

# BIM FRAMEWORK

Cluster Digital Construction

23/03/2023 – Draft version  
For feedback, please send an email to [megan.de.prins@buildwise.be](mailto:megan.de.prins@buildwise.be)

# The purpose of the BIM Framework

The BIM Framework is an overview of the BIM project process for both BIM beginners and experts. The BIM Framework aims to :

- Relate the BIM **process** to the various relevant documents, standards, etc.
- Situate the various terms such as protocol, level of information need, IDS, classification, etc. in the wider use of BIM
- Situate the work of the various working groups, roadmaps and gaps

The BIM Framework is based on the **NBN EN ISO 19560-1/2:2019** standard to set the framework for the BIM process, its steps and the different activities related to it. This publication is therefore **an interpretation** but not an explanation of the standard. Nevertheless the BIM Framework can be used as a support to become familiar with the standard. For a detailed explanation, please consult the [Belgian ISO 19650 wiki](#).

If BIM is completely new to you, please consult the [BIM Starter Pack](#).

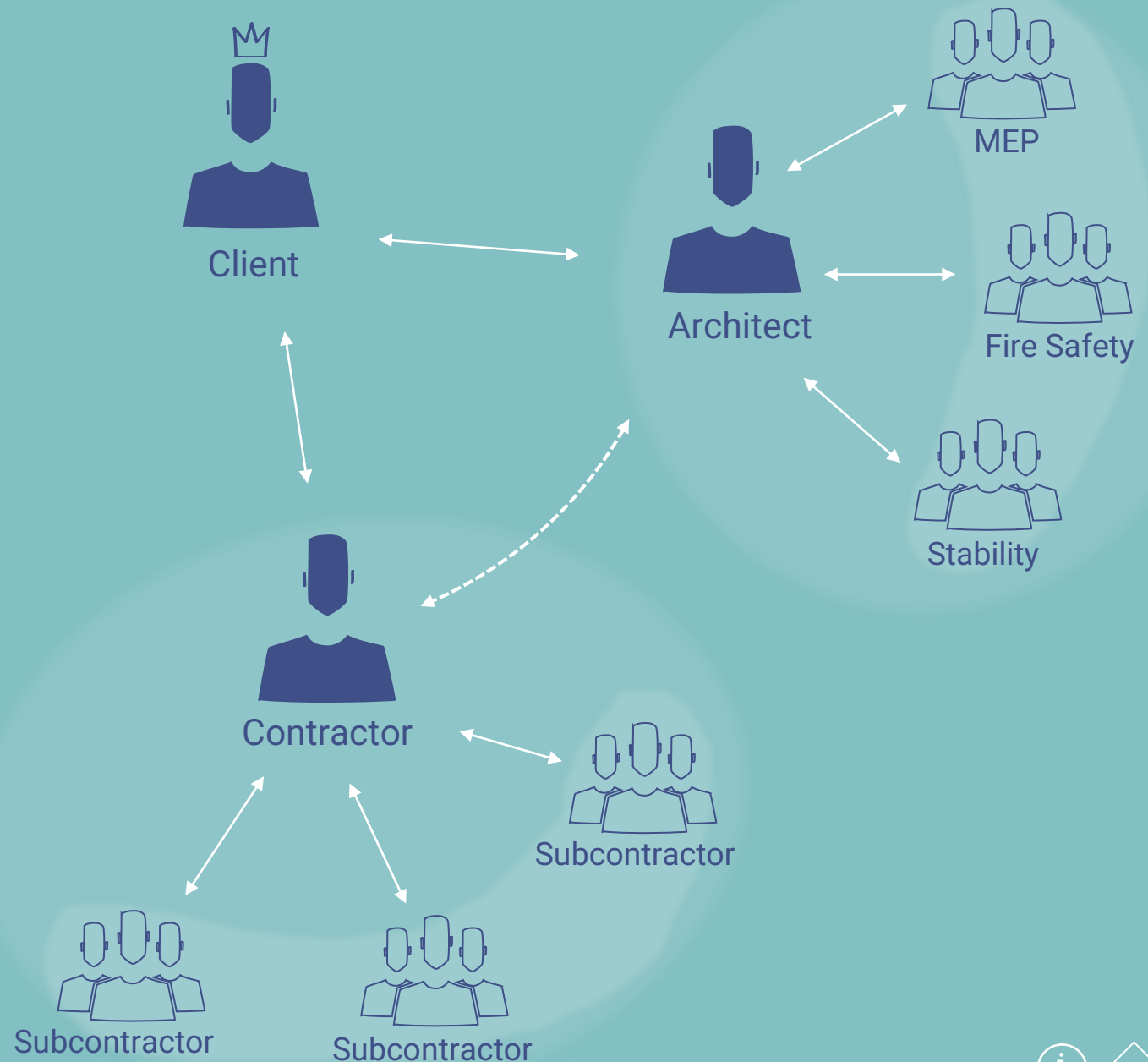
This document is published by Buildwise as part of the [Digital Construction Cluster](#).

# The scenario

## A traditional contract project.

The BIM Framework is developed through an example to explain step by step the different stages of a BIM process following the NBN EN ISO 19650:2019 standard part 1 & 2.

It takes as scenario a traditional contract project, the design and execution are entrusted to separate actors at different times. These contracts are challenging for collaboration because the contractor is involved very late in the process.



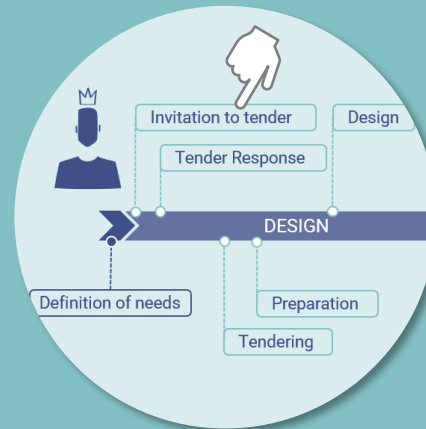
↔ Exchange

⋯↔ Coordination

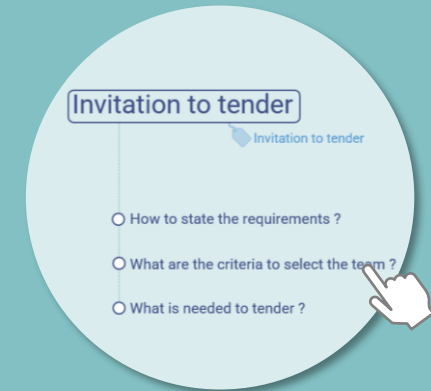
# Reading guide

This publication is interactive, meaning that navigation throughout the document and to other sources is facilitated by "clickable" links. The users can thus navigate through the topics according to their interest.

The main page allows to navigate through the process steps :



The main page



The process steps page

How does the navigation works ?



These icons throughout the publication :



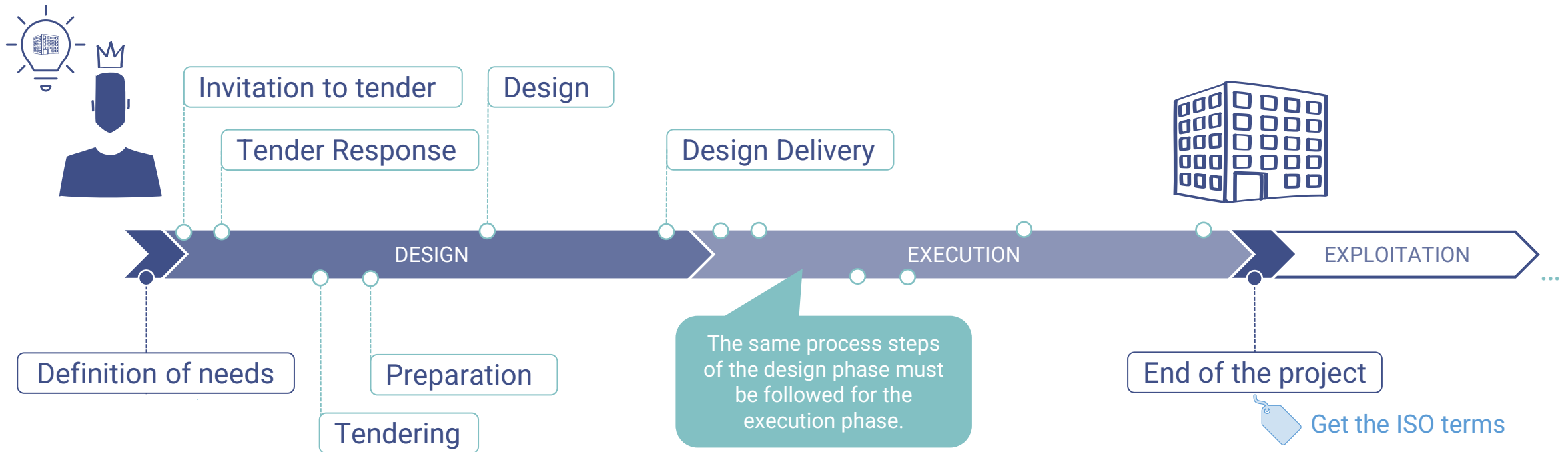
Documents that have to be produced as by NBN EN ISO 19650-2:2019  
Links to the templates (if available)

Standards related to the subject  
Links to the NBN website and the corresponding standard

Terms according to the NBN EN ISO 19650-1/2:2019  
Links to further explanation

Working group activities  
Links to the summary of their activities





# Definition of needs

 Assessment and need

- Which BIM responsibilities will take the client?
- What are the requirements?
- What existing information is available?
- How to work together technically?
- How to work together legally?

The client must define the project requirements, what parties will be involved, what their responsibilities will be and how to work together from a legal and technical point of view.

This vision is translated into several documents.



# Which BIM responsibilities will take the client ?

## Defining BIM responsibilities

The client defines which BIM responsibilities he will take and which responsibilities he wants to outsource.



Information management assignment matrix

# What are the requirements ?

 Get the hierarchy of information requirements

Examples

- Reduce energy consumption of 50% for all future project.
- To be conform to European law related to public institutions
- 30% of building material for new project has to come from renewable sources.
- Stimulate local economy

## Organisation Information Requirements (OIR)

The client defines the requirements to comply with his company strategy and objectives.

→ Related to the old BIM vision document

Input



## Asset Information Requirements (AIR)

The client defines the requirements to be able to manage the building after its construction.

Examples

- Maintenance policy based on international standard, has to be implemented
- All HVAC devices should have a maintenance plan to cover expected lifetime.
- Material passport of the building should be established

↓ Contributes to

Examples

- 40 classrooms for 25 students/classroom
- 1 covered courtyard
- The total surface = 20% vegetation
- 20% company that work on the project has to be located in the same province as the project....

## Project Information Requirements (PIR)

The client defines the requirements of this specific project.



Get the ISO terms



These requirements will be necessary to establish the Exchange Information Requirements (EIR) at the next step : *Invitation to tender*.





# What existing information is available?

## Existing information

The client compiles all existing information and documents which concerns the project.

### Examples

- Plans of the existing situation (e.g. renovation project)
- Pointcloud
- Information about the site



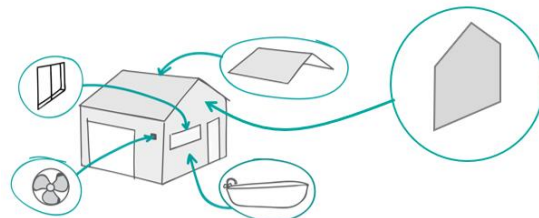
Materials and shared information references

# How to work together technically ?

## Technical agreements

The client defines methods and procedures to be followed in order to realise the project.

The client also defines how to structure the information.



