BDH
Federation of German Heating Industry

Bundesverband Kraft-Wärme-Kopplung e.V.

BTGA
Bundesindustrieverband Technische Gebäudeausrüstung e.V.

bwp | Bundesverband Wärmepumpe e.V.

HKI

VDMA
Valves

ZENTRALVERBAND SANITÄR HEIZUNG KLIMA

Position Paper

Data Exchange in Building Services (BS) and Integration into Building Information Modelling (BIM)

BIM
HVAC Product Data

Date: 05 January 2018

Content

1 Introduction

The method Building Information Modelling (BIM) is increasingly used in planning, construction and operation as well as in the demolition of building and civil engineering projects. BIM already has a strong global presence that is also starting to grow in Germany. In this context, the Federal Ministry of Transport, Building and Urban Affairs published a BIM guide for Germany in 2013. This guide is aimed at owner-builders, product manufacturers and software companies. It explains terms, provides an overview of BIM in Germany and abroad and answers questions about the implementation and handling of BIM.

The main advantages of the BIM method are quality, topicality and transparency of project information that can be evaluated at any time and lead to a higher planning security in project management concerning costs, appointments and sustainability. Apart from this, the BIM guide also emphasises the benefit for all project members, describes the necessary requirements and outlines the expenses.

Possible problems using BIM do not arise from the technology itself but mainly due to a lack of knowledge of the new processes and possibilities. This can be explained by a lack of training in BIM as well as by the current lack of BIM guidelines in Germany. This makes an interdisciplinary cooperation all the more important. The BIM-based coordination processes and the usages, such as visualisation, creation of consistent drawings and schedules, model-based quantity take-off and simulations, and collision checking are described in more detail. It requires highly efficient interfaces to coordinate the dataflow across different (software-) platforms and to the client. While concentrating on IFC this guide describes and evaluates them.

In consequence BIM means a change in the way projects will be executed at several levels, the coordination processes, the organisational structures, and the technology uses, all leading to a more collaborative way of working. The BIM guide includes several appendices comprising data sheets and check lists that can be used in preparing for the utilisation of BIM in offices and projects.

Data Consistency for BIM

In Building Services, CAD drawings and system designs are more and more supplemented by the use of software. This working method requires digital **product data**.

In Germany, the product data exchange for HVAC products is realised by using **VDI 3805**. Data can then be used for computational design processes. The advantage of such a design process is a reduced error rate. Therefore, the aim of VDI 3805 is the standardised recording of product data to use only one database for all different kind of projects.

Since the use of electronic product data is not limited to Germany, the ISO TC 59 SC 13 started elaborating the ISO 16757 “Product Data for Building Services System Model”. In this way, the VDI 3805 shall be internationalised. **With the ISO 16757, the VDI 3805 will become the basis of Building Information Modelling.**

In **Figure 1**the use of BIM in a project and embedding of building services product data via VDI 3805 / ISO 16757 is exemplified. The main source document is a BIM project execution plan which is agreed on before starting the project. It guarantees a transparent procedure during the entire project cycle. The most important factors for successfully using the BIM method are the project participants with their knowledge and motivation, the new processes and applications, the required agreements and standards as well as the applied technology.

