

# BIM/FM Case Study Project for IFMA

*Note: This document was prepared with the official approval of MOL. Any changes or amendments of it have to be approved by MOL and the author.*

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## **1. Management Summary**

In our present case study we describe the introduction of the ArchiFM-ProFM system, a Hungarian-developed BIM-based CAFM solution at MOL Nyrt., the largest company in the region. In the document an answer is given to how the management of MOL FM was able to make use of the advantages offered by the ArchiFM system during operation.

The introduction of the system was controlled by the employees of Graphisoft R&D Zrt. involving several subcontractors, and then, after the spin-off of the CAFM section, vintoCON Kft., founded by former employees, completed the project and has provided continuous technical support for day-to-day operations ever since.

The process of setting up the system was started by surveying the building data. The data of the building and the equipment, also important from the aspect of the operator, was determined, and this data also represented the basis of the survey methodology.

In line with the BIM concept and on the basis of the data already available in the database, the technical data and financial resource demand of the maintenance tasks is planned and monitored, and the realisation of the generated events is documented in the ArchiFM Maintenance module of the system. With the help of WEB-based reports the costs and utilisation data of the individual regions and buildings are clearly arranged, and the management decisions are well founded. Smooth communication between the operation (CAFM) and financial (SAP) databases is ensured by SAP interfaces. The acceptance and payment of the invoices for the worksheets certified in the CAFM system has become significantly simpler due to the integration of the technical and financial systems.

During introduction the structures, standards and company specific methodologies elaborated with the participation of both parties were suitable for the implementation of the solution at the other members of the MOL group too, by making minimal changes, in record time. Now the system supports work not only in the Hungarian language, but through the Slovakian version used by Slovnaft, it offers comprehensive support operating in an international environment.

## **2. Overview**

### **2.1. The reasons, aims and timing of introducing MOL CAFM**

Mol Nyrt. was founded at the beginning of October 1991, from 9 member companies of the National Mineral Oil and Gas Industry Trust. The companies had very different activities, locations and operation.



The size of the company's real estate portfolio called for organising facility management within the enterprise, so MOL established the Organisation of Corporate Services, which was aimed at relieving and serving the main business branches. First the organisation's tasks involved acquisition stocking, investment realisation, stocking, infrastructure operation, IT services and telecommunication organisations. In 2000 Infrastructure Operation was converted into Facility Management. From the different operation organisations and their activities the following were referred as being within the competence of Facility Management:

- Building maintenance
- Operation
- Security
- Reception services
- Office supplies
- Technical planning
- Transportation
- Architectural planning
- Real estate management
- Area maintenance
- Controlling building constructions
- Postal services
- Catering
- Rooms management
- Archiving
- Vehicle fleet management

Real estate of a non-technological, serving function was placed under the control of Facility Management. Such properties first of all include office buildings, warehouses, cultural and sport facilities, hotels, garages, apartments, abandoned business locations and empty plots - properties situated in more than 100 settlements, with buildings, structures (public utilities, roads, etc.) and land.

The diversity of the above tasks and properties called for the elaboration of an efficient and modern facility management strategy. The main aim of the strategy was maximum capital release and a significant reduction of operating costs in order to create a comprehensible real estate portfolio with an optimal composition, which ensures retention of strategically important properties but does lock up capital.

## 2.2. Initial status

The main task of MOL Nyrt.'s Facility Management is to perform Operating tasks involving the operation of more than 300 plots, nearly 600 buildings and over 1,000 structures.

The main aim defined in the operation strategy was to increase the standard of the service perceivably.

All this called for the creation of a precise and up-to-date database containing the required amount of data. This register had to be suitable for providing support for operation control processes. However, it required a comprehensive **database**. The data is contained in several integrated systems listed below:

- MOL Nyrt. registers a significant part of its operating processes in **SAP**, as a primary accounting system. Facility management communicates with SAP via several modules.

- **MOLING system:**

This is an information technology system supported by a geographic information system for storing the land office data of the real estate. The asset data included in SAP is linked to the MOLING system via topographical lot number. The data of new real estates are transferred to the CAFM system by migration.

- CAFM invited tenders concerning the computerised administration of MOL Nyrt.'s national real estate portfolio, in the scope of which a decision was made to introduce Graphisoft's **ArchiFM** and **ArchiFM Maintenance** system. The significance of the project is indicated by that the facility management system - flexibly suiting all main computer technology fields of corporate management - is able to handle the data of hundreds of buildings owned by MOL.