Examples

- What is the exchange format ?
- What is the naming convention for documents ?
- Which international standard will be used in this project ?
- Which meetings will be held at which frequency?
- What are the procedures for coordination ?
- What are the procedures to share information with the client?
- How will existing information be captured?

Project Information Standard

Information production methods and procedures



WG Classification



# How to work together technically ?

## Common Data Environment

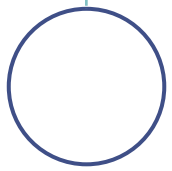
The client establishes a platform to receive and exchange information (documentations, plans, etc) with the team of the project.



CDE

Examples

- Dalux, BIM 360, Trimble Connect ...



# How to work together technically ?

## Definition of milestones

The client defines points in time where he will need to receive information. This will help him make informed decisions for the project.



These milestones will be used to establish the Exchange Information Requirements (EIR) at the step *invitation to tender*.



Milestones are not phases. Milestones define when information is needed relative to a decision that will have to be made with that information. Typically the beginning and end of phases will have milestones prior to them.



# How to work together legally ?

Traditional contract



## BIM Protocol

The client establishes a contractual document clarifying the framework for information exchange.



Project Information Protocol

WG Protocol

Examples

- What about GDPR ? (privacy)
- What about conflicting information?
- What about intellectual property and the use of data ?
- To what extent does the shared information have legal value? Who is accountable if the information is wrong?
- ...

# Invitation to tender

 Invitation to tender

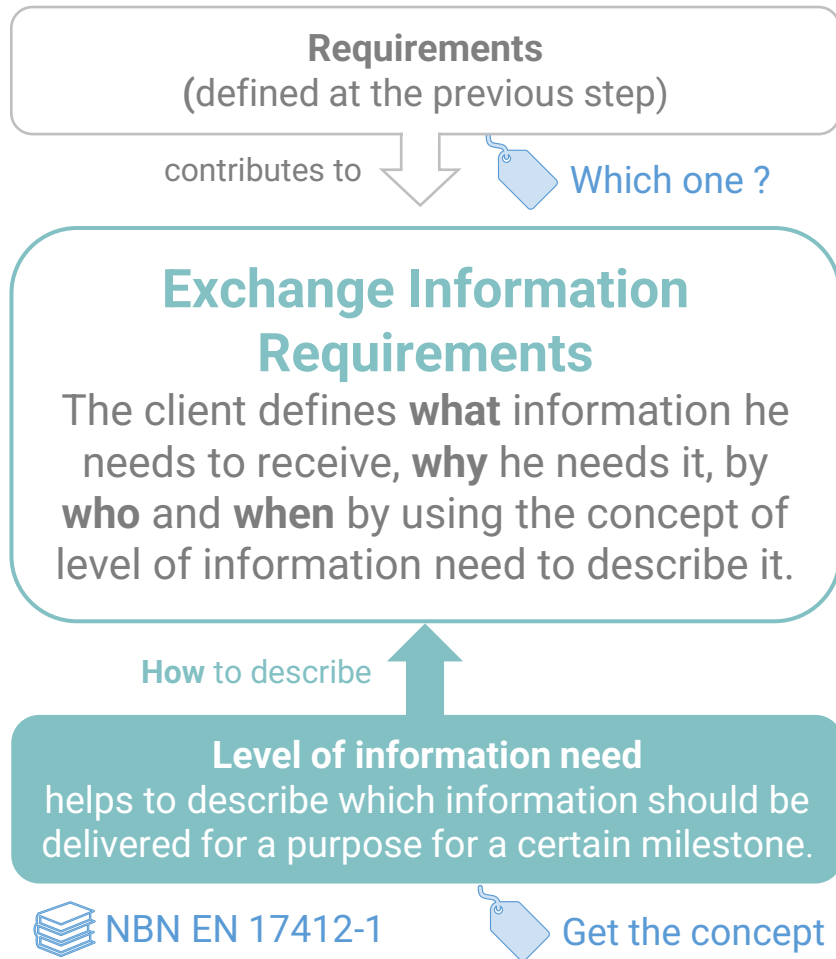
- How to state the requirements ?
- What are the criteria to select the team ?
- What is needed to tender ?

The client needs to compile the information for the appointment and share it with the market or specific potential lead appointed parties. This information will be needed by them to fully understand the appointment and answer in a qualitative way.




# How to state the requirements ?

 Get the hierarchy of information requirements

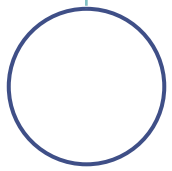


 **EIR Exchange Information Requirements**

 Conversion to be machine-readable format

 **IDS Information Delivery Specification**

The BIMids platform  

# What are the criteria to select the team ?

## Criteria definition

The client defines on which criteria the team will be chosen, criteria are defined according to what is important for the project.



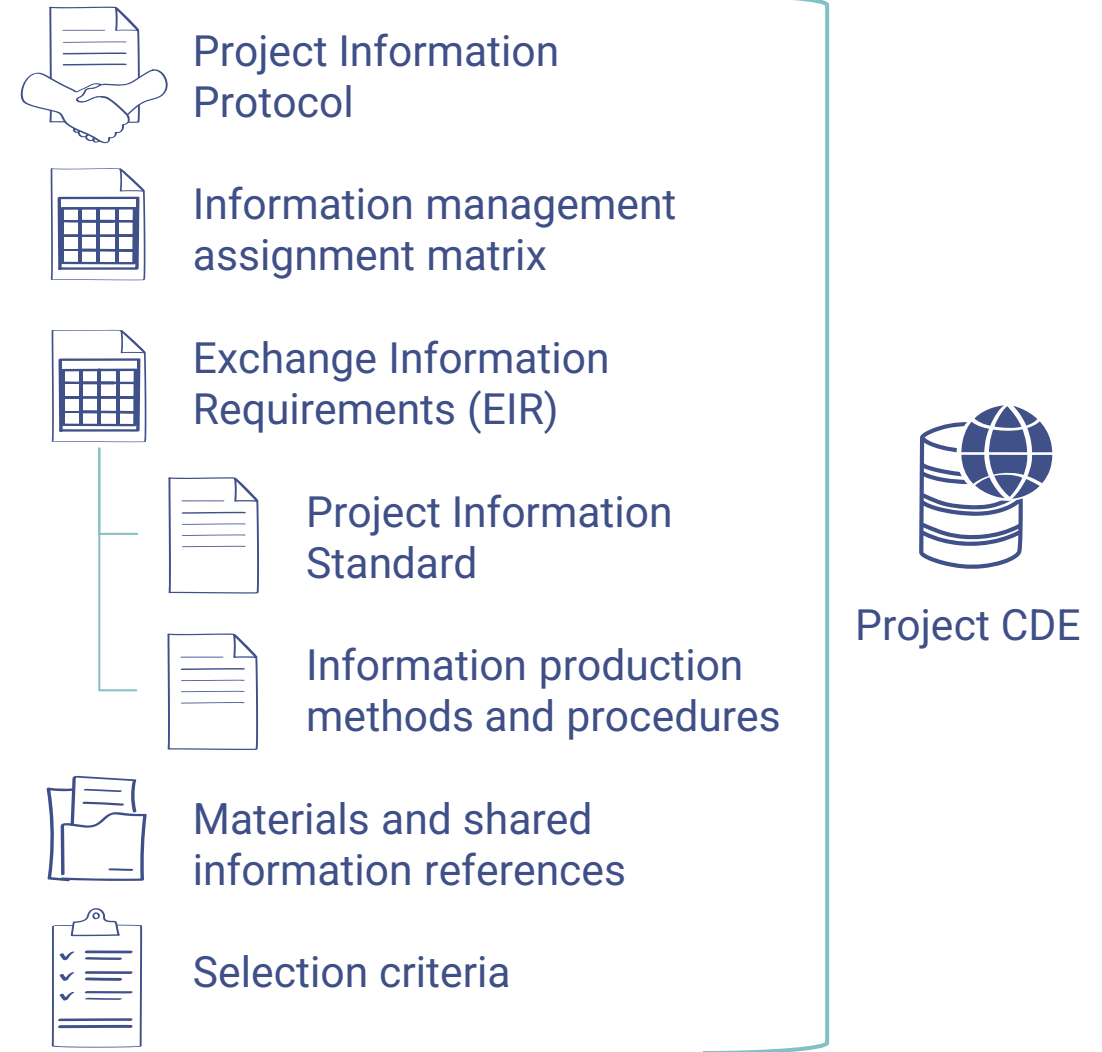
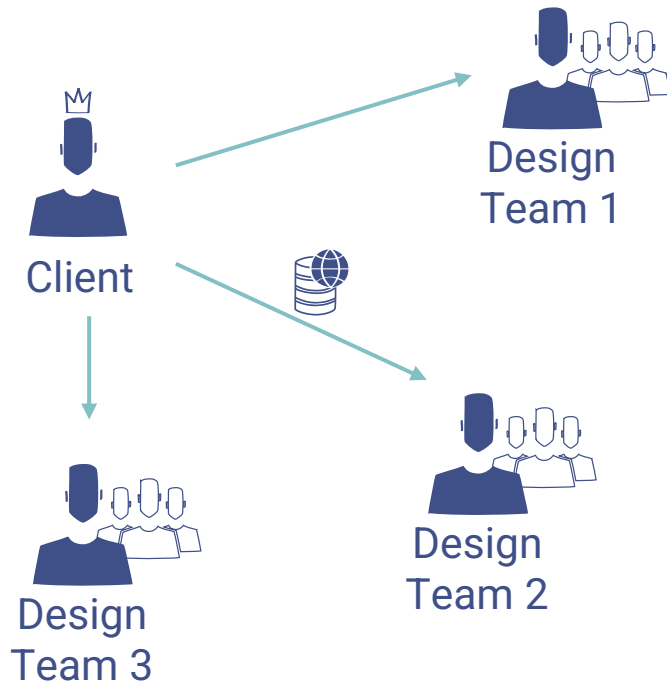
Selection criteria



# What is needed to tender ?

## Invitation for the design team

The client compiles all documents on the project CDE and makes it accessible to potential design teams.



# Tender Response



- Which BIM responsibilities will take the team?
- How to meet the exchange information requirements ?
- What is the ability and the capacity of the team to undertake the project ?
- What is needed to respond to the tender ?

The design teams answers on the tender with a set of documents to make clear how they are going to approach the different information deliverables and requirements as prescribed by the client. This includes proposals for amendments and/or modifications to the tender documents of the client.



# Which BIM responsibilities will take the team ?

## Defining BIM responsibilities

The architect\* defines and divides information management related tasks.  
\*In this example.



Information management assignment matrix  
(optional to use this matrix)

The rest of the tasks are filled in.

# How to meet the exchange information requirements ?

## Defining responsibilities

The potential design teams fill in the responsibility matrix with tasks that they will undertake and the linked deliverables.