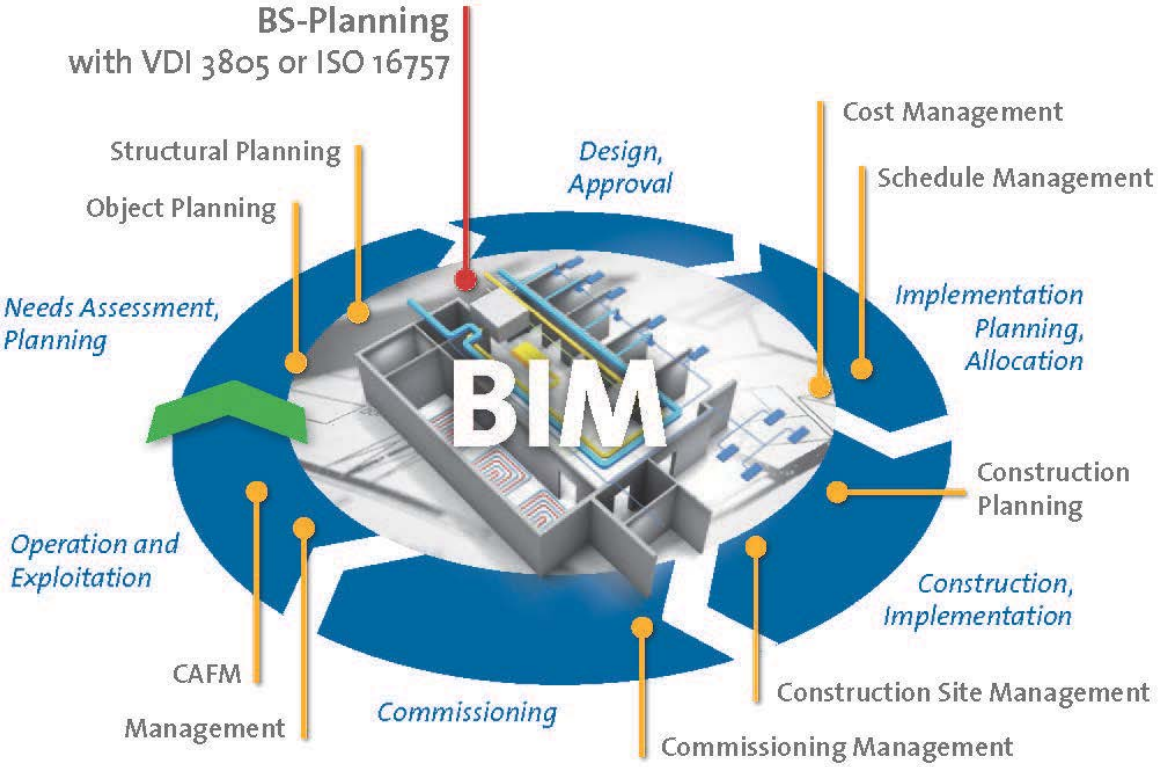

Figure 1: Example of using BIM (including **Building Services data**): Life cycle (planning, implementation and operation) of a building.

2 Implementation of BIM in Germany

The implementation of BIM in Germany is coordinated by the Federal Ministry of Transport and Digital Infrastructure in cooperation with the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety. The required basics are standardised in DIN and VDI. Lead is the DIN NA Bau 005-01-39AA “BIM – Building Information Modelling” (mirror committee to ISO TC 59 SC 13 and CEN TC 442). All work relevant for Building Services is led by DIN NHRS NA 041-01-71 GA “Product data for building services systems” (mirror committee to ISO TC 59 SC 13 WG 11) and by the VDI work group for VDI 3805 “Product data exchange in the Building Services”. The VDI Society Civil Engineering and Building Services (VDI-GBG) has formed a coordination group on “Building Information Modelling” (VDI BIM Coordination Group) in order to establish BIM in the German construction industry. The standards series VDI 2552 represents the national position in the international BIM standardisation activities. In cooperation with the DIN mirror committee, the VDI BIM Coordination Group elaborated an overview of the national and international committees (see **Figure 2**). The aim is to coordinate the contents to allow the creation of consistent standards.

