Neutral building management system in facilities of German federal authorities

by Wonderware GmbH

"Taking the first step is the most important thing when implementing a neutral Building Management System (BMS)! The advantages of using Wonderware products clearly outweigh the use of proprietary systems. The absolute BMS costs decreased considerably since the introduction of the open system and expenses for new systems, particularly for new developments and system extensions, are significantly lower than budgeted."

Kurt Speelmanns, Head of Service Division Bonn, Federal Institute for Realty Projects

Company Overview

Bundesanstalt für Immobilienaufgaben (Federal Institute for Realty Projects), Berlin, Germany
In mid-1998, the German cabinet founded the "Gebäude und Liegenschaftsbetreuung Controlling-Institution (GCI)" - Buildings and Property Holdings Support Controlling Institution. It was established within the "Bundesamt für Bauwesen und Raumordnung (BBR)" – Federal Office for Architecture and Regional Planning. The GCI places orders for and handles the control of technical building services. Since January 1, 2005, the GCI is part of the new "Bundesanstalt für Immobilienaufgaben" - Federal Institute for Realty Projects. About 30 GCI employees look after 415,000 m² in Berlin and approx. 180,000 m² in Bonn.

Requirements on BMS

The technical building management of the Federal Ministries in Berlin and Bonn is handled by private service providers. The GCI organizes the calling for bids, placing of orders as well as the central control of these services. In addition to the support of users and service providers, the GCI is also responsible for the finance- and contract management as well as the basic development for the technical building management and the development of IT technology.

Building Management System

Due to the low number of staff available, the GCI can only complete all its tasks with the support of suitable IT tools. This includes a building management system (BMS) as an indispensable tool focusing on:
• Operating and monitoring of technical equipment;
• Status monitoring to reduce energy consumption;
• Error management;
• Source of operating data for other software systems used for facility management;
• Automation of management tasks;
• Support during commissioning.

This last item is particularly important; the availability of a BMS at a very early stage in the installation of facility equipment can ensure substantial cost savings.

Cross-Facility Controlling

In view of the organizational structure and aiming at minimizing management costs, there are more requirements a BMS has to fulfill when used for cross-facility controlling:
• Standardized data format;
• Standardized user interface;
• Standardized parameterization;
• Standardized programming;
• Independence from manufacturers.

Situation Review

When the GCI began operating in 1999, there was a heterogeneous structure of different management systems in the individual facilities. Therefore, the above listed requirements for standardized cross-facility controlling were not fulfilled. Additionally, future system extensions and new developments of BMS systems required the availability of open competition of independent service providers. It was concluded that only a standardized, *'open'* and in terms of DDC technology *'neutral'* control system could cover all requirements for a BMS in all facilities as well as for all controlling tasks.
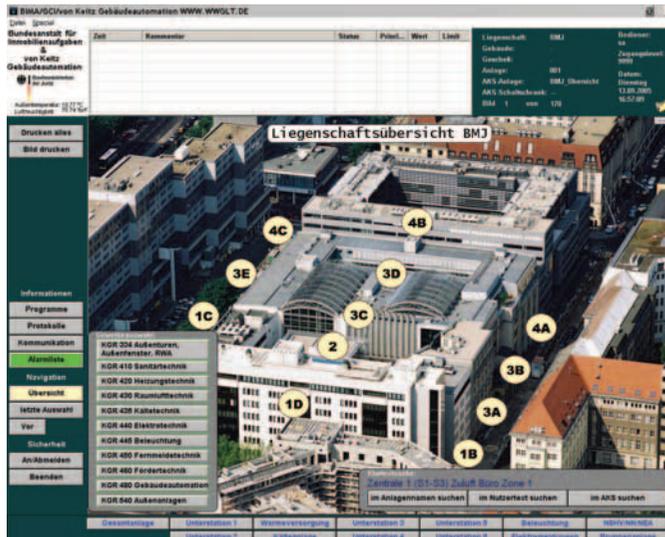
Start screen of the BMS for the Federal Ministry of Justice

The BMS developed to consider all this is impressive:
- One software for all the applications;
- One data format;
- No gateways;
- Low maintenance requirements;
- All data points available up to the top control level;
- Standardized system images of the facility BMS, which can be transferred to the top control level of a higher level BMS without adjustment.

