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AS AN OPTION FOR INTELLIGENT BUILDING

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THE COMBINED USE OF BUSINESS MANAGEMENT WITH FACILITY MANAGEMENT AS AN OPTION FOR INTELLIGENT BUILDING

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ABSTRACT

Words like Business Management (BM) and Facility Management (FM) are well known as separate management methods. FM offers transparency about their property costs and exploitation, starting from the planning phase until its demolition. The investor sees this in the property invested capital and its recoverable yield. This means they also want a profit with their real estates. Besides this, changes in the social and environmental requirements become necessary to adapt the properties. The solution is called Intelligent Building. Its primary aim is to collect and select previous knowledge and information about Facility Management and Business Management. It is an application, mainly with sight to characterize and describe the possibilities of use of intelligent buildings as a combination of Facility and Business Management. This paper is an indirect survey carried out through a

documental procedure in the form of a bibliographic research and theoretician study. Intelligent Building as combination of FM and BM is new, but in our times necessary to satisfy the needs of the demand. This type of building needs to be flexible in its structure and services, open for changes in environmental requirements, e.g. saving energy, and needs a lot of technology to realize their functions. Consequently, it will be sustainable for a value enhancement. With a Computer Aided Facilities Management system this is possible and the company will be more flexible in relation to the competitors and future changes.

Keywords: Intelligent Building; Facility Management; Business Management

1. INTRODUCTION

Words like Business Management (BM) and Facility Management (FM) are well known as separate management methods. Business Management searches for possibilities to optimize main processes and better applications of existing products. But real estates were being forgotten, which means they were not in the prospective point of view for companies. On the balance sheet, real estates are a big part, but to view them as a profit center is a relatively new thing. FM on the other hand is looking for a better exploitation of the building and its related services. A second function of Facility Management is the minimization of the building costs. Over the whole life cycle of a property, FM wants to optimize the processes in a building with functions like insourcing and outsourcing.

Intelligent buildings are high-tech buildings, which means, they are collecting information about the building and their processes into this building. These are also flexible in their construction and open for changes. Flexible buildings are created to correspond with the demand in question of structural needs and exploitation.

A combination of Facility Management and Business Management is new. Flexible high-tech buildings are necessary to satisfy the demand, to increase the productivity, optimize processes and finally, to increase the company profit.

2. METHODOLOGY

This paper is an indirect survey carried out through a documental procedure in the form of a bibliographic research and theoretician study (VERGARA, 2010). Its primary aim is to collect and select previous knowledge and information about Facility Management and Business Management. It is an application, mainly with sight to

characterize and describe (VERGARA, 2010) the possibilities of use of intelligent buildings as a combination of Facility and Business Management. Besides the primary objective, with this approach exclusively based on information about FM and BM, new tendencies in the world-wide construction such as intelligent buildings, are presented based on information of FM and Business.

Furthermore, this investigation is justified by the growing interest of investors and owners of companies to know what a property really costs and where the biggest operating costs are, once, according to newer studies, these new types of FM conform buildings have higher returns on investment.

Finally, as a limitation, the bibliographic exploration (VERGARA, 2010) results should not be generalized for all combinations of BM and Facility Management once any kind of FM actions mainly creates costs. Therefore, intelligent buildings may be, on one hand, a good combination of FM and BM to create a higher property and company value and on the other, to give sufficient flexible constructions for future changes of exploitations.

3. FACILITY MANAGEMENT

Facility Management is not new. The word itself has been used in decades. However, it was only used in the context of dealing with building stocks. In the beginning of this chapter the historical development and definition of FM will be explained, continuing with economical situation, dimensions of Facility Management and finally the service divisions of FM will be discussed.

3.1. Historical development and definition

The term Facility Management, including Facilities Management (SCHULTE; PIERSCHKE, 2000), was used in the late 1970s and early 80s in the USA for the use phase of construction/buildings. The 1st Conference on the impact of facilities on productivity was held in 1978 in the USA, according to May (1998). Only five years later, the Facility Management Institute defined the following concept:

“Facility Management is the practice of coordinating the physical workplace with the people and work of the organization, integrating the principles of business administration, architecture, and the behavioral and engineering sciences.” (LIBRARY OF CONGRESS apud KAHLEN, 2001)

The issues concerning workplace, people and work are now consolidated within the concept of Facility Management (SCHULTE; PIERSCHKE, 2000). This definition is also laid down by the International Facility Management Association (IFMA) in “The IFMA Report # 1” (IFMA, 1984). Based on this definition, many companies are trying to diversify in FM, as the field of FM is very complex; the width of diverse applications and the potential of the market are very high (MAY, 2004). In Brazil, the research started only some years ago but the acceptance of FM in the market exists until now.

