

# ARGE BIM BIM-Webinar

BIM, or Building Information Modelling, is a hot topic in the construction world and refers to the possibility of using digital building models to better organize a construction process and to share information more easily between the various construction partners.

This course introduces you to the different aspects of the BIM process and discusses the many benefits of BIM. In this way, a clear picture is created of the impact of BIM within the construction sector, with a focus on the basic principles, developments and trends. In addition, the concrete steps you need to take as a supplier to work in accordance with BIM are discussed and you are given a step-by-step guide to getting started with BIM yourself.

The course consists of 4 chapters:

1. What is BIM?
2. What are the benefits of BIM?
3. How to work BIM-compliant?
4. Get started with BIM!

## What is BIM?

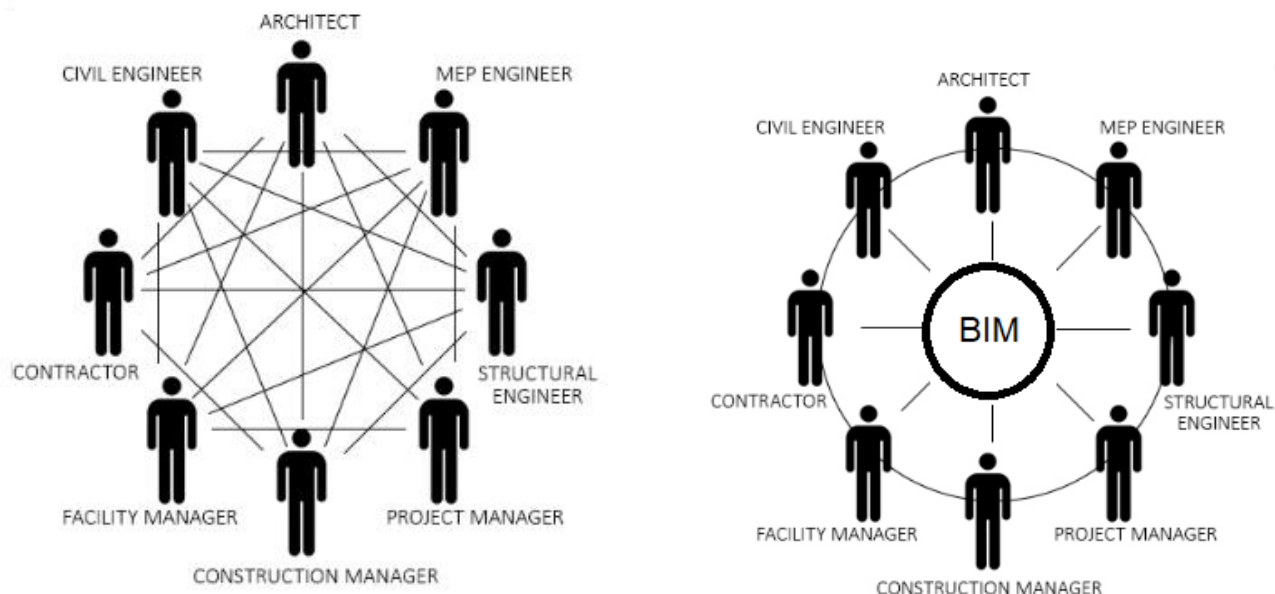
BIM, or Building Information Modelling, is the prime example of the digital transformation within the construction sector.

BIM offers the possibility to better organize a construction process, both of buildings and infrastructure projects, on the basis of one digital construction model, and to share information more easily between the various construction partners.

By using BIM, traditional plans of architects, made up of lines and symbols, are replaced by a 3D model with objects that are geometrically worked out and contain information that is useful for the construction and maintenance phase of the project.

Giving a uniform definition is not easy, as the perspective from which you look at BIM determines the possibilities and potential benefits of BIM.

In a traditional construction process, the approach is sequential. Each construction partner is a separate link in the construction chain. Files with data, information and plans are passed on from one chain to another, so that cooperation between the links is limited and inefficient.



Since this cooperation does not run smoothly, there are often different versions of a construction plan in circulation. You run the risk that the different construction partners are working on different versions, which means that a lot of data and information transfer is lost. The goal of BIM is to centralize all information and data using digital tools.

