Sustainability & Digitization - Contrast or symbiosis?

AUSTRIAN SUSTAINABLE BUILDING COUNCIL

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ÖGNI AUSTRIAN SUSTAINABLE BUILDING COUNCIL

Executive Summary

According to the CRREM (Carbon Risk Real Estate Monitor), 40% of the global carbon footprint is caused by real estate. Yet only 1% of buildings are modernized annually in terms of energy efficiency.
Because of this, the real estate industry faces a forward-looking challenge in the coming years and decades: Sustainability must be further advanced in the real estate industry and, at the same time, digitization must be operationalized in order to make the improvements tangible and increase them further.
Sustainability and digitization - two terms that are important both in the present and in the future. Both are hot topics that shape our society and affect us all.
Why, is there a connection between sustainability and digitization at all? Is digitization automatically sustainable?
If so, how is sustainability defined in connection with digitization?
These questions were addressed by experts from the construction and real estate industry within the framework of the ÖGNI working group “Digitization”.
In the course of developing this position paper, the working group came to the conclusion:
Improving sustainability in the real estate sector is not possible without digitization!
This synergy between digitization and sustainability can only work if data is available and sustainability can hence be made measurable and thus also comprehensible / tangible.
Numerous properties are not yet in a position to record and provide the values for measurable sustainability.

What data is actually needed?

The participants in the “Digitization” working group defined the most important key figures and basic measured values that buildings must provide as a minimum requirement for sustainable operation. These key figures and measured values already have a positive effect on the life cycle costs of a property in the context of certification.
This position paper takes a closer look at some of the data and indicators that a property can provide. The focus is on data that can be recorded continuously and is dynamic.
Of course, static data is also an important aspect. It serves as a basis and reference value for evaluations. This includes, for example, data on the geometry of the building or the documentation of the building materials used. This is necessary to evaluate the dynamic data but also, for example, to provide a functioning circular economy with the necessary information.
Data is often referred to as the gold of the future, but the comparison is somewhat misleading. Gold increases its value through scarcity. The value of data increases through the volume, the quality, the availability and through the insights that can be gained from its interconnections.

There are great opportunities for the real estate industry in the availability and possibility of connecting data.
This position paper is not a guideline in which a certain number of sustainability criteria have been defined and, by incorporating them, stakeholders automatically act sustainably.
The position paper is fundamentally intended to clarify the necessity of digitization in the real estate industry and to influence the design of future sustainability certifications.
The working group came to the conclusion that the symbiosis of digitization and sustainability offers enormous potential for the real estate industry, and that the effort required for digitization is also economically justified.

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Introduction

Digitization is an important building block for further developing sustainability in the construction and real estate industry. For this reason, the ÖGNI founded its own working group in the summer of 2021, which was dedicated to the necessity of linking sustainability and digitization.
Experts from several well-known companies in the construction and real estate industry accepted this invitation and addressed questions such as: “How can digitization support not only the sustainable development and use of buildings, but also their deconstruction?”
The challenges facing the real estate industry are extensive and diverse, but not every form of digitization is sustainable. However, technological advancement is an essential building block for achieving a real estate industry that is circular, continuously reduces its carbon footprint, and responsibly manages resources, and can thus make a significant contribution to achieving climate goals.

The working group established:
» which actor needs/has which data,
» how data can be exchanged between two actors
» which “rules of the game” are necessary so that data sharing could work smoothly.

The aim of the position paper is to demonstrate the connection between sustainability and digitization in an understandable way and to show starting points for implementation in order to take on a pioneering role in digitization in the area of sustainable real estate.
Finally, the entire undertaking is to be considered in the further development of the DGNB (German Sustainable Building Council) certification.

We want to ...
» take the pioneering role in the digitization of sustainability
» consolidate this pioneering role in a position paper
» exert influence specifically on the certification of the DGNB.

Key cornerstones of our work ...
» digitization is an important building block for making sustainability work
» therefore we link sustainability and digitization and
» in particular, establish a connection to the circular economy.

About the Working Group

Who is the ÖGNI?

ÖGNI - The Austrian Sustainable Building Council is an NGO (non-governmental organization) for the establishment of sustainability in the construction and real estate industry. The aim of the ÖGNI is to demonstrate the added value of building certifications in order to create environmentally and resource-friendly buildings, with high economic and social efficiency, which can be used flexibly over generations and have a positive impact on the health, well-being and performance of the users. The focus of the ÖGNI's work is the certification of sustainable buildings - Blue Buildings - according to the system of the DGNB (German Sustainable Building Council).

What is a DGNB certificate?

The DGNB system of the ÖGNI serves to objectively describe and evaluate the sustainability of buildings and neighborhoods. The quality is evaluated taking into account all aspects of sustainability throughout the entire life cycle of the building. The DGNB certification system is internationally applicable. Due to its flexibility, it can be precisely adapted to different building uses and country-specific requirements. The DGNB system considers all essential aspects of sustainable building. These include the six topics of ecology, economy, socio-cultural and functional aspects, technology, processes and location. The first four topics are weighted equally in the evaluation. This makes the DGNB system the only system that gives the same weighting to ecology as to the other factors that make a decisive contribution to the production of a successful sustainable building.