### **2.3. The main functions of the MOL-CAFM system**

- a) registration of the data of the plots, buildings and structures;
- b) electronic drawings of buildings (ground plans, cross-sections, facades);
- c) information on the premises and arrangement, move management support;
- d) maintenance management;
- e) helpdesk service;
- f) registration of contracts, invoices;
- g) breakdown of costs;
- h) project planning, monitoring;
- i) inventory;
- j) WEB-based analysis, inquiries;

### **2.4. The participating enterprises and the roles undertaken by them**

**Graphisoft**, founded in 1982 in Budapest, is one of the world's leading software developing companies in the field of architecture, building engineering and facility management. The company, besides its centre based in Budapest, has 13 subsidiary companies and representation offices all over the world. ArchiCAD is available in 80 countries of the world, in 25 localised language versions. During the development of the ArchiFM product family, and the realisation of facility management projects, it became increasingly more obvious that, on top of the expectations ordinarily fulfilled in the case of the planning systems included in Graphisoft's main profile, the FM sector specifies further important requirements. Because of this it was necessary to separate ArchiCAD and the closely related FM sector. In 2005 - in agreement with the staff working in this sector - Graphisoft decided to detach the FM sector from its basic activity, and an agreement was concluded on establishing a new company vintoCON Kft. (see below).

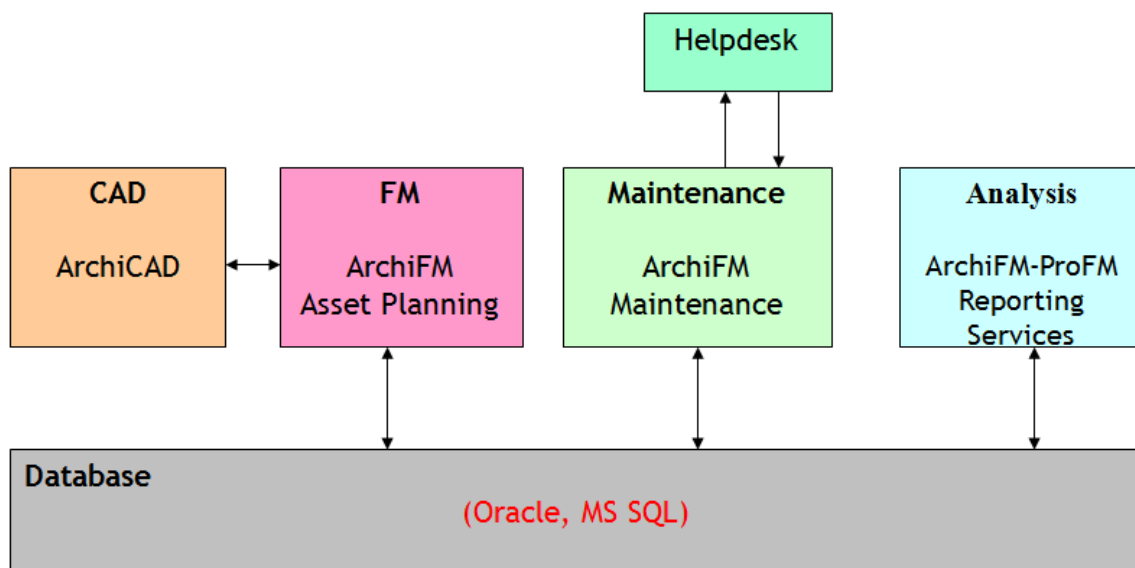
**Axis** is an information technology enterprises founded in 1989. It has a staff of nearly 80 people working in its offices located in Budapest and Székesfehérvár. Axis has numerous business branches, which include application development, which covers a wide spectrum starting from real estate management, through telephone card collecting clubs to warehouse stock registration systems. AXIS participated in the work in the fields of data migration, invoice breakdown, inventory and project planning.

**VintoCON Kft.** was founded in 2005, as a result of the separation of Graphisoft R&D Rt's ArchiFM Service business branch. In 2005 - in agreement with the staff working in this sector - Graphisoft decided to detach the FM sector from its basic activity, and an agreement was concluded on establishing a new company. As a result of this the former staff of the sector, in the same

composition, continued to work in Graphisoft Park within the framework of the newly founded vintoCON Kft. concentrating exclusively on this special field. Since 2005 the further development and support of MOL's facility management software has been realised under vintoCON's control.