During the construction process, all construction partners add their own information to the BIM model using an aspect or discipline model. These different layers are then superimposed, so that a complete 3D model of the construction project can be formed.

The BIM model is not only a 3D model of the project, but it also provides a clear overview of all elements of the project such as material and quantities. In this way, all construction partners in the construction process (such as the architect, the client, the contractor and the supplier) can always work with the most recent data of the construction project.

BIM is a way of working together between the various construction partners, in which one digital 3D model of the project is used as a central information platform.

The project partners, who work together in BIM, make agreements about:

- the way they work together.
- the way they exchange information.
- the way they interconnect all information.

Thanks to BIM, construction partners can therefore work together efficiently, and the construction process can be better organized and structured. This allows the partners to focus during the construction process on the expectations of the customer regarding delivery times, cost price, ...

## What are the benefits of BIM?

### Information sharing

From the start of the project, all construction-technical and project-specific information and data are entered directly into the BIM model. As a result, the various construction partners do not have to call or e-mail each other every time to coordinate certain matters.

At the start, it is determined, among other things, which party manages the BIM file and who is responsible at what time for supplying the information (e.g. models, documents, product information, etc.).

This way of working also ensures that everyone always has access to all available information and can always get started with the most up-to-date data. This naturally leads to more efficient and finer cooperation.

Those who work with BIM can always opt for different types of software. The software is often selected by the various construction partners on the basis of efficiency. Of course, the information and data from the various software packages must eventually all come together in one BIM model. Here we distinguish a Closed BIM and an Open BIM approach.

With Closed BIM, all construction partners must work within one software package. In addition, there is also Open BIM. Open BIM is a universal way to collaborate on a construction project using open exchange standards and processes, regardless of the software package used by the various construction partners. In concrete terms, this means that each construction partner can make a model for his component using the software that is most suitable for this.

For several years now, the construction industry has been convinced of the added value of Open BIM. After all, the purpose of BIM is an efficient, easy and more flexible collaboration and information exchange with all partners in a construction process.

### Collaboration

BIM makes collaboration easier. After all, the collaboration process must be clearly defined and structured before the start of the project. Clear agreements are made via a BIM protocol about who must provide what information (documents, product information, etc.) and when.

In addition, specific agreements regarding this information are also recorded in a BIM implementation plan. The BIM implementation plan is an addition to the BIM protocol and describes how the agreements from the BIM protocol are implemented in practice. In this protocol, for example, it is agreed how the documents are named or which properties must be stated for the various objects. In this way, you can work together in a structured and efficient way.

Thanks to good agreements and a good communication platform, the construction process becomes much more transparent and any tensions between the various construction partners can be prevented. In this way, all comments and feedback can also be collected in a transparent manner, so that everyone has a clear overview of the project and can follow up on everything correctly. For example, a system can be used in which comments are bundled into action points.

### Visualization and faster decisions

Thanks to the digital BIM model you can easily visualize your construction project. You can easily create 3D drawings and digital renders based on all the data contained in the model.

Based on these concrete construction plans, convincing scale models and interesting 3D renders, construction partners can jointly evaluate certain options or design variants and come to a decision. In this way, a customer can also be involved in the design at an early stage and be convinced of the design.

To involve the customer even more, there is also software that allows you to walk through the project virtually. Thanks to this technology, the customer can really experience his project before it is realised.