## Establishing the BEP

The architect describes the means and the methods allocated to the production of information **in order to meet the exchange information requirements.**



High level responsibility matrix

Part of

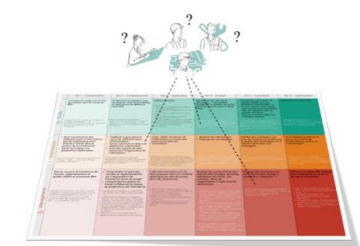


Pre-contractual BIM Execution Plan (BEP)

- Name of the individual working on the project and their responsibilities
- Organisation structure (organigram of the task team)
- Strategy to federate models and other information containers
- Any proposed additions or amendments to the project's information standard, to the project information methods and procedures

Examples

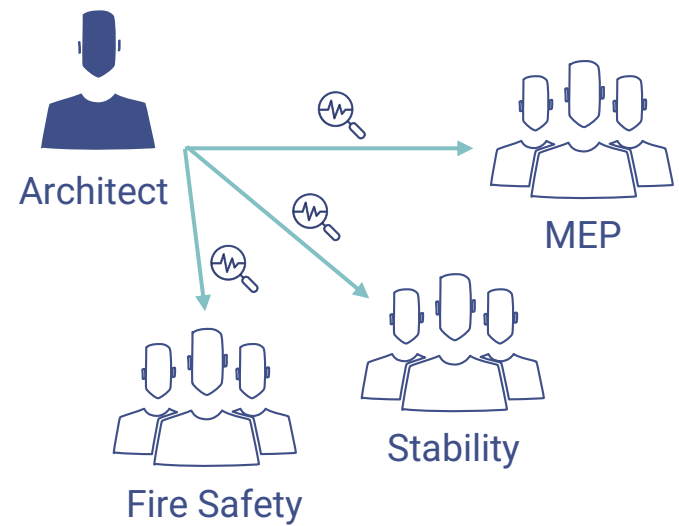
# What is the ability and the capacity of the team ?



BIM Skills Matrix

WG Training

**Verifying the capacity and capability of the partners**  
The architect demonstrates how the design team will meet the client's requirements by assessing task teams with surveys tailored to project and client needs.



Capabilities and capacity analysis of the design team

Identify the risks  
(an input)



Risk Register

Examples

- The team may be understaffed in order to accomplish the project.
- Only half of the team is familiar with the software.
- Not enough software licenses for the entire team.

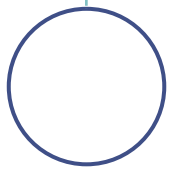
Input



Mobilization plan

Examples

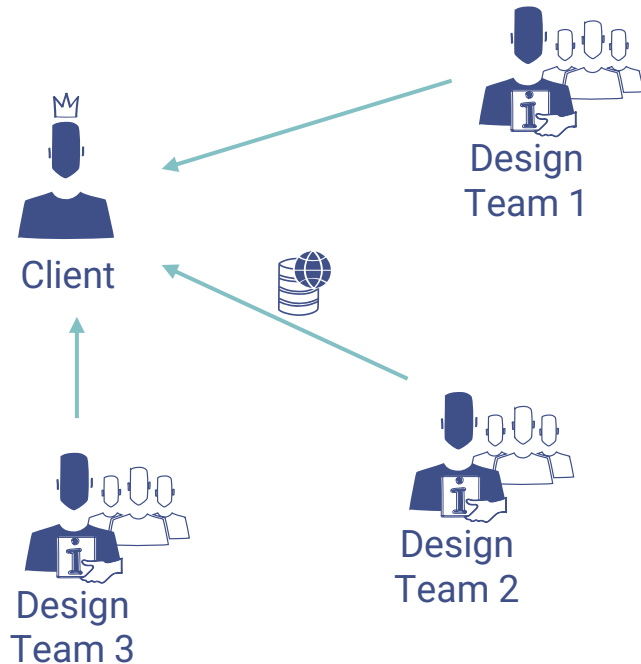
- Check if the propose capacity (number of people) is there (if not find solution)
- Deliver necessary training to team members
- Procure, implement and configure soft/hardware



# What is needed to respond to the tender ?

## Design team response

The architect compiles and uploads the documents herewith on the project Common Data Environment (CDE)



Capabilities and capacity analysis of the design team



Risk Register



Mobilization plan



Pre-contractual BIM execution plan (BEP)



High level responsibility matrix



Project CDE



# Tendering

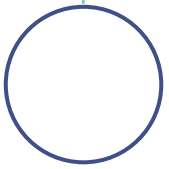
 Appointment

- How to make the appointment specific?
- Who does what and when ?

The client chooses the design team according to the selection criteria after analysing the tender responses.

Sometimes, not all requirements and/or deliverables can be met by the design team. Thus, before the actual appointment is fixed, there is room for negotiation in order for both parties to have a common understanding. In this way, the client has a clear view on what to expect. When negotiations have successfully ended, both parties sign project information protocol.





# How to make the appointment specific?

## Contract agreement

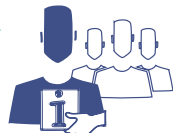
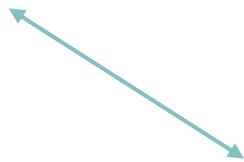
Negotiations about the Project Information Protocol is part of the contract negotiations.



Project Information Protocol



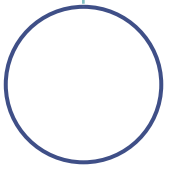
Client



Design Team







# How to make the appointment specific?

## Confirm BIM responsibilities

The architect confirms with the team who will undertake the information related tasks.



## Defining responsibilities for the deliverables

The architect confirms with the team the high level matrix and defines further the responsibilities.



High level



## Agreement on the BEP

The architect confirms with the design the BEP.



Pre-contractual



Information management assignment matrix



Responsibility matrix

Detailed

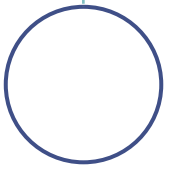
Part of



Contractual

BIM Execution Plan (BEP)

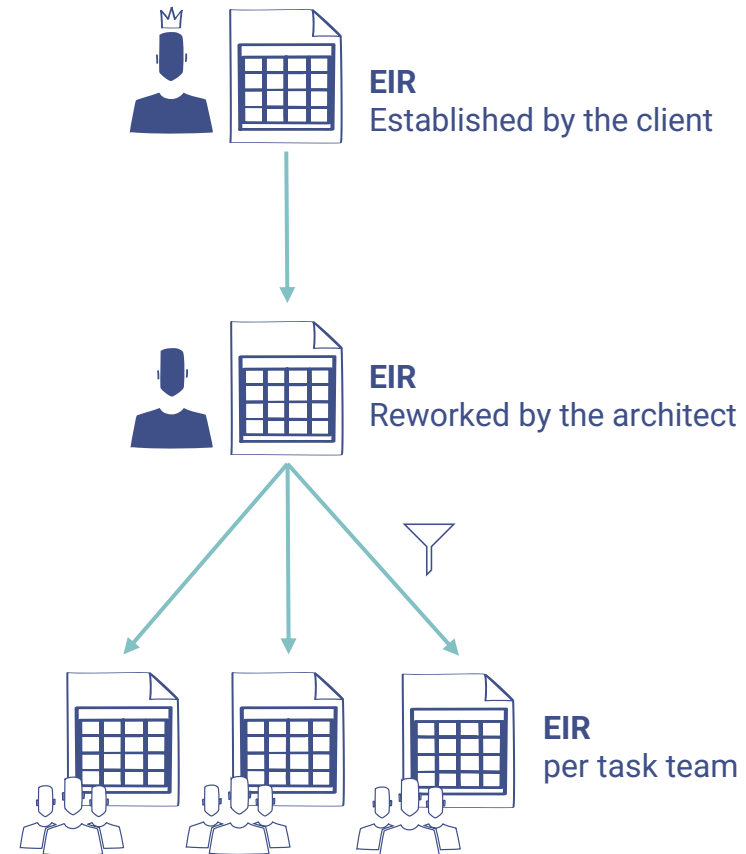




# How to make the appointment specific?

## Information Requirement

The architect makes his own EIR from the one he received from the client. Then he filter it per task team to ensure that he will get all the information to be compliant to client's EIR.



# Who does what and when ?

## Deliverable planning per task team

Each team develops their planning describing **who** delivers **what** information and **when**. The EIR is the input for the TIDP.



## Master deliverable planning

All plannings are coordinated and assembled to form the design team's master working plan which will steer and coordinate the work.



MEP\*



Stability\*



Fire Safety\*

## TIDP Task Information Delivery Plan

\*not necessary done by discipline



Part of



Design Team

## MIDP

Master Information Delivery Plan

# Preparation



- What needs to be done before the actual start of the project ?

In order to deliver all requirements as agreed upon within the timing, there are preparations to be done before the actual work starts. In information management, this will often be related to the procurement of IT infrastructure, software licenses. Nevertheless, human resources and training are also part of this.



# What needs to be done before starting the project ?

## Mobilizing resources & IT

The architect mobilizes the resources & IT as defined in the *Mobilisation plan*.

Examples

- Check if the proposed capacity (number of people) is there (if not find solution)
- Deliver necessary training to team members
- Procure, implement and configure soft/hardware

## Testing procedures

The architect tests procedures described in the *Information Production Methods and Procedures* as defined in the *Mobilisation plan*.

Examples

- Test the access to the CDE
- Test information exchange between different task team
- Test the information production method and procedure

# Design



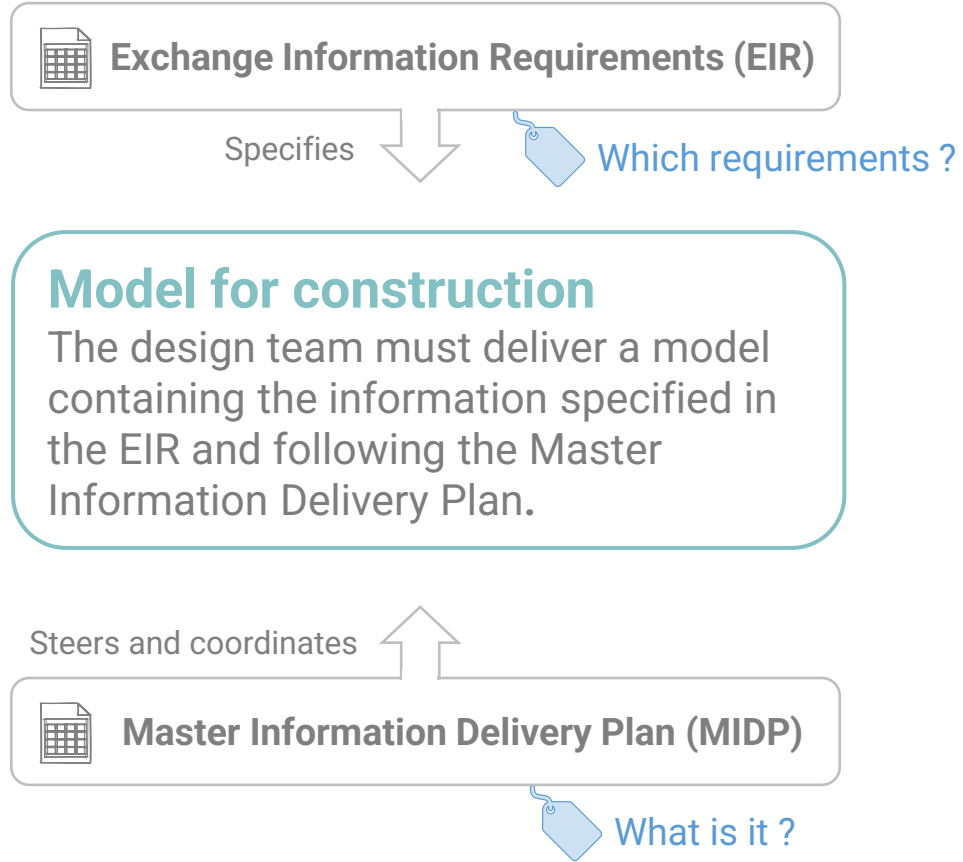
Collaborative production of information

- What must be produced ?
- What is the production process ?

This is the stage where the actual production of the information is done. Collaborative in a way that different task teams have to work together to produce the information deliverables governed by a process that includes coordination, reviews and acceptance of those deliverables.



