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A classification framework for facilities and real estate management

The Built Environment Management Model (BEM2)

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Abstract

Purpose – This paper aims to present an industry-neutral classification model for the management functions of the organizational built environment: the Built Environment Management Model (BEM2). The model is intended to highlight the strategic value of the built environment management functions and to assess how efficiently these functions interact and generate strategic value.

Design/methodology/approach – The research team reviewed a wide range of existing management models for facilities management and real estate (FM/RE) and related management disciplines. In a multi-year research project, the team refined the descriptive model in an iterative validation process between researchers and practitioners.

Findings – The BEM2 framework is an inventory of FM/RE functions. The model highlights the relationships between the four major key process areas and shows the strategic value stream of each particular FM/RE function. BEM2 has proven effective in helping organizations understand the scope and value of the FM/RE functions. The tool can be used to identify organizational gaps and overlaps between divisions, and it can help to facilitate discussions between organizational entities of how responsibilities should be most effectively aligned. It can also serve as an effective model to support the implementation of an integrated building information model (BIM).

Research limitations/implications – The model is currently limited to a description of processes and is as such explaining the sequence of FM/RE business processes. It does not yet address the skill sets required to effectively perform these functions.

Practical implications – The BEM2 framework was successfully used as the business model for the major restructuring process of a large real estate organization. It has also proven to be valuable as a way to introduce students to the subject of FM/RE. The adoption of BEM2 can help to further clarify the standards of the FM/RE profession and to increase the maturity of its business functions.

Originality/value – The BEM2 model transfers principles from related management fields and assembles them into a comprehensive process model for the FM/RE model. It contributes to the discussion on standardization and taxonomy development in the FM/RE discipline.

Keywords Built environment, Facility management, Real estate, Process taxonomy, Building information modelling, Maturity models, Taxonomy

Paper type Research paper

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Introduction

Facility and Real Estate Management (FM/RE) activities contribute to about 5-10 percent of the gross domestic product (GDP) of advanced industrialized countries. The total value of FM activity, including support services, is about 8.2 percent of the UK GDP (Harris, 2002). According to a survey of Berger (GEFMA, 2001), 70 percent of US companies and 50 percent of European companies consider their real property to be a strategic resource.

Recognizing the significant impact that facilities assets have an organizational bottom lines and to the larger economy (Hinks, 2004; OGP, 2005), stakeholders have been emphasizing the need for a strong conceptual framework that could help organizations derive greater value from their facilities assets. Then (1999) highlighted the "need for strategic business planning to incorporate and, indeed, integrate the facilities dimensions of business delivery". The US Government identified the management of its real property as a "high risk area", and established a framework to "overhaul real property business practices" (Teicholz *et al.*, 2005). Dettbarn (2005) identified the need to integrate "the strategic, operational, and tactical aspects of managing … real property portfolios" to increase the performance of the real property function in supporting the organization's mission. Shoet (2006) describes a "need … for the development of methods for the strategic management and maintenance of buildings". The International Facilities Management Association identified in 2007 the linkage between FM and an organization's strategy as one of the most important current FM trends. Multiple European FM organizations are working on a conceptual framework outlining the nature and scope of Facilities Management (CEN, 2006-2009; Kloet *et al.*, 2008). In 2008, EuroFM identified the potential for FM/RE to play "a leading role" in managing the built environment and is currently working on a multi-year research project to "develop a program to advance knowledge in facilities management" (Alexander, 2009). In addition, the emergence of Building Information Modeling (BIM) necessitates a clear framework of FM/RE activities and products to structure integrated data models (Wirdzek, 2010).

The body of knowledge in facilities and real estate management

To help organizations understand the strategic value of its real property, Facilities and Real Estate Management communities have produced a rich body of knowledge. The International Facilities Management Organization provides a knowledge-based FM framework that is organized around core competencies (IFMA, 2010). The new European FM standard contains a set of definitions focusing on service delivery, quality management, process development and space and cost standardization (EN15221; CEN, 2006-2009). The Institute of Asset Management (2008) organizes subject knowledge in its recently published "Competency Framework". Multiple other professional organizations, such as BIFM, EuroFM, FMA, IREM, CoreNet, APPA or ASHE, to name just a few, produce often extensive FM knowledge, in most cases as responses to the specific business needs of their constituents (Then, 2004). The academic world also has made important contributions to the discussion of how to leverage the FM function as a strategic resource. Chotipanich and Nutt developed an inventory of FM functions and assessed how to best position these functions within an organizational context to generate strategic value (Chotipanich, 2004; Chotipanich and Nutt, 2008). Then (1999, 2004) proposes a set of integration models and process sequences to facilitate the alignment of facilities demand and supply. Becker (2003)

borrows the concept of portfolio management to develop an FM model that can effectively respond to fast changing corporate environments. Dettbarn *et al.* (2005) introduces the concept of Key Process Areas and Process Maturity, borrowed from Capability Maturity Models, to define a comprehensive model to link capital investments with organizational strategy."