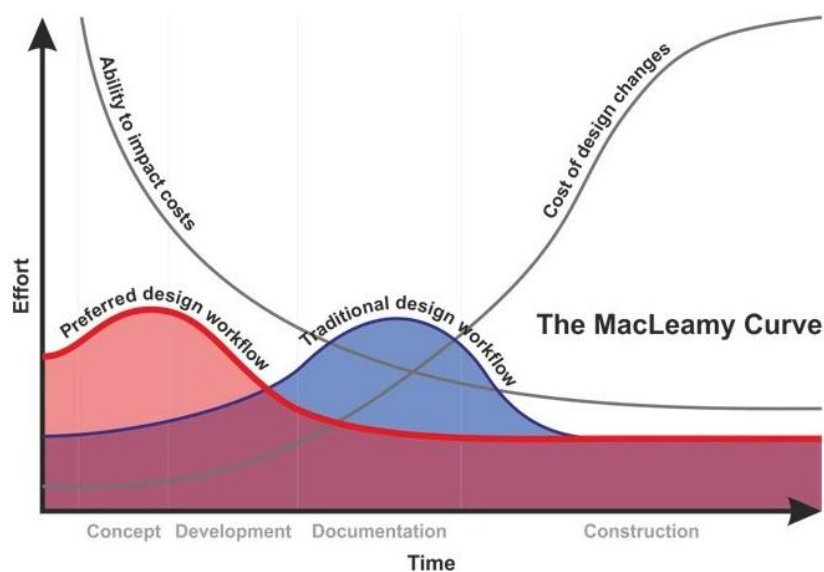
### Validation technical studies & error detection

Due to the 3D visualization and specific clash detection, errors, spatial conflicts and technical problems can be detected during the design phase in the 3D model, so before many costs have been incurred.

Within the construction process, each construction partner retains its own specific responsibilities and tasks. Everyone therefore works in their own sub- or discipline model. But thanks to the central BIM model, the construction partners can very easily check whether their own discipline model is not in conflict with that of others. As an installer in ventilation systems, for example, you do not want your supply pipes to be interrupted by steel profiles. Thanks to BIM, it is possible to check in advance whether this is the case and adjustments can be made. This is called clash detection.

### Planning

When working with BIM, the planning of the construction project also changes. The preliminary design and design phase will take more time than with a project without BIM. During this preparatory phase, the various construction partners are already involved and clear agreements are made about responsibilities for completing the model, supplying information about materials, etc.



As already known, this ensures that (costly) errors on the site can be avoided and the site will therefore run more smoothly and efficiently.

But BIM also offers the possibility to add effective planning information to the 3D model. Information about eg installation time, but also the sequence and interdependencies of elements can be entered. With this information, the construction process can be graphically visualized in function of time, so that the various construction phases can be digitally reviewed. This phased visualization can be used to schedule deliveries, evaluate site equipment (e.g. position of a crane, temporary constructions, ...) and prepare in detail. As a result, the construction process can be further optimized and detailed plans can be drawn up, which can be continuously evaluated and adjusted during the construction process.

### Cost management

BIM can also realize important improvements for price quotations and cost management. BIM can also realize important improvements for price quotations and cost management.

First and foremost, the BIM model can compile a very accurate inventory of the quantities of materials needed for the different elements (walls, floors, roofs, beams, columns, windows, doors...) of the project. These quantities are used to draw up the measurement lists for the preparation of the contractors' price offers. This avoids human errors that occur when drawing up the measurement statements and price quotations (eg incorrect counting, changed quantities or dimensions, ...).

When the final quotation prices are also added to the 3D model, good cost management can also be guaranteed during the construction process by making interim calculations of the costs already incurred, compared to the initial estimates.

