



Course: BIM introduction. Block 2: Working with BIM data. Lecture 2.2

BIM process workflow

Lecture Notes

Author(s)/Organisation(s):

Ariana Kubart (Ocellus)

License



<https://creativecommons.org/licenses/by/4.0/>

Version

Version 2.0

Date: April 2025

Learning outcomes

At the end of this lecture, the learner is expected to be able to

- Revise for role and content of an Exchange Information Requirement document in BIM process
- Explain the importance of a BIM Execution Plan
- Understand the value and usage of Class Systems and a Model View Definition



Summary

The lecture explains how the BIM process looks like, from the very beginning when a new project takes a conceptual idea through its planning and construction until the many years of operation and maintenance. The main focus is to explain the role of diverse documents that specify the requirements in the individual steps of the project life-cycle. Another important topic of the lecture is the selection of appropriate data, needed in the different life-cycle steps.

Expected competences when entering the lecture

- No specific pre-requisites required.
- Attend the first block of the course, BIM Definition

Expected Workload

13 slides with course learning content, 2 hours

Disclaimer

Funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.



Revision History:

Revision	Date	Author(s)	Status	Description
0.1	2024/01/20	A. Kubart	Draft	First draft
0.2	2024/03/03	A. Kubart	Draft	Second draft after revision R. Molins
1.0	2024/03/14	A. Kubart	Published	Edited by M. Morbidini
1.1	2025/01/21	A. Kubart	Published	Edited by T. Näslund
2.0	2025/04/29	A. Kubart	Published	Updated EU logo and disclaimer. Edited by T. Näslund

Content of the lecture:

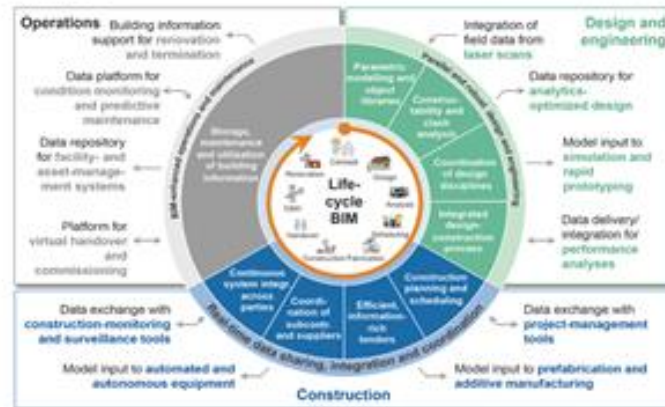
Revisiting Building Lifecycle	5
Information management during BIM Life-Cycle	6
Exchange Information Requirements (EIR)	7
Pre-BEP and BIM Tender	8
BEP - BIM Execution plan	9
Information in BEP	10
BIM Terminology specified by BEP	11
BIM Classification Systems in BEP	12
Project Information Model (PIM)	13
Asset Information Model (AIM)	14
Information loss during hand-over	15
BIM in Facility Management	16
Summary of the BIM workflow	17

Revisiting Building Lifecycle

2.2 BIM Process Workflow

Revisiting Building Life-cycle

- BIM is not only for design and construction, but also for facility management and decommission
- Think BIM model for 100 years