Working Group Participants

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o Cojocea Maximilian – S IMMO
o Engert Peter – ÖGNI
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He is a digitization expert and supports companies with cross-industry "out-of-the-box" thinking in their digital transformation. He is particularly interested in the symbiotic interaction of human and artificial intelligence. He approaches the special dynamics of disruptive processes with a strong focus on implementation. Motto: "Make things work - results count". Matthias Ortner is the author of several studies and publications and has been a speaker at events in various industries for many years. He has also received a number of awards for his work (Immobilien Cäsar, Constantinus Award, eAward etc.).
Advicum Consulting is an owner-managed Austrian consulting and investment company founded in 2002 with extensive experience in management consulting and corporate finance. Advicum specializes in transformation management, the linking of "Old & New Economy" and the associated change of thought and action patterns to make a company more competitive. www.advicum.com
eMentalist is a fully integrated AI solution provider and one of the most innovative AI companies in the DACH region. The team at eMentalist builds data strategies and develops smart data from customized and standardized solutions. USP are the smart radars, which enable predictive analytics for different industries and focus areas with deep learning and semantic analysis. eMentalist identifies unrecognized signals, shows correlations and precisely determines essential influencing factors of the future. It thus detects trends, disruptions and unexpected correlations at an early stage, enabling companies and institutions to manage with foresight.
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Range of topics

Artificial intelligence and its potential for change in the economy
o What opportunities and possibilities does digitization open up?
o How do we deal with current digital trends in a future-oriented way?
o In which areas will artificial intelligence become a particular driver?
o How can artificial intelligence and human intelligence be linked?

Digital transformation of companies and institutions
o How are the ways of working in companies changing?
o What organizational, strategic, operational measures are needed?
o How does digital transformation work in different industries and types of companies?

Socio-ecological transformation as a sustainable solution for the future
o What is the significance of sustainability for successful corporate development?
o How can sustainability be made tangible and implemented in a solution-oriented manner?
o What contribution does digital transformation make to sustainable corporate development?

Digitization & Sustainability

The Connection

Planning, construction and operation of real estate, real estate management

In order to exploit the full potential of digitization for sustainability aspects, it is necessary to break down individual thought and process silos and to act across the building's entire life cycle. Each of the individual processes in the construction and real estate industry benefits from the holistic approach of digitization. The data generated in the individual phases of planning-construction-operation-renovation and deconstruction must not be viewed in isolation but must be available in all phases. Relevant information on the materials used is for example generated during the planning phase and is available without restriction during operation for room conditioning and for deconstruction or recycling.

Consideration of the individual phases:
o Planning
o Construction
o Operation
o Refurbishment/conversion
o Recycling - circular economy

Planning
This phase lays the foundation for data quality. Data quality and data handling are described by the following definitions:

» The semantic description of the data
» The ontological description of the data
» The use of terminologies of the links
» The data transport between individual systems
» The temporal representation
» When which data is made available in which period of time

In planning, the digital twin of the building is modelled by actors from the various disciplines. All participants work on the virtual building and describe it in its full geometric and functional quality. In this phase, processes of use can already be simulated and, if necessary, corrections or optimizations can be made without great effort. These changes are automatically referenced to the existing plans and checked for plausibility or potential conflicts.

Construction

In the construction and execution phase, the information generated in the planning phase is used. Geometric data for the industrial prefabrication of individual construction elements for example is available in such a way that it can be directly read by the production machine.
Functional data for, for example, room conditioning, describes the comfort criteria, which automatically generates the demand for building services components and creates the program code for room automation.
At this stage, besides the great potential for time savings, sustainability can benefit from process and resource efficiency through operational performance and thus CO^2 savings.

Operation

In this phase, digitization supports efficient building operation with all facets of optimization and efficiency strategies. Special attention must be paid here to the lever related to sustainability.
Sustainable buildings based on high-quality data have the opportunity to access measured, analyzed and optimized building and operational data. These can be compared and benchmarked against historical data. By means of holistic optimization strategies, digitization helps to increase sustainability.
To ensure that a building optimally supports the core business of its user during the operating phase, it must be managed by operators who think in terms of technical and business knowledge together. The building operator benefits from the clear presentation of data or the ease of use of the functionality. Thanks to efficient building operation, the operator can now concentrate on optimization tasks that contribute to increasing sustainability.

Refurbishment /conversion

In order to ensure the long-term operation of a property, flexibility for changes of use must already be taken into account in the planning phase. If flexibility has already been considered, the property can be adapted to the new requirements that the change of use or type of use requires with little effort. Digitization supports conversions in that, in the event of changes to room sizes or cubic dimensions, functionalities such as room axes for lighting, heating, ventilation, etc. can be easily and time-efficiently adapted to the new requirements. Any property that is planned for long-term operation is sustainable.