### Maintenance:

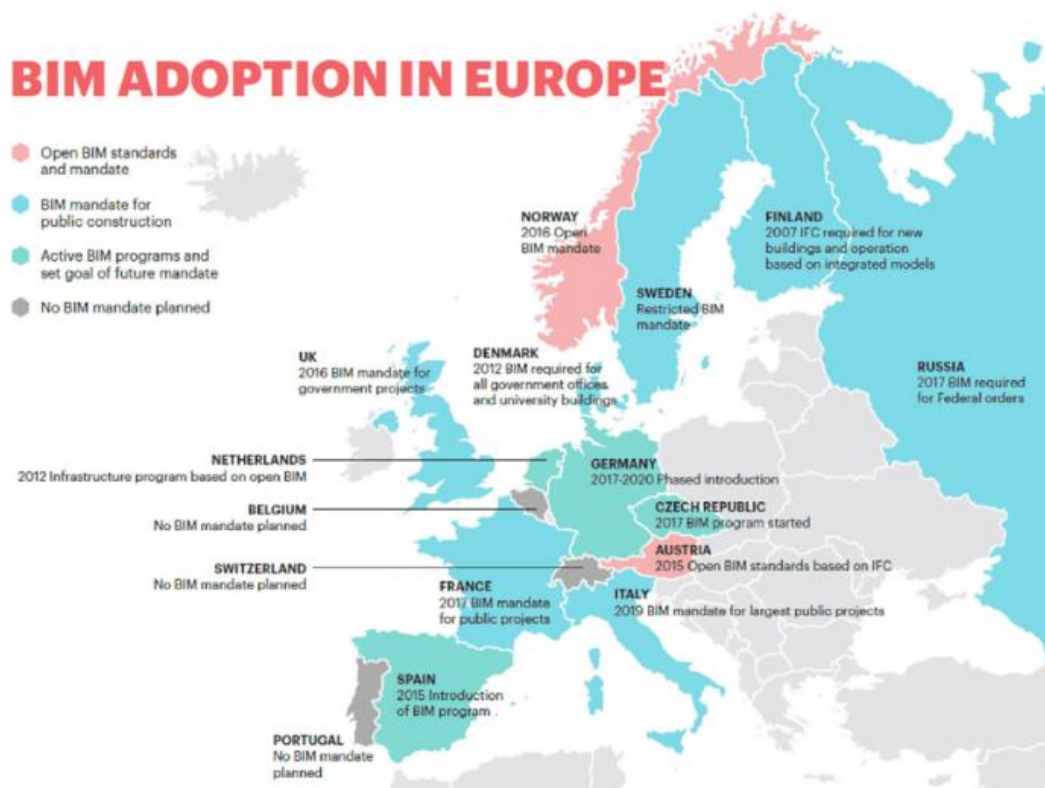
When the BIM model is converted to an as-built model in which any changes during the construction process have been incorporated, this model can be very valuable for the entire lifespan of the building or infrastructure. Based on the linked information, the maintenance of parts can be followed up and, in the event of a problem with an installation or part, the solution can be quickly and accurately searched for or a replacement part can be ordered.

By linking sensor data from the building or the infrastructure, the 3D model can help improve comfort and safety, for example, and a lot of costs can be saved through predictive maintenance.

### Evolution BIM on building and infrastructure projects

In January 2014, the European Parliament voted to modernize (European) public procurement by means of rules to increase the competitiveness of construction partners. During this vote, among other things, the use of BIM for government contracts was put forward. BIM was seen as an interesting electronic tool that leads to more efficient, sustainable and economically interesting construction projects.

These guidelines allow that from January 2016, EU member states could mandate the use of BIM within government projects. Within certain European countries, the use of BIM is now mandatory for certain projects. For example, BIM must be used in public projects with a certain investment volume in Great Britain, Finland, Denmark, the Netherlands and Norway.



### Specific Benefits for Suppliers/Manufacturers

Of course there are also many advantages that are specific to the suppliers. Below we go through some concrete examples of how BIM can also mean added value for suppliers. Here we distinguish benefits at object level, model level, (facility) management level, and time and cost savings.

#### BENEFITS AT OBJECT LEVEL

Many CAD systems have their own libraries with common elements such as doors, windows, ...

Standardization initiatives are good and necessary, but a manufacturer can of course retain its individuality and make brand-specific objects available.

#### BENEFITS AT MODEL LEVEL

Working at model level in BIM can have many advantages for suppliers. You can actively participate in updating the Model by means of. add objects from a library and/or custom objects specific to the project. The use of a plugin for collaboration is also possible.

#### BENEFITS AT (FACILITY) MANAGEMENT LEVEL

Facility management focuses on the management and maintenance of a building. In BIM, a lot of data is added about the techniques and materials used. The BIM model therefore contains relevant information related to the lifespan and maintenance of a building. For example, the model contains data on cost data, space, technical documentation, management guidelines, etc. When a construction project is delivered, BIM also prevents the loss of data from the design and construction team. In this way, time, costs and effort can be saved, even after the completion of a project.

In practice, these benefits of BIM for facility management are not yet really tangible, but this is mainly because BIM is still young and has therefore not been used long enough.