3.2. Economic Situation

Currently, companies are in the situation of rapidly evolving opportunities for data processing. This allows the companies to integrate an information system for all phases of the properties’ life cycle. Brazil is moving in the direction of a service society. An environmental consciousness has become more important (INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, 2007). It demands to proceed rationally with the resources, including, in particular, the saving of energy, the optimal utilization of necessary resources in constructions and the reuse of once necessary materials.

A second challenge is that the market has become very dynamic. The needs of the market participants are changing faster. This means that a property must be more and more quickly constructed and needs to be more quickly at company’s disposal if the company wants to remain competitive. This property also has to suffice the diverse requirements because currently the removal rate of companies has become very high. If it is inflexible, the results will be high modification costs. The property also has to be managed effectively. A company can no longer afford unnecessary costs.

These are the major problems with which the companies rapidly grapple. In search of innovative variations, the inefficiency of the building planning and management was found. The companies are under strong competitive pressure. No company can still afford to consider the cost of their property as given (HARDEN; KAHLEN, 1993). It has to try to minimize these costs. Here the new possibilities of information that should help as well as data processing and comprehensive analysis of enterprise data. Such an analysis will be possible by Facility Management. It takes

up with systems, which allows managers to make building relevant decisions based on adequate information.

3.3. Dimensions of Facility Management

The Facility Management needs to be effective in order to consider the entire life cycle of a property. In addition, all possible real estate and user specific information has to be collected and evaluated. Ultimately a holistic approach of the FM is necessary to guarantee the efficient implementation of tasks and attainment of FM targets (FRUTIG; REIBLICH, 1995).

From today's perspective FM not only includes the use phase of the building, but begins in project development and ends with the demolition of the property. In the planning phase of a property it is possible to influence greatly the future operational costs. In the actual use phase, this is only possible on a small scale or by using a lot of capital. The demolition of a property poses as the end of the FM. The opportunities to influence costs are pictured in Figure 1.

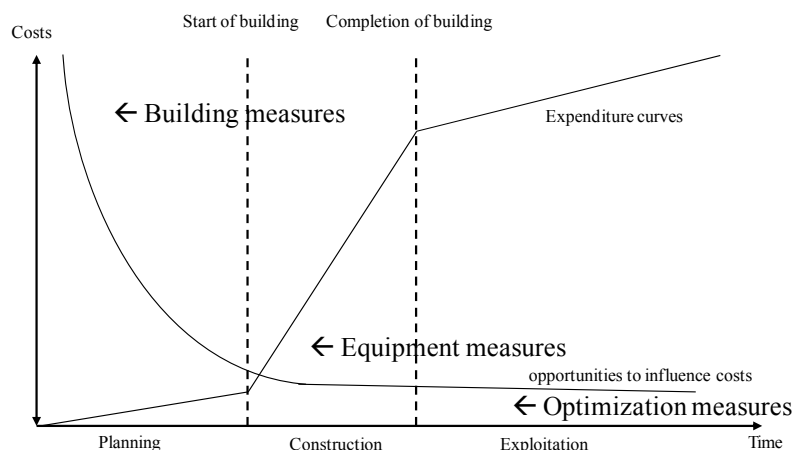


Figure 1 – Opportunities to influence costs

Source: Amelung (1996)

The study of Helbling (2000) describes the situation as follows: “The operating and maintenance costs exceed after around 7 years the final manufacturing costs, that means that 85% of the total cost of a building accrues during use.”.

The Facility Management needs to make decisions, and gather comprehensive and accurate data about the property. The collection of information is one more task of the FM. The collection of this information can exceed or blow the budget.

Therefore at the beginning of a FM project a very accurate differentiation between absolutely necessary and not necessary data should follow. An inobservance leads to much higher costs like Figure 2 points out. Furthermore, a permanent inventory of data maintenance should follow, in order to maintain the status and the quality of the future information. Nävy (2006) writes: “The objective is a transparent company, in which all information about the material resources and their management, organization and administration.” With this knowledge remains the possibility to abridge the time of supply of the information. In the case of an accident is a much faster reaction therefore possible.