Recycling - Circular economy

The current situation makes us directly aware of the scarcity of resources, combined with supply bottlenecks and sharply rising prices, and sensitizes the construction and real estate industry more than ever to devote itself to a functioning circular economy. From a circular economy perspective, resource conservation is at the forefront of any real estate planning, operation and subsequent deconstruction or reconstruction. Digitization is the necessary mechanism that makes a circular economy administrable.
The basis of every sustainably planned real estate project is the consideration of the entire life cycle, which not only has the intended use of the building on the agenda, but also the management requirements and the conversion or revitalization. All disciplines involved in the creation process and in operation have an impact not only in the planning, implementation and life cycle phases, but also in the phase of conversion, revitalization or demolition.
Digitization makes an important contribution in connection with the plan to use materials sustainably. Embedded in the digital twin, data from installed materials, which in addition to the physical properties of the materials also contains information regarding

» the cost/footprint of production and recycling
» the recyclability and separability of the individual material
» the flexibility and dismantlability
» the costs of the materials in the individual life cycle phases
» the location

In order to be able to implement the recyclability of the various materials and composites in reality, digitization already provides proven mechanisms to map real processes of a deconstruction. For example, a distinct material/composite can be recovered at a distinctly located place, at the right time using the right recovery method.
As in all digitization projects, success stands or falls with data quality and the ability to link the data as desired with manageable effort. The interoperability of the data and with standardized interfaces for the use of cross-manufacturer information, opens up the possibility of active data use. To generate added value from the data, nothing now stands in the way of effective data processing. Using stochastic or mathematical methods, tasks such as sorting, categorizing or various optimization tasks can now be realized.
For the circular economy, the material-specific data is provided from already existing databases or material libraries with complete certification information, technical properties and material identifications, life cycle assessment data, etc.
In order to generate, process and store the data according to a project, attention must be paid to a suitable system architecture. This is based on a data lake as the “single point of truth” and plans which data is available where for which process.
The circular economy benefits from the tools of digitization and thus enables progress in terms of decarbonization and resource conservation. The synergies of the two topics also make it possible, in addition to the ecological ideas in the construction and real estate industry, to generate new business models that aim to conserve resources and be sustainable.

Digitization is not automatically sustainable

Digitization is an effective facilitator, a supporting technology for the sustainable planning and operation of a property. However, it must not be the primary focus. Digitization must pursue a clear goal and is always a means to an end. The added value for ecological, economic and social aspects determines the sensible use of digitization tools.
The added effectiveness of a digitized property lies primarily in the meaningful networking of the previously digital stand-alone solutions within the property. Over the entire life cycle of a property, data is collected, stored and analyzed in order to draw conclusions for increasing comfort and for energy- and resource-efficient operation of the building.
Binding and realistic sustainability targets serve as a guideline and aid digitization.
A major challenge here is the social aspect of data protection, because this must always be maintained, especially for personal data.

The Real Estate Industry: Requirements, Challenges and Added Value through Data Availability

1. Investor / owner requirements

Investors and owners of real estate are often not the users of the buildings. This fact results in a discrepancy in the requirements for products in the real estate sector:

The use and operation of real estate and the associated costs, emissions, etc. are traditionally of little relevance to the owner - the focus is on value.

This is also the reason why, despite the digital transformation, data is still not being collected and analyzed across the board in the real estate sector.

As a result of the increasing requirements for the sustainability of real estate, the discrepancy between ownership and use has to some extent evened out. The requirements of users are also becoming increasingly relevant for the owner side, as users on the one hand and regulators on the other increasingly focus on energy efficiency, carbon footprint, climate risks and circularity.

In addition to the aforementioned requirements by the user side, the resilience of a property and its low-maintenance operation, as well as the low-maintenance design of the building, are also relevant for maintaining its value. Low maintenance and repair costs coupled with a future-proof design in terms of an attractive use, thus represent the requirements for a property for investors and owners.

The digital fit out of buildings can help to meet the increasing requirements by providing daily updated digital measurements. Such daily measurements should include, for example, the efficient use of renewable energy sources, the determination of the CO^2 footprint, as well as the recording and documentation of all materials used in order to trace their origin and thus ensure the sustainability of the building.

2. Activities must add value for the client = user.

The users of our properties expect low operating costs. Regardless of whether they are owners/operators/tenants of apartments, hotels, offices or serviced apartments. Data-supported facility management can ensure efficient property management.

The basis for this is, above all, easily retrievable, daily updated and clearly readable data records of all energy consumers. All building services systems must therefore be equipped with the necessary sensors to centrally process the read consumption data.

In this context, it is important to break down the consumption data to the smallest possible units. Energy consumption must be measured individually, i.e., at the level of office units, apartments, etc.

Modern building control systems provide a continuous overview of the main energy consumers in the property, such as electricity, heating, cooling and water.

Via a dashboard, the current energy consumption can be read “at the push of a button”. This enables energy-efficient operation of the property.

Not only facility management, but also the end users (tenants, owners, etc.) must have access to this data via apps. In this way, they can have a direct influence on their own energy consumption through their own behavior.

Another important aspect is the cost of property maintenance and cleaning. These must already be taken into account during planning, and then implemented in coordination with facility management.

Easily maintainable ventilation systems, easy-to-clean floor surfaces, window surfaces, etc. make a significant contribution to keeping operating costs low.

In addition to all these technical aspects, attention must be paid to the quality of the materials used. The users of the properties expect them to be free of substances harmful to their health. This can only be guaranteed if solely tested and approved materials are used and their installation or application is continuously monitored during the construction phase.

3. Key digitization aspects: Cost efficiency, value enhancement, future-proofing.

It is nowadays standard for a new car to have more than 100 sensors. These sensors serve as signal transmitters for purposes such as fuel consumption, tire pressure, necessary maintenance and service. The sensors try to increase the user comfort, reliability and safety. This so-called commodity (car) has an average useful life of 7.5 years [1]. In the Eurocode ÖNORM EN 1990 Fundamentals of structural design, a service life of 50 years [2] is specified for buildings and other ordinary load-bearing structures. This also corresponds to the service life within the scope of the life cycle assessment for the criterion of economic quality. Despite a planned service life that is about 6 times longer, no or fewer sensors are installed or less data is collected in an average building to initiate the necessary maintenance/service or to optimize consumption.