# What must be produced ?



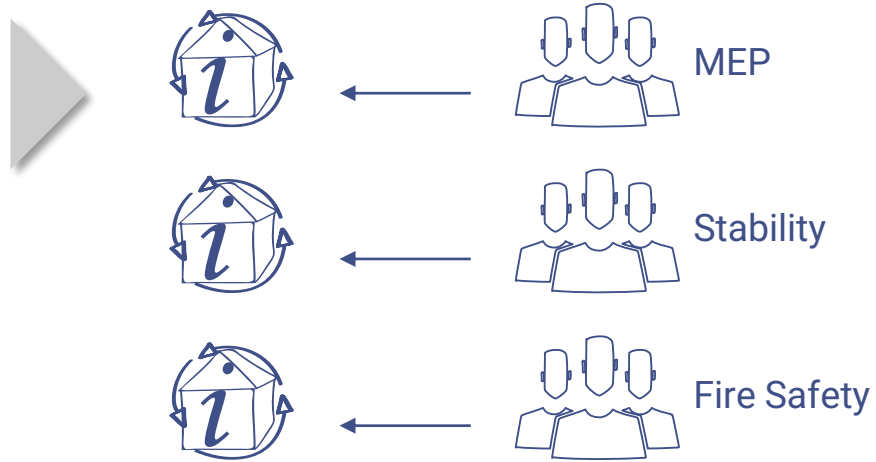
**PIM**  
Project Information Model

# What is the production process ?

**Production**  
Each team works on their model (without communicating) according to their TIDP.

With possibly BIM objects of the manufacturers whose information is structured in a normalized/standardized way

WG Manufacturers




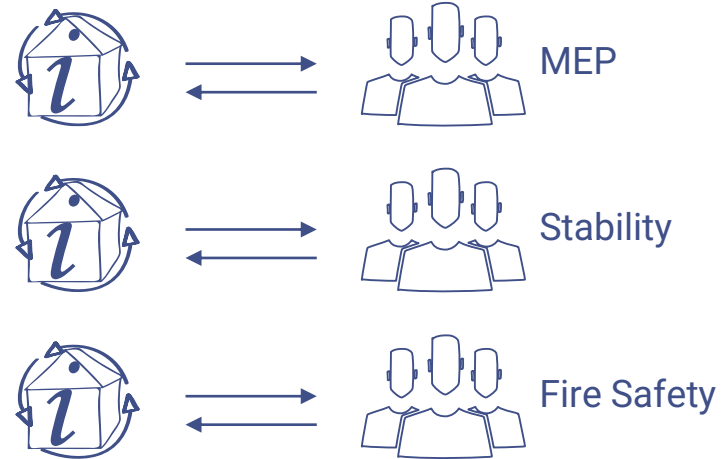


# What is the production process ?

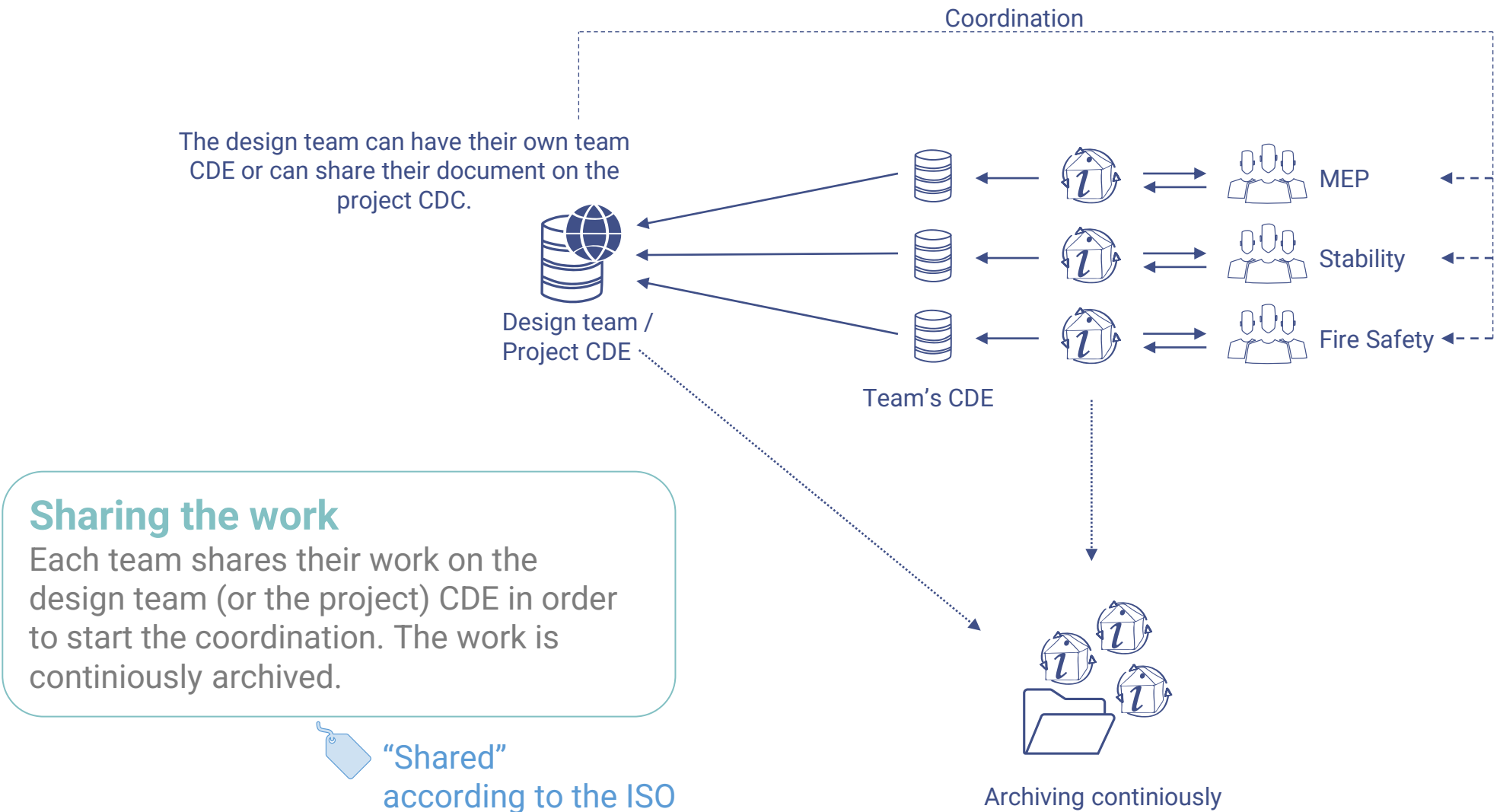
## Quality check

Each team verifies their own model, the used naming convention and metadata for their files. It is work in progress, the work is still not shared with the rest of design team.

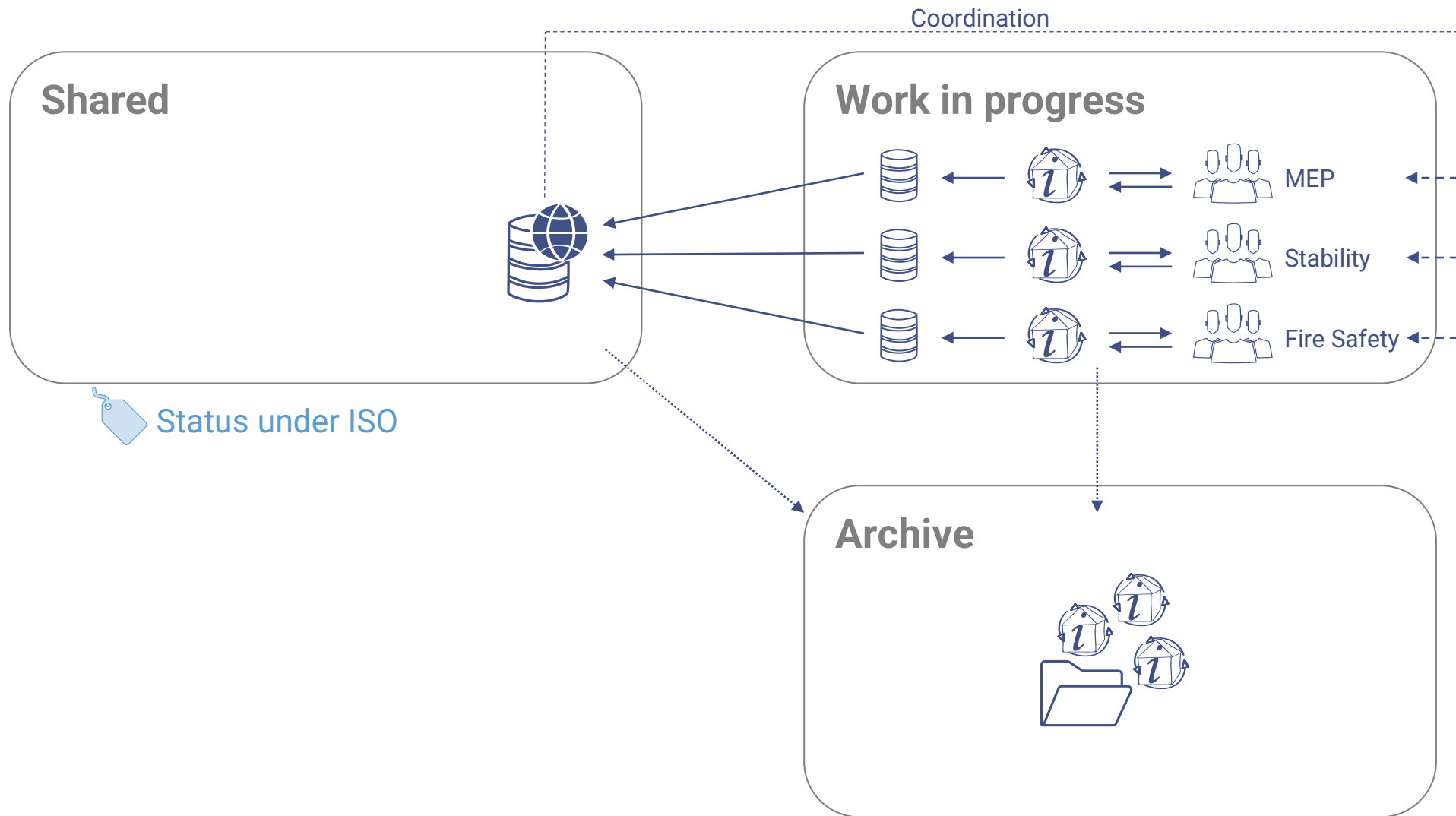
 "Work in progress" according to the ISO