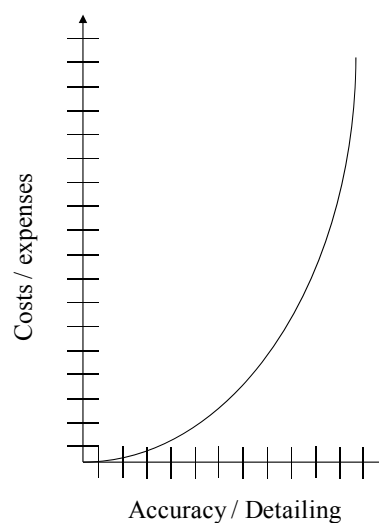


Figure 2 – Increase in expenses and the cost of details
 Source: Braun, Osterle and Haller (2007)

The collection of the respective information on material resources previously was done in the various departments, so FM gathers these now into one inter-divisional place (NÄVY, 2006). The integrality of the FM considers the material resources not isolated from other processes, but as at the center of the viewing and is shown in the following Figure 3.

Therefore, FM is a holistic approach, which implies the view of periods, stages, functions and object overlaps of the FM, to consequently meet the main task of the process optimization (GRABATIN, 2002). Nävy (2006) also writes that due to the complexity of the material resources, the great period of the life cycle and importance of the potential cost is clear that the various tasks are much differentiated within the FM.

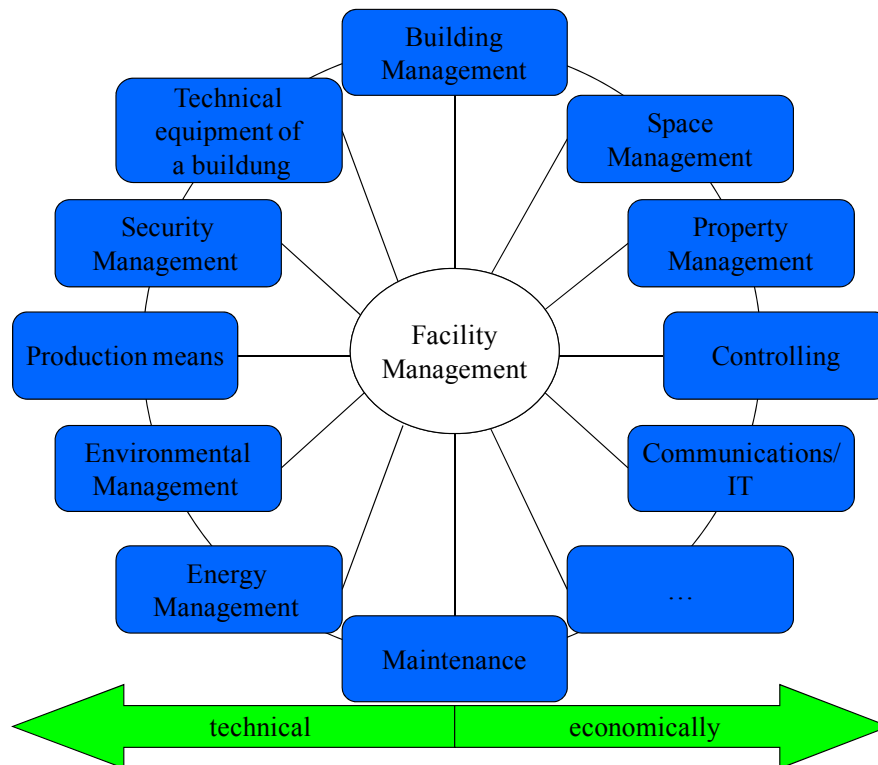


Figure 3 – Areas of the Facility Management
 Source: Nävy (2006, p. 4)

Nävy (2006) leads the technical and the commercial point of view, to suffice the holistic approach of the FM. Once the phase technically seen, it differs between the technical, infrastructural and commercial buildings and space management (HEß, 2002). Lutz and Klaproth (2004) integrate the space management into the infrastructure building management. The commonly used term of the building management limits the Facility Management on the exploitation phase. To comply with the holistic view of the FM, the space management needs to be seen as a single component. According to the author, a connection with the infrastructural building management seems not very promising.

3.4. Service divisions of Facility Management

Services of Facility Management are used for the protection of the core business and thus secure the success of the company. They includes the areas of performance, the management, the operation and services, according to Grabatin and Feyerabend (2008). Administration is the commercial management. It contains management responsibilities in all areas of a company, the administrative agency, the marketing etc (NÄVY, 2006). Operating consists in the technical management that includes the management of all technical systems, buildings and lands. Offices

are even supplementary services, and include mainly the domestic economy and security areas (GONDRING; WAGNER VON VAHLEN, 2007).