## TIME & COST SAVING

Time and cost are two factors that play a huge role in the construction industry. BIM also offers the supplier (indirectly) many advantages in terms of time and cost savings. Thanks to the fast and up-to-date information exchange, a lot of money and time can be saved during the design phase.

Problems can be solved faster. You can therefore also see this as a service that we offer to architects, contractors and suppliers, where they also have indirect benefits in terms of time and cost savings.

## How to work BIM-compliant?

In the meantime, it is clear that BIM is a collaborative concept in which the various construction partners work together around one digital 3D model. They can choose from various software solutions for this. As a supplier, it is important to know your role within the BIM project, because it is often not necessary to purchase these software licenses. That is why it is especially important to understand what the software systems do.

With the emergence of digital transformation in construction and the exponential growth of numerous software systems, it is important, especially for suppliers, to have a good overview of which software is relevant to which application.

There are many specialized software applications available, but as a supplier you do not always need them. As a supplier, you must therefore first determine what you specifically want or need to offer:

- If, as a construction partner, you want to model effectively in BIM and, for example, develop a 3D model further (geometrically) during an implementation phase, you must purchase the necessary software license and thoroughly train your staff. An overview of courses can be found on the Bimportal website.
- However, if you only need to provide data and only view the model, read it and add comments, you can do this using a (free) BIM viewer.

## BIM Maturity

Not every project or design is currently carried out equally intensively in BIM. For example, there are companies that are much further along in working with BIM than others. The extent to which a technology or new knowledge is applied is expressed in a maturity level. Whether or not BIM is applied intensively can also be expressed in a maturity level.

There are 4 different levels of maturity in BIM (0-3). These maturity levels are defined in the EN ISO 19650 standard.



### BIM MATURITY 0

Level 0 of BIM maturity refers to the stage where an organization is not using Building Information Modeling (BIM) at any phase of the building's lifecycle. At this stage, information management in projects occurs using

traditional methods such as 2D CAD drawings and manual documentation. There is no digital representation of the building's physical and functional characteristics, and no centralized data exchange between project members.

This level of BIM maturity is characterized by a lack of integration between different project phases, resulting in increased potential for errors and rework. Project outcomes and cost savings are limited, as there is no way to easily access and share information throughout the project lifecycle.

### BIM MATURITY 1

Level 1 refers to the stage where 2D CAD drawings and 3D models are created with the aid of BIM tools and are primarily used for a visual representation of the building data. Here, the BIM models are created separately by each team member, but the models are not centrally linked together.

The difference here is that partial digital collaboration occurs because teams can access all information in a common data environment (CDE) such as Dropbox or Google Drive. Nonetheless, there is minimal integration between each phase of the construction process.

### BIM MATURITY 2

Level 2 refers to the stage where all project teams create and use 3D models. The data in the models are linked through an open format such as the IFC (industry foundation class) and merged into a single 'federated' model. It enables the use of BIM models for visualization (3D), scheduling and construction planning (4D), and cost management (5D).

At BIM Level 2, a common data management system links all BIM and project-related data together and allows project members to access and update building information in real-time. The focus here is on the use of the BIM process for collaboration and data management. This leads to improved communication and coordination between project members and allows for more efficient and effective decision-making during the design and construction stages.

Currently, this is the most acceptable stage that is currently regarded as being 'fully BIM compliant' in the construction industry.

### BIM MATURITY 3

This level is described as the 'holy grail' for BIM. Level 3 is the level where BIM is fully integrated into all aspects of the project lifecycle, including operation and maintenance. At this level, building information is used to plan for future maintenance, upgrades, or expansions and to make energy-efficient decisions. By removing the barrier of sharing information between project teams through full interoperability, Level 3 opens the opportunity of connecting the entire construction supply chain with the integration of 6D (sustainability) and 7D (facility management) data — all focused on the building's entire lifecycle.

The main reason why this is not yet happening today is that every player in the value chain (from raw material manufacturer, supplier,... to project owner) must be part of this story. As long as every partner involved is not equally familiar with the BIM process and can actively participate in this platform, it is difficult to reach maturity 3.