## 2.5. Description of the technology used

The MOL-CAFM project uses the ArchiFM System based on the BIM (Building Information Modelling) concept. The main elements of the system are the following:



**ArchiCAD** is one of the world's leading CAD systems, which is a pioneer on the CAD market due to the realisation of object-oriented technology and support of three-dimensional building models. Instead of displaying the building elements with lines, it uses intelligent objects with real parameters, so-called GDL objects. The final result of the planning work is a virtual 3D building model containing the technical features of the real building.

ArchiCAD's BIM model operates as a central database; after making a change in a given part, the program automatically updates all other related features, including floor plans, cross-sections, facades and the 3-dimensional models. The Virtual Building Model™, suiting the great diversity of the data parameters that can be recorded, provides a full solution in all fields of the building industry including architecture, building engineering, construction and operation. The digital building model contains and handles all information

relating to the entire lifetime of the buildings. The Virtual Building Model is a 3D digital database containing all building elements and all furniture and equipment. This information can be any information - in line with the client's demands - including surface and volume data or individual product information.

**ArchiFM** is one of the first CAFM systems that realises the Virtual Building Model concept and forms an integral system with the ArchiCAD planning software: at the same time as the graphic display of the 3D building or object model, it is also created in the database.

The most important functions of the **ArchiFM Asset Planning** module:

- Area management
- Asset management
- Tenant management
- Move management

As a part of the Virtual Building Model concept the **ArchiFM Maintenance** module offers a solution for supporting operation and maintenance tasks.

This module uses the ArchiFM asset management and database to support maintenance work processes.

ArchiFM MNT follows the real structure of the maintenance processes:

It supports the entire process of obligatory statutory maintenance, planned preventive maintenance and maintenance needed because of random failures. ArchiFM Maintenance enables the short-term and long-term handling of maintenance events and costs, the continuous monitoring of the work to be performed, and the technical and cost analysis of the work performed. With the help of the database created, users are able to make plan-fact comparisons and determine cost limits based on a precise and real work plan.

### **3. The project and its milestones**

#### **3.1. Building survey and creating the BIM model**

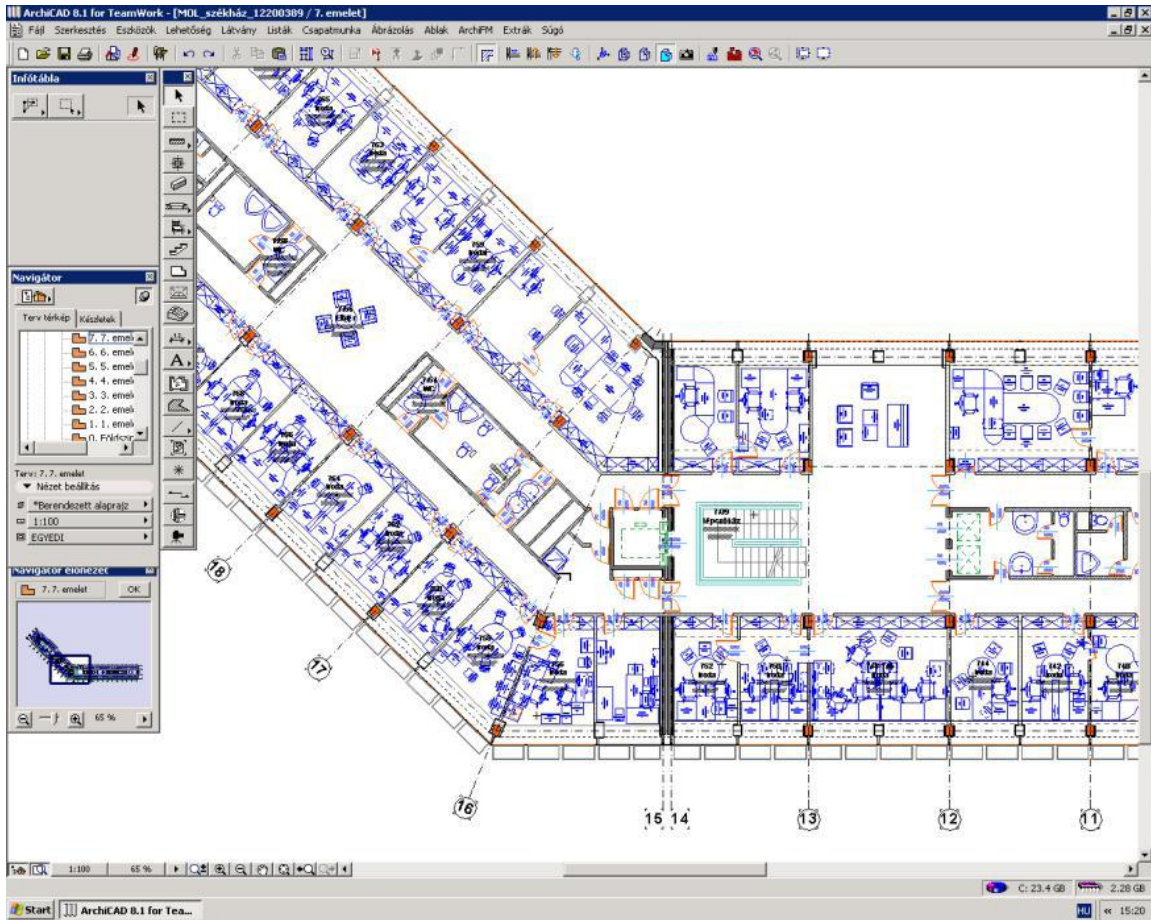
MOL and Graphisoft signed the contract concerning the introduction of the CAFM solution in November 2001.