# What is the production process ?



# What is the production process ?



# Design Delivery

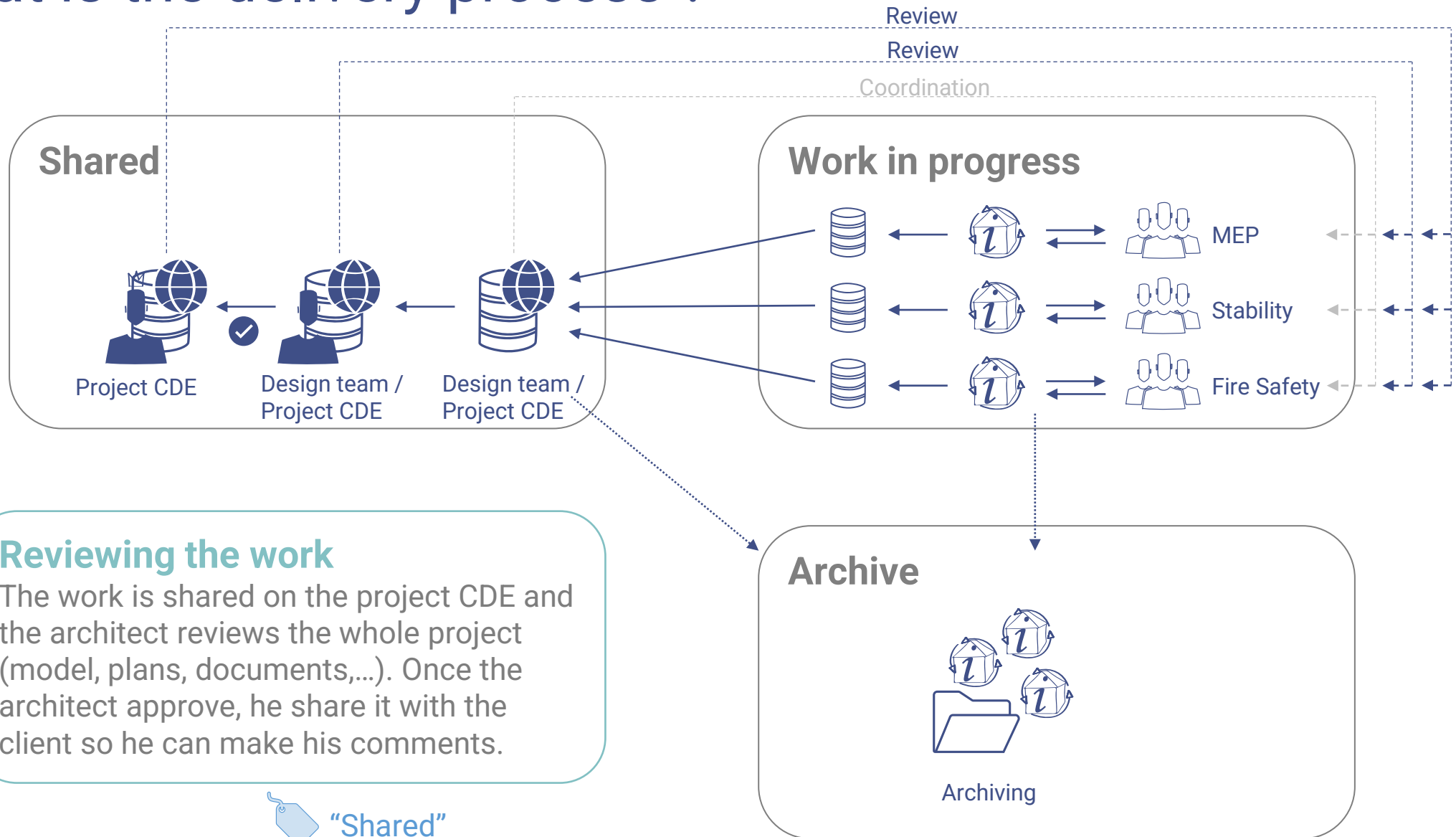
 Information model delivery

○ What is the delivery process ?

When the information has been reviewed and is ready to share with the client it is published on the project CDE. The client can now review the information and accept/reject it. When accepted the client can use the information to make decisions (e.g. to move to the next phase).



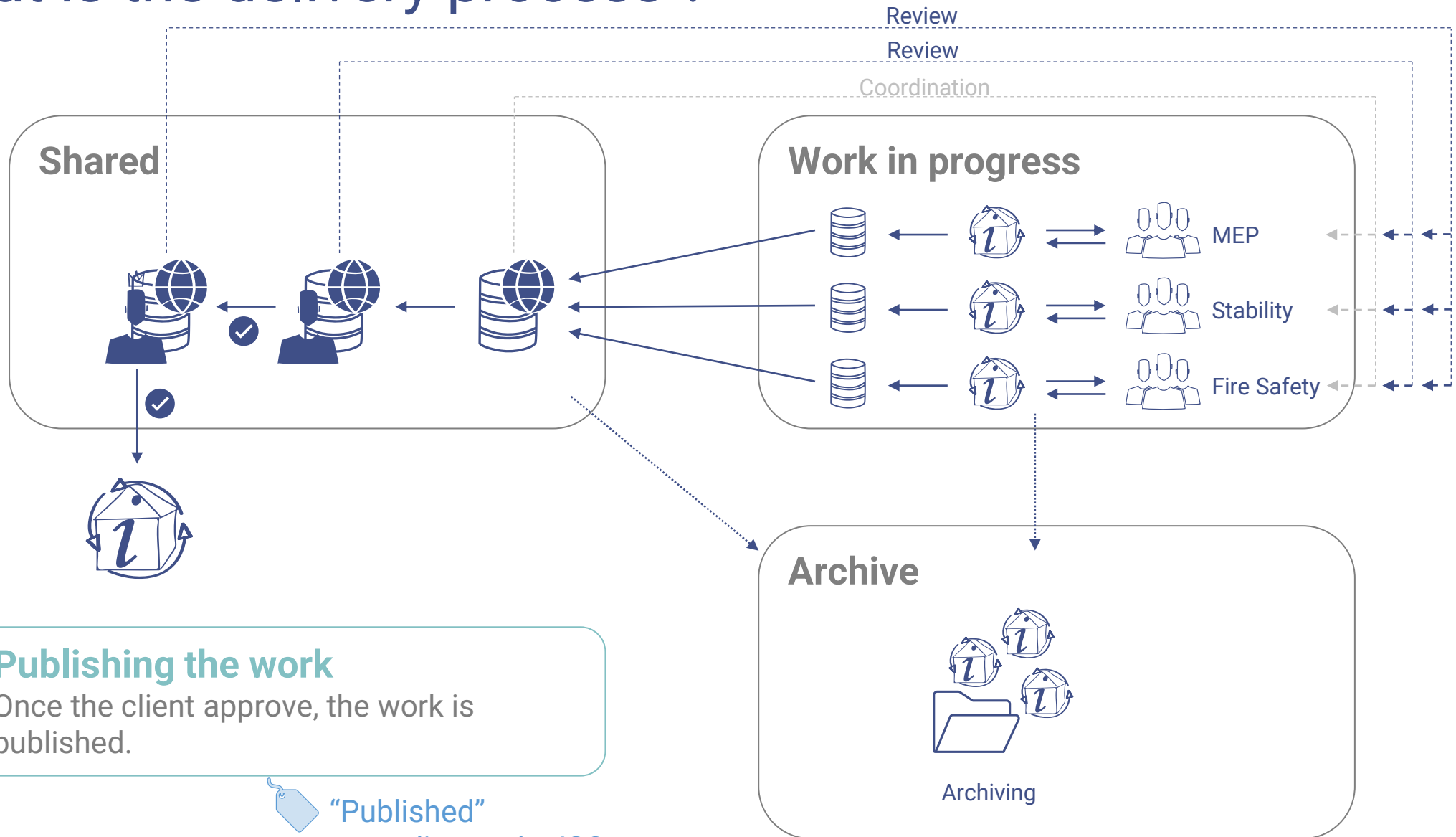
# What is the delivery process ?



**Reviewing the work**  
 The work is shared on the project CDE and the architect reviews the whole project (model, plans, documents,...). Once the architect approve, he share it with the client so he can make his comments.

“Shared” according to the ISO

# What is the delivery process ?



## Publishing the work

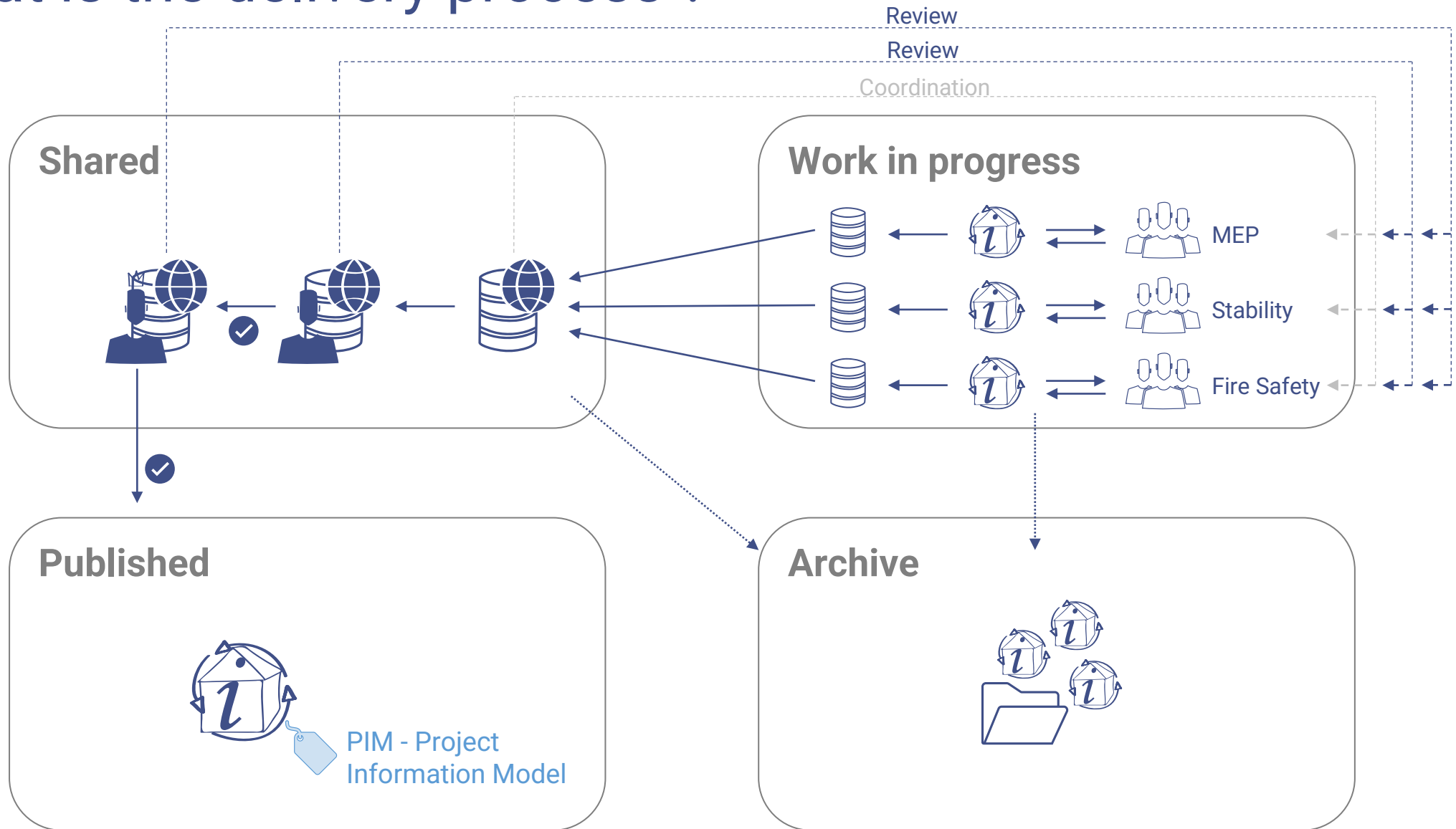
Once the client approve, the work is published.