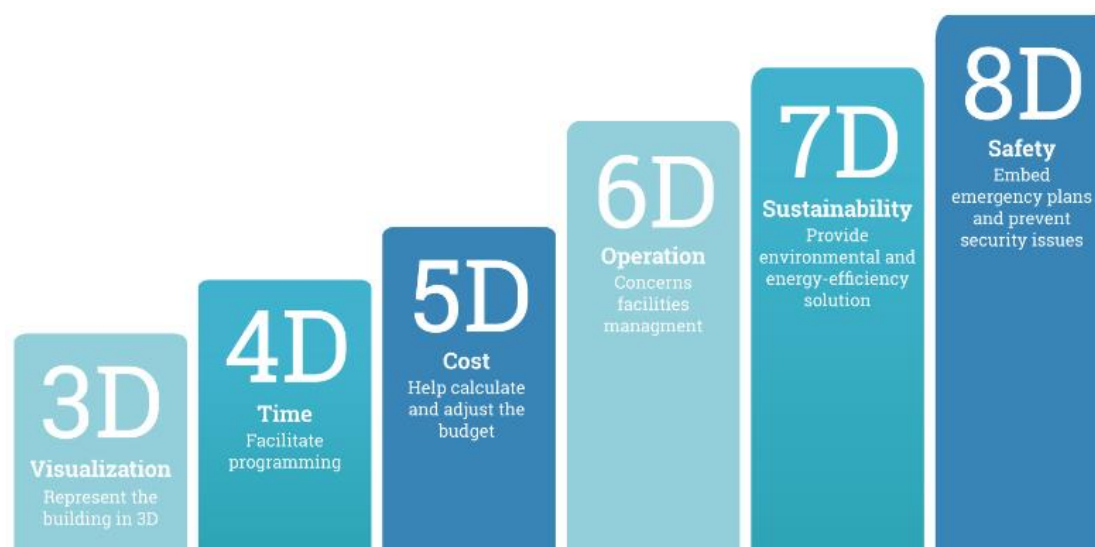
In the first place, as a supplier, your own maturity is important. Below you will receive a few questions to map out your own level.

A second important point is the maturity of the project itself. If you only come into contact with projects of BIM maturity 1, it is sufficient that you can exchange your 2D files. This gives you some time to prepare to participate in projects of BIM maturity 2. However, do not leave these preparations for too long and make a concrete action plan. As the evolution is going now, more and more projects will land at maturity level 2 in the near future.

Maturity 3 lies much further in the future for suppliers, because the construction partners themselves must first be able to fully understand and implement this evolution.

## BIM Dimensions

While maturity refers to the extent to which BIM is effectively applied in a project, BIM dimensions mainly concern the type of information that is provided. These types are continuously replenished. A preliminary up-to-date overview of the different types of information can be found below:



- 3D talks about design drawings where the spatial dimension the Z axis has been added.
- 4D will typically add elements of time management to the information.
- 5D is mainly about elements of cost management.
- 6D includes the sustainability of the project. All information and data related to the impact on the environment and energy efficiency.
- 7D talks about the life cycle management of a project.
- 8D all information and data related to emergency and evacuation plans and safety measures.

If we link BIM dimensions to BIM maturity, we see that maturity level 1 contains 2D and 3D elements. For maturity level 2 we see elements from 4D and 5D appear, while the 6th dimension actually only becomes very important from maturity level 3.

It is therefore important for suppliers to check whether 4D elements such as time management (for example delivery time, depending on the quantities) can be important to add to the digital information.

### What is LOD?

Level of Detail (LOD) is the former name of what is now called Level of Information Need (LOIN). LOD or detailing of a BIM object refers to the complexity represented by this object. Typical for manufacturers and suppliers is that they often try very hard to make their BIM object a perfect copy of the original object down to the smallest detail. It is not for nothing that Building Information Models are often referred to as the digital twin of the object or project.

However, the problem is that if we add too much information to the BIM object and want to visualize it, the software files become too large to work properly.

Because detail can be given about the geometry as well as about the properties and other information, a new term was chosen for the EN ISO 19650 standard, namely LOIN, level of information Need.

### What is Level of Information Need (LOIN)?

Agreements must of course be made between the various construction partners regarding the sharing of information. What information should be put into the model? Which information is irrelevant? In addition, we must distinguish between non-geometric and geometric information.