Problem statement: the need for a unified management model

Despite the growing body of work, attempts to categorize FM/RE business functions and their strategic value have not yet resulted in a generally accepted framework. Two challenges are responsible holding back such a uniform framework.

First, the currently proposed frameworks remain fragmented between different constituencies. Numerous labels such as "Real Estate", "Property Management", "Corporate Real Estate" or "Facilities Management" separate the field into parallel communities with often only marginally varying business focuses. These labels conceal the fact that all of these communities have a broad range of common interests:

- Does the portfolio of facilities and infrastructure adequately support the organization's vision and mission?
- Does the organization have the right mix of facility assets?
- Is the organization able to obtain or build facility assets effectively?
- Does the organization have appropriate facility services and spaces?
- Are facilities and infrastructure components adequately maintained?
- Do the facilities comply with regulatory standards?

Second, many existing frameworks in FM/RE are conceptually ambiguous and lack taxonomical rigor. A review of 17 existing FM/RE models showed that a majority of existing FM/RE frameworks rely on simplistic taxonomies with often unclear or even conflicting organizing principle (Ebinger and Madritsch, 2011). In addition, the review found that frameworks proposed by the big FM/RE associations were mostly based on simple lists or tree structures and had little value beyond providing an inventory of FM/RE knowledge. Several recently proposed frameworks employed advanced taxonomical principles to explain the organizational value of facilities assets, such as the models proposed by the Institute of Asset Management (2008), the European Standards EN 15221 (2006-2009) or the National Research Council (2008). However, all of the advanced models relied on several, unrelated frameworks to express the strategic value of facilities assets and are rather difficult to access.

Goals and objectives

The continued fragmentation of the FM/RE constituencies, as well as the lack of a simple framework, triggered a multi-year project by a research group consisting of two graduate programs and of multiple FM practitioners in the US and Europe, with the goal to develop an "industry neutral" framework, that would respond to the two challenges: the framework should reflect general practices in Facilities Management and Real Estate in neutral terms, and it should be taxonomically consistent and easy to understand. The proposed model would be descriptive, i.e. it would show how the facilities asset management functions relate to each other and how they generate strategic value.

Methodology

Literature review

The research team conducted an extensive literature review, focusing on conceptual frameworks in FM/RE as well as in two related management disciplines: Portfolio, Project and Project Management and Information Technology Management. The team selected these two disciplines because they address managerial challenges similar to the challenges known in FM/RE and because they have already well-established and widely recognized management models. The following sections briefly describe these models and highlight in italic font the key principles, which the research team adapted in its management framework.

Review of portfolio, program and project management (PPPM) standards. In the management discipline of Portfolio, Program and Project Management, two leading providers of management methodologies are the Project Management Institute (PMI) and the UK Office of Government Commerce (OGC) (Crawford, 2004). An analysis of both standards and their evolution through several editions (PMI, 2008; OGC, 2005) revealed a number of interesting points. Both major Project Management Methodologies differentiate between processes and capabilities. "Processes" describe a series of interrelated activities that are assigned to specific organizational entities. "Capabilities" consist of a set of specific skills needed to perform the processes. The project management methodologies increasingly recognize that projects happen in a hierarchical organizational context and that operational project work must be supported by tactical program coordination (= Project Portfolio Management), in order to achieve the organization's strategic goals and objectives. Both, the PMI and the OGC have issued "Program Management" and "Portfolio Management" guides that define the "value stream" linking operational work with the strategic objectives of the organization (PMI, 2006; OGC, 2006).

