FACILITY MANAGEMENT AS INNOVATIVE TOOL FOR EFFECTIVE MANAGEMENT OF SUPPORTING COMPANY ACTIVITIES

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In general, all organizations, whether public or private, use buildings, properties and services (support services) in order to support its core activities. By coordination of these assets and services; use of management skills and incorporation of various changes inenvironment; facility management (FM) affects its ability to act proactively and ensure all its requirements. The aim of FM is to strengthen (in terms of main production flow) boundary processes and systems, to allow workers (with their help) give better performance and contribute to overall success of business organization. Presented article deals with implementation and use of CAFM software ProFM, which has in result, simplification and streamlining of building management. It subsequently summarizes the advantages of using FM in organization.

Keywords
facility management, ProFM, building, efficiency, administration

1. New trends in industrial production

We often use the acronym PLM – what we understand in meaning of managing product lifecycle – it often conveys the idea that it is a process that runs from product development to its dispatch to customer. However, this process must go further today – it must necessarily include customer service and controlled method of product disposal.

Figure 1. *PLM*

PLM in its essence has lot of meanings, and includes custom integration of business systems and procedures – has for task meaningfully (in meaning of targeted strategy) to integrate personnel, technology and information to achieve successful, competitive business development. To achieve these objectives is more and more often used collaboration, digitization and communication technology – which is why we often talk about digital factory (DF). Definition of digital factory by the Association of German Engineers (VDI) says that *digital factory is an umbrella term for a large network of digital methods, models and tools (including simulation and 3D visualization), which are integrated into ongoing data management* [VDI 2008].

Under the concept of digital business we understand especially gradual project process that is supported by very diverse, but mutually compatible software tools. Concept of digital factory is unique in that it allows comprehensive representation of real production not only with all production processes in virtual environment, but also the production systems.

2. Education of new professionals

From the above it is clear that in rapidly developing field of business processes and systems digitization will need many professionals – it is now extremely important to familiarize with these new trends not only university students, but also company employees, who meet this problems more often.

Department of Industrial Engineering and Management at University of West Bohemia in Pilsen deals with digital factory problematic since 2005. Together with the Departments of Design and Technology is deal with most activities, which include the total product life cycle management – technology design and preparation of products and creation of production system for their implementation. The core of activities is concentrated primarily in areas of systematic design process, production machines programming and logistic support of workshops layout design with strong focus on ergonomics and subsequent simulation of proposed production processes.

At University of West Bohemia in Pilsen are today for product lifecycle management products mainly used products of Siemens PLM Software, specifically NX and Tecnomatix (Process Designer, Process Simulate Plant Simulatin, Jack). These packages consist of several tools beginning with design CAD/CAM, planning tools and ending with simulation and optimization tools. Advantage of this comprehensive package is data consistency between instruments and overall management of entire "virtual factory" which helps to drive real factory.

Within these three departments of Faculty of Mechanical Engineering, UWB, product life cycle is captured from initial product design phase to final phase describing the simulation of its production process.

In practice, only those steps in product management life cycle are not enough. With increasing time, more and more attention must be paid to what does not represent direct production process of business item – management, maintenance and upgrading of existing production base. Otherwise, even in run-in company, stress, confusion and sometimes even chaos are generated more and more. With minimizing of these adverse effects deals next section of digital factory, which focuses on management and asset management – what is known as Facility Management (FM).

3. Facility Management

In general, all organizations, whether public or private, use buildings, properties and services (support services) to support core activities. By coordination of these assets and services, by use of management capabilities and incorporation of various changes into organization environment facility management affects its ability to act proactively and ensure all its requirements. This is also done in order to optimize costs and assets and services flow.

Main potential benefits of facility management implementation in organizations:

- Clear and transparent communication between demand and supply side by dedicating persons as single points of contact for all services, which are defined in Facility Management agreement.
- Most effective use of synergies amongst different services, which will help to improve performance and reduce costs of an organisation.
- Simple and manageable concept of internal and external services responsibilities, based on decisions, which lead to systematic insourcing or outsourcing procedures.
- Reduction of conflicts between internal and external service providers.
- Integration and coordination of all required support services.
- Transparent knowledge and information on service levels and costs, which can be clearly communicated to the end users.
- Improvement of organisation sustainability by implementing a life cycle analysis for facilities [Vyskocil 2007].

Nowadays, there is continual development of facility management in all european countries. All public and private organizations use facility management services to support main organization activities. Facility management affects company's ability to act proactively and meet all requirements by coordinating properties and services using management skills and processing many changes in environment. [Vyskocil 2009]

Facility management can be characterized by three areas, which are interrelated.

