Chapter 1
From Linear Delivery Process to Life Cycle Phases: The Validity of the Concept of Building Performance Evaluation

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1.1 Transcending the Meaning and Boundaries of POE

1.1.1 The Evolution of POE

The idea

The first precursors to post-occupancy evaluation (POE) started in the US with studies of dormitories in the late 1960s. Van der Ryn and Silverstein (1967) carried out case study evaluations of dormitories at the University of California, Berkley, while Hsia (1967) was doing the same at the University of Utah. At the time, they were not called post-occupancy evaluations, but they were attempts at assessing building performance from the building users' point of view (Connell and Ostrander 1976a). Wolfgang Preiser, first editor and author, was inspired by Van der Ryn and Hsia and developed his Master's thesis on evaluating dormitory performance at Virginia Tech (Preiser 1969). He used political science rating scales, with error rates of 3–5%, to create specific quality profiles of the three different housing types, as seen by the students.

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The term

The term 'post-occupancy evaluation' was used in a publication, for the first time in the *AIA Journal* issued in January 1975. Herb McLaughlin, author of that article, with a team of consultants performed POEs on hospitals in both Utah and California. At this point, information and studies were being mentioned in publications, but were also becoming in-house tools for designers and design firms (McLaughlin 1997). Table 1.1 gives a summary of milestones in the evolution of POE.

Table 1.1 Milestones in the evolution of POE and BPE

Year	Author(s)	Building type (s)	Contribution to the field
1967	Van der Ryn and Silverstein	Student dormitories	Environmental analysis; concept and methods
1968	Manning	Offices and schools	Comprehensive building appraisal
1968	Sanoff	Any facility type	"Evaluation Techniques for Designers"—first monograph on POE
1969	Preiser	Student dormitories	Environmental performance profiles; correlation of subjective and objective performance measures
1971	Field et al.	Hospital	Multi-method approach to data collection
1972	Markus et al.	Any facility type	Cost-based building performance evaluation model
1974	Becker	Public housing	Cross-sectional comparative approach to data collection and analysis
1975	General Services Administration (GSA)	US Courts Design Guide	Office system performance standards
1975	McLaughlin	Hospitals	"Evaluation of Hospitals"—first article published on POE
1975	Veterans Administration	Veterans Hospitals	POE of the Veterans Administration Hospital in San Diego
1976	U.S. Army Corps of Engineers	Military facilities	Design guide series with updatable, state-of-the-art criteria
1976	Goodrich	Public square	Observational POE methodology
1976	Connell and Ostrander	Government facilities	POEs of postal and enlisted housing
1978	Bechtel and Srivastava	Housing	Comprehensive review of POEs of housing
1979	Public works—Canada	Government facilities	POE incorporated into project delivery system
1980	Daish et al.	Military facilities	POE process guidelines
1980	Marans	Offices	Evaluation model linking perceptual and objective attributes
1981	Palmer	Any facility type	Programming linked to POE methodology
1982	Parshall and Pena	Any facility type	Simplified and standardized evaluation methodology for practitioners

(continued)

Table 1.1 (continued)

Year	Author(s)	Building type (s)	Contribution to the field
1983	Duffy and Chandor	Offices	Orbit 1: Systems design standards
1984	Brill et al.	Offices	Linking worker productivity and office design
1985	Davis et al.	Offices	Orbit 2: rating process on organizations, buildings and information technology
1987	Building Research Board	Any facility type	"POE practices in the building process"
1988	Preiser, Rabinowitz and White	Any facility type	"Post-Occupancy Evaluation"—first book on POE Methodology
1989	Farbstein	U.S. Postal Service	POE and organizational development
1989	Preiser	Any facility type	"Building Evaluation"—POE case studies from around the world
1992	Sanoff	Any facility type	Integrating programming, POE and user participation in design
1996	Baird et al.	Any facility type	"Building Evaluation Techniques"—first comprehensive methods book
1997	Preiser and Schramm	Any facility type	"Building Performance Evaluation"—conceptual BPE framework
2001	Federal Facilities Council	Any facility type	"Learning From Our Buildings"—Federal POE/BPE overview
2001	National Clearinghouse	Educational facilities	Feedback-based design standards for schools
2003	NCARB	Any facility type	"Improving Building Performance"—a study guide for architects
2005	Szigeti and Davis	Any facility type	Performance based building
2005	Preiser and Vischer	Any facility type	"Assessing Building Performance"—global BPE book
2006	Zeisel	Any facility type	Example POE—The Jerusalem Center for multi-handicapped visually impaired children
2007	Nasar, Preiser and Fisher	Any facility type	"Designing for designers: lessons learned from schools of architecture"
2007	Hartman	Any facility type	"Measuring a buildings success"—an article reviewing the potentials and fears of POEs for building designers
2008	Gonchar	Any facility type	"Looking back and moving forward"
2009	OECD	Educational facilities	First coordinated European effort
2009	Ireland	Any facility type	Importance of collaboration and building analysis—examples using information about LEED and intelligent building design
2010	Spataru	EON Research House	Research on 'Creative Energy Homes'