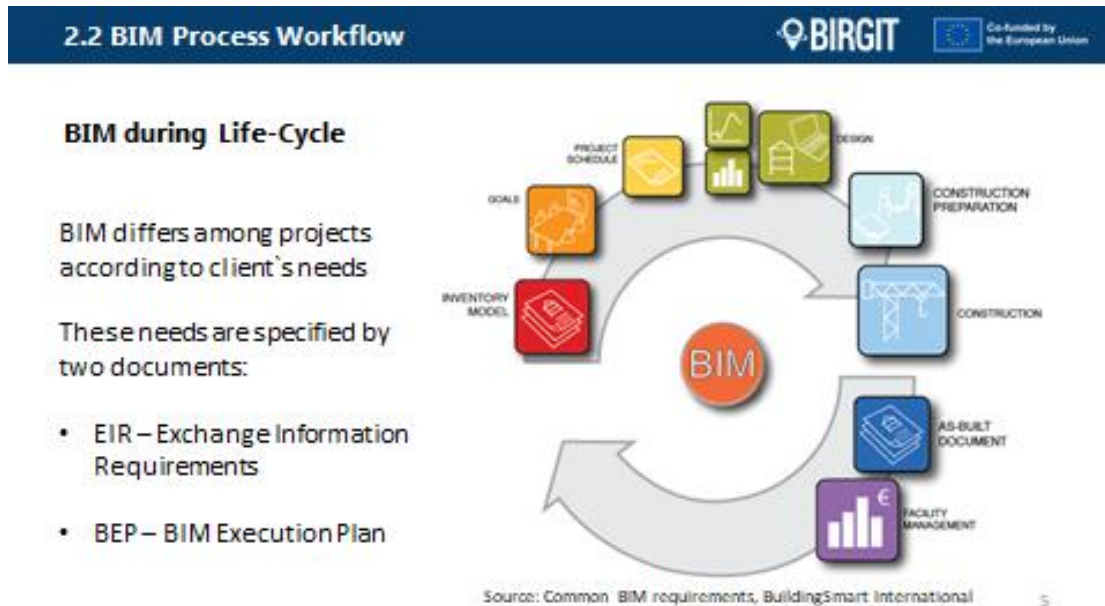


Applications of BIM along the engineering and construction value chain. Source: Shaping the Future of Construction, <https://www.weforum.org/publications/shaping-the-future-of-construction-a-breakthrough-in-mindset-and-technology/>.

BIM is a long-term process that involves the creation and use of digital models to manage building data throughout its whole lifecycle, let us say one hundred years. BIM workflow typically involves the following steps (as we already spoke about in the introduction block):

- Planning and Conceptual Design: Defining the project scope, goals, and objectives.
- Design Development: Refining the design and creating more specific models.
- Construction Documentation: Generating detailed construction drawings and specifications.
- Pre-Construction: Preparing for construction by determining the materials, equipment, schedules and required budgets.
- Construction: Building the physical structure in accordance with the plans and specifications.
- Commissioning: Verifying that the building performs according to the design specifications.
- Operations and Maintenance: Facility management and updating the BIM models with as-built information.
- Decommissioning: Preparing the building for demolition or repurposing.

Information management during BIM Life-Cycle



There are different needs for the BIM model during the different stages of the project life-cycle. Information crucial for facility management will of course differ from the information necessary for efficient construction.

What kind of information should be included also depends on the project owner's (i.e. client's) needs and expectations.

So, the first step in the BIM process is that the project owner needs to specify his needs and expectations. These are summarized in a document called EIR, Exchange Information Requirements. We will describe it more closely in following part of the lecture.

The specific steps and sequence of a BIM workflow may vary depending on the project and its owner as well. They can even be called differently. In any case, they should always be clearly described in another, following document, called BIM Execution plan, BEP.



Exchange Information Requirements (EIR)

2.2 BIM Process Workflow



EIR Document

- Exchange Information Requirements
- Pre-tender document
- Client specifies his needs for potential contractors
- Tender with bids from the contractors is the next step



[Exchange Information Requirements che cose IEIR nel BIM.jpg \(843x321\) \(accasoftware.com\)](#)