The aforementioned comparison shows the urgent need to digitize buildings in order to shape and improve cost efficiency, value enhancement and future-proofing over the course of their useful life.

In the area of cost efficiency, digitization means that daily updated measurements are available and these are used to carry out necessary maintenance at the right time, but also to identify where exact improvements need to be made. These optimizations and improvements not only have a positive impact on cost efficiency, but also on the value and future security of the building.

The measures identified and implemented through digitization increase the resilience of the property and result not only in functional preservation (as with cars, for example), but also in an increase in value.

In order to take advantage of the opportunities described above, targeted monitoring with open systems that can be adapted to new findings is necessary. This monitoring must collect all necessary data and can thus not only contribute to securing and improving the quality of the property, but also support the use of renewable energy sources.

4. Reduction of life cycle costs

The benefits of digitization for the sustainability of a property are by no means a one-off phenomenon. With forward-looking planning, the increase in cost efficiency runs consistently through all life cycle phases of the building, from planning and construction, through operation, to conversion, deconstruction or sale. Whether it’s the procurement of building materials, the installation of technical systems or the design of IT networking, a well thought-out digital and open-system approach not only enables seamless and reusable documentation, but also allows targeted and consistent access to physical and digital components of the property at later stages of its life. Examples of this are, on the one hand, material registers, which actively promote the reuse of components and thus the circular economy, and, on the other hand, networked consumption meters and sensors, which allow near-real-time control of the building technology and subsequently provide information about the actual consumption data of the property. Such solutions can only be implemented in the best possible and most efficient way if the application has already been prepared and at least considered at the

beginning of the life cycle. Retrofitting at a later stage, if the necessary basic requirements are not met due to digitally uncoordinated planning, can significantly reduce the cost savings from the potential efficiency gains. In the worst case, full implementation at a later stage is no longer practicable and a concrete opportunity to reduce life cycle costs is lost.

5. Fast, accurate and networked access to information and data.

Requirements and challenges:

A number of key challenges exist to enable fast, accurate, and connected access to information and data within different stakeholders of a real estate project. These challenges can be overcome by unifying and making data available.

The standardization of data plays the most important role here, as attention must be paid to the type, form and scope of the data in order to be able to import it into further applications. Storage in tabular form is recommended here, since this type of storage can be processed in almost all systems. The type and volume of data also play a major role, since the guiding principle here is: “The more, the better”. This circumstance becomes even more important when one considers that certain data may have no significance in the continuing system or section of the life cycle, but may be relevant in the demolition phase, for example.

The data could be made available via interfaces between the various systems or via central databases. However, both variants require a consensus between the software operators.

Added Values:

The comprehensive preparation and provision of data not only enable fast, precise and networked access to information and data. Furthermore, this approach enables knowledge in the form of key figures to then be transported into further projects in the form of comparative values. In addition, the data can be used to generate automated reports and analyses.

Beyond that, the central storage of data enables a certain independence from systems and providers.

6 Data-driven building models as a basic prerequisite for sustainable digitization of real estate.

One approach to creating a truly experiential solution with added value from networked data and information is to design and use a digital data model of the building that is filled, maintained and used throughout its life cycle. Possibly a further development of the already widespread Building Information Modeling (BIM) or Digital Twin, this approach combines the idea of these virtual images of a building with the idea of life cycle thinking. This only works if a seamless transfer of the data model from one project phase to the next is guaranteed. To achieve this, the use of digital replication should provide a basic attractiveness for all important parties along the life cycle in order to spur the active filling and maintenance of the model. In addition, the structure should fundamentally cover all the needs of the life stages of a building, but in use it should also allow appropriate adaptation and expansion according to local needs. The advantages and disadvantages of standardization on the one hand and flexibility on the other must be consciously weighed up in advance.

7. Data sets supplied to the individual subgroups

Delivering the datasets to each subgroup presents some challenges and, therefore, demands on the data and project teams. Before starting a project, for example, a project team should agree on how to standardize the data. As a result, all subgroups of a project should be in agreement on how the data will be harmonized before the existing information from the subsections of a project is passed on. It is also beneficial to harmonize data from previous projects, based on the agreed-upon standardization.

Furthermore, access to the data should be regulated. On the one hand, access can be based on different systems and thus on networked data. Another option is to store the data centrally, for example in a data warehouse. Access via software solutions has the advantage that the authorization for changes can already be recorded in the system. This is not possible, or only possible to a limited extent, when providing raw data.

“Data Jungle: What data do we need? How do we get the data? Who has the data sovereignty?

The topic of digitization is on everyone’s lips, and everyone is considering collecting data, storing it and using it. However, on the one hand, there is currently still little data available from new buildings or renovations, and on the other hand, the comparability of the data is very difficult.
Thus, the following questions arise:
- Which data should be collected in order to achieve added value for all project phases and project participants?
- What are the requirements regarding data quality -are they usable for further development?
- What are the requirements regarding data homogeneity -are they comparable?
- Who has to define the collection of data as a project goal?
- How can the data be made available?