- LOG Geometry
- LOI – Information
- DOC – Documentation



A lot of information is about the geometry of the objects. Depending on the way in which the BIM model is viewed (entire structure, floor or room level, ...), it is important that information can be displayed selectively. After all, it goes without saying that objects that are not geometrically visible at project level should not be worked out in detail.

It goes without saying that for projects of BIM maturity 1 no additional information is required and a simple 2D or 3D representation of the object is sufficient. Only from maturity 2 is it relevant to add extra information, but then again focused on the relevant information in relation to the construction project or the BIM model. Here we mainly find information that we can link to the BIM dimensions 4D (time) and 5D (cost).

In addition to the geometric data and more extensive information about the object, it can also be useful to link technical data sheets, manuals, instructions, etc. to the object. This information falls under the heading of documentation.

Comments:

- Check to what extent all geometrical information is necessary for your object, which information is relevant and what information you do or do not want to include.
- You also have to watch over your own intellectual property, especially your know-how. That is why information that is exchanged should always be a balance between what is relevant for the project on the one hand and your own IP and internal know-how on the other.
- Do your own research. Pierce the 'BIM bubble' and look for solutions that apply to your company or your specific case. There are no ready-made BIM solutions. So you will have to see for yourself what your role can be within BIM and how you want to play this.

## BIM protocol and implementation plan:

Since you work with many partners within a construction process, good communication and transparent agreements are essential.

The BIM protocol is a contractual document in which concrete expectations and agreements are drawn up by the BIM coordinator.

Since every project is unique (new client, different composition of construction partners), a specific protocol must be drawn up for each construction project. The protocol specifies the agreements regarding the exchange of information throughout all phases of the construction project. At the start of a BIM project, this protocol is signed by the known construction partners.

The BIM implementation plan describes how the specific agreements are implemented in practice. This implementation plan is therefore an addition to the BIM protocol, which includes agreements on work processes, data management, data exchange, and software applications. The BIM implementation plan also regulates and evaluates the concrete cooperation between the various construction partners at each important milestone. If necessary, the BIM implementation plan can also be adjusted, so that the BIM process is aligned with the needs and knowledge acquisition of all construction partners.

The BIM implementation plan describes how the specific agreements are implemented in practice. This implementation plan is therefore a supplement to it.

In accordance with the agreements made in the BIM protocol and the implementation plan, a communication platform is also being set up. All information and models from the different partners are centralized on this platform, so that everyone has access to up-to-date data and incongruities are avoided.

## BIM Objects and Libraries:

It is only when the question is effectively posed in the project or when the products have to be visualized geometrically in the BIM model that a BIM object is needed. Integrating BIM into your company also does not automatically mean that your entire product catalog has to be housed in a (usually commercial) library.

A BIM object consists of data placed in the geometric model in the form of attributes, parameters or properties (according to the standard terminology and structure used). The following information must be added to a BIM object:

- All information representing the visible geometry of the object (possibly linked to the level of detail (LOD) according to the different views)
- Parameters describing the object
- All the details necessary to use or install the object
- Possibly additional documentation and images to better understand the object

However, in more complex and larger construction projects, where non-standard products are sometimes requested, it can be more difficult to cover the questions with general objects. It is then sometimes more profitable to (initially) design the BIM object on demand. You have to weigh this against the effort to develop a more advanced product configurator application.

When we look at the amount of objects used in a BIM project, it goes without saying that there is a need for a structure and system to find all objects.

Objects will therefore be placed in a digital library, where specific objects can be searched for. And just like in a physical library, all objects are collected and displayed in a structured way in a BIM library.

There is a multitude of platforms on the market and as a supplier you are encouraged from different angles to place your objects on a commercial library. The most important exercise as a supplier is to first find out which BIM platforms and libraries your customers already use and what their preferences are.

## Get started with BIM!

Implementing BIM in your company does not happen overnight. It takes time and practice to get started. The implementation of BIM is also not a uniform path: this transition is different for every company and depends on the specific situation, the specific context, or the specific project.