The first step to creating the central database was to obtain accurate and up-to-date data. During the project the buildings were surveyed on the basis of the standard survey documentation prepared on the basis of the existing survey experience.

The buildings were surveyed in several stages, according to their order of priority.

The actual work started in the scope of a pilot project, the aim of which was to elaborate the uniform survey methodology. MOL headquarters located in Budapest, Október 23-a utca was selected as the subject of the pilot project.

The building portfolio was surveyed jointly by three companies specialised in ArchiCAD surveys: Mátrix FM, Anterra and CAD Stúdió.



During the realisation of the survey project quality management had outstanding significance, because later the ArchiCAD plans were not used independently (as a digital plan warehouse), but as parts of a system.

Quality control and management was performed by CAD Stúdió.

Before the survey the following documents were prepared:

- Survey methodology
- Documentation of MOL standards
- ArchiCAD model and exemplary buildings

### Preparing the **MOL Standards**:

This document provided support for preparing and adjusting the graphic plans of the MOL-CAFM system introduced at MOL Nyrt. The specification contained regulations relating to the general requirements and structure of the plans.

In operating practice, in general, not all elements need to be graphically displayed, so in the BIM model certain elements appear only in the database. A system of rules was elaborated concerning the amount and quality of the data recorded in the BIM model. The data recorded during the building survey was specified in accordance with the rules previously determined on the basis of the MOL standards, with the intention that in the future only data of an amount that fulfils the operation tasks and the main aims of the project should be recorded in the MOL-CAFM system.

The survey was performed on the basis of the physical structure used in ArchiFM:

Country-Region-City-Site-Building-Wing-Story-Room-Asset

By the end of 2002 the complete survey and documentation of nearly gross 400 thousand square metres of buildings was completed. The furniture and, no less importantly, the person and organisational hierarchy of the users was also recorded.

### **3.2. ArchiCAD-ArchiFM introduction**

After checking and cleaning up the survey data, the data was read into the CAFM system.

The ArchiCAD and the ArchiFM module was introduced as the first element of the ArchiFM-CAFM system developed by Graphisoft.

Due to the BIM technology, with the help of the unique bilateral synchronization, the applications follow the changes online. For example, if a modification is made in the graphic plan affecting the premises of the surveyed building, the area and other technical parameters are also changed in the database immediately. The same process also works the other way round. If certain technical parameters are modified in the alphanumeric database, they also change in the graphic plan.

Typically the parameters recorded during the survey could be listed in the following categories:

- Area data: The gross and net area of a given room represents the basic data used for numerous financial and technical calculations.