“Published” according to the ISO



# What is the delivery process ?



# End of the project

 Project close-out

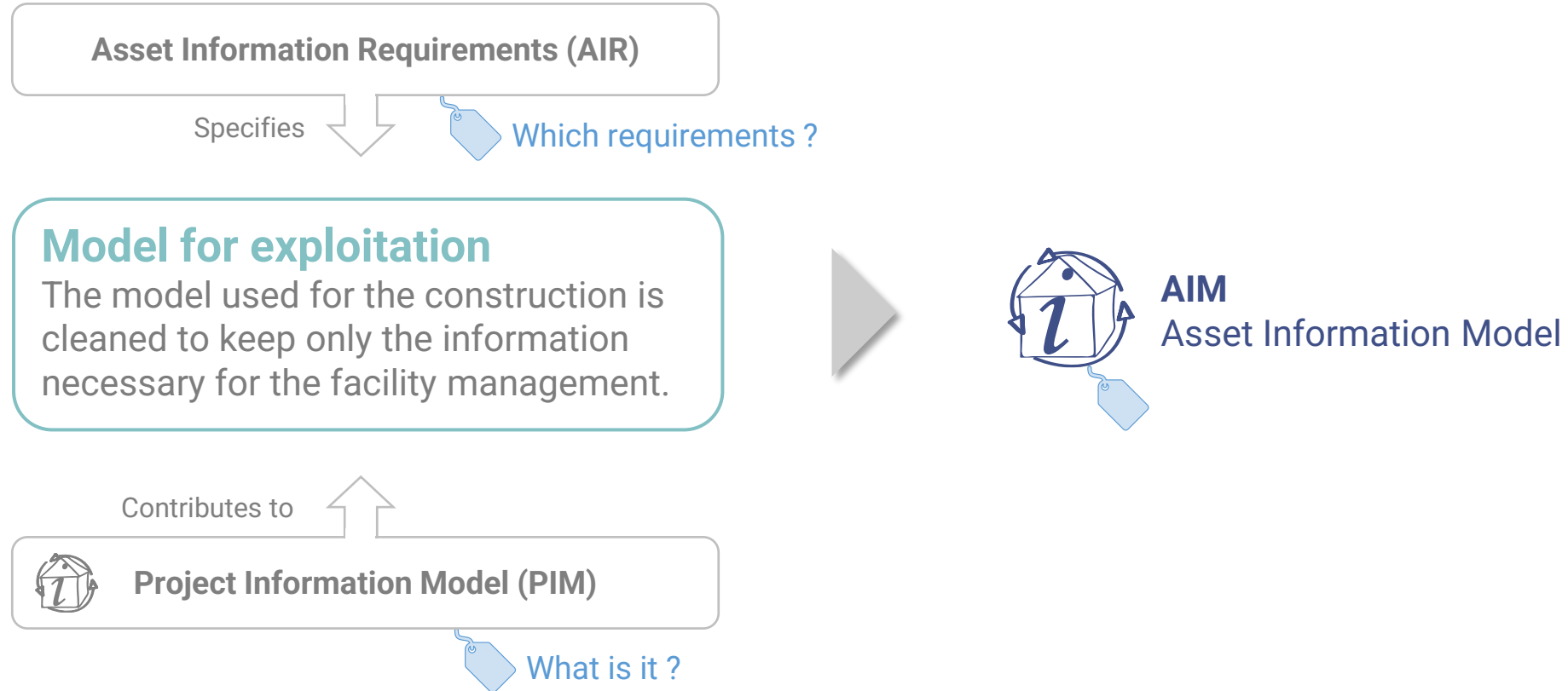
- How to prepare for the next steps ?
- Are there lessons learned for future projects ?

The project team captures the lesson's learned and documents them. A part of the delivered information (Project information model) will be useful for the future and is thus passed onto the Asset information model which will be used during the operational stage.





# How to prepare for the next steps ?



# ○ Are there lessons learned for future projects ?

## Registering lessons for future projects

The project team captures the lesson's learned and documents them.

# Lexicon

## Information Requirements (OIR, PIR, AIR, EIR)

Get the hierarchy of information requirements [here](#).

Get the terms in the BIM process :

- [What are the requirements ?](#)
- [How to state the requirements ?](#)

## Level of information need

Get the concept [here](#).

Get the concept in the BIM process :

- [How to state the requirements ?](#)

## Status code of information

Get the concept [here](#).

Get the concept in the BIM process :

- [What is the production process ?](#)
- [What is the delivery process ?](#)

## Project & Asset Information Model (PIM & AIM)

Get the terms [here](#).

Get the hierarchy of information requirements [here](#).

Get the terms in the BIM process :

- [What must be produced ?](#)
- [How to prepare for the next steps ?](#)

## Master & Task Information Delivery Plan (MIDP & TIDP)

Get the terms in the BIM process :

- [Who does what and when ?](#)

## Milestones

Get the term in the BIM process :

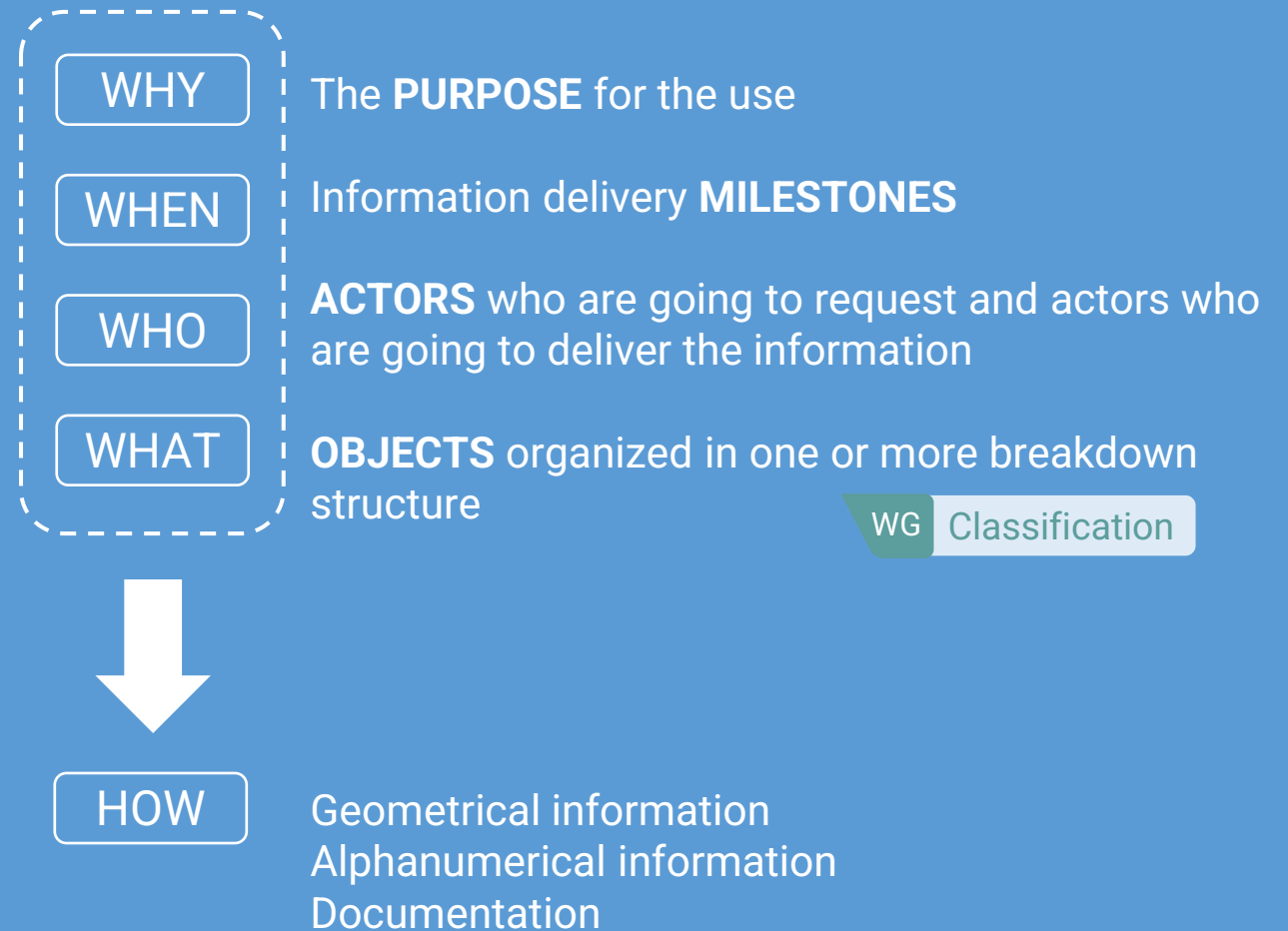
- [How to work together technically ?](#)

# Level of information need NBN EN 17412-1:2020

Level Of Information Need is a concept helping to describe which information should be delivered for a purpose for a certain milestone.

It aims to support Exchange Information Requirements (EIR).

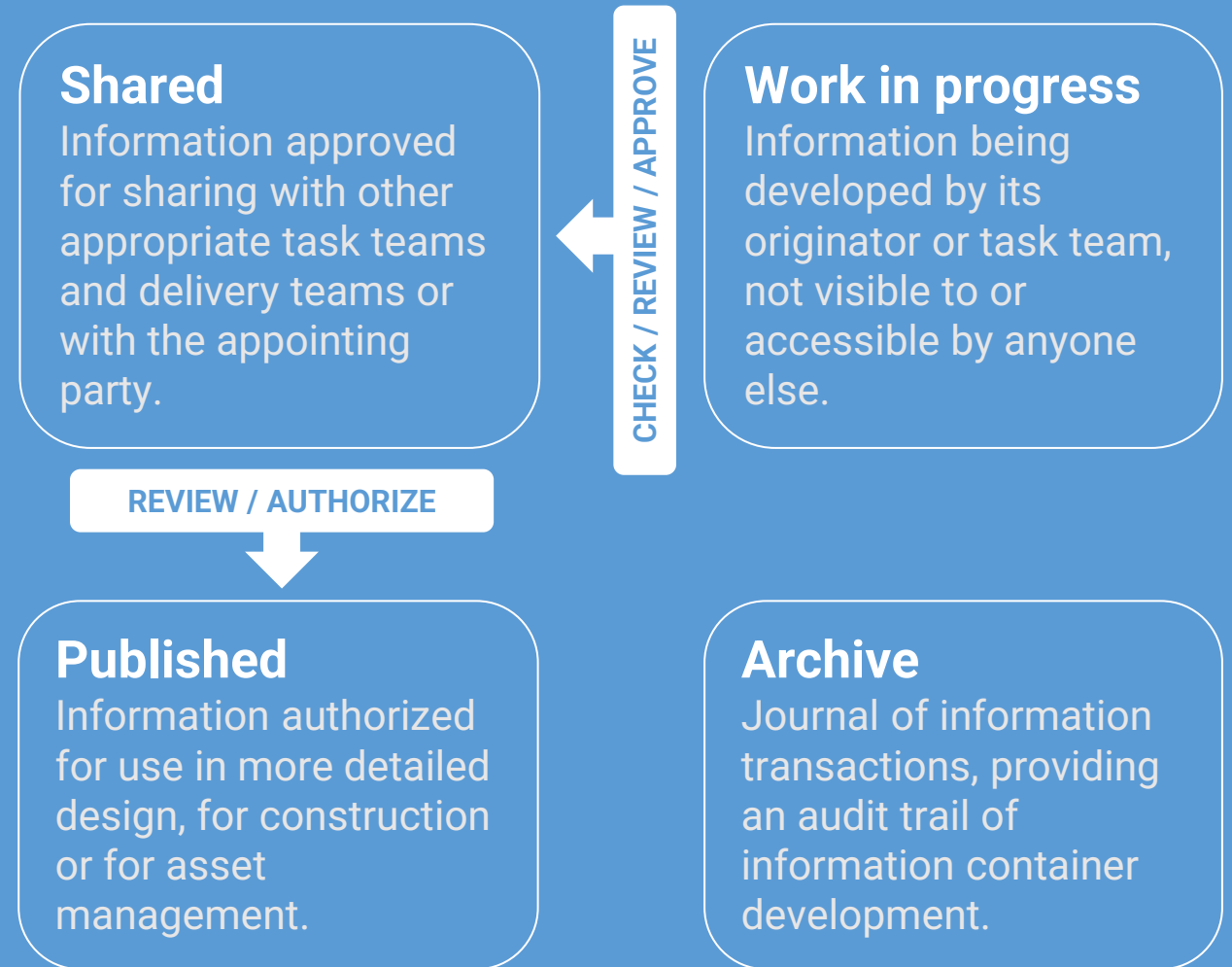
Some prerequisites are essential to specify the level of information need and how information is going to be delivered. It concerns why, when, by/for who, and what information should be delivered.