Review of information technology (IT) management standards. In the field of IT management, two prominent methodologies were studied. The "Capability Maturity Model", originating from Software Engineering Institute at Carnegie Mellon University, introduced the concept that the various functions of Information Technology Services are documented and diagrammed as interrelated "Key Process Areas (KPA)". Each KPA has a certain level of "maturity", ranging from chaotic to highly organized. Drawing from the tradition of Quality Management, the Capability Maturity Model suggests that an organization should improve performance by systematically increasing the "maturity" of its various Key Process Areas (CMU, 2006). The concept of Process Maturity has resonated well within the IT community and is increasingly applied in other areas (Cooke-Davies and Arzymanow, 2002; Mullaly, 2006; PMI, 2003; OGC, 2006).

The "Information Technology Information Libraries (ITIL)", developed by the UK Office of Government Commerce (2010), is a management framework to identify, plan, build and support IT services. In its current third version, the methodology documents best practice processes organized along the life cycle of the information service (Zhang *et al.*, 2009).

Development of an industry-neutral FM/RE framework. Early in the research process, the research team developed the "Built Environment Management Model" BEM2. Borrowing from PPPM and IT, and differing from most FM/RE frameworks, the team decided that the BEM2 model should strictly focus on business processes, and as such

reflect the sequence of management activities and how they relate to each other. The model was incrementally improved through several iterations. Using semi-structured interviews, the updated model was presented to FM/RE practitioners and reviewed for completeness and relevance. In addition, the model was tested in a comprehensive, multi-year reorganization of a large scale FM organization (Reuter and Ebinger, 2009).

The built environment management model (BEM2)

The key process areas of the facility life cycle

Similar to the ITIL approach, the team used the notion of the asset life cycle as the primary organizing principle**.** This cradle-to-grave sequence ensures that important aspects relative to the asset are considered in the framework. Borrowing from classifications proposed by Then (1999, 2004) and Dettbarn *et al.* (2005), the BEM2 breaks the Facilities Life Cycle into four Key Process Areas (KPAs) (Table I).

Figure 1 shows how the four KPAs are sequenced into the asset life cycle and form a very basic process sequence. This sequence is the simplest representation of the Built Environment Management Model. Since it is comparable to existing life cycle models, it is well understood and recognized.

KPA 1, Strategic Planning, is often a process external to Facilities Management and may or may not include Senior Facilities Personnel. KPA 2, Facilities Planning, is the facilities response to the organization's strategy. It must balance between the need for new facilities and the need to renew the portfolio of existing facilities. KPA 3, Project & Transaction Management, executes the decision made in KPA 2, by buying an existing facility through a real estate transaction, or by designing and building of a new facility. The newly acquired facility is handed over to the operations team through a commissioning process, which (in KPA 4) operate, maintain, and service the Facility. The Facilities Condition Audit function, part of KPA 4, reports to the Facilities Planning function, when a facility system has reached the end of its useful life and needs to be replaced. This information is considered by the facilities planning function, which then starts the next cycle for the facilities system.

Key process area (KPA)	Description
KPA 1 Strategic planning	Definition of organizational goals and objectives
KPA 2 Facility planning	Translation of organizational strategy into real estate options, and the selection and financing of the best option
KPA 3 Project/transaction management	Acquisition/construction and commissioning of the physical facility
KPA 4 Operations, maintenance and services management	Operation, maintenance and servicing of existing facilities. Services include a wide range of support services, such as Lease Management, Space Management, Office Support Services, Technical Services or Food Services. In addition, this section includes a feedback function to inform the planning function on re-investment needs for existing facilities (Facilities Audit Function)