As a first step, the minimum data to be collected is defined in the following sections and its path through the life cycle is then considered. In the individual sections, prerequisites are presented to collect the necessary data and to avoid a data jungle.

What data is needed?

In order to steer the topic of digitization and sustainability on the right track in the future and to avoid a data jungle, a central data model must be created in the planning phase across all planning trades and execution standards, so that it can then be used in the next phases of the life cycle, from execution to the operation of a building to deconstruction.

In the case of newly constructed buildings, a digital building model (IFC model) must be at the center of the planning process, where all planning trades (building construction, civil engineering, building services, structural engineering, etc.) combine their data. It is important to assign the necessary information to the respective building components so that the information can also be used and updated in the next phases of the life cycle.
For existing buildings, the first step is to create a digital building model using the existing data (2D data, point clouds), where the existing information is documented, and this data can then be built upon so that building improvements can be made in different directions. The advantage of a digital building model is that all necessary information throughout the life cycle of a structure is documented in one central location, avoiding a data jungle.
In order to create an optimal data model that everyone can also work with, it requires predefined data sets with which everyone can subsequently plan.
To map the working group’s predefined key figures into a building model, perhaps visually, uniform data sets for different components are needed.
The following key figures were defined in the working group:
CO^2 consumption during operation
kWh consumption during operation
Waste generation by type and weight
Environmental impact on tenants / indoor comfort
Water consumption
In order to achieve the EU’s energy and climate protection goals, the European EPBD (Energy Performance of Building Directives) has tightened requirements for buildings and their energy performance certificates. This directive addresses the following issues:
Lowest energy standard requirement for new buildings and renovations
Increase in the rate of energy-related renovation
Only renewable forms of energy allowed in new buildings
Digitization of building technology
Expansion of the e-charging infrastructure
Promotion of greening of buildings
Integrate climate targets into spatial planning
More demanding inspections of building technology systems
Use the SRI (Smart Readiness Indicator) to design and create a healthier and more comfortable building. It aims to address occupant needs and reduce energy consumption. The main focus of the SRI is to develop energy-efficient and climate-friendly cities and to increase the quality of life and economic attractiveness of the location.

Execution / commissioning

The efficient execution phase benefits from detailed planning, a clear and validated database and predefined interfaces, and an execution team involved at an early planning stage. The partnership-based approach to all project participants creates the basis for constructive, open and trust-based cooperation. Through the early involvement of the relevant executing disciplines, everyone is familiar with the overall project goal and motivated to achieve the planned objective.
The system integration architect coordinates the individual technical trades and defines specific target and quality specifications for each individual trade. This concerns, for example, data quality and descriptions of interfaces for data transfer to a higher-level system. From the point of view of digitization, the primary goal is to be able to administer the data centrally.
Based on the generated data, which is derived in the digital twin or from the simulation, the programmers of the executing company can automatically generate the program code and use it for commissioning. This is referred to as automatic code generation. In this case, the technical solution for building operation is automatically generated from the planning data. This makes it possible, for example, to put an office or an apartment into operation in a few minutes. A modern engineering tool is characterized by its ease of use and enables even “non-programmers” to achieve time-efficient commissioning by parameterizing and configuring. The flexible functionality also allows for unforeseen adjustments. In principle, the automation contractor does not have to be physically present on site, but can work remotely on the automation system. However, this requires well-coordinated teams from all trades.
When the application-specific program code is created, the functionality of the project is mapped in the software. The configurator sits above the program code, enabling efficient engineering in the execution phase.
- Select target system - The target system takes over the functionality of an entire building, floor, room or technical trade and is networked with other systems, sensors and actuators. Of course, external data sources can also be integrated. The target system also provides the interface to databases in order to exchange data with, for example, control technology, property management software, facility software or hotel booking software.
- Define areas - In a target system, the local assignments are made in this step and ideally provided with comprehensible unique room names or area names.
- Select functions - The intended functions are defined in the individual areas.
- Define hardware - In the definition of the hardware, the data is assigned to physical interfaces.
- Signal assignment - In this step, the interfaces are assigned to the components of the technical building systems. This can be, for example, an assignment between push-button lighting, thermostatic valve, residential unit meter, residential unit wallbox or push-button shading.
- Load program - The finished configured software package is loaded to the assigned target system.
- Parameterization - In this phase, the individual functionalities are fine-tuned and concluded with a function test.

In addition to the typical technical trades, this concept also networks mobility and provides all relevant data for property management billing via interfaces. The property manager is automatically provided with energy trends or alarms. The visualization for operation via PC or cell phone is automatically created during parameterization. With this approach, the commissioning time of buildings, in contrast to conventional concepts, is reduced many times over.

Documentation

Given that digital planning and, in the final stage, BIM (=Building Information Modeling) provide very detailed data, accurate and timely documentation should no longer be a problem, should it?
Common practice shows that documentation is usually submitted at a late stage and usually in a quality that can be improved, which is in fact often caused by the client (= building owner).
Why? Because very often, for example, neither the requirements for documentation, such as the level of detail, nor responsibilities are personalized.
In the area of heating, ventilation and air-conditioning systems and the higher-level I&C (=Instrumentation and Control), very often only products or system parts are documented, for example, but the commissioning work is also recorded accordingly.
In summary, it can be said that personalized responsibilities for each specialist trade, the documentation content and the quality must be defined when all the trades are commissioned in order to ensure the best possible operation.