# Status code of information NBN EN ISO 19650-1:2019

The status code is an attribute that has to be assigned to each information container (plans, 3D model, etc)

This should be enabled by the common data environment (CDE).



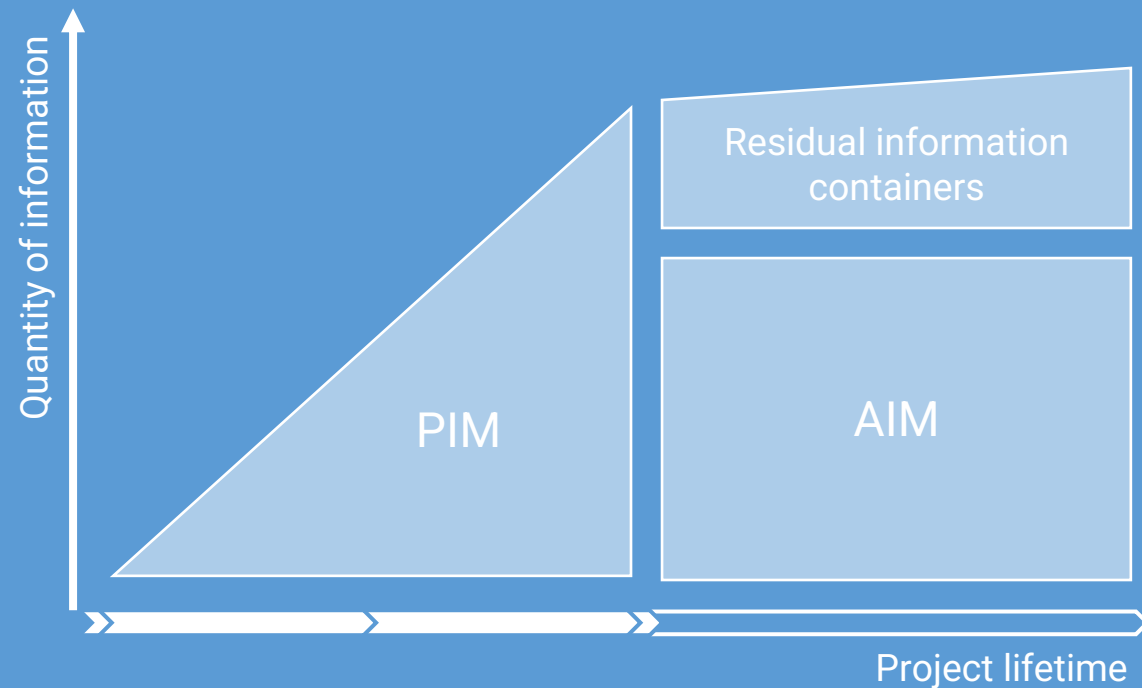
# Project & Asset Information Model (PIM – AIM)

 NBN EN ISO 19650-1:2019

The 3D models are considered as information containers.

The **Project Information Model (PIM)** is the model containing all the information needed for the construction project (before the exploitation phase).

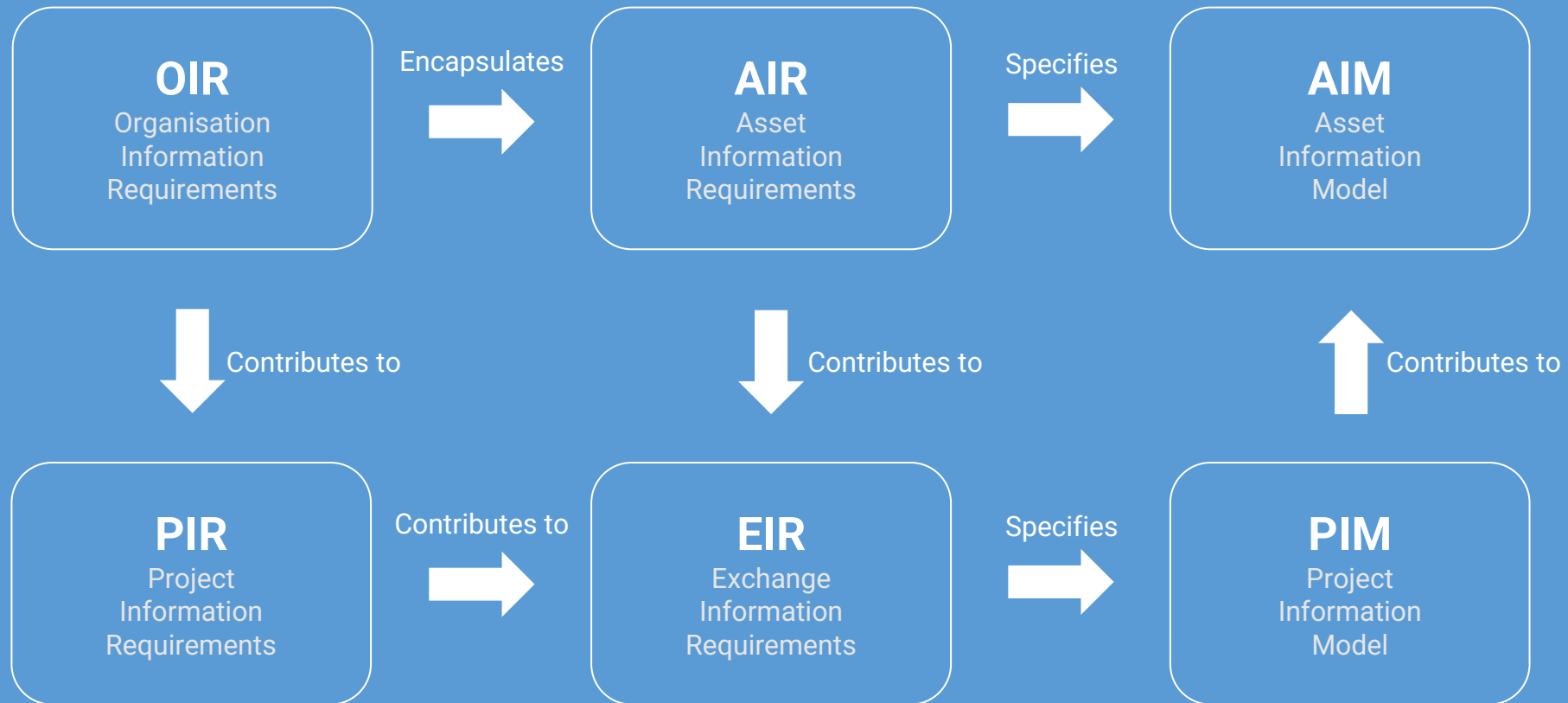
The **Asset Information Model (AIM)** is the model containing all the information necessary for the proper operation of the building once it is built, for its renovation, etc. (during the exploitation phase).



# Hierarchy of information requirements



NBN EN ISO 19650-1:2019



# Cluster's Activities

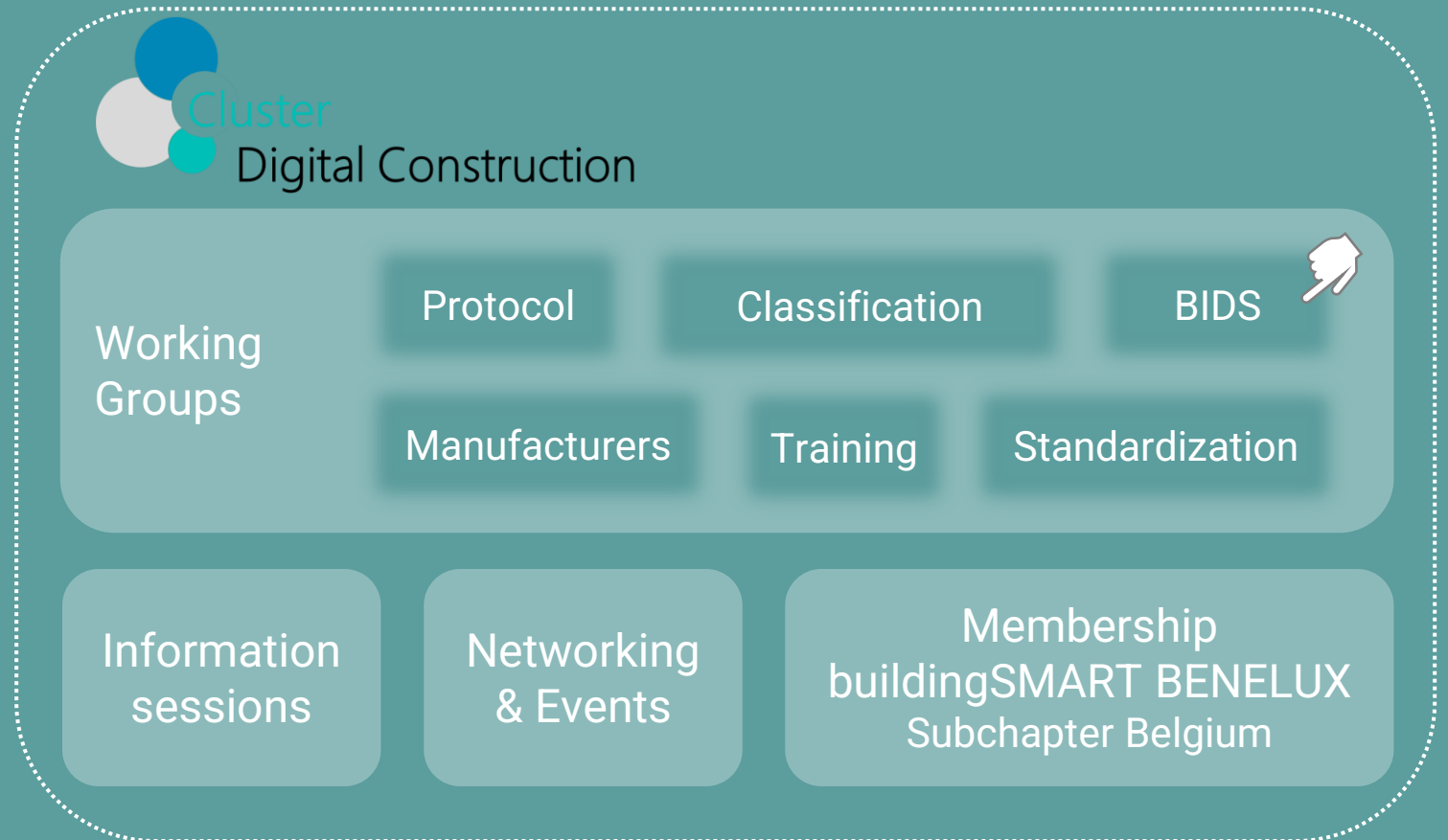


Technical Committee **Digital Construction**



The Digital Construction Cluster aims to boost the use of BIM and new technologies.

How can we do this?  
By working on the development of reference documents with the help of precursors.







# WG Protocol

This WG establishes guidelines for the exchange of information during the BIM process.

## GOALS 2023

1. Publish the template for the project information protocol and other information management documents to be compliant to the ISO 19650 standard.
2. Vulgarizing the ISO 19650 standard through the publication of online Wiki.

## 2019

Previous standard :  
[BIM Protocol](#)   
[BIM Execution Plan](#) 

## 2023

[Wiki](#)   
[Templates](#) 

President

Robin Collard

Facilitators

Louis Casteleyn



Cluster's Activities



# WG BIDS

BIDS stands for “Belgian Information Delivery Specifications”. This WG is working on the development of a unified information transfer method to facilitate exchanges between the various actors in the construction industry (all phases).

