# SBB survey with SIA and FSA (BSA-FAS) on the use of Building Information Modelling (BIM)

22.03.2021

# Introduction

Since the beginning of 2021, SBB has been using Building Information Modelling (BIM) (in accordance with SN EN ISO 19650 1:2018) for its information management regarding all structural engineering investment properties (> CHF 5m).

Through this online survey, SBB, the Swiss Society of Engineers and Architects (SIA), and the Federation of Swiss Architects (FSA/BSA-FAS) wanted to discover what participants think of information management using BIM. Those who took part answered questions about their organisation's attitude, perception, level of development and needs, as well as their awareness of the SN EN ISO 19650 *Organization and digitization of information about buildings and civil engineering works, including building information modelling (BIM) – Information management using building information modelling* and the SIA leaflet 2051 *Building Information Modelling (BIM)*.

Information management refers to an area of activity in project management which involves the collection, forwarding, handling, processing, evaluation, and storage of project information and data. The term "BIM" is understood to mean the joint use of digital building information models during the planning, implementation, and management of structures. The digital building information models are a reliable source for decision-making.

The mailing lists for the newsletters and social media of SBB, the SIA, the FSA, the usic and Bauen Digital Schweiz primarily formed the basis for the selection of people/organisations. For this reason – among others – the sample is not representative and cannot be extrapolated to apply to the population as a whole. General statements about the construction industry or a sector of the industry therefore cannot be made. The results of the survey reflect the survey participants. The composition of participants is broken down in the key data (see key data).

The objective of the survey was to gain an overview of attitudes which can serve as the basis for measures and further clarifications. It is not possible to draw conclusions about the Swiss construction industry as a whole due to certain methodological limitations (e.g. the anonymity of participants, coverage bias and self-selection bias). Nonetheless, the survey reveals interesting trends that are worth pursuing. Evaluating the individual questions can also be useful for conceptualising new, specific, and more differentiated hypotheses and questions.

**Breakdown of survey participants**

The 738 valid responses received come from people who work for organisations with the following characteristics:

| | | |
|---|---|---|
| 53 | 7.2% | Fewer than 5 employees |
| 77 | 10.4% | Between 5 and 9 employees |
| 254 | 34.3% | Between 10 and 49 employees |
| 210 | 28.5% | Between 50 and 249 employees |
| 144 | 19.5% | More than 250 employees |

The proportional number of organisations according to size in the online survey is likely to differ greatly from the known proportions from the Federal Statistical Office (FSO). If we compare an example of the distribution of participants by size of organisations for architecture, engineering, other technical planning, geomatics, consulting etc. (NOGA 711/712) against FSO data, it is clear that the participants disproportionately come from medium-sized and larger organisations.
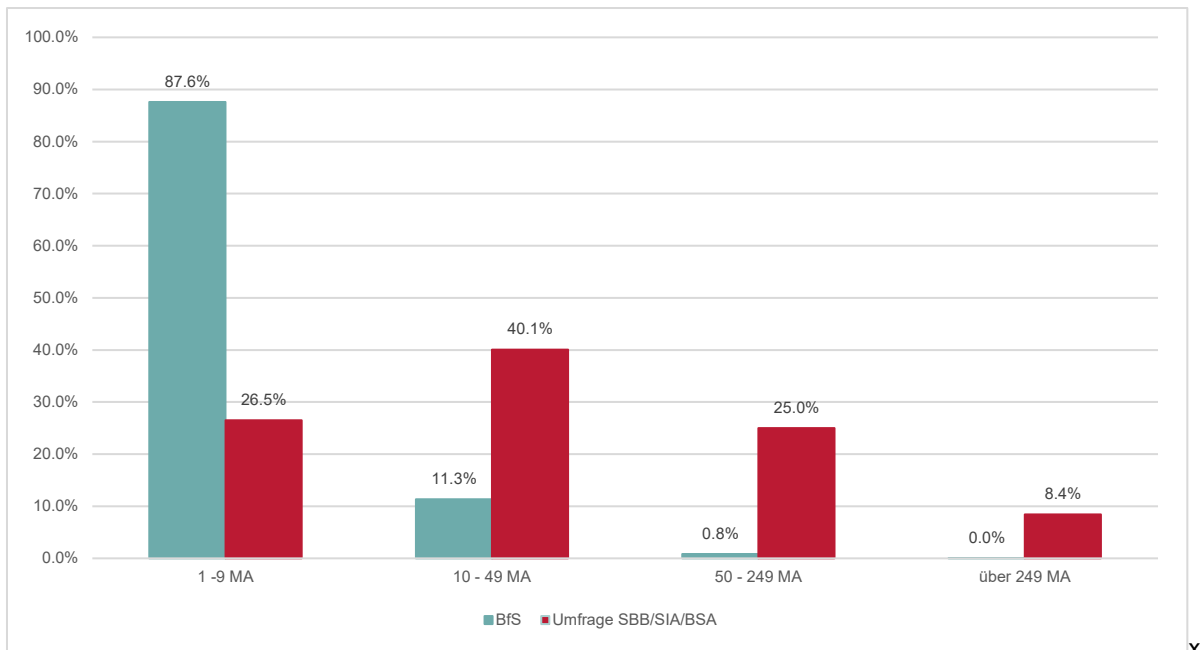
NOGA 711/712 according to company size (green FSO / red survey)