(continued)

Table 1.1 (continued)

Year	Author(s)	Building type (s)	Contribution to the field
2011	Borg	Any facility type	"A Dossier on Post-Occupancy Evaluation"
2012	Mallory-Hill, Preiser and Watson	Any facility type	"Enhancing Building Performance": State-of-the-art book on BPE process model, methodology and case studies
2012	Kampschroer	US Federal Buildings	Building requirements and evaluations for Federal Buildings
2012	Lenoir, Baird and Garde	Educational Facility	How to achieve thermal comfort through the use and efficiency of the ENERPOS building in La Reunion
2012	Newton et al.	Educational Facilities	Australia's "Building the Education Revolution"—template designs critiqued by an interdisciplinary team in POEs reviewing pedagogy, sustainability and life-cycle analysis
2014	Vischer and Malkoski	Workspace, Office	How and why certain work environments work for employees and their employers
2015	Preiser et al.	Any facility type	"Architecture Beyond Criticism": The paradigms of architectural criticism and performance evaluation and how they complement each other to give an overall result of how the building is used, observed, and appreciated
2015	Park	Any facility type	Concept and importance of using and understanding humans as sensors within the built environment
2015	Elzeyadi	Schools	"A Green Lesson: Measuring the Impacts of LEED Certification Credits on People, Planet, and Profit of K-12 Schools"
2017	NCARB	Any facility type	"Improving Building Performance"—a study guide for architects
2017	Fay et al.	Healthcare	Study of how a POE can be brought to actionary items through the use of charrettes

The methodology

Also in the late 1970s, the AIA Research Corporation commissioned a methodological review of POE techniques (Connell and Ostrander 1976b). And by the late 1980s, POEs were being carried out around the World, including the UK, Canada, New Zealand, Australia, and the US. At this time, public works projects, government buildings, airports, and other similar facility types were the main focus of POE studies. In the mid-1980s, the methodology of POE expanded when the National Academy of Sciences (Building Research Board 1987) established a committee to review the possible improvements within the practices of programming, POE, and database development.

Framework
The first books published on POE included *Post-Occupancy Evaluation* in 1988 by Preiser, Rabinowitz, and White and *Building Performance*, the predecessor of this present volume, in 1989 by Preiser. Both titles were considered as companion volumes: while the first book provided the framework and structure for completing an evaluation of a building, e.g., measurement techniques for the evaluation of the quality of the facility, the other one complemented the theoretical fundamentals with case studies from around the world.

Research, methodologies, and framework of POEs continue to evolve. POEs are one step, on the larger scale of building performance evaluation (BPE), in understanding how buildings function after they are occupied. This resource helps architects, building owners, and facility managers understand the implications and reactions to the facilities that they designed, built and/or commissioned. By considering the whole process from conception to future uses of the building, there can be a more holistic approach to the planning, programming, design, construction, occupancy, and future adaptability of the structure (see Fig. 1.1).

