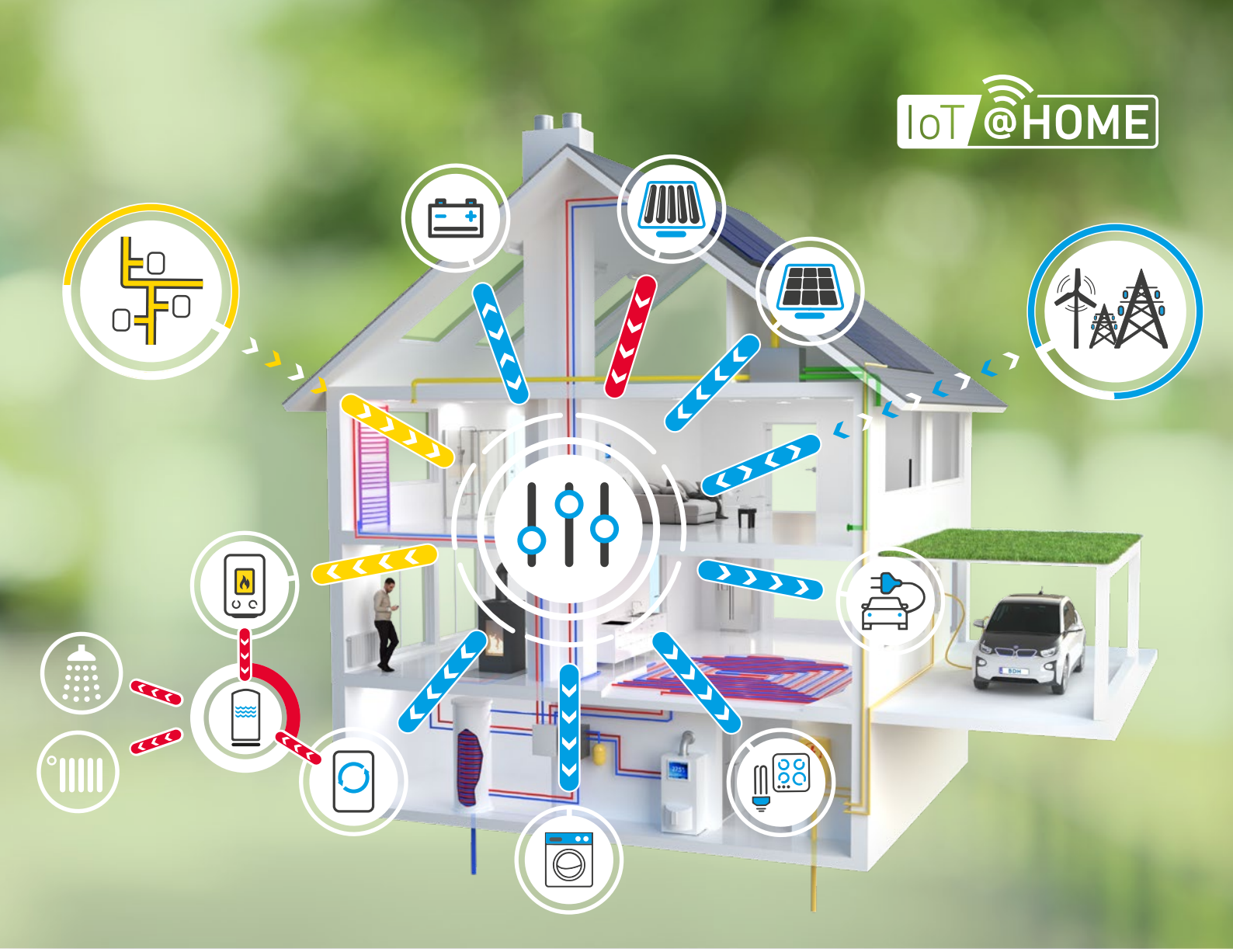

Position Paper “Recommendations for Implementing a Digital Strategy in Building Services”

Main Topics:

- Sector Coupling in the Building
- Building Information Modeling BIM

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BDH
Federation of
German Heating Industry

Part 1: Recommendations for Action

Digitalization as an Enabler of Social Change Processes

Nowadays, our society is placing the highest priority on transitioning our ways of doing business, working and living toward sustainable principles. Digitalization often plays a decisive role in these transition processes, without it, many changes would be very difficult or even impossible to implement. Digitalization is therefore regarded as one of the keys to accomplishing the transformation to a sustainable and climate-neutral economy and society.