| | | |
|---|---|---|
| 9 | 1.2% | General contractor* |
| 11 | 1.5% | Other ("not "external" but not defined here) |
| 12 | 1.6% | Total contractor* |
| 16 | 2.2% | General planning* |
| 22 | 3.0% | Private developer |
| 22 | 3.0% | Authority / other public body |
| 25 | 3.4% | Operations / management |
| 28 | 3.8% | Public developer |
| 124 | 16.8% | Manufacturing / product delivery |
| 137 | 18.6% | Construction company* |
| 332 | 45.0% | Architecture, engineering, other technical planning, geomatics, consulting* |

*(*planning and implementing organisations)*

| | | |
|---|---|---|
| 66 | 8.9% | Active worldwide |
| 40 | 5.4% | Active throughout Europe |
| 20 | 2.7% | Active throughout Switzerland & in DE, FR, IT |
| 280 | 37.9% | Active throughout Switzerland |
| 85 | 11.5% | Active supra-regionally |
| 247 | 33.5% | Active regionally |

Survey data is broken down by question only and not further by organisation size, type etc. The survey was primarily analysed by question (738 participants), with a secondary focus specifically on planning and implementing organisations (NOGA 711/712 and construction industry – 506 participants). In the following diagrams, the data for all organisations (738 participants) is shown on the left and the data for planning and implementing organisations (NOGA 711/712 and construction industry (506 participants)) is shown on the right.

# Evaluation of survey responses

## Collaboration within projects for which Building Information Modelling (BIM) is/was used for information management.

The majority of all survey participants (56.8%) have already worked on projects where BIM was used for information management. When looking more specifically at planning and implementing organisations such as general contractors, construction companies, total contractors, general planning and organisations from the architecture, engineering, other technical planning, geomatics and consulting sectors (NOGA 711/712), it is apparent that more than two thirds of these participants (67.8%) have already experienced working on these types of projects.
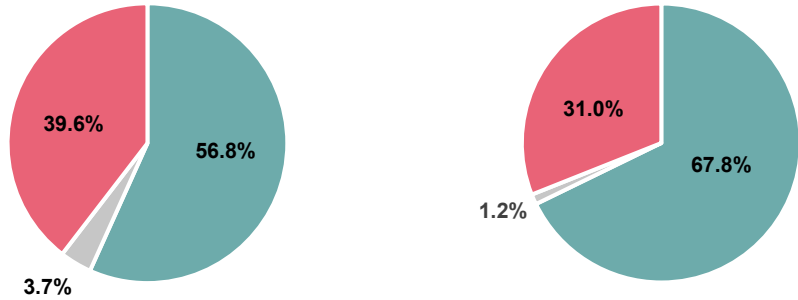


"Is your organisation already working on projects that use Building Information Modelling (BIM) for information management or has it done so in the past?" Yes (green) / No (red) / No statement possible (grey).
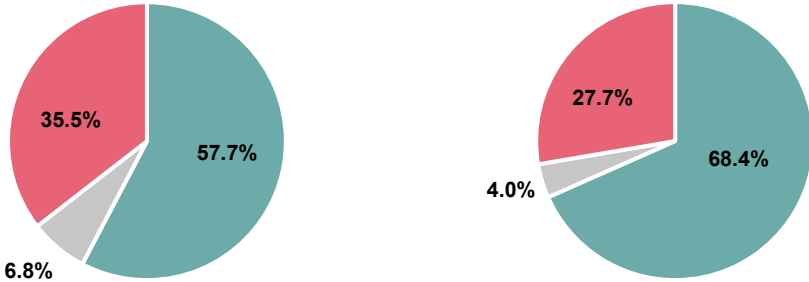
Figure left: all organisations (738 participants) / Figure right: NOGA 711/712 organisations and construction industry (506 participants)