1.1.2 Holistic Thinking: The Building Life Cycle

Traditionally, building delivery was—and in parts of the building industry still is—considered as a linear process. For many architects, for example, the design of a building marks the beginning of a project and the hand-over of keys signifies the end. This perspective emphasizes the planning and construction of a facility with the product in mind, but omits the occupancy and future re-use phases. In reality,

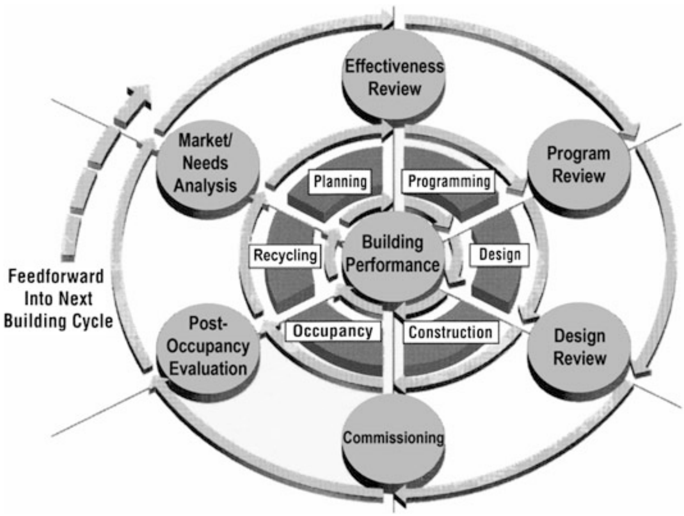

Fig. 1.1 Building performance evaluation (BPE) process model. *Source*: Authors

the client wants a building to be built in order to get a problem solved within their organization. They look forward to using the building for the given purpose. Therefore, from the client's perspective, the opening of a building does not mark the end of the process where the building's success can be determined. It is rather the starting point of building use, the longest period of time within a building's life cycle. So, compliance with construction cost limits and building time frames are only preliminary criteria to characterize its success. Although running costs, functionality, or user satisfaction and well-being are some other important factors to be considered when buildings are evaluated, for example in form of POEs. With a POE, important feedback is received about the building's strengths and weaknesses during occupancy allowing improvement in view of performance and quality. Finally, holistic thinking also includes a reflection about a building's re-use, transformation into a different building type, or even its potential future demolition. With this holistic perspective in mind, building life cycle developed consisting of six phases, covering all possible stages of a building's life: strategic planning, programming, design, construction, occupancy, and finally, adaptive re-use/recycling. Each of these phases is an indispensable component of the life cycle and has to be considered in a circular arrangement. Moreover, in order to get the complete picture, the evaluative stance, already implemented in form of POE in the phase of occupancy, was expanded to the other five phases as well with the goal to improve continuously the quality of buildings. While pre-design planning (Hershberger and Smith 2017), design, and building management all contribute to an economical and efficient building, 'feedforward' may be the more important, and unfortunately overlooked, step of BPE. By generating databases or allowing others to use your findings, the process of designing a building, similar to that of what has already been built and studied, will greatly help all steps of BPE, i.e., planning, programming, design, construction, and building management. Feeding forward information and knowledge helps to streamline all stages of building design and management, including avoiding costly mistakes. It is evident that BPE transcends the meaning and conventional boundaries of POE by focusing on evaluation throughout the building life cycle. This concept is discussed in several chapters throughout this book.

1.2 The BPE Process Model

1.2.1 Life Cycle Phases and Review Loops

BPE grew out of POE. Rather than focus solely on the phase of building occupancy, the process model for BPE takes into consideration performance evaluation over the entire life cycle of buildings. The phases, feedback loops, elements, and levels of BPE were introduced for the first time by Preiser and Schramm (1997). The model evolved over the years and the potential and benefits of applying BPE over the lifetime of a building is now discussed and researched regularly (Preiser and Schramm 2005, 2012; Preiser and Hardy 2015). This section summarizes the six phases and the respective internal feedback loops of BPE:

- Phase I: Strategic Planning—Effectiveness Review
- Phase II: Programming—Program Review
- Phase III: Design—Design Review
- Phase IV: Construction—Commissioning
- Phase V: Occupancy—Post-Occupancy Evaluation
- Phase VI: Re-use/Recycling—Market/Needs Analysis (see Fig. 1.1).

Phase I—Strategic Planning
The starting point of the building life cycle is the strategic plan, which establishes medium- and long-term needs of an organization through market/needs analysis, and, in turn, is based on mission and goals, as well as facility audits. If, for example, the statement, 'being close to the customer' is part of global organization's mission, the market for its products has to be analyzed in order to identify possible locations for regional headquarters or subsidiaries.