Therefore it was decided to standardize all BMS systems within the responsibility of the GCI.

Selection Procedure
An elaborate, multi-stage selection procedure initially included 51 providers of visual display software and system tests and visits to reference facilities. In the end, the decision was made in favor of Wonderware's InTouch HMI (Human Machine Interface) for the following reasons:
- The software met all requirement;
- Wonderware is not a service provider, but software and license vendor as well as support provider;

- The complete openness of the software;
- The largest amount of installations worldwide;
- The largest number of system suppliers competing with each other as a guarantee for an open competitiveness;
- Non-region specific and no trade restrictions.

The choice for the Wonderware-based system took into consideration that the major part (>99%) of the BMS costs were the responsibility of the competition and was confirmed in March 1999 by the Federal Ministry of Transportation, Architecture and Housing. Subsequently, an agreement was made with Wonderware regarding the delivery of licenses and support.

System Configuration
As soon as the system had been defined, a system standard was to be determined and a basis developed that needed to match the performance of regular BM Systems.

The FactorySuite was the basis for BMS systems, tendered and commissioned by the *'Bundesamt für Bauwesen und Raumordnung'* and in future also by the *'Bundesanstalt für Immobilienaufgaben'*. As part of maintenance or system extensions, existing proprietary BMS systems in the facilities were being replaced step by step by neutral control units. The ultimate goal was to create a standardized data model, standardized data formats and standardized communication structures as well as to substantially cut investment and operating costs.
The system configuration can be described as follows: The basis of the BMS server is a standard Windows-PC with InTouch HMI, Wonderware Historian and ActiveFactory software. In addition to the Wonderware components, the drivers required for the connected system buses were also installed. In the past, mainly DDE servers were used as drivers, however, these were being replaced by OPC servers and free OPC connections from Wonderware. InTouch HMI and analysis tools of ActiveFactory software were being used for additional BMS workstations.
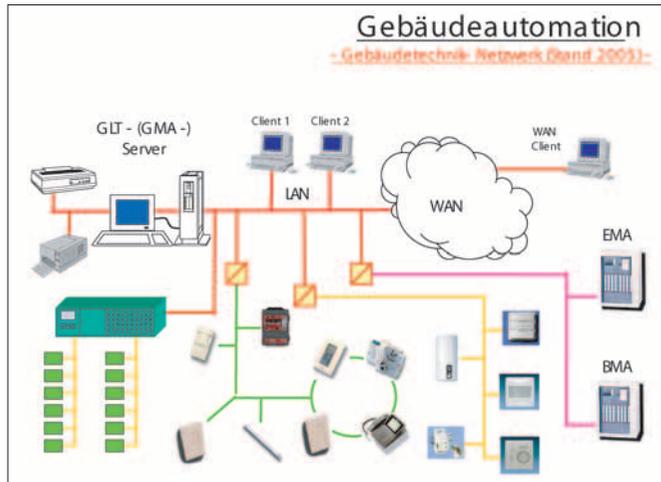

Federal Ministry for Economics and Labor, Berlin

Federal Ministry of Finance, Berlin

Open BMS: Standard system configuration with DDC/PLC, LON and KNX

Cost Advantages

Using open BMS systems at the GCI, it is safe to say that there are many advantages compared to the use of proprietary systems with regard to costs and performance, particularly considering the adaptability of Wonderware components to operator-specific needs.

Since the implementation of the open system, the costs of the BMS have decreased considerably and the costs for maintenance, repair and extension of the system are much lower than what was originally budgeted. Next to the general decline in prices, the opening up of the market to more competition and a more attractive price structure of the mid-range enterprises in this sector need to be mentioned. An open system allows the use of industrial automation components that are better priced and which are often more robust than equipment that was specially built for building automation purposes.

Advantages of Open Control Technology
• Lower investment cost;
• Lower operating costs;
• Optimized concept adapted to requirements;
• Combination of various systems;
• Easy to adapt;
• Opening up of the market through greater competition;
• Independence.