## Familiarity with norms and leaflets

Fewer than half of all participants (43.8%) are familiar with SN EN ISO 19650. Looking more specifically at planning and implementing organisations reveals that almost half of these participants (49%) are aware of the standard. More than half of all participants (58.1 %) are aware of the SIA leaflet 2051. Looking more specifically at planning and implementing organisations reveals that almost two thirds of these participants (66 %) are aware of the leaflet.

## Use of open file formats (e.g. IFC)

The majority of all survey participants (57.7%) use open file formats. Looking more specifically at planning and implementing organisations reveals that more than two thirds of these participants (68.4%) use open file formats.



"Do you use open file formats (e.g. IFC) to exchange data?" Yes (green) / No (red) / Don't know (grey).

Figure left: all organisations (738 participants) / Figure right: NOGA 711/712 organisations and construction industry (506 participants)

**Level of implementation / development status in general and focusing on specific use cases**

The Transtheoretical Model (Stages of Change) (Prochaska & Di Clemente,1983; Prochaska, Prochaska, & Levesque, 2001) was used to evaluate the level of implementation (measuring the development status) for potential uses cases in these projects and/or within organisations involved in them.

Scale/evaluation logic:

| | |
|---|---|
| We haven't yet considered it. | = 1 (pre-contemplation) |
| We have discussed it but do not have any plans for implementation. | = 2 (contemplation) |
| We are planning to implement it. | = 3 (preparation) |
| We have implemented it unsystematically as part of a pilot project. | = 4 (action) |
| We are implementing it in a systematic way. | = 5 (maintenance) |

Mean value above 3.5 = unsystematic implementation in pilot projects

Mean value between 3.0 and 3.5 = in planning stages, with a tendency towards implementation

Mean value between 2.5 and 3.0 = in planning stages

Mean value between 2.0 and 2.5 = discussions have taken place but without any plans, with a tendency towards planning

Mean value between 1.5 - 2.0 = discussions have taken place but without any plans

**(Overall item):** "If you were to compare yourself to similar organisations, how would you rate the level of implementation of BIM for information management by your organisation?"

All (738 participants): mean value: 3.124 / standard deviation: 1.402925305

Planning and implementing organisations (506 participants): mean value: 3.455 / standard deviation: 1.320

"We use common digital platforms to share information among stakeholders."

All (738 participants): mean value: 3.356 / standard deviation: 1.499446631

Planning and implementing organisations (506 participants): mean value: 3.661 / standard deviation: 1.391

"We transfer the agreed data and information at specific times and in the desired manner (formats, labels etc.)"

All (738 participants): mean value: 3.083 / standard deviation: 1.535469524

Planning and implementing organisations (506 participants): mean value: 3.385 / standard deviation: 1.458

"Model-based solutions are proposed and decisions are made during joint meetings."

All (738 participants): mean value: 2.844 / standard deviation: 1.503870321

Planning and implementing organisations (506 participants): mean value: 3.168 / standard deviation: 1.482

"We use model and collision tests to ensure the quality of the design."

All (738 participants): mean value: 2.823 / standard deviation: 1.570280649

Planning and implementing organisations (506 participants): mean value: 3.172 / standard deviation: 1.536

🙂 🙁 "We enable all stakeholders to examine the project at any time using tools for viewing the information models."

All (738 participants): mean value: 2.713 / standard deviation: 1.529785694

Planning and implementing organisations (506 participants): mean value: 2.988 / standard deviation: 1.528

🙂 🙁 "We use information models to determine quantity and cost calculations."

All (738 participants): mean value: 2.629 / standard deviation: 1.466089596

Planning and implementing organisations (506 participants): mean value: 2.901/ standard deviation: 1.463

🙂 🙁 "We use information models to manage ongoing issues and defects."

All (738 participants): mean value: 2.524 / standard deviation: 1.440820385

Planning and implementing organisations (506 participants): mean value: 2.788 / standard deviation: 1.442

🙁 🙁 "We use information models as part of the tender process."