- field workers, ie, human resources and sociological aspects,
- work processes, ie, performance and funding,
- workspace area, ie, architecture and engineering. [ifma]

The performance itself is affected by a large number of other external factors. These include economical state, market changes and customer behavior, limited access to technology, etc.

First two areas (personnel and processes) are same in all control areas. It is always a set of activities provided by or designed for a group of people. For facility management is just specific the third area, referred as "Areas". Facility Management manages primarily activities intended to optimize use of building space. We do not mean all activities that are linked to space, but they are activities through which quality of space can be increased and promote optimal recovery. From the above, basic objective of facility management can be defined:

The aim of FM is to strengthen – in terms of the main production flow – boundary processes and systems, to (with their help) allow workers at individual workplaces give better performance and contribute to overall success of business organization [Rondeau].

All organizations fully automatically ensure activities that are necessary for correct operation. New on market, or small companies have everything relatively more simple and partially more transparent. By gradual expansion of company, functionality is becoming increasingly complex and increasing on priority. It is obvious that optimization of core activities is carried out continuously, is still in the field of view of companies. Often, however, support activities are disregarded. These activities provide background, which means that they provide an environment in which individual employees are working, whether CEO or warehousemen. These all need to ensure for their work number of services and assistance to enable them to concentrate on "their" job activities. Facility management is responsible to provide this all for them in form of which is cost-optimal, pleasant, legally and formally regular, ecological and energy-efficient and appropriate to corporate standards [Vyskocil 2007].

4. Facility Management problematic in industrial company

Theoretically is quite clear. The practice of industrial companies shows that asset management and maintenance still uses a lot of traditional methods. Ignorance of relevant professional specialists then naturally brings imperfection and inefficiency into asset management processes. Key information is often found only in minds of seniors and experienced staff and therefore their retirement or leave to another company presents great risk or that needed information is lost.

It is not always sufficient support from top management, negatively is reflected, that workers ensuring FM processes for various reasons belong under different leaders, what can lead to a situation where right hand doesn't know what left is doing. Clear implication is, that there is no pressure on any partial unification of auxiliary software products and, of course, there is no pushing for integration of new software products.

Any integration in FM area starts over data of:

- space (spatial passport),
- assets (technical passport) and
- individual elements and parts of buildings (building passport).

For most businesses usually range of master plan, sites, areas, number of objects and machines, technologies, facilities, equipment and inventory is so large that spreadsheets are not enough. In larger companies data are going to hundreds of thousands of items, and specialized software products known as CAFM is required, which already have their place in business information system.

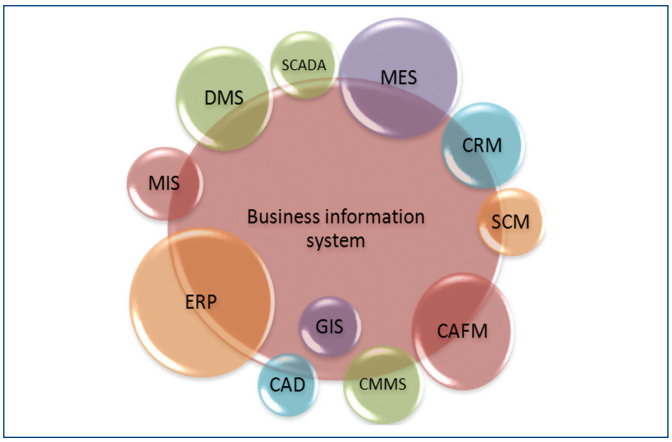

Figure 2. *Business information system [Vyskocil 2009]*

There is a number of complex software packages that allow various data to be stored in database and generate a variety of management reports as required. Without good order in data collection efficiency cannot be expected even at a relatively expensive system. But if there is, effective management can be performed and it is possible to achieve high savings. Also, proper inventory records, list of the required maintenance term contracts in order, also key management are areas with economic potential.

From the above it is clear that in order to maintain data of all movable and immovable property in company it is now unthinkable not to use effective software support. Important is that today, there are many companies on the market, that deal with FM issues professionally and are able to offer broad portfolio of services.

5. FM Software Support

FM area is quite extensive and must operate with huge amount of data that are tied in many different areas. In many companies, costs for maintenance, management and asset management are increasing. It is not possible (without use of computer technology) in a transparent and comprehensive manner throughout life cycle maintain and manage (with minimal costs) all processes in optimal integration of people, technologies and locations.