Operation / Life Cycle

Data is not only important in the planning and execution phase, but also for building operation - around 80% of the total costs of a building are attributable to building operation.
In recent years, digital planning has become more and more common and will increasingly take the form of BIM (=Building Information Modeling) projects.
Currently, however, this digital building planning data is usually only passed on to the next project stage, such as the execution phase, or it serves as a basis.
However, if 80% of the life cycle costs are incurred in the building operation, it is essential to already define the needs of the operator / facility management in the concept or planning phase and to ensure that this data is available for / in the operation.
Why is this data so immensely important for various stakeholders and what opportunities does it offer?
In order to demonstrate the meaningful use, two possible operator practice examples can be found below:
By comparing target data with actual data, for example, deviations (anomaly detection) can be identified, localized and corrected accordingly.
Furthermore, historical user and building data can be used as a benchmark through the application of various software solutions and thus form the baseline for further optimization measures.

Circular economy

The topic of circular economy was dealt with in detail in a position paper of the ÖGNI. At this point, it should only be pointed out that the data of the materials used, such as quantity and service life, must be recorded. However, this is static data that only changes during a conversion and therefore does not have to be collected continuously, but only when certain events occur, such as renovation or repair.

How does one obtain a clear overview of the data?

In order to maintain the overview of the various data of a building/project, a BIMcloud is required for the data storage of various documents (IFC model, PDFs, JPEG, etc.), in which all participants can directly access the project data, thus eliminating the need to send e-mails. In various BIMcloud products, individual editing rights can also be assigned to the participants. With such BIMcloud solutions, very simple communication can take place between the participants, and in addition, model checks, conflict detections or validations can also be completed.
This cloud and the information it contains can then be transferred to operations/facility management after completion of the project and kept up to date by operations. This means that the current information status of the various components/materials is also available during deconstruction or demolition.

Who has the data sovereignty?

In the real estate industry, many different professionals work on a common project and rarely know the details of what each other is doing - this is the starting situation for many projects, especially from the perspective of digitization.
A large part of the industry sequentially works through its individual processing steps (from the initial concept to the finished building and downstream operation) according to the iterative method. Even well-intentioned collaborative work via the BIM method is hampered by the silo thinking of individual professionals. The digital twin, which could already detect planning errors before commissioning, often fails in the task of bringing together the different data sources. In addition to the challenge of presenting the data in a holistic model, there is also the question of the legal authority to process and use this data - data sovereignty.
Data sovereignty describes the power of disposition over the processing of digital data. The term also includes data protection, encryption, transmission and storage.
The complexity of the individual performance stages in the creation process and in the operation of real estate in connection with the forwarding and transferring of relevant data is not trivial, but it is absolutely necessary with regard to digitization.
When transferring data from a contractor to the commissioning party (e.g. owner, ...), in addition to the legal framework, the following questions must be addressed

- Who is the data owner
- Who is authorized to store the data and how?
- Who is authorized to process the data and how?
- What methods are to be used to protect the data?
- How is data misuse managed?

Methodology and Procedure for Data Classification

The following chapter deals with the procedure and the methodology of the data classification. This approach and methodology were chosen to address the problems described in the previous chapter.
In a first essential step, the working group dealt with the following two tasks.
- Which data does which actor need?
- Which data does which actor have?

Furthermore, different data sets and the respective actors were described and then assigned to each real estate life cycle phase (see also Figure 1). The phases of the real estate life cycle are as follows:
- Deconstruction & Site Preparation
- Planning & Investment
- Construction
- Operation
- Conversion & Refurbishment

The entire data sets and the respective actors of each phase were then consolidated in an overall table and presented in a data matrix. This resulted in a total of 77 data sets and 27 actors, which were then distributed among the various phases. Due to the high number of data sets and actors, problems arose, among other things, in that data was mentioned twice and several times over the various life cycle phases, and that data sets were transmitted inadequately or unclearly defined. In addition, some data sets were not relevant with regard to the criterion of sustainability, which is the core of this position paper. In summary, as already mentioned in the previous chapter, a veritable “data jungle” was created.
In order to now structure the aforementioned “data jungle”, the following structuring approach was chosen.
In a first step, each data set was evaluated with regard to the three pillars of sustainability and, if possible, assigned to them. The three-pillar model of sustainability is based on that of ÖGNI and DGNB and can be described as follows:
Economy: Refers to the fact that we consider buildings in an economically sensible way and over their entire life cycle.
Ecology: Involves constructing buildings in a way that conserves resources and the environment.
Social: Focuses on the user of the building: e.g. accessibility, visual and acoustic comfort, user influence, perception of safety and mobility issues.

