural points.

CONCLUSION

The IFF's POE allowed us to define some guidelines for future projects, buildings and maintenance actions in that campus. One of these guidelines is the need to create a General Plan for the campus, including the need of relocation and resizing areas, in order to solve dimension and conformity problems in existent spaces. We must consider, in the occasion of spatial relocation, the centralization of some activities, to make the most of the existent spaces.

The creation of a Civil Maintenance Plan, jointed to an Equipment Maintenance Plan is also extremely important to reach the objective to maintain health assistance quality, with the minimal interruption in the services.

IFF's POE's team was:

Ana Claudia Penna & Leonardo Lacerda: architects (Fiocruz)

Jorge Castro: architect (Fiocruz), Dsc., Professor at Fluminense Federal University (UFF)
 Paulo Afonso Rheingantz: architect, Dsc. Professor at Federal University of Rio de Janeiro (UFRJ)
 Helena Rodrigues & Isabelle Soares: Architecture students (UFF) and trainees (Fiocruz)
 Aline Fayer, Jackeline Rodrigues, Jonas Victorino, Júlio César Dias, Lediane Rodrigues, Lucianna Nascimento, Rafael Assis, Talita Mattos & Thatiane Castellani: Technicians trainees (Fiocruz)

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⁴ ORNSTEIN, S.; ROMÉRO, M. *Avaliação Pós-Ocupação do Ambiente Construído*. São Paulo: Nobel, 1992.

⁵ Technical Norms Brazilian Association

⁶ Fernandes Figueira Institute

⁷ Water and Sewerage State Company of Rio de Janeiro

¹INTERNATIONAL ORGANIZATION FOR STANDARDIZATION. ISO 6241 – performance Standards in building – principles for their preparation and factors to be considered. Switzerland, 1984.

² PREISER *et al.* *Post-Occupancy Evaluation*. Nova Iorque: Van Nostrand Reinhold, 1988.

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