- Surface data: By listing the glass wall surface of a given façade, the number of square metres of the wall surface that needs to be cleaned can be determined.
- Volume data: By calculating the volume of rooms, basic data can be obtained needed for example for air technology calculations.
- Furniture data: barcode registration for inventory purposes, geometrical data to support the precise arrangement of the individual organisational units.
- Financial characteristics: Stating the data of purchase and the price, gross/net value and depreciation allowance can be calculated.
- Inventory register: Individual registration numbers and barcode can be allocated to important equipment, with the help of which the current inventory or list of premises can be printed out by pushing a button.

The graphic module of the BIM model contains the following graphic parts:

- Building floor plans
- The objects to be displayed graphically placed in the rooms
- Employees' symbols

In the plans in ArchiCAD format the basic data of the rooms are stored (m<sup>2</sup>, internal height, floor covering, name, number, etc.). In the graphic plan the objects and the employees can be moved from one room to another. Such changes also appear in the alphanumeric ArchiFM database.

The content of the BIM model's alphanumeric ArchiFM database:

- Physical structure of the building
- Objects placed in the physical structure
- Object features, parameters
- Statements on moves
- Worksheets for realising moves

### 3.3. MNT-HelpDesk introduction

In 2002 at the MOL group the other member of the ArchiFM product family, ArchiFM Maintenance was introduced together with the related standard WEB-based HelpDesk solution. The aim was to support maintenance and operation tasks.

The users of ArchiFM Maintenance are the companies in charge of the operation of the facilities, but MOL reserved the possibility of control due to the great diversity of the roles and accesses ensured by ArchiFM Maintenance.

Occasional failures are handled with the help of the Helpdesk system linked to the ArchiFM MNT module.

On the web surface for reporting errors MOL's employees can report failures and they can continuously monitor how their status changes.

The staff of the operating companies handle the reports received in the ArchiFM MNT module.

Besides handling failure reports, ArchiFM MNT also supports the handling of maintenance events prescribed by law as well as planned preventive maintenance events.

With the help of the BIM model it is easy to make statements broken down to area units, on the basis of which the tasks of the individual units can be inspected, monitored and coordinated, as a result of which both the operators and the management can make well-founded decisions.

### **3.4. IMAX module**

The IMAX module supplied by AXIS was installed at the same time as the above modules. This solution performs the following tasks within the system:

- Registration of operation contracts
- Registration of contracts with public utility service providers
- Registration of lease contracts
- Breakdown of the received operator invoices on the basis of the maintenance worksheets

The module also has its own enquiry solution.

### **3.5. WEB reports**

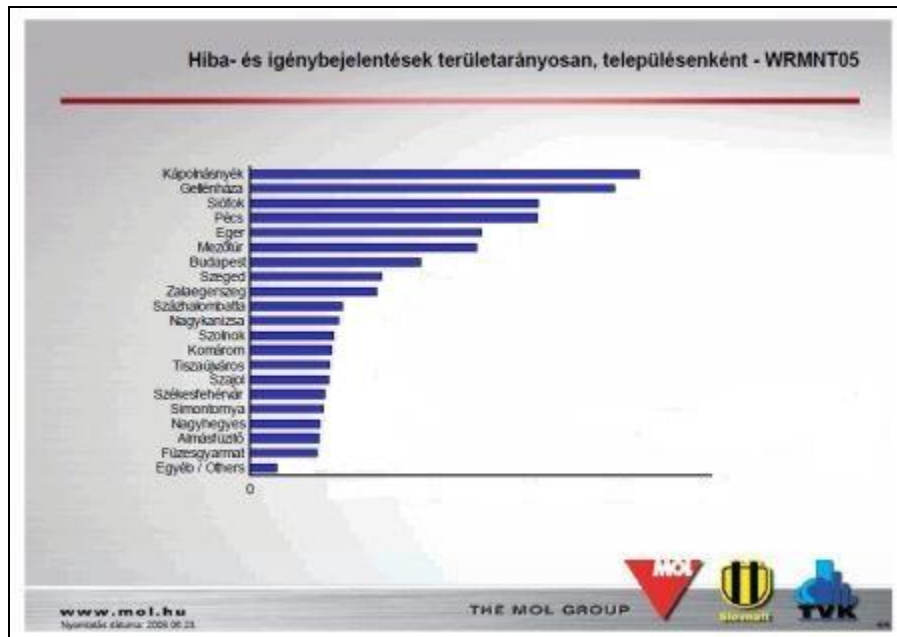
After the introduction of the basic modules, the regular and ad-hoc reports, in the interest of which the system was actually set up, could be created and finalised jointly with the management. The Reporting Services Module accessible on the web linked to the ArchiFM products provides integrated data access to the database elements created by ArchiFM, realising by this optimal data acquisition.