4. THE COMPANY

4.1. Business - the core business of the company

Each company has its central task – its core business. Due to the economic pressure, to which it is increasingly exposed, it is concentrated on its own core business. The basis for this is that the company first recognizes its business and its corporate strategy in this direction is prepared to change, which of course, mostly is incident with structural changes in the companies. This disposition, however, the companies demonstrate the least possible. Brazilian companies are not totally open for changes and innovations. They believe their methods are still the best. Many companies may adapt badly, but a reorganization of the administration allows the discharge (less work) of personnel from the additional non-productive actions and a concentration for the main tasks.

4.2. Company and its properties

Hens (1999) says that companies need commercial real estate in the form of office space, production halls, etc. In these properties, companies produce the company's performance. Strategies will be conceived, product and marketing approaches elaborated, and most important decisions will be reached. The importance of the property unmistakably comes up. Nevertheless, a company hardly ever has its real estate effectively managed (JÜRGENSONN; SCHÄFERS, 2004). The large amount of the costs that rose with the building are considered necessary and unchangeably accepted. Why?

One reason could be the decades of staying in the same national level of competition. Within the Brazilian economy currently underlies a fundamental change away from the market to the buyers' market. The former national competition situation exists now worldwide and sure both for the number of competitors and the intensity of competition. (The former situation of national competition now exists internationally, and in truth, affects both the number of competitors as well as the intensity of the competition. Enterprises fight for greater productivity in enhanced fields of competition. Companies and investors want the best use of their assets. And

the property now represents the largest single item in assets, after the production and administrative areas are rationalized.

It is doubtful that the actual value of the current property assets corresponds to the balance sheet (GERLACH; HIERONYMUS; SCHWATLO, 1994). It has for many years worked for an improvement of the production processes, but is attached the management of resources in such a low role that it could be neglected. After investigations, in the USA only about 60 - 70% of the companies with just an approximate knowledge about their property data and about 20% have no knowledge (FALK, 1994). Overall, this means that only 10 - 20% of companies manage effectively their real estate. According to IFMA (1984), study results demonstrate for the clarification of the income statement that between 10 and 18% of annual expenses (total expenses in the income statement of the companies) are in any way associated with buildings. This is even more obvious if someone looks at the balance sheets. According to the balance of Harvard Real Estate Inc. links between 25 and 50% of total assets are land and buildings. This means that between a quarter and half of the total balance sheet of a company concerns its real property, too much for one to simply accept this costs.

The interested parties in a property can be grouped into two categories. The investor sees that in the property invested capital and its recoverable yield. He is therefore interested to maintain the value of the building. The operators and tenants wish to obtain profits with the property. Once the production allows only a small increase, it orients to the building as a greater potential.

Companies want to analyze their properties of the benefits and will have, in relation to their intensity of benefits, an unpleasant surprise. The intensity of benefits of real estate is frightening low. An example of office space under consideration of a 5 day work week with 8 hours per day and normal holidays, amounts to the usual exploitation 20%, which means that the property has a capacity utilization of 20% (FALK, 1994). In other words, this means with 220 working days a year, each with 8 hours of work time, the building is empty 7000 hours of a year from possible 8760 hours per year. This lack of capacity utilization is questionable. Once a company has detected this, it has found a potential, which is, for intensive management, the productivity of the company increase in a significant degree.

The current property portfolio that companies want is generalized and explained on the example of the “Switzerland Building Park”. It has about 2.2 million buildings (HOFFER; WÜEST; PARTNER, 1995). A subdivision after usage demonstrates that it includes more than 50% of residential buildings. These and agricultural buildings, annex and large parts of the industrial and commercial buildings are only relatively primitive structures of stone, wood and binders. Such buildings are designated and known as static. A subdivision by age shows that more than 50% of the buildings were built before 1960 (OTT; KAUFMANN; JAKOB, 2004). In other countries, this proportion is often even higher. Already a purely technical point of view shows that at this time could then still not highly technical building arise. (However, only through the pure technical point of view it is demonstrated that buildings built during this time (before 1960) cannot result in high technology buildings. These buildings are simple structures, also known as static.