All (738 participants): mean value: 2.480 / standard deviation: 1.39404226

Planning and implementing organisations (506 participants): mean value: 2.686 / standard deviation: 1.404

🙁 🙁 "We use model-based simulations in order to make predictions (e.g. regarding costs and deadlines)."

All (738 participants): mean value: 2.341 / standard deviation: 1.340403622

Planning and implementing organisations (506 participants): mean value: 2.559 / standard deviation: 1.356

🙁 🙁 "We use information models to make the maintenance and management processes more efficient."

All (738 participants): mean value: 2.092 / standard deviation: 1.276074613

Planning and implementing organisations (506 participants): mean value: 2.152 / standard deviation: 1.291

**"The building industry is prepared for this."**

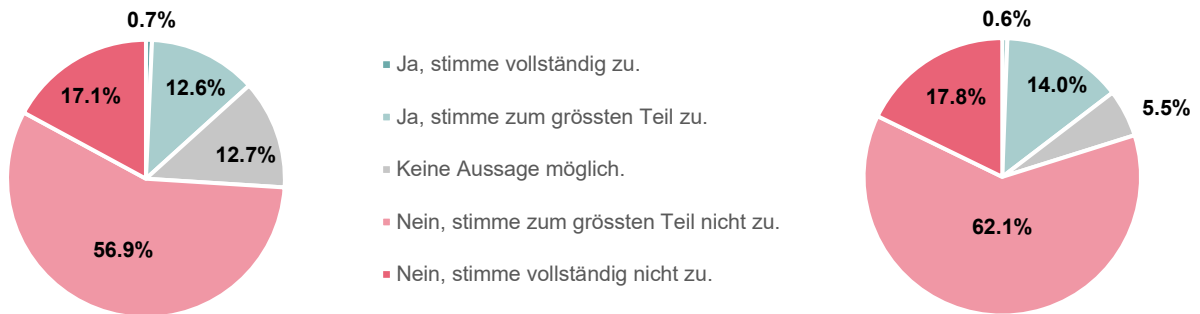13.3% of all participants agree / **74% disagree** / 12.7% can't say.



Figure left: all organisations (738 participants) / Figure right: NOGA 711/712 organisations and construction industry (506 participants)

**"It is essential for the building and real estate industry in the future."**

**69.4%** of all participants agree / 20.5% disagree / 10.2% can't say.
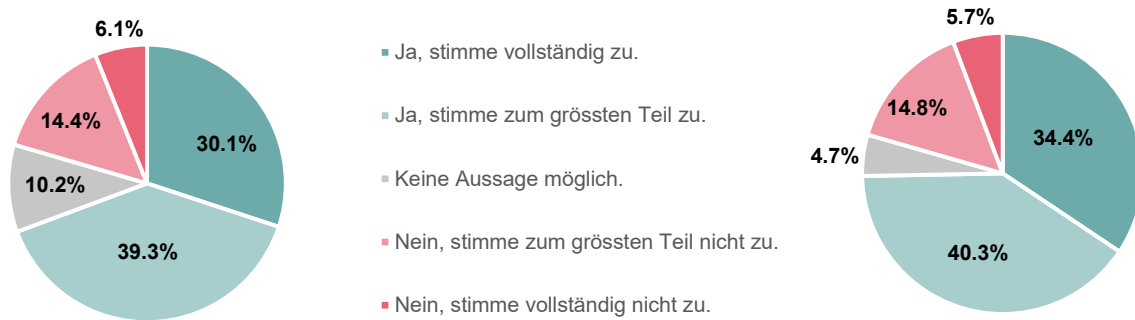


Figure left: all organisations (738 participants) / Figure right: NOGA 711/712 organisations and construction industry (506 participants)

**"There is a consensus in the industry concerning the terms that are used."**

22.1% of all participants agree / **60.8% disagree** / 17.2% can't say.
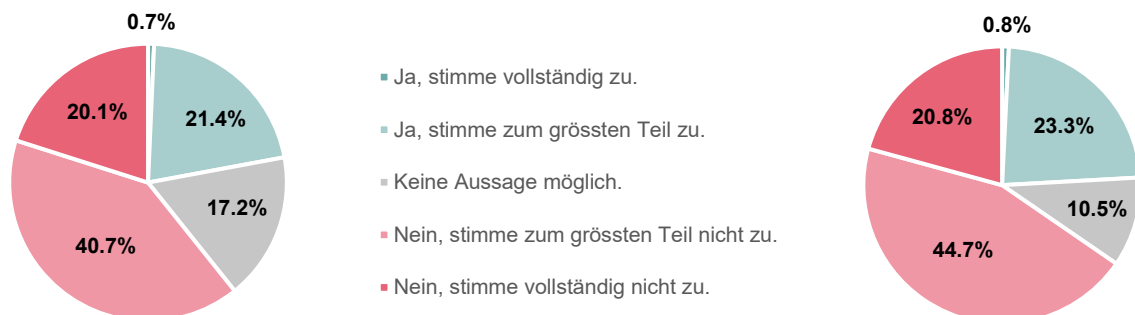