Similarly to the other members of the ArchiFM product family, regulating data access has outstanding significance in this case too. The reports are executable only with appropriate access.

The WEB access of the reports makes it unnecessary to install fat client software on the managers' computers, the statements can be launched on the local intranet in a WEB browser.

The statements prepared using different filters can be printed out, saved in the central data warehouse or even forwarded immediately by e-mail. By using the timed execution function the reports are automatically executed, and the

software sends the result in the language, at the time and to the e-mail inbox required.



### 3.6. Extension to the MOL group on the basis of the standards

In December 2003 Graphisoft started the localisation of the entire ArchiFM system for Slovnaft, a new member of the MOL group. The MOL standards elaborated in connection with the introduction of MOL-CAFM enabled the quick and simple introduction of the Slovakian CAFM, taking into consideration the Slovakian standards. Besides developing the Slovakian software module versions this work also involved the updating and translation of the entire related documentation.

On the turn of 2004-2005 the ArchiFM system was also extended to another new member of the MOL company group, TVK. TVK was integrated in the maintenance structure as an independent area, the digital ArchiCAD-based survey of TVK's real estate portfolio, similarly to Slovnaft's, was also performed jointly by vintoCON Kft. and its syndicate partner, Invenit Kft.

### 3.7. Further developments, customisations

After the accomplishment of the original project contract the Client ordered customisation and further development projects from the suppliers, the most significant ones of which are listed below:

**Project planning module (Axis):** A completely new module, which uses property data from the database and is suitable for planning renovation/reconstruction and other investment projects and for monitoring their status. The module obtains the technical data of the real estates from ArchiFM.

**Maintenance customisation:** It was necessary to adjust the original functionality of ArchiFM Maintenance to MOL's business processes. The solution also includes the development of new functions and the modification of already existing functions.

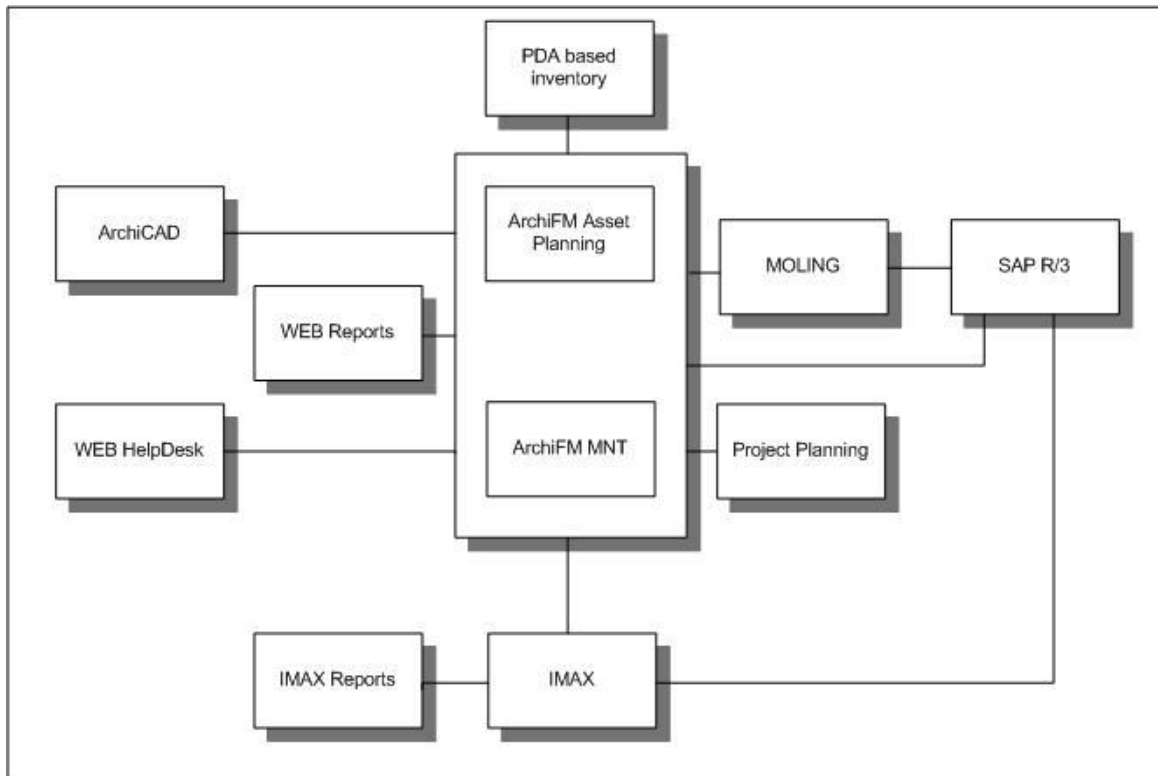
**Slovnaft EUR switch-over:** The complete CAFM system had to be reviewed because of the introduction of the EUR in Slovakia. In the Slovakian module, in the case of all data interfaces and enquiries containing financial data the currency had to be modified suiting the change, and the affected user manuals also had to be changed.