6

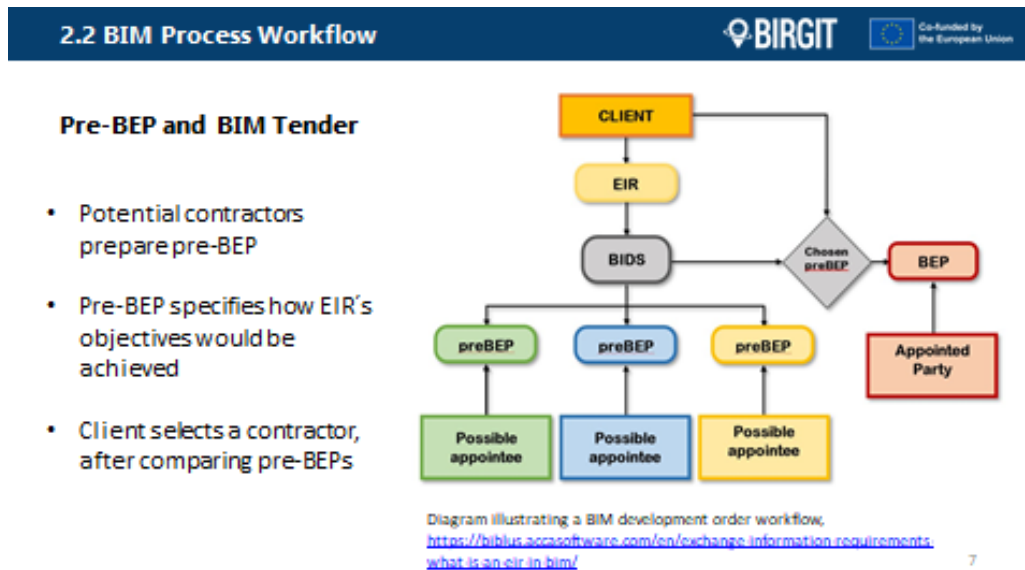
EIR is a pre-tender document, i.e. one of the first things done in the BIM process. EIR is drawn up by the client who needs to build a building and who specifies the buildings vision and requirements in the EIR.

This information includes definition of building objectives, desired management aspects and technical specifications. The EIR is prepared by standard procedure according to ISO 19650-1 rules.

Preparation of the EIR initiates the tender to which building industry professionals, i.e. potential contractors, respond with their relating offers.

For more information, see: [Exchange Information Requirements: What is an EIR in BIM? - BibLus \(accasoftware.com\)](#)

Pre-BEP and BIM Tender



When preparing their offers (also called bids) the potential contractors (also called the bidders), put together a pre-contractual BIM Execution Plan (pre-BEP). In their pre-BEPs, the bidders specify how they aim to achieve the objectives required in the EIR. It can be by specifying for example their level of competence, operational capacity or resources and technologies they plan to use.

After comparing the bids, the client appoints a contractor, who then develops the post-contractual BEP.

This is illustrated by the figure on the slide and below:

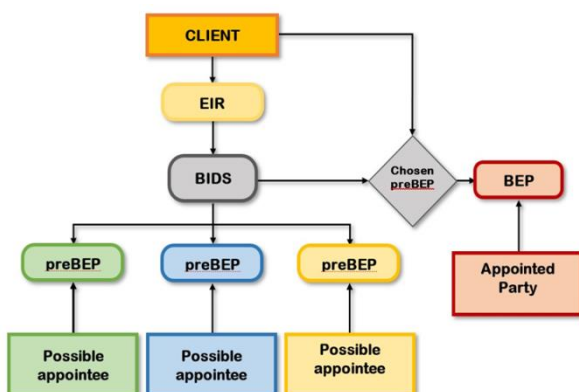


Diagram illustrating a BIM development order workflow,
<https://biblus.accasoftware.com/en/exchange-information-requirements-what-is-an-eir-in-bim/>

BEP - BIM Execution plan



BEP is a plan defining the goals of implementing BIM technology in a project. Sometimes it is referred to as a BIM Implementation plan, but they are the same thing.



Any major construction project should start with BEP creation. A well-coordinated project use to be those with a well-crafted BEP.

There is no universal BEP that would work for every project. In other words, BEP and its implementation must be adapted to specific requirements of each project.

However, it is not necessary to start from scratch every time when creating BEP. Companies usually have templates and the whole process is led by the ISO 19650 standard.


The responsible team follows and monitor progress according to the plan. At the same time, the BEP should be developed, updated and corrected at every stage of the project. That is essential for getting the maximum benefit from BIM implementation.