Considering the two approaches together, a gross estimation over the current property portfolio follows. Currently, one can consider as dynamic up to 10-15% of all existing buildings, this meaning high-tech buildings. In other words, at least 85% of all buildings are quite normal and simple buildings. Looking on the basis of these numbers in the future, one recognizes that our neither built environment in the near future nor static buildings will be marked. For Brazil there are no existing numbers. This means that the considerations of Facility Management may occupy not only with new planned buildings. On the contrary, there should be the objective, primarily of old buildings through Facility Management to be adjusted to the needs of owners and users.

Most companies view as the biggest expenditure for the property the final manufacturing costs (HOMANN, 1999). All others are so insignificant that they are together in a block of fixed costs to be considered. They do not remember that every piece of useable floor area even day to day creates usage costs like electricity, air conditioning and others. Such an approach is of course a cost analysis that is not possible. The market analysis of an international company says that within 8 years of follow-up costs already amount 5.5 times (HOMANN, 1999). Follow-up costs are divided into additional costs (heating, lighting, electricity costs, etc.) and repairs (cabling, partition walls, double floors, etc.) (WEISE; HORNBERG, 2007).

What was initially demonstrated succumbs great changes to the Brazilian economy. Companies are coming in stronger competition. This will have higher requirements, which they solve with a view of performance enhancement. Companies need, more than ever before, respect on the efficiency of all of its parts. Minimizing costs is the challenge. Otherwise, they cannot stand the competition today on the new international markets. The rise in recent years, in development of data processing and technology (particularly for construction and space) must be integrated, if possible. The realization of the companies' mission to orient only at the manufacturing sector is not enough. There will be requiring always more services. Such are rendering almost exclusively in commercial properties, which means that also the building must be optimally managed (NÄVY, 2006).

Particularly through strong training of the service sector, more people will always work in offices. In order to be able to explore their productivity (the people who work in the offices) it is necessary to create optimum working conditions for them. Currently, the workers themselves demand even more. The money alone plays for them no longer the only role. They spend about 60% of their day at work and therefore must be motivated (HELLERFORTH, 2008). They call for a "kind of world experience on workplace".

Stronger environmental consciousness of people also shapes the enterprise sector (WEISE, 2007). Current intensification of legal rules for the environmental operation of buildings must be absorbed by companies. Optimal use and re-use options of more valuable resources is required. Especially for scarce resources like oil one should try switching to other opportunities. The prevention of pollution by minimizing pollutant emissions must be respected (INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, 2007).

Companies need to manage effectively their property. They must keep in mind, however, the above-mentioned aspects. Especially for the cost of a property, it is therefore important, to be able to predict the thinking and be assured from the beginning of the planning, because the costs first may be higher or perhaps at new building/reconstruction (HELLERFORTH, 2008).

5. THE “INTELLIGENT BUILDING”

Due to the ever-increasing international competition and the necessity of integration of growing economical, environmental and social aspects in the individual phases of the entire life cycle of real estate the “intelligent building” was developed as an alternative test of solving the difficulties faced by the companies.

5.1. Term: “intelligent building”

Intelligent buildings are also an attempt to meet all demands by the company using the latest high-tech and data-processing opportunities (LAZAK, 1994). In order for a permanent exchange of information to occur between the groups (which are in the building), all data must be systematically collected and handled by a computer, so at the end an “intelligent building” may be developed.

This indicates that the integration of data-processing techniques is a basic requirement and must be assured from the beginning of the planning (KIM, 2008). It has been recognized that the availability of information decreases very quickly in accordance with existing methods of commissioning, so that in the use phase much data needs to be recorded again. Then again, the costs increase, what belies the economic requirements.

Booty (2006) defines that “... an intelligent building provides a productive and cost-effective environment because its four basic components – structure, systems, services and management – have fully integrated, creating the optimum design”.

Intelligence is a function of flexibility and adaptability to the changing needs of the permanent business establishment. The need for change results from the changing needs of the users of the property, the environment and the society. This will be achieved through flexible concepts, integrated building automation, networked information and communications technology.

Flexible concepts are buildings that are designed in such a way that the demands corresponds with today's users, but, also above all, with changing needs in the future quickly and without much effort to adapt.

Integrated building automation means it is in a position of reasonable intertwining, monitoring and managing together all of the systems of the house and all of the security systems with different functions and origins (HERCZEG, 2006).

Networked information and communications technology means that all information will be collected and stored centrally through processed data. They are all accessible on the current status. It gives modern possibilities of communication between the business groups, but also between the individual employees.

