Introduction

Is it chilly in here or is it just me?” While the performance of a building is frequently reflected in informal comments like this or, sometimes, complaints from building occupants, more formal methods of evaluating building performance can be extremely beneficial. Although the term is not universally embraced, the process of evaluating a building’s performance is generally known as Post Occupancy Evaluation (POE). There is no industry accepted name or definition for such an evaluation. Commonly used terms include environmental design audits, building-in-use evaluations, post-occupancy assessment, facility assessment, and building performance evaluations. Despite the lack of a single definition, many industry professionals agree that there are potential benefits to implementing a formal POE process.

Potential POE benefits include discoveries that can improve a building’s performance over time, avoid repeated errors by the design team, and encourage better communication among owners, facility managers, and occupants. These benefits are realized through a range of activities which fall into two main categories: 1) precise cost-accounting of systems including technical measurements of building performance; and, 2) comprehensive surveys of building occupants. These two categories can influence one another significantly. For example, incorrect set points on a building control system could lead to occupant discomfort.

Cost Accounting and Technical Performance Measurement

In comparison to most technical evaluations, such as commissioning, post occupancy evaluations are less focused on costs and mechanical systems and put more emphasis on organizational changes and human needs. However,
there are several technical parameters that may be measured as part of a POE including temperature, relative humidity, air movement, light intensity, indoor air quality, carbon monoxide, and radiation. The results from these measurements can prompt changes in building systems, from minor adjustments to major retrofits.

In addition, results of the occupancy surveys can prompt further investigation into specific physical systems. For example, a large number of complaints regarding air flow in the building may invoke a concentrated study of the air movement in the building. Generally, survey results are used to change thermostat set points, controls, and air volumes.

**Comprehensive Surveys of Building Occupants**

Successful surveys depend largely on two elements: a representative set of collected data and the accuracy of that data. By following a set of guidelines in designing and implementing the survey, the study can more closely reflect and describe actual conditions. Conducting an effective occupant survey necessitates a fair and informed framework of questions. According to the UC Berkeley Survey Research Center, effective surveys share certain characteristics:

- Survey questions should be easy to understand and not contain obvious bias toward particular answers.
- The tone and context of the survey needs to hold the respondent’s interest and be presented in a convenient form.
- The method of survey delivery allows answers and data to be easily recorded and processed.
- If the survey is administered to a subset of a population, that subset should be representative of the entire population. For example, if you want to collect information from occupants in a building, make sure to survey individuals from every occupied floor in the building.

Surveys should be as straightforward as possible. This begins with the title of the survey, which should quickly inform the respondent of the subject matter and the approximate length of time to take the survey. The questions should also be no longer than they need to be and the answer choices should contain the full range of responses. The Likert scale, for example, is characterized by a set range of responses that assign quantitative value to qualitative data. Likert scale-type questions are particularly useful in building occupant surveys to help collect respondents’ experience in terms of data that can be easily processed and analyzed. However, while it is often advantageous to be able to quantify and codify responses, a blank response field will sometimes yield crucial new information. A combination of the above survey characteristics should be specially applied to each building circumstance.

**Strategies for Overcoming POE Challenges**

The New Buildings Institute released a report in 2005, “A Market-Friendly Post-Occupancy Evaluation: Building Performance Report.” The authors assert that developing and executing a comprehensive, thoughtful post occupancy evaluation is key to the success of the building performance assessment. NBI concluded that one of the reasons POE has not had widespread acceptance is that it lacks a clear, universal protocol. The Building Performance Report (BPR) presented by the New Buildings Institute is one example of such a protocol.

The BPR is a multi-level method for conducting building evaluation after occupancy. The three levels are: performance review, diagnostics, and guidance or services. The performance review consists of a building occupant survey and a review of energy and water bills. In the next step – diagnostics – more specific

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**Figure 2 - Sample Survey Results Chart**

This chart represents some of the potential categories of occupant survey questions and their corresponding results.

Phillip Merrill Center Building, Center for the Built Environment (CBE), UC Berkeley

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evaluations are carried out related to any issues that were revealed in the performance review. Finally, the findings of these evaluations are translated into the necessary actions to correct or alleviate problems.

POE is only beneficial if the information collected from the occupants is followed by an appropriate reaction from building operations management and the problems are addressed or remedied. If this commitment is presented as part of the survey, more occupants are willing to participate, and more complete and beneficial results may be achieved.