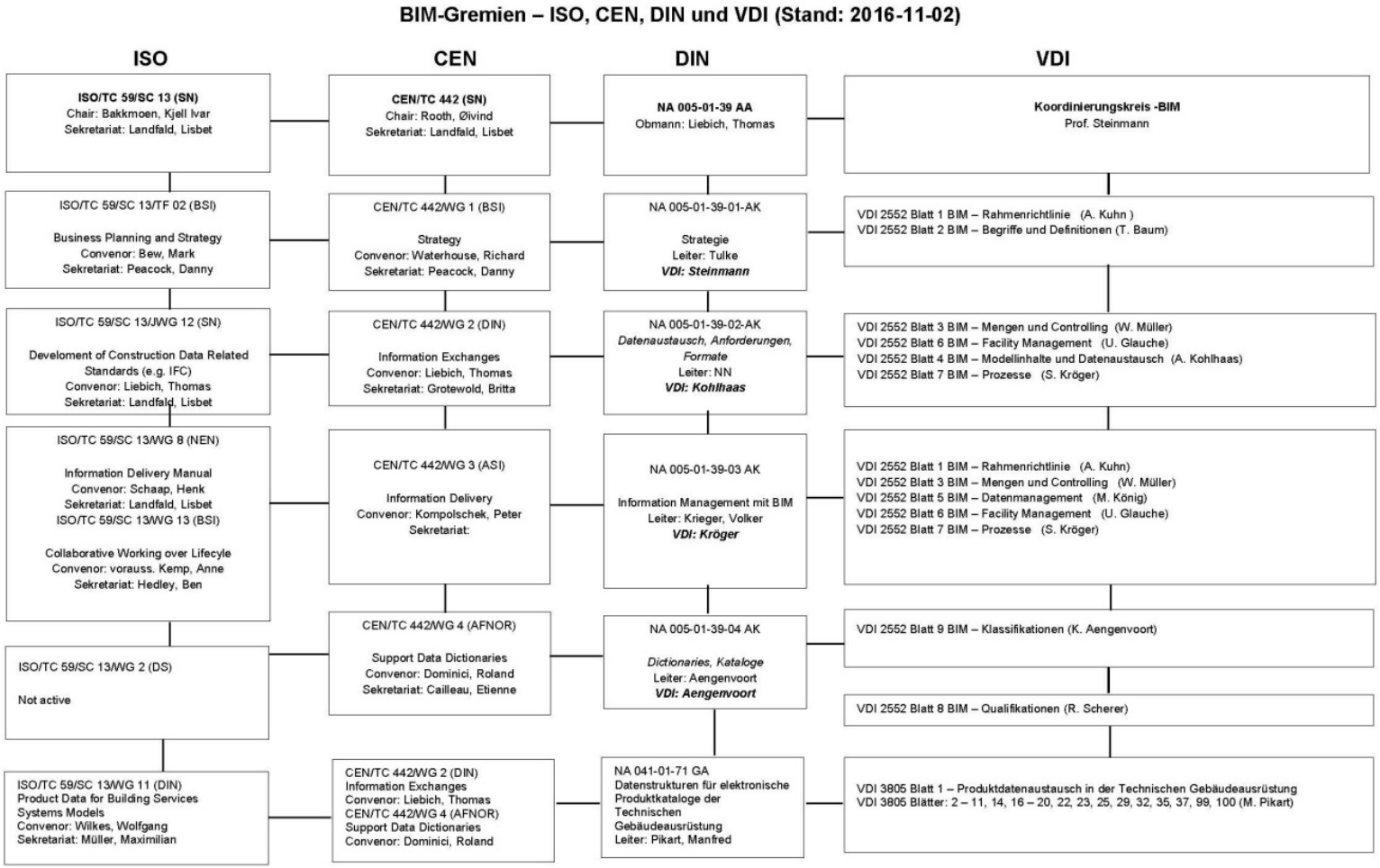

Figure 2: Overview of BIM committees.

As the work on several sheets of the standards series VDI 3805 “Product data exchange in the Building Services” is already completed, especially in the field of heating and ventilation, it can be consulted as basis document for the national implementation of BIM in the area of building services. For current information on the work progress, see www.vdi.de/3805.