Table I.
The four key processes areas of BEM2

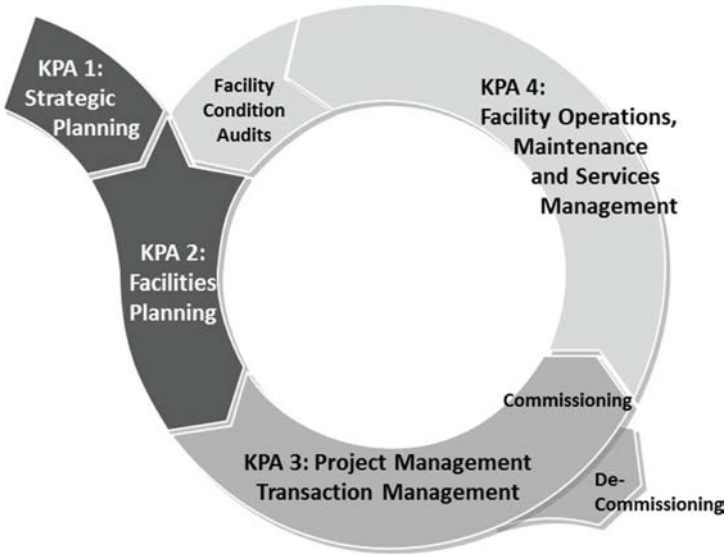

Figure 1.
The four key process areas of the facilities life cycle model of BEM2

The "value streams" of the built environment

Recognizing that all business processes generate strategic value for the organization, even if they are implemented in a non-strategic operational environment, the model aims to visualize the value stream from the operational level up to the strategic level. It introduces "value perspectives" as a secondary organizing principle and shows if a facilities process has a strategic, tactical or operational perspective, similar to the approaches chosen by the European Norm EN15221-1:2006 or the National Research Council (2008).

To visualize both dimensions in one diagram, the model unrolls the circular life cycle process along the linear *x*-axis, and plots the "value hierarchy" along the *y*-axis. The diagram shows value streams within FM for each function in a vertical direction upwards.

The two dimensional matrix shows the value proposition of each of the four Key Process Areas.

(1) KPA 1, Strategic planning, is a core function of the organization and as such at the top of the "value stream".

(2) KPA 2, Facilities planning, is a tactical function that, on a strategic level, optimizes the organizational investments by deciding on the right investment vehicles (i.e. leasing/buying/building of facility assets). Decisions related to the mix of the facility portfolio have a direct impact on an organization's balance sheet.

(3) KPA 3, Capital project and transaction management, is an operational function delivering a specific project or transaction as defined in the planning function. While a single project solves a specific problem (operational perspective), several projects combined into a portfolio require a more tactical perspective to decide on the best sequence and resourcing of the multiple projects. A

well-delivered portfolio of projects generate strategic value, by having a minimal detrimental impact on the core business, while delivering projects that fully support the core business' core objectives (strategic perspective).

(4) KPA4, Services, operations and maintenance management, consists of a large number of operational functions. Similar to the Project Management process area, each of the operational activities is rolled-up to a tactical function, which oversees the work and ensures consistency and efficiency in the operation and maintenance of the facilities and in the delivery of services. Well-run functions in this process area have significant strategic benefits, as they provide an environment within which the organization can perform optimally.

BEM2: understanding the value proposition of the four FM KPAs

The simplified matrix of Figure 2 can be overlaid with the detailed process of the asset life cycle. Figure 3 breaks the four Key Process Areas into a higher level of granularity and shows primary processes that are directly involved in the asset life cycle (box with dark shading), as well as supporting processes that are indirectly contributing to or benefiting from the life cycle processes (box with white background).

Horizontally, the diagram shows the organizational layers relevant to the Built Environment. The top layer, the strategic perspective, defines the strategic value of each KPA. The second layer addresses the tactical perspective of FM/RE. The functions on this layer are typically owned by senior personnel in the Facilities and Real Estate Management departments. The third layer, the operational perspective, describes the execution layer of the FM/RE function.

Each process included in the Built Environment Management Model (BEM2) is briefly outlined in Table II. The authors recognize that the brevity of the description does not fully capture all possible functional aspects in each area. The full version of the BEM2 model has a detailed catalogue for each process area. This catalogue includes a detailed description of the process itself, its inputs and outputs, a list of skills needed to competently work within this process and a list of metrics that can be used to measure performance.