The term "digitalization" includes numerous lines of action, and the applications involved have an enormous bandwidth. For example, the digitalization of the energy system is regarded as a necessary prerequisite for the energy revolution. In a building, this means sector coupling at the level of the customer's systems. However, digitalization also means the optimization of business processes, such as in trade and public authorities. Industry 4.0 is the generic term for the comprehensive digitalization of industrial processes. The keyword "digitalization" also covers the subtopics "broadband expansion" and "Building Information Modeling (BIM)". With the introduction of BIM, the construction industry should be digitalized and the corresponding processes digitalized and optimized. As in other areas, overlapping also often occurs here, so coordinating activities are required.

Therefore, all in all the digitalization is not an end in itself, but an enabler for a large number of changes in processes, for new business models, and new applications in the widest range of industries.

Digitalization is penetrating ever more deeply into society, and it has increasing dynamism and far-reaching effects. The applications of digitalization have a lot in common, in that they affect the interaction of systems in different domains, the products of which have, until now, acted completely independently. One example of this is the already widespread coordination of the use of photovoltaics, heating and electric cars in private buildings in order to optimize the internal power consumption.

Cross-domain applications necessitate overcoming "bunker thinking", as they come to fruition through the exchange of ideas between industries. The spreading of these applications throughout the mass market also requires the cross-industry standardization of their interactions. As tasks, such as the digitalization of the energy system or the introduction of BIM, cannot be considered solely from a national point of view, these lines of action need to be synchronized internationally.

Recommendations for Implementing a Digital Strategy in BS

Particularly for sector coupling in a building and the digitalization of the construction industry, the BDH recommends the following activities:

- Incentives for improving the **connectivity of systems:** The communicative connection of systems forms the basis for sector coupling in a building. Nevertheless, nowadays only a fraction of newly installed heating systems are connected with the Internet, although this would almost always be possible. To aid this, incentives should be available which, with low expenditure, would act as a "door opener" for other applications of digitalization in the energy revolution.
- **Incentives for installing energy management systems:** The greater dissemination of energy management systems is the key to using the flexibility of the customers' installations in a way that benefits the system. Here again, an incentive would be very advantageous.
- **Variable electricity prices as an incentive for behavior beneficial to the system:** The variability of electricity prices should be made understandable and easy to use advantageously in order to motivate customers to contribute towards controlling their consumption in a way that benefits the system. It is essential that the customer is involved in an unbureaucratic and straightforward manner.
- **Distributed, controllable power generators** such as the fuel cell heater have to be taken into consideration in the digitalization of the energy system without preference for any particular technology.

On account of its independence from volatile sources, it is an ideal complement to photovoltaics. However, there needs to be a possibility of remunerating the provision of controllable generation capacity. Bureaucratic obstacles hindering the commissioning and connection to the low-voltage network have to be removed.

- The **framework conditions for models for using surplus electricity** need to be simplified and made applicable for the customer: cellular structures (such as energy communities, local solutions), distributed electricity trading, bidirectional charging of electric cars, etc. Leaseholder power models need to be customer-friendly and entry barriers have to be eliminated.
- **The merging of national and European lines of action in regulations and standardization:** Climate protection is in no way a national issue, and this is even more relevant to the digitalization of the energy system with suitable technical solutions for implementation. Manufacturers in the sector coupling field are frequently internationally active, but individual national initiatives under the framework conditions are driving up the costs for both manufacturers and consumers. Therefore the digitalization of the energy revolution must not lead to Germany going its own way. Activities at European level – such as the action plan for digitalizing the energy sector – and the German lines of action have to be synchronized with one another. Differing European lines of action also need to be synchronized.
- **Adaptation of the occupational and training profiles** to the fields of digital application and the associated conditions. For example, BIM requires a new type of cooperative working between the various parties involved in the construction industry. This also has to be reflected in the contents of occupational and training courses. Furthermore, this interdisciplinary communication should be supported by commensurate conditions.

Part 2: Background Information

The Potential for Digitalization of Building Services (BS)

In the following, we would like to consider in detail two topics in the field of technical building services in which digitalization plays a key role: building information modeling (BIM) and sector coupling in the building.