Figure left: all organisations (738 participants) / Figure right: NOGA 711/712 organisations and construction industry (506 participants)

**"There are enough types of contract models in the market."**

12.7% of all participants agree / **62.6% disagree** / 24.7% can't say.



Legend:
- Ja, stimme vollständig zu.
- Ja, stimme zum grössten Teil zu.
- Keine Aussage möglich.
- Nein, stimme zum grössten Teil nicht zu.
- Nein, stimme vollständig nicht zu.

Left pie: 1.5%, 11.2%, 24.7%, 36.7%, 25.9%
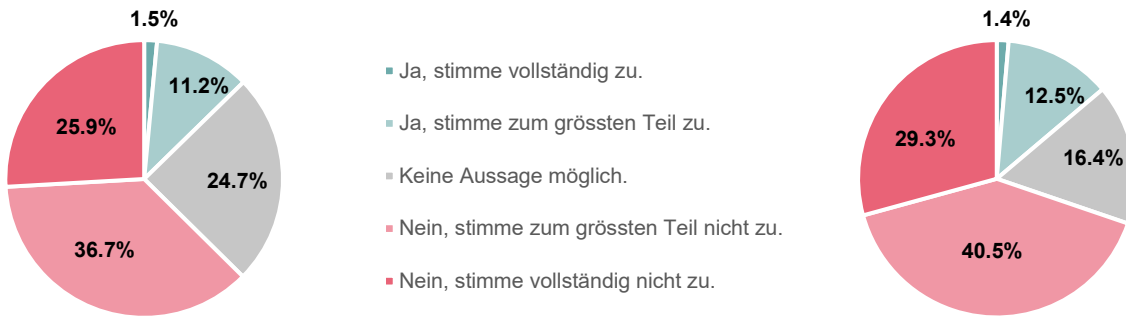Right pie: 1.4%, 12.5%, 16.4%, 40.5%, 29.3%

Figure left: all organisations (738 participants) / Figure right: NOGA 711/712 organisations and construction industry (506 participants)

**"There are enough relevant training opportunities in the industry to acquire the necessary skills."**

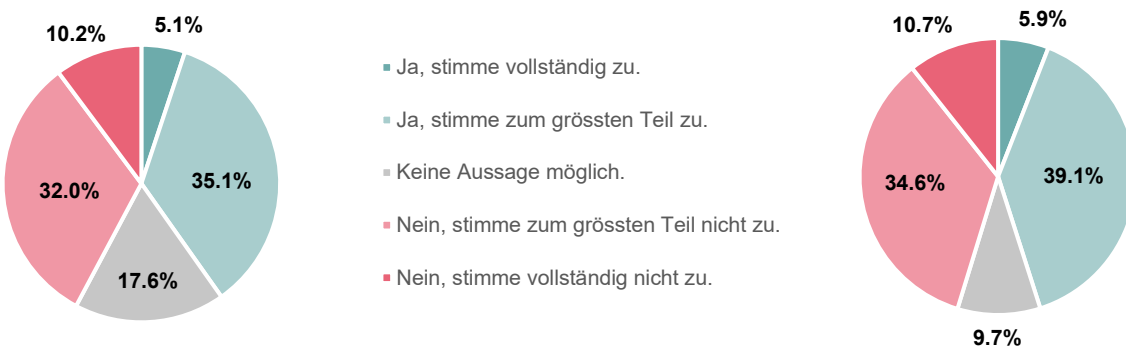40.2% of all participants agree / **42.2% disagree** / 17.6% can't say.



Legend:
- Ja, stimme vollständig zu.
- Ja, stimme zum grössten Teil zu.
- Keine Aussage möglich.
- Nein, stimme zum grössten Teil nicht zu.
- Nein, stimme vollständig nicht zu.