Computer-aided facility management (CAFM) is software system for management of support processes based on graphical representation of management area (CAD), endowed with strong database support information [Mobach]. The aim of CAFM system use is to streamline support operations, exactly address cost items and create an information base for quick decision-making management. Therefore it is not surprising that many companies decided to help solve this situation by creation of support programs. From various islet solutions, that are integrated over time at the beginning, into increasingly larger and more complex packages of FM support. In Czech Republic probably the most popular program in this area is ARCHIBUS [archibus]. Other competing softwares in this area are AFM, Chastia FM, FM Plus. At University of West Bohemia a German product ProFM, is used.

5.1 ProFM

German company ProjecteamAG (http://www.projecteam.ag/) specializes in projecting companies. It is a project organization that offers services in a wide range (Ideological design solutions, planning and design and implementation of the project and buildings).

It also offers customers its own services in subsequent stage of new investment management (operation and maintenance and change of purpose of land, buildings, equipment and machinery.

The scope of project services is complex for many industries:

- Municipalities and municipal enterprises,
- Industry and industrial parks,
- Hospitals and sanitary facilities,
- Real estate and housing management,
- Trade and crafts, business parks,
- Transport companies [ProjecTeam AG].

Analytical methods used to determine extent and needs of organization and gradually possible solutions are proposed for problems with operation, administration and maintenance in order to reduce current costs. Tailor-made concepts and projects are then supported by implementation of modular program of CAFM nature, including the necessary training.

5.1.1 ProFM software composition

ProFM® is modern software (developed by German company ProjecteamAG) for facility management. ProFM® is user friendly, graphically oriented CAFM system integrating AutoCAD with direct connection to Oracle database [ProjecTeam AG]. Modular software design offers great flexibility and can be used for all business types. ProFM® includes all technical, business and infrastructure processes, and is composed of 19 different modules that manage different areas of FM. List of ProFM modules: Area Management, Graphic Module, Inventory, Cataster, Infrastructure, Keys, Safety, Nets, Media, Contracts, Terms, ISP, CAD, Reports, Messages, Workflow, Maintenance, ILP and Contractor. These modules are interrelated.

6. Pilot project

In January 2012 at the Department of Industrial Engineering and Management at University of West Bohemia in Pilsen pilot project was launched and facility management software ProFM® was installed. Costs associated with purchase, implementation and operation of ProFM were zero (Grant conditions). Graphical presentation of building is shown on Fig. 3. Upper left corner represents the basic layout in AutoCAD, upper right color-coded areas in ProFM. Bottom loft and roght corners are professional 2D and 3D visualisation in presentation software VisTable [Poor].

ProFM software allows for needs of facility manager clearly graphically distinguish type of space in building. Each type (corridor, office, classroom, workshop, hall, etc ...) according to FM standards has its own different colour.

Figure 3. *Graphical presentation of building [Poor]*

Figure 4. *Space management*

In addition to any room data can be inserted:

- Inventory
- Staff
- Area
- Type of room
  (classroom, office, workshop, hall...)
- Number of employees
- Keys
- Various documents
  (CV, Pictures, Videos, Text documents, Audio...)
- Contracts
- CAD-drawings
- Excel reports
- .....

Most ProFM modules are formed by form of tables, in which implemented data can be seen. Example – Module Area Management. Each area in building in the inventory module contains data: number, size, classification, subclass, status, last change, plant, building and floor. Displayed data can be filtered and changed according to customer requirements. Area management module is shown on Fig. 5.

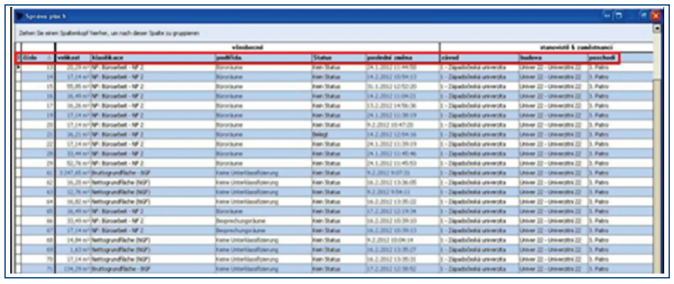

Figure 5. *Area Management module*

Completely „filled" room is shown on Fig. 6.