**HelpDesk development:** The original Helpdesk process had to be customised to suit MOL's demands, today reporting and service communication is realised here, both in respect of handling errors and demands.

Igénylési szám	Státusz	Rögzítés időpontja	Területi egység	Helye	Tervezett befejezés	Tényleges kezdés	Tényleges befejezés	Bejelentés szövege
100104	Érvénytelenített	2008.05.30. 15:10	Dunántúl		2008.05.30.	2008.05.30.	2008.05.30.	Vintocon-Tes
39434	Bejegyzett	2006.07.25. 11:26	1003					vintoCON tes
14973	Bejegyzett	2004.11.11. 13:06	1002					test Központ
14972	Teszt	2004.11.11. 13:04	1006					test központ
14967	Teszt	2004.11.11. 12:48	1003					test Központ
15008	Teszt	2004.11.11. 12:45	Alföld					test uzem2 C
14988	Teszt	2004.11.11. 12:43	Dunántúl					test uzem1 ci
14989	Teszt	2004.11.11. 12:38	Budapest					test UZEM1 C
14855	Teszt	2004.11.09. 10:58	1003					test

**PDA-based inventory development (Axis):** A PDA-based surveying system was set up at the Client to support the technical surveying of local furniture and engineering equipment by barcode. With this solution data can be recorded directly on site, in a controlled way, in electronic form, and migrated to the central database.

The present structure of MOL's CAFM system and the connections between the individual modules are illustrated in the picture below.



### 3.8. System operation, support

Similarly to other corporate management solutions, in the interest of ensuring the Client's continuous operation, a software monitoring and maintenance contract was concluded with the Suppliers. In the scope of this collaboration of several years, the problems occurring in connection with MOL CAFM are solved and demands are answered suiting the response times according to the SLA recorded in the contract. Database audits performed at regular intervals also form parts of the service.

### 4. Summary: Costs and benefits

The architectural survey performed as the first step of the MOL CAFM system resulted in cost optimisation in respect of m<sup>2</sup>-based accounting.

The information relating to premises stored in the database proved to be significant during the utilisation of the real estates. Together with the staff register and the function supporting move management, a more sensible arrangement of MOL's organisational units can be achieved. As a result of this it is possible to utilise the liberated areas in other different ways, e.g. leasing them to external tenants.

The Maintenance - HelpDesk - Imax modules resulted in significant savings in the field of technical operation. The events created from the error and demand reports stored in the same central database provide current information for all concerned parties. There is no need to make phone calls or take notes, no excellent memory is needed, because the desired data can be interrogated within moments.

Integration with the accounting and other registration system enabled significant simplification of the earlier harmonisation processes. Communication between the different sections concerning joint affairs is much less time-consuming, because the data is accessible in the parties' own systems in the same way.

In summary it can be announced that after the completion of the project it could be seen clearly that the MOL-CAFM system was favourably integrated in MOL's IT and Facility Management strategy, and today professional work cannot be imagined without the continuously extended database containing information going back nearly a whole decade.

**written by vintoCON Kft. – Hungary**

[www.vintocon.com](http://www.vintocon.com)

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2. Interview with Mr. Barts J. B. (2004)