Information in BEP

2.2 BIM Process Workflow Co-funded by
the European Union

Information in BEP

- Lot of information needed in BEP
- Data management, responsibilities, deadlines, software, terminology etc.
- Monitoring progress and development of BEP during time



<https://bimcorner.com/creating-a-successful-bim-execution-plan-part-1/>

There is a lot of information that should be included in a BEP. This includes:

- How the data in the actual BIM files should be generated, managed, documented and shared
- Agreed roles and responsibilities within the BIM process and even team knowledge and skills
- A strategy for key deliverables and project milestones.
- Practical working details, such as file name conventions, software used, as well as a common set of annotations, abbreviations and symbols
- Who is responsible for communication and for BEP implementation

It might take time to put the BEP together, but once it is up and running, it keeps everyone moving forward. This can save a lot of time in the long run. The BEP also serves as a guide for new project participants.

More details on:

<https://bimcorner.com/creating-a-successful-bim-execution-plan-part-1/>

<https://bimcorner.com/creating-successful-bep-part-2-bim-uses/>

<https://bimcorner.com/creating-successful-bim-execution-plan-part-3-design-a-bim-process/>

<https://bimcorner.com/creating-successful-bim-execution-plan-part-4-information-exchanges/>

BIM Terminology specified by BEP

2.2 BIM Process Workflow

Co-funded by the European Union

Terminology specified by BEP

- Thousands of BIM objects with possibly hundreds of properties each
- Everybody in project needs to use the same terminology
- The names, data structure and hierarchy is described in BEP

<https://bimcorner.com/wp-content/uploads/2022/07/KF-DATA-in-BIM-Infographics.jpg>

10

Any BIM process creates huge amounts of data. These data are placed in data storage in a relational database.



Each object is defined by a table and each property is a column. Objects relate to one another in the same way a relational database creates connections. The most important feature of structured data is its query simplicity.

Another important issue for the queries and cooperation is to use the same terminology through the whole BIM process. This terminology, together with data hierarchy, is one of the parts of BEP.

BIM model is not only the 3D representation. The drawing we see on the screen represents only the graphical part of data.


There are BIM objects, which are digital equivalents of real-world building components. These can be walls, windows or roofs, but also electrical- or ventilation systems. Each BIM object contains detailed information, called “properties”, e.g. non-graphical data, in the BIM context.

BIM Classification Systems in BEP

2.2 BIM Process Workflow   Co-funded by the European Union

BIM Classification Systems

- Predefined hierarchies and properties of BIM objects
- Different systems, based on region and country
- Specified in BEP
- IFC the only globally used system



<https://bilibus.aecsoftware.com/es/wp-content/uploads/sites/3/2020/03/cover-IFC-UNICLASS-495x321.jpg>

11

There is even another way to deal with the huge amounts of complex information, which is produced in construction projects. For easier navigation and sharing of the datasets, the BIM objects are structured into hierarchies by so called “Classification systems”.

There are several classification systems in use, usually depending on country or region. In Europe, the predominant classification is [Uniclass](#) 2015, but each country also has its own system. For instance, Sweden uses CoClass as its own system.