Feedback Loop I—Effectiveness Review
Outcomes of strategic planning are reviewed in terms of their effectiveness, relating to the specific 'big issue' categories of a given organization that match its mission and goals, such as corporate symbolism and image, visibility, innovative technology, flexibility and adaptive re-use, initial capital cost, operating and maintenance cost, and costs of replacement and recycling. Described by Schramm (2005), a possible outcome of Phase I and its feedback loop is the fact that a building may not be required at all.

Phase II—Programming
Once strategic planning, cost estimating and budgeting has occurred, a building project is a reality and programming can begin. Over the past 40 years, programming has become a required step in building delivery. It is outlined in the standard American Institute of Architects (AIA) Handbook (2013), is part of the Royal Institute of British Architects' (RIBA) 'Plan of Work' (2013), and described by the German Institute of Standardization (Deutsches Institut für Normung, DIN) in the new DIN 18205 'Brief for Building Design' (2016). A building program or brief documents outline the client's needs, aims, resources, and context for the project. Programming takes place between key stakeholders, including representatives of future building occupants in consultation with building specialists.

Feedback Loop II—Program Review
At the end of this phase, program review involves the client, the programmer, and representatives of occupant groups. This allows the project participants to reflect on the program document containing performance criteria and other outcomes of strategic planning. The review process allows the program to be evaluated step-by-step and to be modified in response to requirements or new priorities, which

might have emerged as part of the planning and programming process (Marmot et al. 2005).

Phase III—Design

This phase includes schematic design, design development, and construction documents. In the design process, schematic design is the initial phase of building design, during which a range of alternative solutions are developed, translating the programming parameters into one or more broad-brush building solutions. Design development is the second stage of building design, wherein one of the alternatives is chosen and elaborated on in order to address the program in more detail. Finally, construction contract documents are produced for the selected design.

Feedback Loop III—Design Review

The design phase has evaluative loops in the form of design review, or 'troubleshooting', involving the architect, the programmer, and client and/or user representative(s). The development of computer-aided design (CAD) techniques and building information modeling (BIM) makes it possible to evaluate solutions during the earliest phases of design. This allows designers to consider the effects of design decisions from various perspectives, while it is still not too late to make modifications. The goals of the organization, as well as its specific program requirements, provide evaluation criteria against which the programmer, client, and users can judge the building design as it develops. In areas where the design fails to meet program requirements, the client decides if the relevant program parameters, such as budget or functionality, need to be modified. Program tracking is therefore essential in order for subsequent, program-based design review to be realistic, useful, and effective (Vischer 2005).

Phase IV—Construction

Once design review has occurred with satisfactory outcomes, building construction can begin. The program, working drawings, and written construction documents are all part of the building contract, and they describe the expected performance of the future building in detail. In this phase, construction managers and architects share in construction administration and quality control to assure contractual compliance. In addition, national standards and codes, as well as local regulations need to be met, including quality standards or safety regulations. Failure to complete the previous phases can result in unforeseen change orders during construction, as some new requirement is identified or budgetary constraints imposed. Responding to change orders can substantially alter the cost of building construction.

Feedback Loop IV—Commissioning

At the end of the construction phase, inspections take place, which result in 'punch lists'; that is, items that need to be completed prior to acceptance and occupancy of the building by the client. As a formal and systematic review process, this loop is intended to insure that owners' expectations, as well as obligatory standards and norms, are met in the constructed building. This feedback loop is a 'reality check': it ensures that the builder fulfils his contract and that specific building performance criteria are made explicit, as well as compliance with relevant standards and norms is achieved (Holtz 2005). This process is specifically important for the building user or owner with smart buildings (see Sect. 1.3.3) to ensure that the facilities manager is properly informed on how to operate integrative and ‘smart’ building systems.

Phase V—Occupancy

In temporal terms, this phase is the longest of all those described. In fact, most analytic approaches to building delivery end at move-in. However, the BPE approach, with its reliance on feedback and evaluation, maintains a long-term perspective by including the period of occupancy in order to improve the quality of decisions made during earlier phases. While the earlier sub-phases normally last a couple of months, occupancy may last 10—50 years, depending on building type. To occupy a building is the original goal of a client when they decide on a building project. Although strategic planning, facility programming, and design are important phases in the quest to realize a building, it is only at move-in that the client obtains the architectural solution to the initial problem.