It is therefore possible to speak of sustainable action when these three dimensions are brought into harmony. The aforementioned classification of the data according to the three pillars of sustainability was chosen in order to ensure the focus with regard to sustainability, since, as already mentioned, some data sets did not reflect the latter.
In a further step, five data categories were formed in order to better assign or categorize the respective data sets - these can be presented as follows:

In a final step, the category “Prioritization with regard to sustainability” was formed in order to further reduce the number of data sets or to filter them according to their importance with regard to sustainability.
After the last step mentioned, the following result could now be presented in order to classify the data sets accordingly into the life cycle phases, the data categories and the columns of the described model (see Figure 3):

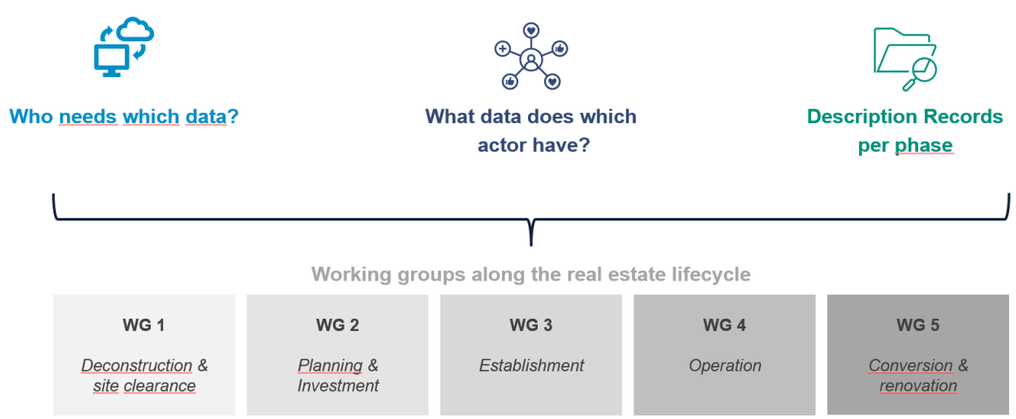

Fig 1: data sets accordingly into the life cycle phases

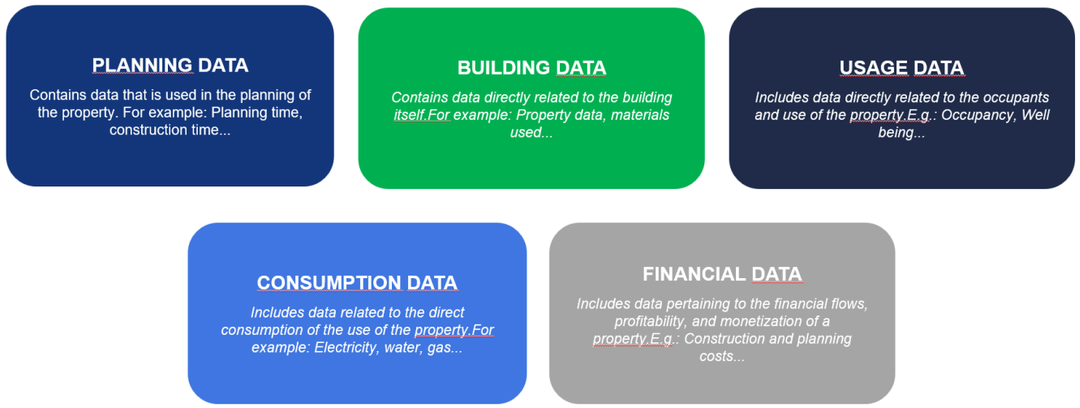

Fig. 2 data categories

In total, the original number of 77 data sets could be reduced to 25. Looking at Figure 3, it should be noted that a data set can fall into several data categories and columns.
Based on the entire data set, five to six key figures are to be derived in a final step, which will then be included in the DGNB certification. These indicators are then briefly described in Chapter 9.
In addition, indicators were defined which were

Result of the methodical approach

Filtering in terms of sustainability was also integrated.
The total number of 77 data records was reduced to 25.

Life cycle phases	Number of records*	Planning data	Building data	Usage data	Consumption data	Finan-cial data	Ecology	Economics	Social
Deconstruction & site clearance	0	0	0	0	0	0	0	0	0
Planning & Investment	3	3	2	0	0	0	3	3	0
Establishment	9	5	7	0	1	1	7	5	0
Operation	7	0	3	3	3	0	6	6	2

Fig.3 Data Modell

considered important with regard to the circular economy, but which will not be discussed further in Chapter 9 due to the lack of digitizability or measurability.
Those metrics and measurements are as follows:
- User: indoor satisfaction
- Sealed area compared to usable area
- Primary energy demand
- Air quality
- Proportion of subsidized housing/average urban/rural rent
- Diversity (e.g., number of cultures/age groups/gender/demographics represented in the property)
- Recycling rate of construction and raw materials
- Proportion of secondary raw materials to primary raw materials

In the following chapter, we will now discuss the mentioned key figures/values that resulted from the approach and methodology of the data classification. The working group agreed that the mentioned key figures/values are only to be understood as basic requirements on how buildings can be operated sustainably.

Solution and conclusion: Transition to key figures that should influence sustainability certification

This chapter also serves to conclude this working group and the position paper and is intended to summarize the results of this working group.
As was already evident in the previous chapters, the symbiosis between digitization and sustainability can only work if data is available. Thus, measurable sustainability cannot be achieved without digitization. Nevertheless, numerous real estate properties are not able to report the values for sustainability. The following data-driven values/key figures, which emerged from the methodology addressed in Chapter 8, should be provided automatically by each property within a very short time:

CO^2 consumption during operation (OIB guidelines)

The CO^2 consumption for real estate should represent an exact assessment of the current greenhouse gas emissions of buildings based on the measured consumption data (such as electricity, gas or other energy sources).

kWh consumption in current operation:

This reference value is intended to represent the kWh consumption of a building in ongoing operation and further consists of the following sub-indicators:

Annual value kWh per energy source
kWh electricity total
kWh of electricity from individual usage units
kWh from each electricity producing unit
kWh fed back into the grid from self-generating plants

Environmental impact on tenants / indoor comfort e.g.: Room temperature, indoor climate in relation to outdoor climate:

This benchmark is intended to ensure adequate indoor conditions for building occupant activity at all times of the day and year. In addition, the conditions in the outdoor space are to be determined as a comparison in order to be able to relate the determined figures.
A further step is the recording of the CO^2 concentration in the indoor space in comparison to the outdoor space. The data shows whether the limit values with regard to the CO^2 concentration are complied with or which quality level of the indoor air quality is given.
High air quality as well as pleasant room temperatures increase the well-being and performance of the building users. A positive indoor climate with a high level of satisfaction among building users has a positive effect on the occupancy rate and marketability of the property and reduces potential cost and health risks.