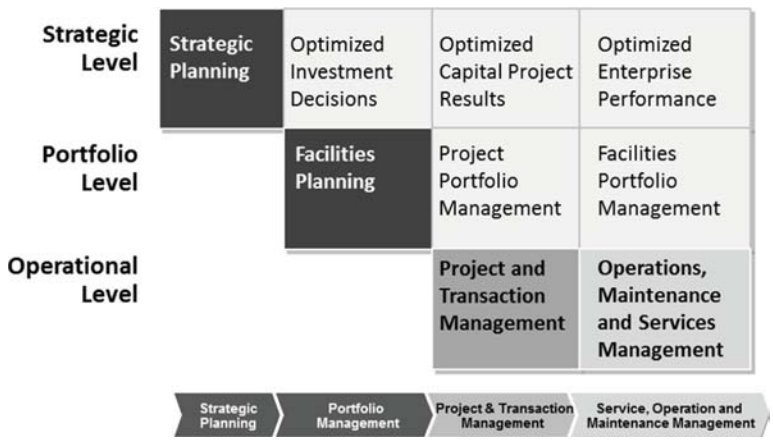

Figure 2.
The two dimensions of BEM2

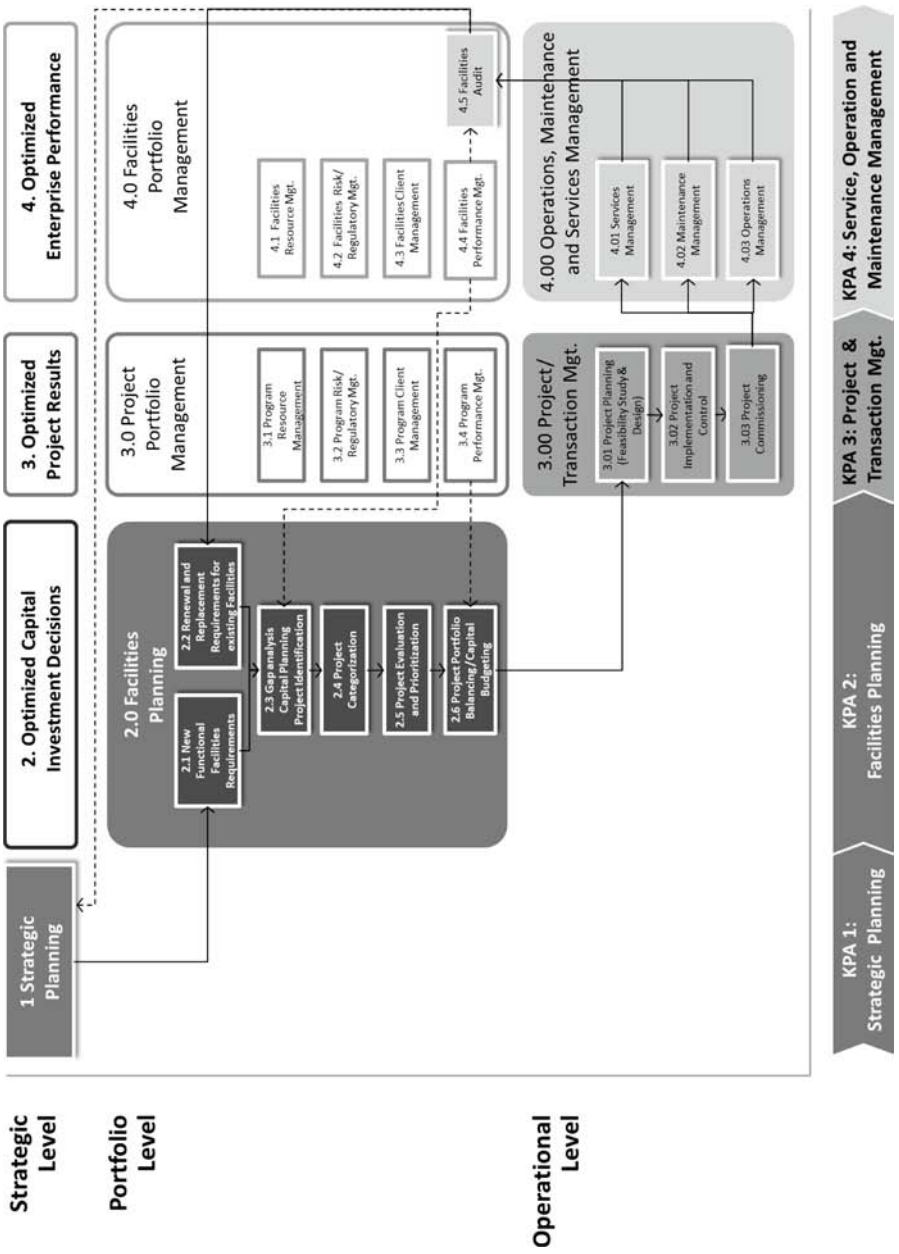

Figure 3.
The built environment management model (BEM2)