Feedback Loop V—Post-Occupancy Evaluation

During this phase, BPE is activated in the form of POEs that provide feedback on what works in the facility and what needs improvement. POEs also test some of the hypotheses behind key decisions made in the programming and design phases. Alternatively, POE results can be used to identify issues and problems in the performance of occupied buildings and to identify ways to solve these. Moreover, POEs are ideally carried out at regular intervals, that is, in 2- to 5-year cycles, especially in organizations with repetitive building programs, such as school districts and federal government agencies (Bordass and Leaman 2005).

Phase VI—Adaptive Re-use/Recycling

In many cases, recycling buildings for similar or quite different uses towards the end of their useful life has become quite common: warehouse lofts are often converted to artists’ studios and apartments, and railway stations transformed into shopping centers, museums, and other functions of various kinds, for example. Such major use changes are as dramatic as constructing a new building. Even if building use does not change, building interiors are changing constantly throughout the lifetime of a building. The question of how well a building adapts and can be recycled is very important, not only in the sense of sustainable building practices, but also in the sense of adaptation to new uses (Preiser et al. 2017). The end of this phase constitutes the end of the useful life of a building, e.g., when the building is decommissioned, re-used, or demolished. In cases where construction and demolition waste reduction practices are in place, building materials with potential for re-use will be sorted and recycled into new products, and hazardous materials removed.

Feedback Loop VI—Market/Needs Analysis

This loop involves evaluating the market for the building type in question in terms of a prospective client organization’s needs. It can mean assessing the rehabilitation potential of an abandoned or stripped-down building shell, or the potential of a prospective site in terms of future needs. Thus, in the BPE process model, the end point of this evolutionary cycle is also the beginning point of the next building life cycle.

1.2.2 The Performance Concept: Addressing Fitness for Use

As pointed out before, 'design' and 'construction' are important phases located between 'programming' and 'occupancy'. With their design, the architect gives an architectural solution to the problem analyzed during programming. Then, construction is the three-dimensional implementation of the architectural solution into a physical object. This object has to provide everything the client and users are looking for: its performance must be right!

The 'performance concept', focusing especially on the building industry, is the basis for the BPE process model. It evolved in the 1960s (Eberhard 1965), and became topic of the brand new international standard ISO 19208 *Framework for Specifying Performance in Buildings* (ISO 2016): "Over the last decade, this concept has been expanded to be used to address the beneficial or adverse impact of choices made regarding building materials, construction methods and resources, operating energy, water services and sanitary systems on economic conditions, the environment, a society or the quality of life, i.e., the contribution which a building makes to sustainable development" (p. V). The task of this standard is not only to present the necessary framework and principles to describe the performance of a building, but also "to provide the means of evaluation for solutions for all these applications" (ISO 2016, p. V).

As building performance evaluations evolved over the years, they continued to be evaluated in an informational manor. Due to their informal nature, the lessons learned were not necessarily applied in the next building or made to be public knowledge as a resource for similar building types. Although because of relatively slow change in the evolution of building types in the past, knowledge about their performance could be passed on from generation to generation of building specialists. Often individual craftspeople with multiple skills, i.e., artists, designers, draftsmen, and builders, had more control over the building delivery process than the members of multi-disciplinary teams of experts that are typically involved in buildings today. The emergence of new professions means increasing specialization; for example, project management focuses primarily on the building delivery process, and facility management focuses on operating the building over its lifetime. In order to achieve a successful building project and also a building object of high quality, project managers and facility managers may also take over the role of the evaluator, assessing the building performance throughout the building life cycle, thus assuring the expected quality of the facility.

The evaluation of performance in terms of quality assurance of a product is well-known in other industries. In the automotive industry, for example, every component, every sub-process, and every car is evaluated against specified performance criteria. The same is true for BPE. To be objective, actual performance throughout the building life cycle is measured against established performance criteria, taken from the literature, analogs and precedents, experts, codes, or other sources. The key aspect of performance criteria is that they constitute objective, quantifiable, and measurable 'hard' data, as opposed to 'soft' criteria, which derived from qualitative and often subjective assessments. Thus the BPE model is based on a feedback system comparing explicitly stated performance criteria with the actual, measured performance of a building.