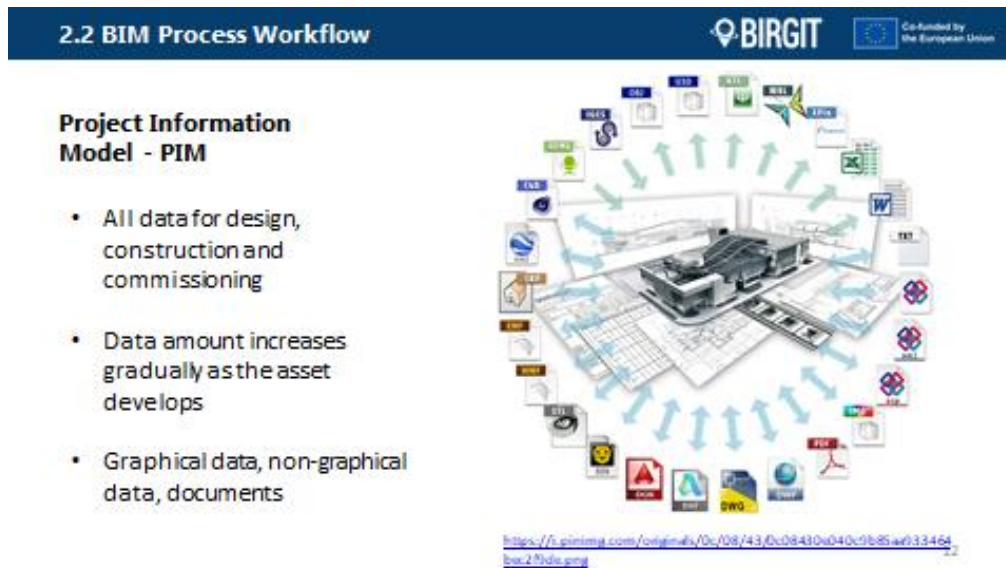
coclass.byggtjanst.se

Other systems are Unifomat II or OmniClass, used mainly in US. In any case, the classification system should be specified in BEP.

Even open BIM exchange format called Industry Foundation Classes, IFC, is a classification system itself and we will speak about it more in detail later in the course.

Each classification system has different numbers of classification levels. Further, it has even different property sets. Predefined property sets are grouped logically. Grouping of user-defined properties should be described BEP.

Project Information Model (PIM)

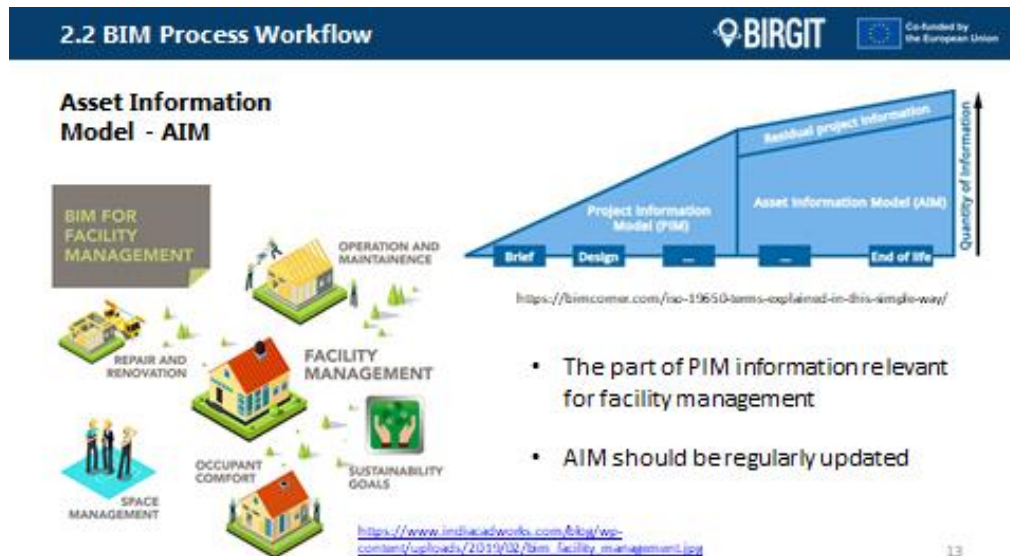


While the BEP specifies how the BIM process will work, Project Information Model, PIM, is basically all of the data required to carry out the delivery phase of an asset. In other words, PIM contains the data in design and construction phases, until commissioning of the assets later on.

As the project develops, so increases the amount the data. In the beginning, there might be an architectural model only. Further in the construction phase, there will usually be a huge amount of diverse information in the BIM model.

The PIM should be managed within the Common Data Environment, CDE, which should be the single source of information for the project. We will learn more about CDE in the next lecture.

Asset Information Model (AIM)



Not all the information necessary for design and for construction is needed for the management of the asset in the operation-phase.