Water consumption (e.g. m^3 of water from the local network or well usage)

This benchmark is intended to ensure the preservation of the natural water cycle as well as a reduction in potable water demand through recycling of wastewater and use of local resources.
Accordingly, reducing potable water and wastewater demand can reduce ongoing costs. In addition, a high level of recycling of wastewater as well as the use of local resources (wells, rainwater) can be achieved.

Waste generation by type and weight

This guideline value provides information on what waste is generated and in which quantities. This primarily serves to raise awareness. In a second step, the data can be used to work on reducing waste, for example by adapting the purchasing strategy for office supplies and the like.
A reduction in waste saves money for disposal and must also be stated in a company's ESG report (current status, measures for reduction, etc.).

As already mentioned, the key figures / values stated are merely to be understood as basic requirements for how buildings can be operated sustainably. Nevertheless, even the fulfilment of these basic requirements, in the context of a certification, should have a positive effect on the life cycle costs of a building. Those key figures thus represent a minimum level of motivation to further optimize the sustainability and ultimately also the economic aspects of a building.
The findings of the position paper have further highlighted the problem of superimposing digitization and sustainability. From the wealth of key figures provided by the participants in this working group, many were classified as either not (yet) digitally recordable or as less relevant in terms of sustainability. For example, the key figures stated at the end of the previous chapter should be mentioned here (e.g. user: indoor satisfaction, sealed area compared to usable area, primary energy demand, air quality, etc.).

Nevertheless, the core message remains the same, as already mentioned:

Without digitization, there is no sustainability. The link here is data and data availability. Accordingly, without the ability to digitize data, there is no data and thus no measurable sustainability.
The findings of the working group indicate that the focus will be on data availability, transfer, linkage and measurability. Data is generated in many ways, but standalone data does not add the value that it can when used in a structured data lake. If the digitization of sustainability is not advanced, real estate and properties will lose value and ultimately attractiveness.
Sustainable construction therefore means taking all possible measures along the entire life cycle of a building that serve to act in an ecologically, economically and socially compatible manner. This requires continuously updated and ready-to-hand data - for measuring ESG criteria, selecting service providers, assessing the market situation and much more.
In this context, the topic of the circular economy must also be considered, among other things. In a functioning circular economy, raw materials are not removed from their cycle, but remain in the economic cycle for as long as possible through their efficient and intelligent use. It is clear that this will not succeed without the digitizability of data and the resulting measurability of sustainability.
As the real estate industry faces huge steps towards sustainability (achieving European climate targets, EU taxonomy, etc.), digitization must act as a pathfinder on the way to a sustainable real estate universe.
Pressure will come not only from regulatory measures such as EU taxonomy and "green" building code requirements, but above all from investors, whose requirements profile for real estate acquisitions will change fundamentally.
The working group of this position paper, concludes by agreeing that a symbiosis of digitization and sustainability has great potential to create added value in the real estate industry and help to better master the challenges of this time.

LIST OF FIGURES

[1] CRREM (2020): Carbon Risk Integration in Corporate Strategies within the Real Estate Sector. Online abrufbar: CRREM-Carbon-Risk-Integration-in-Corporate-Strategies-within-the-Real-Estate-Sector.pdf (Zugriff am 08.07.2022)
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[1] Die Nutzungsdauer und Obsoleszenz von Gebrauchsgütern im Zeitalter der Beschleunigung. Eine empirische Untersuchung in österreichischen Haushalten. Mai 2015 AK Wien. ISBN: 978-3-7063-0563-1
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ÖGNI
AUSTRIAN SUSTAINABLE BUILDING COUNCIL

AUSTRIAN SUSTAINABLE BUILDING COUNCIL

ÖGNI - Austrian Sustainable Building Council is an NGO (non-governmental organization) for the establishment of sustainability in the construction and real estate industry. The aim of the ÖGNI is to demonstrate the added value of building certifications in order to create environmentally and resource friendly buildings, with high economic and social efficiency, which can be used flexibly over generations and have a positive impact on the health, well-being and performance of the users.

The ÖGNI was founded in 2009 and is a cooperation partner of the DGNB (German Sustainable Building Council), whose certification system was adopted, adapted to Austria and has been continuously developed since then. The ÖGNI is the only Austrian council that is an “established member” of the WorldGBC (World Green Building Councils) and strives to strengthen the European quality certificate on an international level.

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Cooperating with:

WORLD GREEN BUILDING COUNCIL
DGNB Deutsche Gesellschaft für Nachhaltiges Bauen German Sustainable Building Council
SGNI Swiss Sustainable Building Council
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GBCe green building council españa