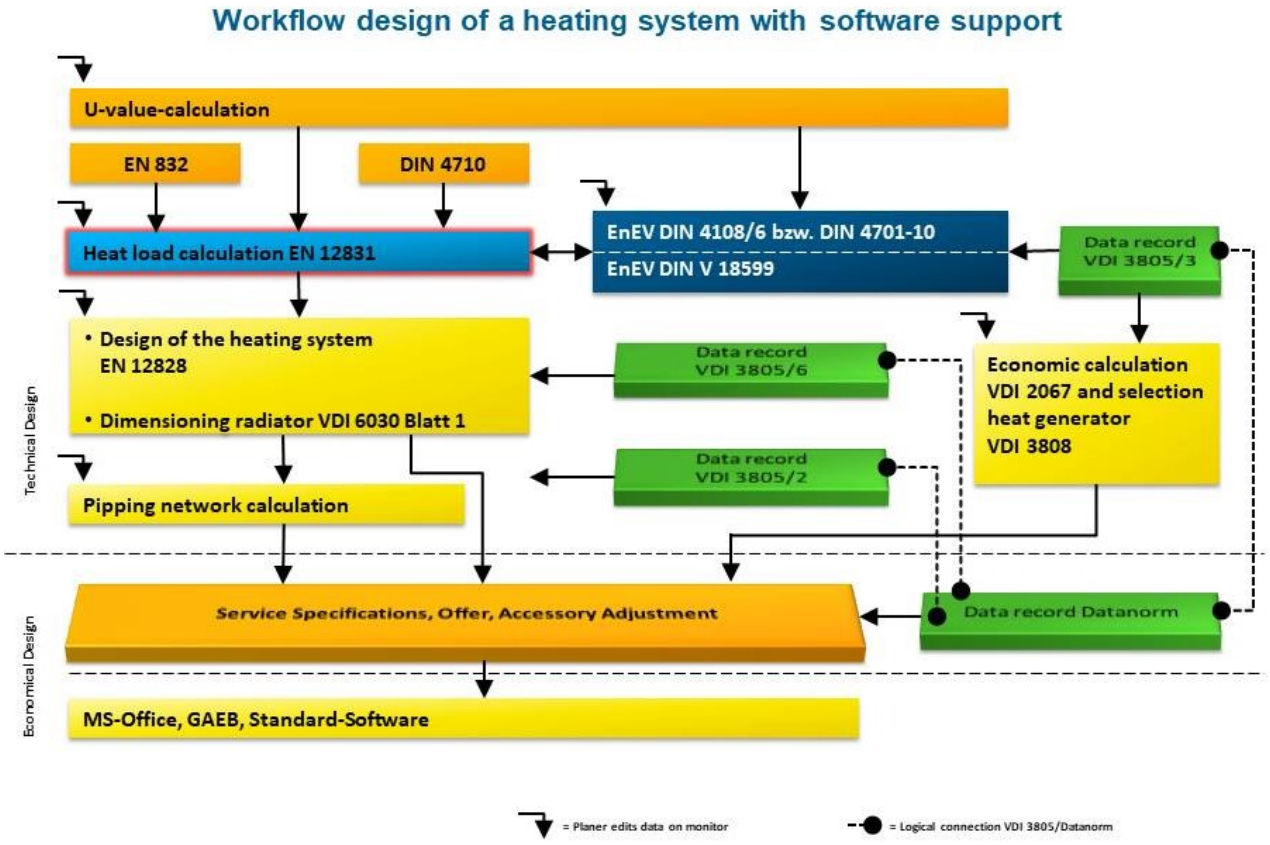

Figure 3: Planning of heating with software support.

To support the planning process as shown in **Figure 3**, the BDH (www.vdi3805-portal.de) and VDMA (www.vdi3805.org) provide internet portals with current data records of the manufacturers in the area of heating/ventilation.

They also work in favour of using the VDI 3805 as standard for the exchange of manufacturer data in the field of BS. Many software manufacturers support this as well, and already implemented the appropriate interfaces for processing the data into their programs (see paragraph 4.2).

3 International Implementation of BIM

BDH, VDMA and the mentioned software manufacturers are working on implementing the national VDI 3805 standard on international level as constantly and directly as possible.

Starting in 2011, the ISO 16757 “Data structures for electronic product catalogues for building services” is being developed. Currently, the basic parts of standards are being created. They do not only describe the basic structure of the data record, but also the linkage to BIM and the already existing norms, specifically:

Part 1: Concepts, Architecture and Models
Part 2: Geometry
Part 3: Algorithmic Language
Part 4: Mapping to buildingSMART Standards (BIM)
Part 5: Exchange Structure

Product characteristics are defined on the basis of the data model from ISO 13584 “Industrial automation systems and integration - Parts library”. The ISO 16739 “Industry Foundation Classes (IFC) for data sharing within the construction and facility management industries” is the basis for the data exchange model. To describe the definitions of characteristics, the ISO 12006-3 “Building construction -- Organization of information about construction works - Part 3: Framework for object-oriented information” serves as the basis. Finally, the ISO 29481 “Building information models - Information delivery manual” is the basis for defining the processes.

Figure 4 shows the planning process for a building within the BIM process. During the process, the manufacturer data is used at several points which is why they must be available.