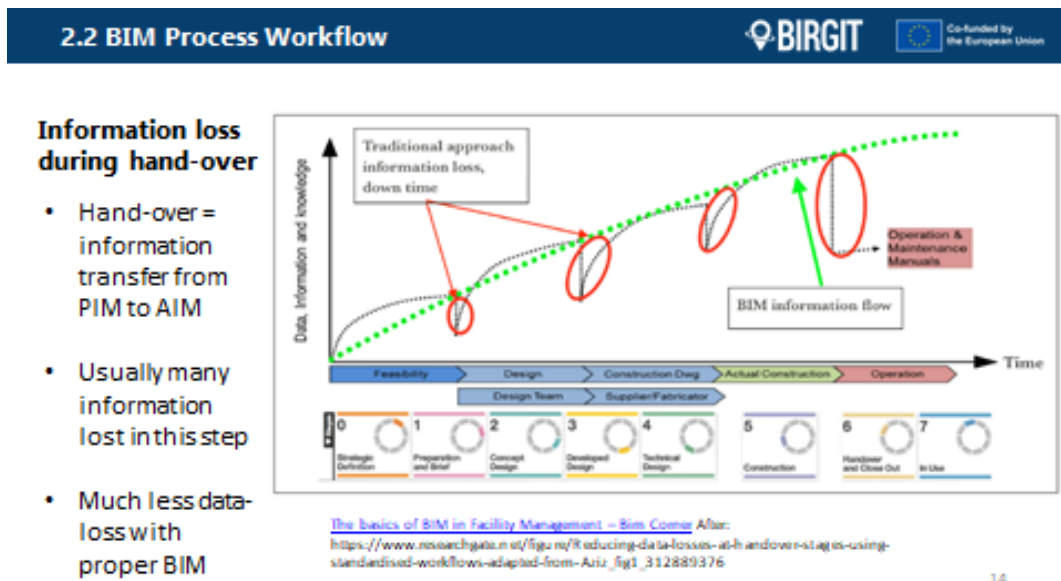
Hence, after the commissioning of the asset, relevant elements of PIM are transferred into Asset Information Model, AIM. This AIM is also called “hand-over model”. The remaining, residual data are achieved.

AIM requirements should be agreed already in the beginning, optimally in EIR (Exchange Information Requirements). Data structure in AIM should enable transfer to computer-aided facility management systems (CAFM).

There is a standard specification for this structuring, called COBie, Construction to Operations Building information exchange.

Even AIM needs to be updated regularly. That is because there will be new data about repairs, upgrades or refurbishments. Other information to be updated time to time is e.g. asset occupancy, performance, new regulations, changes in responsibilities and so on.

Information loss during hand-over



14

As we have just learned, certain information (that one which is relevant for Facility Management) is transferred from a Project Information Model (PIM) to an Asset Information Model (AIM) in the end of the construction. The initial AIM uses to be referred even as “Hand-Over” and “As-Built” model.

In practice, the constructor passes over the data to the project-owner.

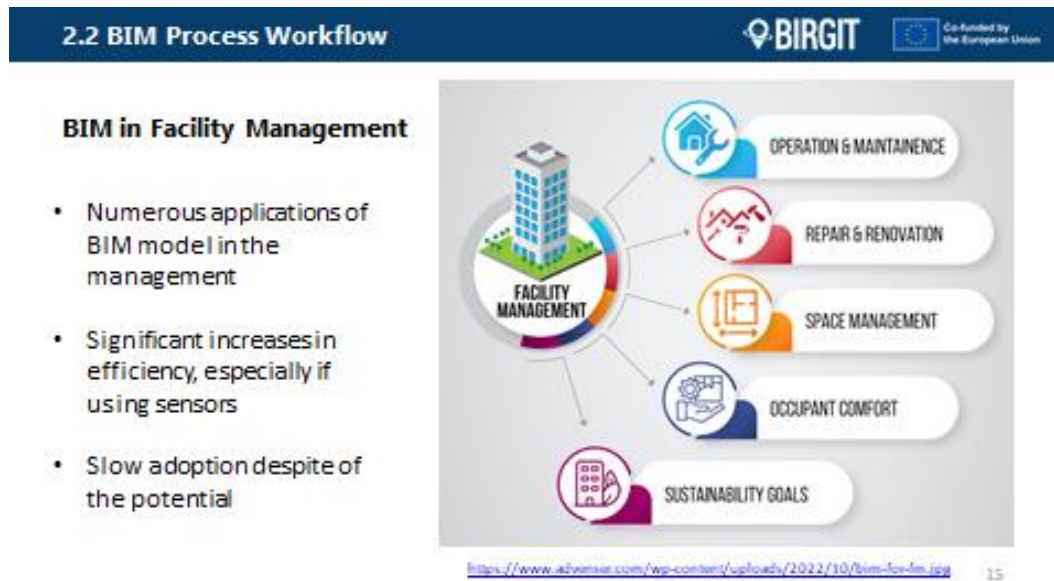
Some information used for construction is not necessary to manage the asset, while other information is crucial for the management, even though it was not important for the construction.