Specific strategies for overcoming challenges facing the widespread adoption of POE include the following:

**Funding**

- **Challenge:** The cost of a POE varies and the funding for it may or may not be planned for in the design or operations budget.

- **Strategy:** Start with a general, low-cost evaluation. This could reveal that the building does not have significant problems and may circumvent the need for further, more cost intensive post occupancy evaluation.

**Interest**

- **Challenge:** The value of POE may or may not be evident or seem pertinent to the property manager or owner, depending largely on when the idea is introduced.

- **Strategy:** Discuss POE early. Highlighting the benefits of POE and planning for it at the beginning of the project can greatly increase the likelihood of the evaluation’s execution and success.

**Technical and Logistical Skills**

- **Challenge:** The skill set required to perform a POE is diverse and technical. It may be challenging to find one individual with the necessary skills to perform all the tasks of the POE.

- **Strategy:** Gather a team. A team effort is the best solution for a successful POE because a combination of techniques is often used to achieve a comprehensive evaluation.

**Professional Territory**

- **Challenge:** Some data collected from the POE could be perceived and consistency and formalization of POE is inevitable.” They argue that POE integrates stakeholders, building disciplines, research traditions, and the building life cycle in numerous complex and beneficial ways. In particular, the importance of the life cycle assessment of a building will demand POE as a critical part of the building process as we move toward an increasingly sustainable built environment.

It remains unclear whether the increasingly stringent environmental measures of sustainable buildings may have deleterious impact on building occupants. From recent case studies on green buildings, POE may be able to identify such problems with design features as well as highlight the satisfaction enjoyed by building occupants. As the building industry strives to meet greater sustainable goals, POE may receive greater consideration as a standard part of building practice.
Occupant satisfaction was studied over a range of characteristics: air quality, cleanliness, thermal satisfaction, acoustic satisfaction, and lighting. The subject buildings showed, on average, 27% higher occupant satisfaction than the national average. Attributes that drove some of the lower occupant satisfaction scores were poor acoustics, excessive ambient noise, bad lighting, and persistent maintenance problems. As a result, the POE authors suggested that the GSA give greater attention to acoustical design in future projects.

**Twelve GSA Buildings - Case Study of POE**

The General Services Administration (GSA) undertook POE reviews of twelve sustainably designed buildings, eight of which were LEED certified. The POE concluded that measured operating and maintenance (O&M) costs were only 7% below the national average for the non-LEED certified buildings. In contrast, the two LEED Gold buildings had significantly lower O&M costs. This suggests that O&M savings cannot be driven solely by system efficiencies, but must also be promoted through consistent post-occupancy O&M sustainability practices. Overall, the twelve buildings consumed 15% less energy per square foot than the national average.

**Training Highlights**

California utilities offer outstanding educational opportunities that focus on the design, construction and operation of energy-efficient buildings. Listed here are a few of the many upcoming classes and events; for complete schedules, visit each utility’s website.

**Operating Your Facility with an Eye Toward Energy Conservation and Sustainable Operations**

Facility operators are intimately connected to the energy and resource consumption patterns in their facilities. This class is intended to provide facility operators with some of the tools they need to ensure more efficient operating strategies and to provide them with examples of ways to use these tools to begin to identify and capture savings. PEC. May 18, 8:30am – 4:30pm. San Francisco. [http://www.pge.com/mybusiness/edusafety/training/pec/classes/](http://www.pge.com/mybusiness/edusafety/training/pec/classes/)

**Transform: Turn Existing Buildings “Green”**

Owners and operators of existing buildings can improve their property’s energy performance and make a true claim to “sustainability” by attending this workshop. Receive an overview of operations and maintenance (O&M) techniques for transforming existing buildings into greener facilities. SCE. May 26, 8:30am – 12:30pm. Edison AGTAC, Tulare. [http://www.sce.com/ECR/](http://www.sce.com/ECR/)

**RCx 101: Identifying and Assessing Common Retro-commissioning Opportunities**

This class will focus on practical tools and techniques that can be used to identify and assess retrocommissioning opportunities in existing buildings. These techniques can also be applied to troubleshooting during new construction commissioning and day-to-day operations. PEC. May 20, 8:30am – 4:30pm. San Francisco. [http://www.pge.com/mybusiness/edusafety/training/pec/classes/](http://www.pge.com/mybusiness/edusafety/training/pec/classes/)