Left pie: 5.1%, 35.1%, 17.6%, 32.0%, 10.2%
Right pie: 5.9%, 39.1%, 9.7%, 34.6%, 10.7%

Figure left: all organisations (738 participants) / Figure right: NOGA 711/712 organisations and construction industry (506 participants)

**"Developers are able to commission this correctly."**

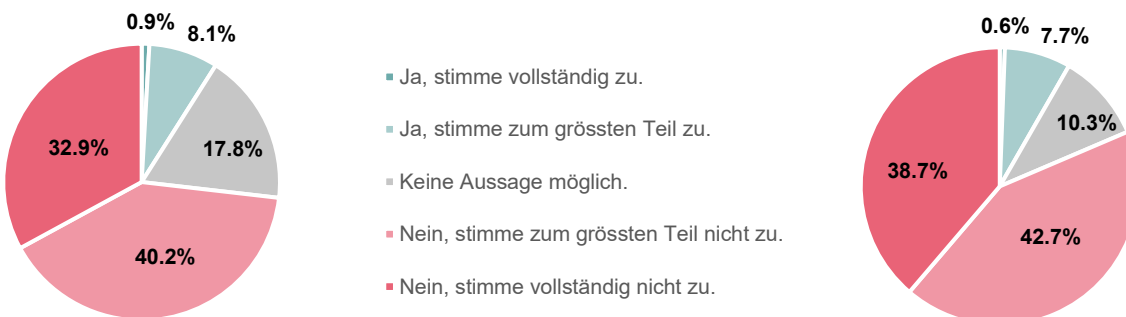9% of all participants agree / **73.1% disagree** / 17.8% can't say.



Legend:
- Ja, stimme vollständig zu.
- Ja, stimme zum grössten Teil zu.
- Keine Aussage möglich.
- Nein, stimme zum grössten Teil nicht zu.
- Nein, stimme vollständig nicht zu.

Left pie: 0.9%, 8.1%, 17.8%, 40.2%, 32.9%
Right pie: 0.6%, 7.7%, 10.3%, 42.7%, 38.7%

Figure left: all organisations (738 participants) / Figure right: NOGA 711/712 organisations and construction industry (506 participants)

**"According to the Swiss Confederation's digital strategy, the Confederation and all federal enterprises including SBB will use BIM for structural engineering projects (> CHF 5m) on a compulsory basis from 2021..."**