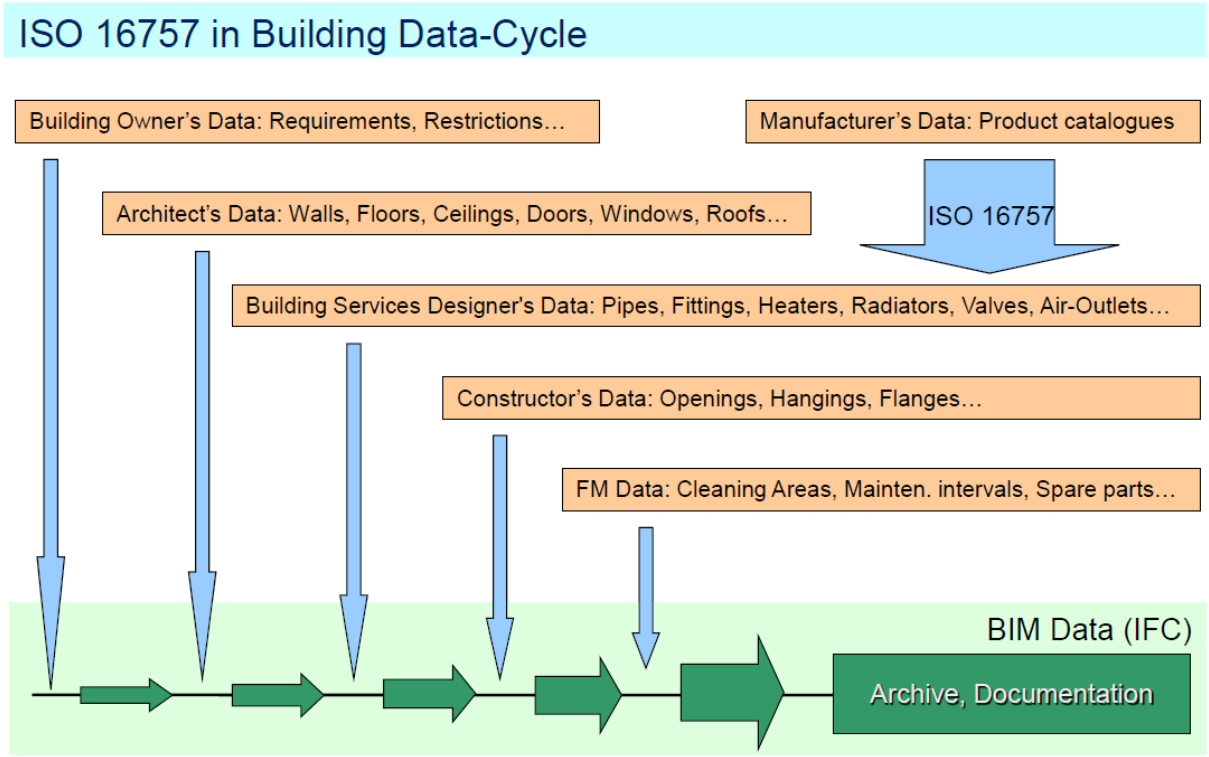

Figure 4: Using TGA data via VDI 3805 and ISO 16757 in the BIM process.

The new international standard will be structured similarly to the VDI 3805 to guarantee a simple subsequent conversion. When transferring the current data model (VDI 3805) to an ISO standard, the data contents as well as the basic structure remain unchanged. Only the syntax, i.e. the form in which data is stored, will be changed to ensure further usage of previously entered data.

4 Position of the Building Services Industry

The standardised interfaces (neutral, open and unique standard data format) give the manufacturers the advantage of maintaining only one data format. Expense and effort can therefore be considerably minimised. As the format can be maintained by the manufacturer, the data responsibility lies with him and a high data quality is guaranteed. Programming of individual manufacturers' applications is fast and easy to realise. Due to a relatively small volume of data, even when describing complex products, the data exchange process is simplified as well. **In principle, all technical and geometric data of a product can be transferred by means of the VDI 3805 / ISO 16757.** Data can be linked to business and tender data via the article number in VDI 3805. This includes the European requirements of the ErP directive and the labelling as well, because the VDI 3805 / ISO 16757 also allow the distribution of product labels.

4.1 Building Services Industry

The following industrial companies support the implementation of BIM as described both nationally and internationally:

4.2 Software Manufacturers

The following software manufacturers support the implementation of BIM as described both nationally and internationally:

4.3 Implementation / Realisation

In most product areas, the national standardisation process for VDI 3805 is completed. For the national implementation of BIM, VDI 3805 can directly be referred to.

With regard to the international implementation of BIM, in the field of building services ISO 16757 can be referred to. The implementation of BIM can be done progressively..

5 Glossary

BIM	Building Information Modelling
BS	Building Services
CEN	European Committee for Standardisation
DIN	German Institute for Standardisation
ISO	International Organisation for Standardisation
TC	Technical Committee
NA	Standards Committee
SC	Sub-Committee
BS	Building Services
VDI	Association of German Engineers
WG	Working Group

6 Table of Figures