It is important that the information should be sufficient to maintenance and operation of the facility, but not too much to make the model too big. Moreover, too much information is practically impossible to update. It would result in situation that there would be a lot of unreliable information in the end, making all the effort unworthy.

It was common that huge part of information got lost during this data transfer and that the information crucial for operation had to be re-created. Of course, it decreased quality of the management and increased its cost.

Luckily, if the transfer is properly planned, fully digital and helped by BIM, it is possible to avoid such data loss.

BIM in Facility Management



To construct new asset is costly. But to operate and repair it for 100 years costs much more, compared to the construction.

And that is the reason why the Facility (asset) Management should be as smooth and efficient as possible. This requires proper data in AIM and that is why efficient PIM-to-AIM transfer is so fundamental.

BIM and AIM can facilitate the asset management in multiple ways.

First, one can use the data to plan optimal utilisation of space, keep information about inventory and analyse what needs to be maintained or replaced.

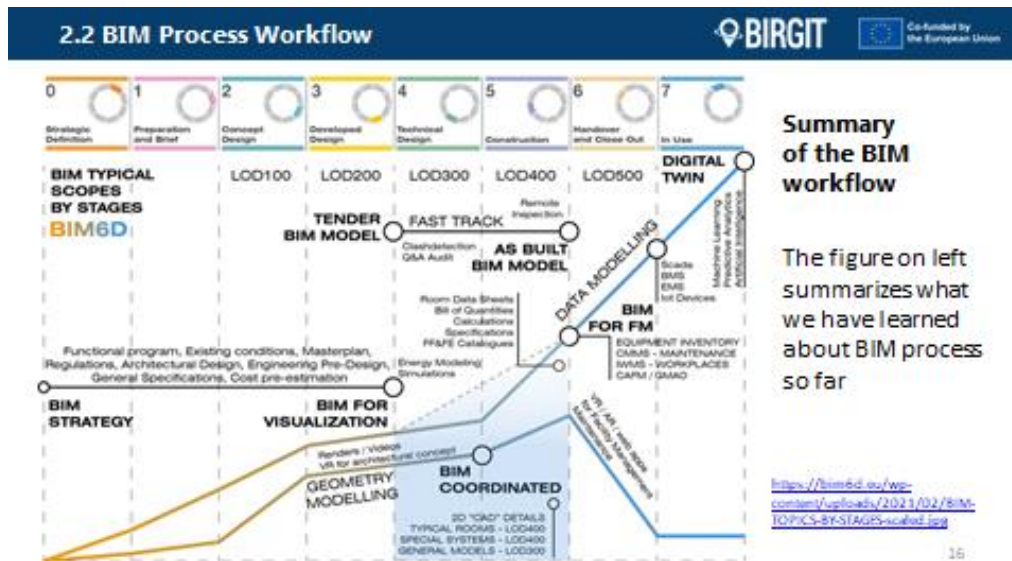
Other important information can include efficiency of energy-use, tenant comfort and safety or planning of retrofit or renovation.

The benefits of BIM-lead Facility Management will only improve as the sensor technology develops. However, adoption of BIM by facilities managers has been relatively slow so far.

The steadily updated AIM can be used for decommissioning of the assets in the end of its life-cycle. There are some pilot studies about the topic, but it is definitely not widely used yet. The main reason is that BIM is a new technology and BIM models are provided mainly for newly developed projects.

We provide a lecture going deeper to this topic, namely Lecture 3.1. “BIM for infrastructures and facility management”.

Summary of the BIM workflow



The figure summarizes our newly obtained knowledge about BIM as a process to improve efficiency during whole building/asset life-cycle. It starts with the project idea and definition until the project is in use, and points out the important issues through the BIM process.

In lecture 2.3: “BIM Coordination” we will explain how the process is coordinated.