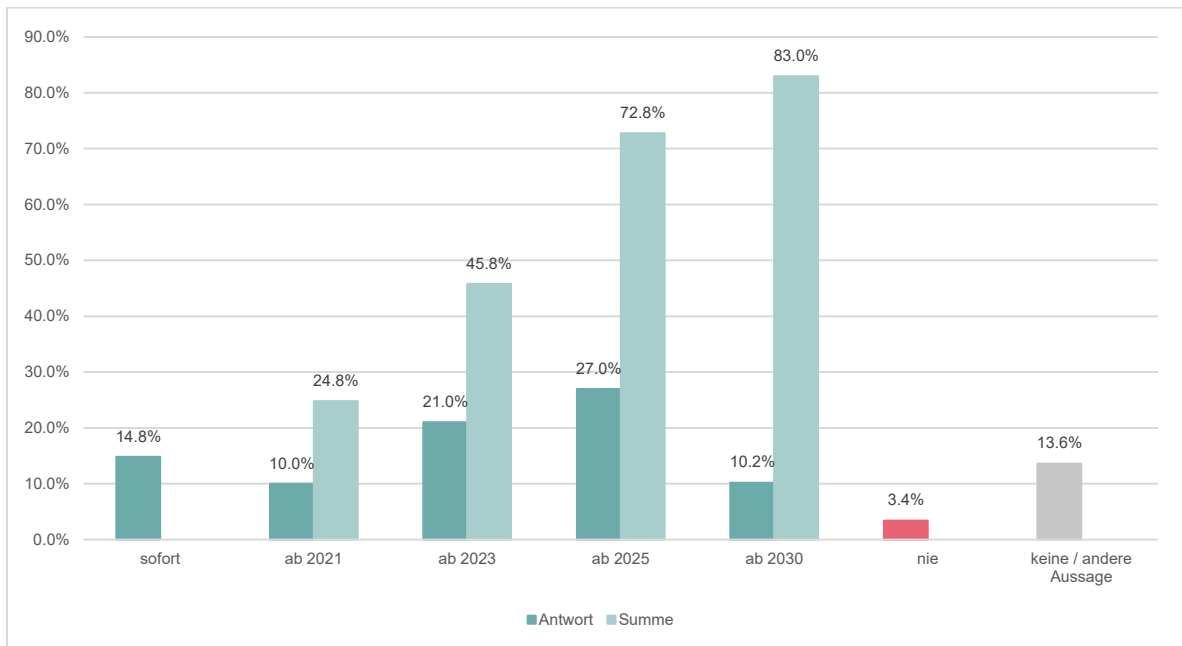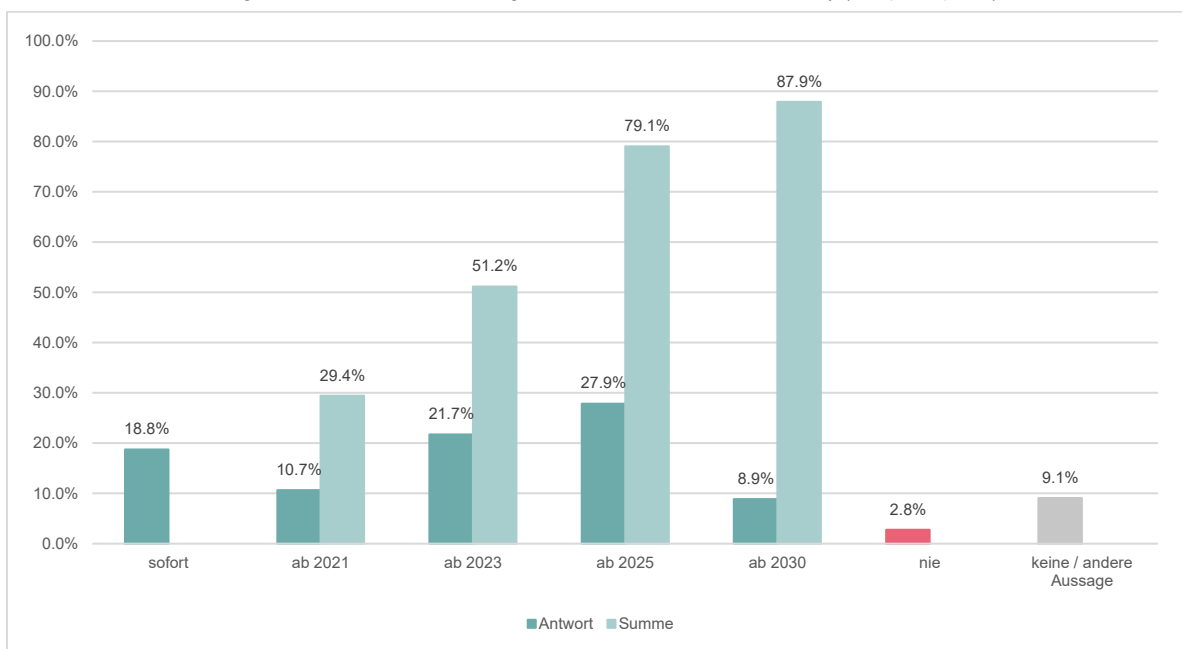There tends to be a consensus that application (in full) is realistic by 2025 (72.8%).



Figure above: all organisations (738 participants)

Figure below: NOGA 711/712 organisations and construction industry (506 participants)

## Conclusion

The survey participants think that the application of information management using BIM will become realistic by 2025 at the earliest. However, due to the transitional phase from national to international standardisation and the current low familiarity with SN EN ISO 19650 1:2018, there is no common understanding of BIM.

Although the mean values of the level of implementation for specific use cases suggest that the average survey participant is in the planning or early implementation stages, the differentiated data reveals a different picture: either the participants are already in the process of implementing the specific use cases, discussions have not yet taken place, or discussions have taken place but there are no implementation plans.

The majority of participants think that fundamental principles like definitions of terms and contract templates – the basis for understanding and collaboration – are not adequate and that formulating objectives (order) is often challenging for all stakeholders.

Therefore, all stakeholders in the value chain of the building industry will soon be required to establish and maintain uniform principles, as well as a common, uniform understanding of the subject area. More attention and weight must be given to formulating requirements and defining the construction project (setting objectives), especially when it comes to information management. Terms must be clarified and uniformly defined to ensure common understanding. In addition, contractual documents that support and regulate collaboration must be drawn up. This can only be achieved if all parties collaborate.