KPA 1: strategic planning	
1. Strategic planning (strategic level)	As the only function within this Key Process Area, Strategic Planning is conducted by the leadership of the organization. The purpose of this process is to define the goals and objectives for the core business. Depending on the importance that the Built Environment has to the organization, the Head of the FM/RE group may or may not participate in this process
KPA 2: facilities planning	
2. Optimized capital investment decisions (strategic level)	The organization decides how to invest available capital. Investment in real property compete with investments in other vehicles, and should be subject to rigorous performance analysis. The portfolio of real property is usually a mixed of owned and leased facilities. If facilities assets are critical to the core business, the organization will tend to own the assets. Conversely, if assets are non-critical to the core business, the organization may tend to lease
2.0 Facilities planning (tactical level)	This process group explains the steps of Facilities Planning. It is common for Finance and FM/RE department to collaborate in this process group
2.1 New functional facilities requirements	This process establishes an inventory for new functional facilities requirements that are not available in the existing facilities portfolio. Organizations often have a gate-keeper that ensures that requests are properly authorized before they are submitted
2.2 Renewal and replacement requirements for existing facilities	This process establishes an inventory of renewal and replacement requirements needed to maintain the existing facilities portfolio. This inventory is usually an output of the facilities audit process
2.3 Gap analysis, capital planning, project identification	Using the two inventories from 2.1 and 2.2, and considering the performance of existing facilities in 4.4, this process matches the demand for facilities with the supply. Gaps are identified and projects formulated. This process is usually owned by an office charged with facilities planning. This process results in a list with identified projects
2.4 Project categorization	Since there are different drivers and fund sources for facilities projects, projects that are competing on the same grounds should be grouped into the same category (Example: all Life Safety Projects should be put into a group "Mandatory Projects"; all projects with third party funding should be placed into a group "Externally Funded")
2.5 Project evaluation and prioritization	Within each category, projects are evaluated for business viability and strategic value, resulting in a prioritized list of projects
2.6 Project portfolio balancing/capital budgeting	The prioritized lists of new projects are compared against previously approved projects. If needed, prior capital plans are modified. Depending on the organization's capacity for capital investments, top priority projects in each category are approved and added to the new Capital Budget

(*continued*)

Table II.
The inventory of BEM2 processes

KPA 3: Project management/transaction management	
3. Optimized project results (strategic level)	The Project or Transaction Management function is responsible to build, buy or lease new facilities assets. The strategic value of this KPA is an optimal project execution with minimal organizational disruption, and a delivery of project results that fully meet organizational requirements
3.0 Project portfolio management (tactical level)	This tactical process group is responsible for the coordination of all capital projects and real estate transactions within an organization. All processes within this group are headed by senior FM/RE personnel
3.1 Program resource management	This process is responsible to ensure that capital projects and real estate transactions have the right team and all necessary resources to operate effectively
3.2 Program risk / regulatory mgt.	This process is responsible to monitor and mitigate risks associates with the capital projects and real estate transactions and to ensure that regulatory requirements are met
3.3 Program client management	This process maintains close relationship with the project/transaction clients to ensure that client expectations are met by the delivered product
3.4 Program performance management	This process monitors that projects and transactions deliver the financial and strategic value that was defined in the planning stages. This process interacts with process 2.6 and reports performance indicators (cost, schedule, value) of an ongoing project to allow the organization to assess the portfolio of ongoing projects against new, competing projects
3.00 Project/transaction mgt. (operational level)	This operational process group implements capital projects or executes real estate transactions. All processes within this group are overseen by operational Project/RE personnel. In Most of the Project and RE work is outsourced to Real Estate Professionals, Architects, Engineers, Construction Managers and Contractors
3.01 Project planning	The planning process expands early project assumptions defined in process 2.3 (Project Identification) and conducts an in-depth study of the project. Process 3.4 (Program Performance Management) monitors if the early assumptions continue to be valid, and reports deviations back to process 2.5 (Evaluation/Prioritization) Once the initial studies are complete, detailed plans and specifications are developed
3.02 Project implementation and control	Once the project plan is approved, the project is executed. This includes the construction, alteration, purchase or lease of a facility
3.03 Project commissioning	At the end of the construction project or as part of the real estate deal, the performance of the new facility asset is verified against specified benchmarks. The operations and maintenance teams are trained and receive the necessary building information (asset maintenance schedules, warranties, 2D/3D building models, as-built documents etc.)

Table II.