By using FactorySuite as a manufacturer-neutral BMS, it is possible to adapt the system from an early stage in the planning on to suit the user's requirements. This is true for the entire range of the DDC hardware and software (the planning engineer can select freely among the available systems – specialized individual components such as KNX and LON, or freely programmable DDC/PLC technology). Also, the location of the switch cabinets offers substantial potential for cost savings.

Further possibilities for cost reduction arise for competing companies which – under these circumstances – can include their 'own brand' DDC or PLC in their offer. This presents advantages both in terms of cost and

quality of the system. This approach enables the enterprise to offer a product it knows particularly well, which in turn allows short commissioning times to be realized.

When connecting a number of BM Systems to an upper level control-management, a neutral BMS offers significant advantages. Since the data model is standardized, it is possible to exchange data with applications from all facilities under the same conditions. The applications of the individual facilities can be combined together easily to form one complete system.

Facility Management
Thanks to the simple option of data point transfer into the FactorySuite components via Excel or by using the Wonderware OPC Tag Creator, the input that was usually required in the past in order to make data points available on the control level, has been dramatically reduced. When integrating the DDC systems of different manufacturers into one control desk involving 10,000 data points in the past, expenses of almost one man year were calculated.

Today this can be done by a simple push of a button. In the case of an extension or redevelopment of an existing BMS, open control technology presents further advantages. From experience, we do not recommend upgrading an existing BMS system that is still functioning. Instead, systems are extended with an open, Wonderware-based BMS system.
The existing BMS will continue to be used parallel during a transition phase until the old system is replaced entirely. This solution is ideally applicable for older systems for which spare parts are becoming rare. Failing substations can be replaced step by step with new DDC/PLC technology, where usually all the field devices can continue to be used and components that are still intact can be used as spare parts for the remaining old devices.
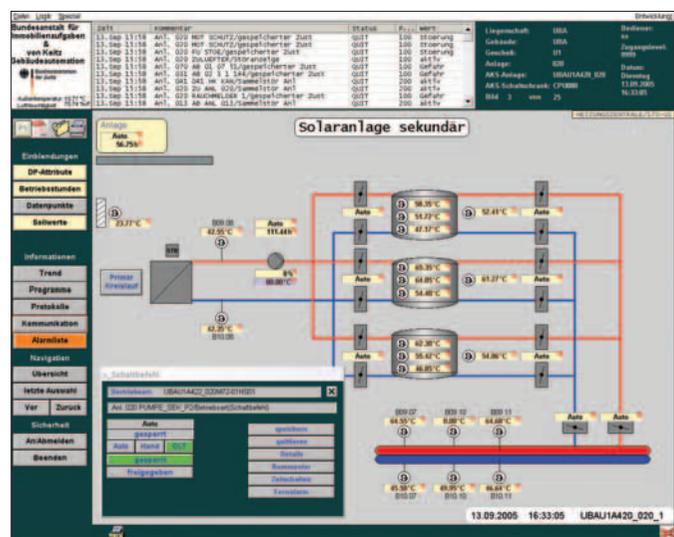
Example of a BMS user interface for a heating system with additional information

Press and information office of the Federal Government, Berlin

Federal Ministry for Education and Research, Bonn

Outlook

With regard to the future development of building automation, the following trends are visible:
•Increased use of IT standards on the BMS control level;
•Increased use of industrial automation technology in building automation;
•Continued variety of field bus systems;
•Integration of other management systems into the BMS.

Based on the status described here, more facilities will be extended and converted using the neutral BMS standard based on Wonderware. These include the federal government buildings in Bonn and Berlin, the buildings of the Foundation of Prussian Cultural Heritage, including the museum island in Berlin. The

Dessau federal environmental office and the former high-rise building *'Langer Eugen'* used by members of parliament in Bonn are currently in the implementation phase. The BMS standard of the GCI is also used by city of Bremen and at the Frankfurt exhibition center.

Thanks to the new opportunities offered by the Wonderware Application Server, the BMS standard of the GCI is being developed further in the direction of a BMS solution based on ArchestrA.