Outcomes of BPEs vary according to short-, medium-, and long-term time-frames. Short-term outcomes include user feedback on problems in building performance within a specific sub-phase of the building life cycle, and identification of appropriate solutions. In order to assure the expected performance and quality, short-term outcomes are aimed at immediate implementation, with a limited budget and only minor adjustments. Medium-term outcomes include the application of the positive and negative lessons learned to inform subsequent phases within a building's life cycle, as well as the next building life cycle. This is especially useful for large organizations with recurring building types and programs. Long-term outcomes are aimed at the creation of databases, clearinghouses, and the generation of planning and design criteria for specific building types.

1.3 Validity of the BPE Concept

1.3.1 Applications Around the World

This book verifies the validity of the concept of BPE with examples from around the world. With contributions from eight countries and four continents, this volume expands the global perspective already characterized in the two former BPE books: *Assessing Building Performance* (Preiser and Vischer 2005) and *Enhancing Building Performance* (Mallory-Hill et al. 2012). All chapters are written by international experts to demonstrate the theories and advances in the field, as well as how to apply BPE in order to improve building performance. In addition, case studies relevant to a range of cultural contexts provide specific examples on how BPE methods and instruments are used in the field.

Many chapters are based on papers presented at IBPE-symposia (International Building Performance Evaluation). These symposia started in the 1990s at conferences of the Environmental Design Research Association (EDRA) and the International Association for People-Environment Studies (IAPS) in the United States and Europe, attended by a global audience.

1.3.2 Contributions to Sustainable Development

Around the early 2000s, amid growing concerns about the environment, a number of new voluntary third-party rating systems specifically aimed at green buildings emerged, including the Leadership in Energy and Environmental Design (LEED) system in the US, Building Research Establishment Environmental Assessment Method (BREEAM) in the UK, the National Australian Built Environment Rating System (NABERS) in Australia, and the German Seal of Quality for Sustainable Building of the German Sustainable Building Council (Deutsche Gesellschaft für Nachhaltiges Bauen, DGNB) in Germany. The World Green Building Council, formed in 2002, brings together member-based councils in over 70 countries "to create green buildings for everyone, everywhere—enabling people to thrive both today and tomorrow" (WorldGBC 2017). Green building councils promote sustainable design through green building rating systems that reward buildings different levels of certification when evaluated against an extensive set of sustainable design target performance criteria. Several contributions in this book focus on green buildings.

1.3.3 Improvements in Building Process and Quality

Integrative Planning

Integrative planning is basic for the success of a building project. It is only when all relevant participants consistently and comprehensively coordinate their work for a project, from the very beginning, that the process and the building itself will improve significantly. Therefore, an interdisciplinary team, together with the client and in participation with users and the public, works on a holistic building concept within an overarching planning strategy and on basis of a well-defined facility programme. These exact aspects, i.e., cooperative planning in a team, user participation, and facility programming, are mirrored in the results and recommendations for action the German Reform Commission 'Construction of Major Projects' highlighted in their final report in June 2015 (BMVI 2015). This commission was founded by the Federal Ministry of Building and Urban Development in view of major projects, such as the International Airport in Berlin, that are not delivered within budget or on schedule and exhibit distinct signs of procedures that do not represent value for money. In summary, the BPE process model emphasizes a process with interdisciplinary teams, it is user-oriented, and refers to programming as one of the major six phases of the building life cycle. Case studies in this volume cover these issues.

Building Information Modeling (BIM)

Many benefits and accomplishments of BPE are made possible and easier through the development of technology. Building information modeling (BIM) is now widely used in the architecture and building profession. This technology allows architects and designers to draw their buildings in 3D and to share these computer models with all members of the interdisciplinary team for coordination prior to construction. For example, client goals and user requirements translated by the programmer into performance criteria could be evaluated in the digital 3D-solution of BIM. Computer modeling highlights any conflicts prior to construction, which in turn streamlines the construction process by reducing the amount of questions in the field, e.g., requests for information, that typically pertain to details left off the drawings and/or conflicts shown between trades. Again, the German Reform Commission 'Construction of Major Projects' already mentioned above is recommending "the use of IT-based methods such as building information modeling (BIM), which can help to prevent such planning errors, […] resulting in cost-intensive corrections" (BMVI 2015, p. 1). This issue is reflected in this book as well.