1. Building Information Modeling (BIM)

The international standards from the ISO/TC 59 SC 13 and CEN/TC 442 committees can support the realization of Building Information Modeling (BIM). This would enable European activities (such as a digital product pass, the proposed legislation EPBD, CPR, Circular Economy, SPI, Action Plan for the Digitalization of the Energy Sector, etc.) to be coordinated in various sectors (such as the BS industry) by means of a uniform format (e.g. EN ISO 16757). Networking across sectors is also possible (e.g. Industry 4.0 and BIM) in order to enable environmentally related data to be transferred uniformly and collectively.

Digitalization will make the communication more complex and correspondingly more important. Therefore all parties involved in digitalization projects need to exchange information even more intensively. These points are also supported by standards from the ISO/TC 59 SC 13 and CEN/TC 442 committees (e.g. a uniform data environment (DIN SPEC 91391), uniform language (EN ISO 12006-3 and EN ISO 23386, as well as EN ISO 23387) and uniform communication (BIM Collaboration Platform)). Communication between people and machines can be simplified by using uniform, standardized interfaces, followed up by support from AI. This leads to an enormous social learning process. Therefore it is crucial to include all those involved in the digitalization process, create suitable framework conditions, and make them available in a customizable way. Here, bureaucratic barriers have to be eliminated, and concepts simplified and made easy understand and use. This can be ensured by stipulating uniform interfaces.

And this is where digitalization is making new applications possible. In view of the long product development cycles and the subsequent essential transition periods for existing platforms, manufacturers require early, reliable framework conditions and requirement specifications.

2. Sector Coupling in the Building

In the course of the energy revolution, the energy system has to be made capable of coordinating the handling of a large number of new distributed and volatile generating plants, while at the same time supplying the increasingly electrified generation of heat. However, this must not impair security of supply.

To achieve this, the generators, heat accumulators and loads in the energy system should be networked – this also applies to a large number of installations located in residential buildings. They need to be given incentives to encourage usage in a way that is beneficial to the system, and be able to react to these incentives. For example by postponing non-time-dependent consumption whenever the power grid is reaching the limit of its capacity. The Smart Meter Gateway (SMGW) serves as a central, highly secure means of communication between the power supply system and the building. This involves communicating both regulatory requirements and market-based incentives concerning the power system to the building – such as power restrictions at the grid connection point or variable electricity prices.

In the building of the customer these incentives to coordinate all the products relevant to energy have to be implemented: the photovoltaic system, heating, electric car and probably battery storage as well. An energy management system organizes the interactions of these sub-systems, and brings them into line with the customer's needs and wishes. In this way, the system-beneficial behavior of the building can be guided in the interests of the customer, taking into account not only the customer's convenience and personal preferences but also the power supply specifications. Cross-industry standards are needed to ensure the trouble-free interoperability of systems from different manufacturers.

The Way into the Mass Market

Many of the digital applications described could be implemented today, as the main building blocks are already available. However, to fulfill its potential, it has to be brought into the mass market. To this end – if possible international but at least European – pilot projects should be implemented and standardization promoted. Two examples are shown below:

1. To implement BIM in the building sector, the course of sector coupling could be standardized by using a uniform language basis (properties according to EN ISO 23386) developed in CEN/TC 442, and its use could be pursued with the aid of EN ISO 12006-3 and EN ISO 23387 from linked databases in various software programs (architecture, BS and Facility Management). Trials of this practical application would enable the standards developed to be examined and their integrative use to be validated in a complete process. The essential need for further development of data management principles can be determined on the basis of a national application. The practical example should cover both new and existing buildings. If the practical example proves to be robust in use, then it could serve as an introductory example on a wide front, including public authorities.
2. Sector coupling in a building, that is the interaction of energetic installations in the customer's building, requires standardized cross-industry interfaces. The EEBUS initiative is pursuing this goal, and working on application-based specifications together with members from a range of fields (such as heating, automobiles and photovoltaics).

The resulting specifications will be brought into national and international standards (for example VDE AR 2829-6). Together with specifications and standardization, the cross-industry testing of products is also an important step on the way into the mass market. For this reason, the Living Lab Cologne (https://livinglab.cologne/) sponsored by the BMWK was recently founded.

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About the BDH

The Federation of German Heating Industry represents 121 member companies. They manufacture the systems and components of heating equipment, and account for over 90 percent of industrial heating sales in Germany and nearly 60 percent in Europe.