One can say that a intelligent building is in the position, thanks to its flexible building concepts, its integrated building automation and its networked information and communication technology that responds intelligently to changing needs of its residents (users), the environment and the society (Economic situation) (ALDA; HIRSCHNER, 2005).

A building can divided into “simple” and “intelligent”. Simple buildings are simple structures of mortar and stone. An intelligent building can arise from them, when the possibility of a building exists to adjust without substantial intervention and without follow-up costs or adjustment of changing needs. The prerequisite is that the building and its environment views coherently. Previously, all parts of problems of a building were processed consecutively or parallel. Therefore for an intelligent building to arise, it is necessary to consider integrally all areas. This is done mainly in two main phases (OBERER, 2008):

The 1st phase is the “primary building blocks”:

- Functional analysis (customer needs);
- Intelligent envelope to cover defined functions;
- Shape building technology and building ecology; and
- Efficiency targets for investment and operation.

The result is an improved structural overall concept. The 2nd phase is the “secondary devices”:

- Building automation and security concept;
- Communications concept for the media, people, goods and values;
- Intelligent building infrastructure with cabling, networking and logistics; and
- Building management to the long-term Facility Management.

The result of the 2nd phase is an optimized integrated project, called “intelligent building”.

Finding these elements of modules and their meaningful combining shows the intelligence of a building. An intelligent building will be achieved when the in the planning which needs the users of the building and in the future will have are analyzed. These will be implemented in the intelligent envelope of the building, which means, it will be possible, by changing needs also to change accordingly the design of the building, for example growing at or shrinking, owner occupancy outside users (SANTAMOURIS, 2006).

From here on an appropriate structure of the building engineered will be constructed and the requirements fair flexible housing technology components (heating, ventilation, electrical equipment, etc.) installed. When this construct suffices satisfactorily the profitability targets, the best overall architectural concept has been found.

Besides this, the technical/electronic communication options (such as wireless communications, video, image, data), the meaningful choice of cabling the facilities for the transmission of information (such as fax, computer, telephone) and a meaningful choice of home automation and security systems have to be integrated and also planned by the long-term Facility Management from the beginning, for later an intelligent building to be built, which becomes a promise of maximum benefit for all interested parties of the building (HERCZEG, 2006; BOOTY, 2006).

5.2. Intervention of Facility Management

It is difficult to manage such an intelligent building. This should still result under the aspects of minimum cost, which is practically impossible without proper previewed management. Here, Facility Management interferes in the company. It includes the holistic consideration of a property starting with the planning over construction, exploitation and maintenance until to the demolition. In the use phase Facility Management develops his biggest efficiency. The system is used is Computer Aided Facilities Management - CAFM (SUN; HOWARD, 2004; NÄVY, 2006). The property portfolio of the company is in terms of revenue enhancement and cost-cutting managed.

Effective management of buildings influences the balance of the company in a favorable direction. Facility Management does not exist in parallel with the company

(business) management, but it intervenes in the business with opportunities to reduce costs and increase the performance of the company (BOOTY, 2006).

Facility Management may be understood as a cross-cutting feature of corporate governance of the company, which is in a separate area of specific responsibility that receives its tasks through the company and that influences the company through its solutions.

6. CONCLUSION

Buildings that save energy, like passive houses or zero-energy buildings, by minimizing the additional costs and are flexible in their construction need a lot of technology to realize their functions.

It was demonstrated that every real estate needs to be seen as its own profit centre, with a long exploitation life and high costs during this exploitation time. The best possibility to influence the future additional costs by using all Facility Management functions is in the planning phase. FM offers transparency about its property costs and exploitation.

The properties in the companies as a profit factor were forgotten until some years ago. New companies and investors want the best use of their assets. And the property now represents the largest single item in assets, after the production and administrative areas.

The investor sees in the property, his invested capital and his recoverable yield. This means he wants a profit with his real estate. In order to achieve that, it is necessary to increase the intensity of exploitation, investigate the current real estate portfolio of the company and its costs.

Changes in the economical, social and environmental requirements become necessary to adapt the properties. The solution is called Intelligent Building. Intelligent Building as combination of Facility Management and Business Management is new, but is currently necessary to satisfy the needs of the demand. The need of intelligent building is very current, which conferences like Green Intelligent Building Conference (2013) shows.

This type of building needs to be flexible in its structure and services, open for changes in environmental requirements and sustainable for a value enhancement.

With a CAFM system this is possible and the company will be more flexible in relation to the competitors and future changes.

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