Smart Buildings

Other opportunities for feedback and feedforward information is through the development of smart buildings. These buildings contain highly advanced systems controlling heating, venting, air conditioning, shades, lighting, security systems, etc. On the one hand, they are able to collect data on how the building is used, contributing to the evaluation of the occupied building against planning parameters and simulation models. This information can then be used by architects and designers when developing similar structures. On the other hand, feedback by the occupants of smart buildings is most sensitive and critical, since they risk to be dominated by the building automation system—without any means of control. This issue is covered in this book as well.

1.4 Conclusion

The performance concept and framework for systematic evaluation of the built environment as outlined in this book is a much needed and timely methodological approach toward achieving higher quality in buildings, accountability in the building process, and ultimately, better building utilization and user satisfaction. Making explicit the performance requirements that are expected from a building, designing a building accordingly, and eventually comparing the actual performance of the building with that which was initially stated in the building program is the basis of the performance concept advocated for use in BPEs.

The goal of this second edition, of *Building Performance Evaluation*: *From Delivery Process to Life Cycle Phases*, is to update several original chapters with more recent findings to bring those theories up-to-date, while balancing those chapters with some new voices in the field, since the book's first publication. As such, the book is divided into Frontiers of Building Evaluation, Advances in Evaluation Knowledge, Advances in Evaluation Methods, and the Epilogue: Looking at the Influences of Wolfgang F.E. Preiser and the legacy that he's left behind. In summary, *Building Performance Evaluation* presents the past, the present, and the future.

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Wolfgang F.E. Preiser held a Ph.D. in Man-Environment Relations from Penn State, and several architecture degrees from Virginia Tech, Karlsruhe Tech (Germany) and Vienna Tech (Austria). He had over 40 years of experience in teaching, research and consulting in the evaluation and programming of environments, including health care facilities, public housing, public libraries, cross-cultural and universal design, as well as design research in general. He published 20 books and over 130 chapters, monographs, and articles. Most recent books include: *Architecture Beyond Criticism: Expert Judgment and Performance Evaluation* (Routledge, 2015); *Enhancing Building Performance* (Wiley, 2012); *Universal Design Handbook* (McGraw-Hill, 2010); *Designing for Designers: Lessons Learned From Schools of Architecture* (Fairchild, 2007). Preiser lectured worldwide at 69 venues and conferences in the United States and Canada, as well as 86 overseas. He served on national committees with the American Institute of Architects, the Building Research Board of the National Academy of Sciences, and the National Institute for Disability Rehabilitation Research. Preiser received many awards, including: 2 Progressive Architecture Awards; 2 Professional Fellowships from the National Endowment for the Arts; The Career Award from the Environmental Design Research Association (EDRA), 2 EDRA Achievement Awards, as well as other awards while at the University of Cincinnati.

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Ulrich Schramm is Professor in the Department of Architecture and Civil Engineering at the Bielefeld University of Applied Sciences, Minden Campus, in Germany. His appointment includes teaching and research responsibilities in the field of facility programming, building performance evaluation and building technologies. He is a trained architect and an experienced facility programmer. He received his doctorate in Architecture from the University of Stuttgart and a post-doctoral fellowship from the German Research Foundation (Deutsche Forschungsgemeinschaft, DFG) for his stay at the University of Cincinnati as Visiting Professor of Architecture. Results of his studies within the International Building Performance Evaluation (IBPE) consortium and the campus-based research project Intelligent Building Technologies (InteG-F) have been presented at conferences of the Environmental Design Research Association (EDRA) since 1995 and published in several articles and book chapters. Some recent chapters he has written were published in *Enhancing Building Performance* (Wiley-Blackwell, 2012) and *Architecture beyond Criticism: Expert Judgment and Performance Evaluation* (Routledge, 2015). He also co-authored the first book on Facility Programming in Germany *Nutzerorientierte Bedarfsplanung: Prozessqualität für nachhaltige Gebäude* (Springer, 2011). Currently, he is serving at the German Institute for Standardization (Deutsches Institut für Normung, DIN) in Berlin as expert and co-chair of the revised edition of the German building standard DIN 18205 *Brief for Building Design*.