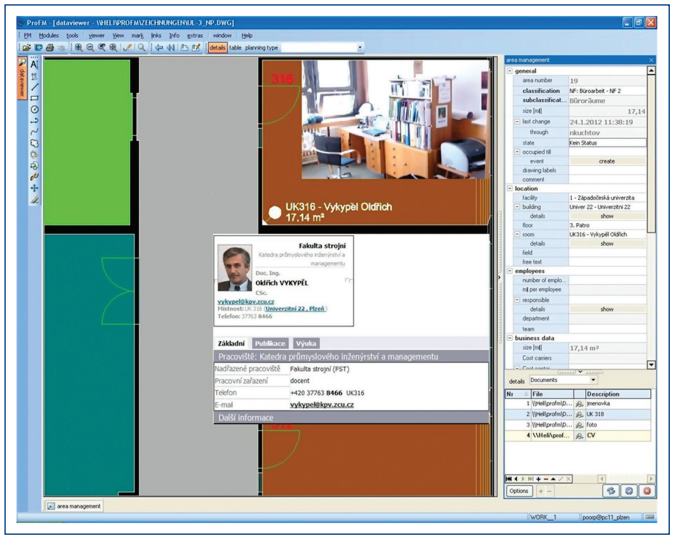

Figure 6. *Filled area with all necessary data*

Another objective of pilot project was to graphically transfer the managed object into 3D environment. For this purpose a software called VisTable was used. VisTABLE® represents an integrated concept for intuitive team-oriented factory planning. The combination of innovative hardware and software enables to accelerate and optimize planning process. VisTable tool serves as supporting applications for structural design of manufacturing systems. This software is particularly characterized by ease of manipulating. Nevertheless includes applications that facilitate work and decision

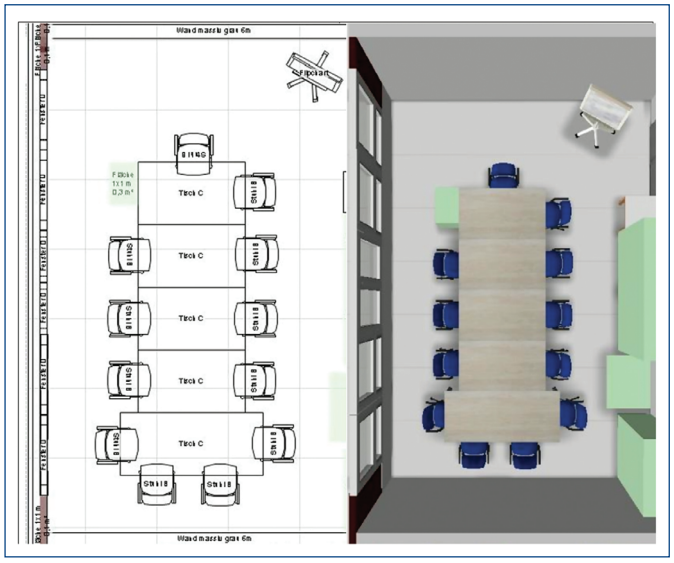

Figure 7. *2D and 3D room model*

making in design and layout of workplaces entire production layout, but also in design of other areas, such as office, public, etc. In VisTable in particular following activities are supported:

- Interactive layout design within the planning team, analyses of material flows
- Team-based detailed design of layouts, check for compliance of safety margins
- Layout benchmarking [Poor]

Areas 2D model in managed object were converted into 3D. Sample of one room (2D and 3D view) is shown in Fig. 7.

Fig. 8 represents reality and virtual model.

Figure 8. *Reality and virtual model*

7. Advantages of FM using

- easy browsing, editing, and management of all detailed company requirements ,
- structuring of digitally-led documentation in all areas of administration,
- capture of surface load, data about machines, service, handling areas, etc.,
- data management (e.g. project data connection HLS and ELT and FM data),
- used planning and project documentation is current,
- transparency, daily updates,
- cost savings, reduction in operating costs (up to 30%) and reduced space requirements (up to 40%),
- coordination and integration of support activities (even when outsourcing)
- synergistic effect of supporting activities, more efficient space organization,
- FM information can be used as strategic overview for planning or for more accurate accounting and inventory, as well as for distribution of rent and depreciation, optimizing resources and also for addressing exact costs [ifma].

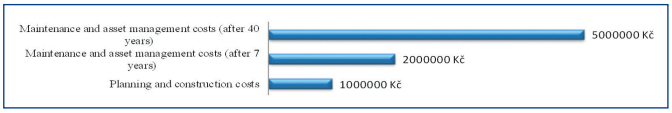

Figure 9. *Costs evaluation [ifma]*

8. Conclusion

Ever-increasing demand for environmental quality in buildings, as well as quality of the surrounding external environment are driving the need to properly design buildings that would meet standard requirements for internal environment. Facility management is profession that

involves several disciplines to ensure functionality of built environment by integrating people, places, processes and technology. To control the quality of support processes, complete and comprehensive agenda is still key issue. Processes of supporting activities are always built on data space, property, or may also relate to individual elements and parts of objects. It is modern software, such as ProFM, which facilitate, simplify and streamline object management of and help to maintain Facility management standards.

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