(*continued*)

KPA 4: Operations management, maintenance management, services management	
4. Optimized enterprise performance (strategic level)	The fourth KPA contains processes needed to uphold the performance of existing assets. These processes have the strategic goal to provide an environment, within which the organization can function at its optimum
4.0 Facilities portfolio management (tactical level)	This tactical process group is responsible to ensure that the Operations/Maintenance/Service Delivery functions generate optimal results at low costs. Service Level Agreements are established with users, to ensure that the right level of service is provided at an agreed level of cost. The processes within this group are headed by senior FM professionals
4.1 Facilities resource management	This process is responsible to ensure that all facilities functions are adequately staffed
4.2 Facilities risk/regulatory mgt.	This process is responsible to monitor and mitigate risks associates with the existing facility portfolio and to ensure that all regulatory requirements by all Authorities Having Jurisdiction are met
4.3 Facilities client management	This process maintains close relationship with the facilities clients to ensure that client expectations are met by the Operations, Maintenance and Service Delivery functions
4.4 Facilities performance management	This process monitors that the Maintenance, Operations and Service Delivery functions meet the performance goals that may be defined in Service Level Agreements
4.5 Facilities audits	This process monitors the condition of the existing facility portfolio. It identifies the need for renewals and replacements
4.00 Services, operations and maintenance management (operational level)	*This tactical process group is responsible to run and preserve existing facilities, and to provide facilities-related services*
4.01 Services management	This process can be divided into a large number of service processes that may be provided by the Facilities Management Group: Property Management/Lease Administration, Space Management, Food Services, Security Services, Fleet Services, Office Support Services, Janitorial services etc. Each service group has its own vertical "strategic value chain": executed on the operational level, coordinated on the tactical level (functions 4.1 to 4.5 apply to each service type) and appreciated on the strategic level
4.02 Maintenance management	This process is responsible for the preventive and reactive maintenance of the existing asset portfolio and to conduct repair work as necessary
4.03 Operations management	This process is responsible to operate the facilities systems (HVAC, Electrical, Plumbing) so that the core business has an optimal work environment Operations management includes sub-processes with responsibility for utility and energy management

Table II.

Discussion

BEM2 has strong parallels to previously proposed models. The "Integrated Resource Management Framework" developed by Then (1999) divides FM/RE into four roughly comparable Key Process Areas, as does the "Capital Project Portfolio Management (CPPM) Model" by Dettbarn *et al.* (2005). Ten's model explains the interactions between the KPAs with process sequences comparable to BEM2, even though he doesn't explicitly refer to the asset life cycle. Contrasting, the CPPM Model shows the relationships of its Key Process Areas as continuous interdependencies without highlighting process sequences. Finally, the models of the European FM norm EN15221-1:2006 and the National Research Council (2008) highlights the value stream of FM activities by clearly defining the interrelationships of operational, tactical, and strategic levels.

BEM2 refines the ideas of the above models and combines them with other principles from related management disciplines (Project Management and Information Technology). The resulting model follows clearly defined taxonomic principles. It consists of a matrix with two dimensions (asset life cycle vs. organizational value stream), that is overlaid with a sequence of primary and supporting facility asset management processes. The exclusive focus of BEM2 on processes and value stream, and the visuals with the three levels of detail (Figure 1, 2 and 3) make this model easily accessible.

During the course of the research project BEM2 was used to evaluate over 50 organizations in North America and Europe within a wide range of industries. The model was found effective in helping organizations better understand the relationships between asset management functions and to identify inefficiencies from gaps or overlaps between these functions. The process model also provided the process framework for the implementation of a comprehensive Facilities Building Information Model in a large healthcare system in North America (Reuter, 2010).

Conclusion and further research

The introduced model BEM2 responded to the two challenges stated at the beginning of the project: BEM2 provides an "industry-natural" framework, as it was found to be applicable to a wide range of industries, ranging from asset-intensive processing industries to businesses, where assets are incidental, such as professional services firms. Second, the model has a clearly defined taxonomy. It matrixes the asset lifecycle with the organizational hierarchy and allows therefore to identify the "who" and the "what" of the asset management function. This conceptual clarity makes this model an effective tool to identify organizational gaps and overlaps between asset management functions, and it can help to facilitate discussions between organizational entities of how responsibilities should be most effectively aligned.

Similar to comparable process models in PPPM and IT, BEM2 can be used to measure the "how well" (i.e. the "maturity") of each process. The research team is in the process of developing a maturity framework, the "Built Environment Management Maturity Model" (BEM3), which allows organization to measure how well the FM/RE functions identified in BEM2 are performing. The BEM3 methodology and results will be presented in a subsequent paper.

The authors are convinced that process models such as the proposed BEM2 may help to further clarify the standards of the FM/RE profession and to increase the maturity of its business functions.

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