Below you can find the most important building blocks for a good implementation of BIM:

- Build basic knowledge
- Perform self-analysis
- Formulate objectives
- Select hardware and software
- Start a pilot project
- Evaluate and provide feedback

### Build basic knowledge

Naturally, everything starts with building up knowledge about BIM.

### Perform self-analysis

Before introducing BIM in your company, consider the following questions:

- To what extent is your company on board with the digital transformation?
- Can BIM be important within the processes between your company and involved construction partners?
- Can BIM add value through your products during the operational phase of the building?

### Formulate objectives

Now that you have determined the potential added value of BIM for your company, you need to make concrete choices.

### Level:

At what level will you implement BIM?

- Is it sufficient to define and make available the products as BIM objects?
- Or is it necessary to take a broader view and offer full BIM support to your customers?
- Will BIM become a clear part of your business strategy?

### Phases:

In which phase of the construction process are you or do you want to be involved?

- Is it only about delivering products?
- Which applications do you want to be able to run?
- architectural modelling
- structure and stability design
- MEP (mechanical, electrical, plumbing)
- Energy simulations
- Facilities management
- ...

### Speed:

How quickly do you want or can you implement BIM?

- What can you achieve in the short term?
- What is interesting in the medium term?

### Select hardware and software:

You have thought about the objectives with regard to BIM, so now it is time to make choices in terms of software. There are many software systems, libraries, classifications and standards available within BIM.

There are many specialized software applications available, but as a supplier you do not always need them. As a supplier, you must therefore first determine what you specifically want or need to offer:

If, as a construction partner, you want to model effectively in BIM and, for example, further develop a 3D model (geometrically) during an implementation phase, you must purchase the necessary software license and thoroughly train your staff.

However, if you only need to provide data and only view the model, read it and add comments, you can do this using a (free) BIM viewer.

### Start a pilot project:

If you have never participated in a BIM project before or if it is your first BIM project, it is important to know the BIM protocol of the project. A BIM protocol is the basic document of every BIM project. This describes in detail how cooperation will take place, what the mutual agreements are, which BIM maturity is used. The BIM protocol will also contain the agreements on standards and classifications.

Important question to ask yourself; “Can I comply with the BIM Protocol?”

As a supplier, you are not expected to design or help set up this BIM protocol. To this day, this protocol is mainly driven from the design and construction phase. In the long term, agreements can also be made for the management of the building. This can become important for suppliers because they often have great added value here.

### Evaluate and provide feedback:

Choosing BIM obviously has a lot of impact. Below we briefly discuss some possible pitfalls that should be avoided during the implementation of BIM.

- Choosing BIM has an impact on the company, processes and employees. Don't underestimate this. Everyone has to be part of the story, BIM is not an application that you just add to your business processes.
- Software is only a means to efficiently collaborate and exchange information between the various construction partners.
- Without a vision, strategy and clearly defined way of working, you have little chance of success with BIM. It is essential that employees are aware of the vision and strategy surrounding BIM and that they have received BIM training. Certainly, those employees who are confronted with the BIM processes in your company.

- BIM is also often used by companies as a marketing tool. Try to make this distinction when you are approached as a company by a library manager or potential partner. Align their supply or demand with your own objectives as a company and check whether this is relevant for your BIM strategy.
- Make sure that your own digital maturity as a supplier is in order before you get started with BIM or purchase BIM software. Go for a structural solution where BIM can be integrated into your own digital processes, innovation and digital culture.

## End

Congratulations! You are at the end of the course. You are now familiar with the basic principles, developments and trends of BIM. In addition, you also know how to work BIM-compliant and you are aware of the steps you will have to take yourself if you want to get started with BIM!

### **ARGE - The European Federation of Locks and Building Hardware Manufacturers**

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EU Transparency Register ID number: 881365536049-72

ARGE is a European Federation which represents National Associations of Locks and Building Hardware Manufacturers throughout Europe. It was established in 1956 and represents approx. 250 companies, many of them SME. Nearly 50,000 employees generate an annual turnover of close to 10 billion € with the development, production and distribution of mechanical, electro-mechanic and electronic door and window hardware. ARGE's commitment focuses on European standardisation, EU legislation, digitalisation, and on environmental sustainability of building hardware.