## GOALS 2023

1. Developing an Exchange Information Requirements in IDS format.
2. Standardize the phases in a project lifecycle (in order to be able to link a project phase to a EIR)

## 2019-2022

Modeling convention

Version 1

Version 2 

## 2022

Digitalbuilding.lu 

(in collaboration with CRTI-B)

President

Marijn Verlinden

Facilitators

Hélène Dewint



Cluster's Activities



# WG Classification

This WG is looking at ways to structure models using both the IFC structure and other classification system(s).

## GOALS 2023

1. White Paper : “Current methods and problems related to structuring of information in the BIM framework.”
2. Introducing the NL/SfB as the reference classification system for Belgium and setting up a system for updating it.
3. Reflection on the conversion of the specifications into a database.

## 2019

Monographs :

- « Classifications system and BIM »
- « Comparison of classifications systems in BIM »

## 2022

Organization of meetings with different actors to explore the current working methods.

President

Paulus Present

Facilitators

Pauline Dewez



Cluster's Activities



# WG Standardization

This WG aims to inform the members about the standardization work on BIM carried out at European and international level. This WG also makes sure that the standards in preparation are coherent with the interests of the sector in Belgium.

## GOALS 2023

1. National Annex to ISO 19650
2. Feedback on developments of new standards at an international and European level

## 2022

Organization of 3 information sessions

Publication summarizing the work in progress at international and European level and the work in progress at buildingSMART International level.

President

Stefan Boeykens

Facilitators

Tim Lemoine



Cluster's Activities



# WG Training

This WG aims to promote the understanding and adption of BIM and new technologies / process in companies of all sizes.

## GOALS 2023

1. BIM Trainers pack

## Before

- [BIM starter pack](#)
- [The digitization guide](#)
- [BIM skills Matrix](#)
- [The sheets « Trades and BIM »](#)

President

Mélanie Léonard

Facilitators

Pauline Dewez



Cluster's Activities



# WG Manufacturers

This WG aims to support manufacturers in their thinking about how to deliver their product information in a BIM process, and also to help stakeholders (AR, engineering office, contractor) to use these information.

## GOALS 2023

1. Draft of a **roadmap** to achieve the following goal : the manufacturer knows how to publish the data of these products and the other stakeholders (AR, engineering office, contractor) know how to use them.

President

An Lievens

Facilitators

Tim Lemoine



Cluster's Activities





# The scenario NBN EN ISO 19650-1:2019

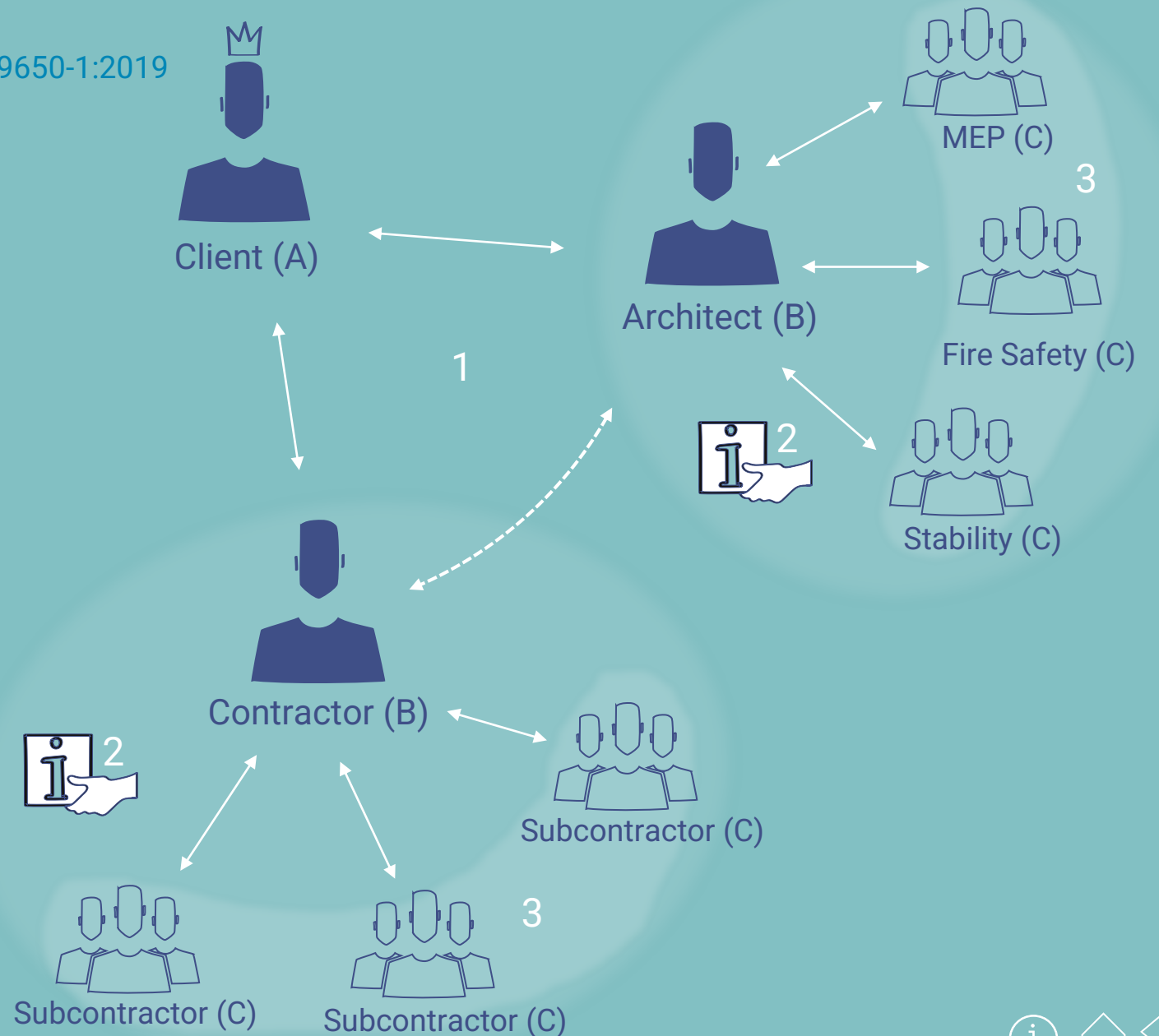
The BIM Framework is developed through an example to explain step by step the different stages of a BIM project based on the NBN EN ISO 19650 : 2019 standard part 1 & 2.

It takes as scenario a traditional contract project, the design and execution are entrusted to separate actors at different times.

- A. Appointing party
- B. Lead appointed party
- C. Appointed party

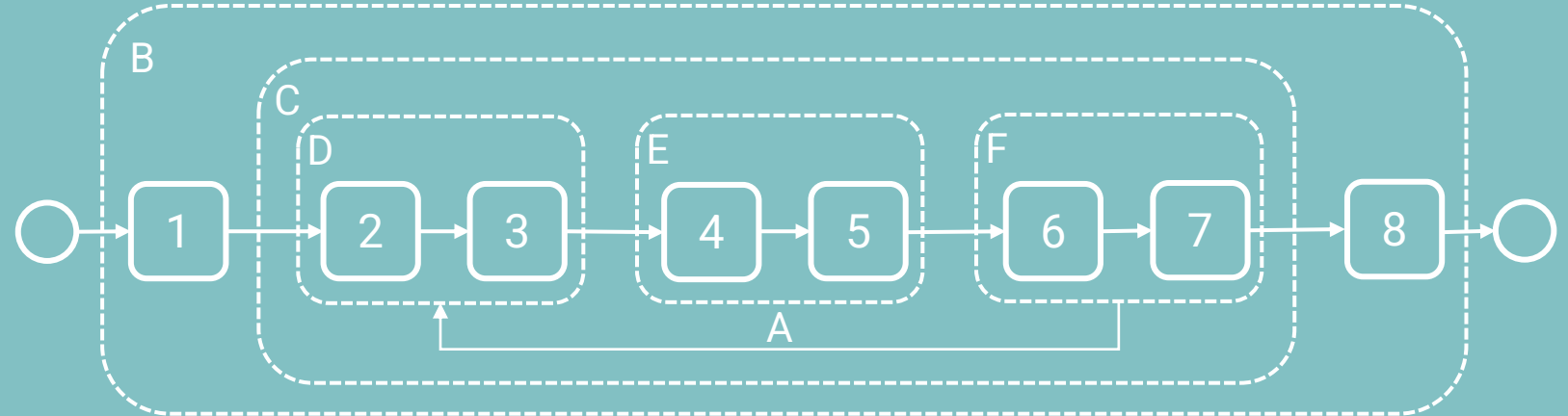
- 1. Project Team
- 2. Delivery Team
- 3. Task Teams

-  Information requirements and information exchange
-  Information coordination



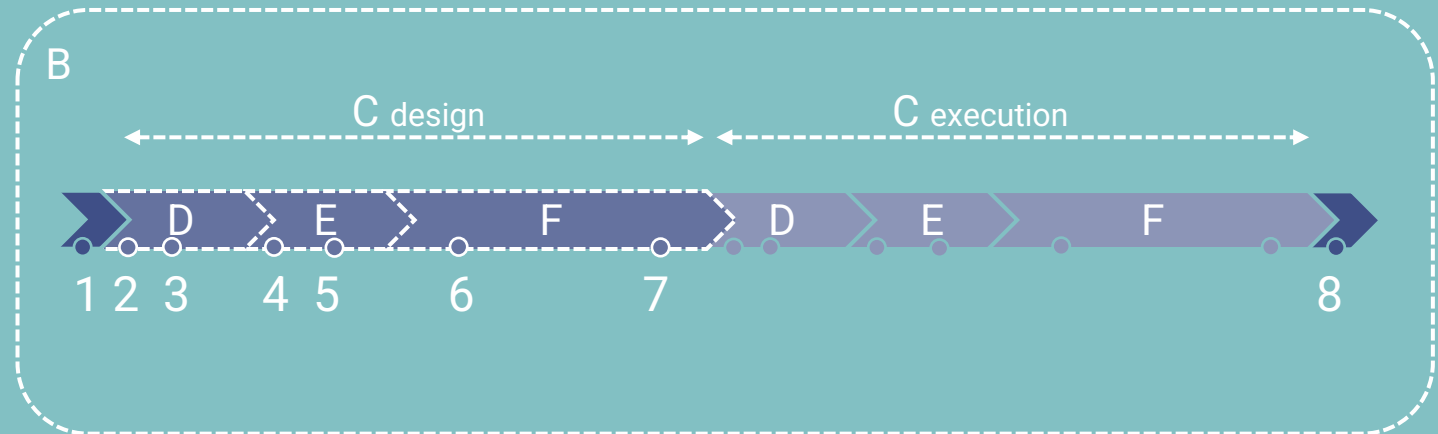
# The process steps and activities ISO 19650

- A. Information model progressed by subsequent delivery team(s) for each appointment
- B. Activities undertaken per project
- C. Activities undertaken per appointment
- D. Activities undertaken during the procurement stage (of each appointment)
- E. Activities undertaken during the information planning stage (of each appointment)
- F. Activities undertaken during the information production stage (of each appointment)



NBN EN ISO 19650-2:2019, 4, Figure 3.

- 1. Assessment and need
- 2. Invitation to tender
- 3. Tender response
- 4. Appointment
- 5. Mobilization
- 6. Collaborative production of information
- 7. Information model delivery
- 8. Project close-out (end of delivery phase)



Scenario for traditional contract



# 1. Assessment and need NBN EN ISO 19650-2:2019

## Which BIM responsibilities will take the client ?

1.1 appoint in individuals to undertake the information management function

## What are the requirements ?

1.2 establish the project's information requirements

## What existing information is available ?

1.6 establish the project's reference information and shared resources

## How to work together technically?

1.3 establish the project's information delivery milestone

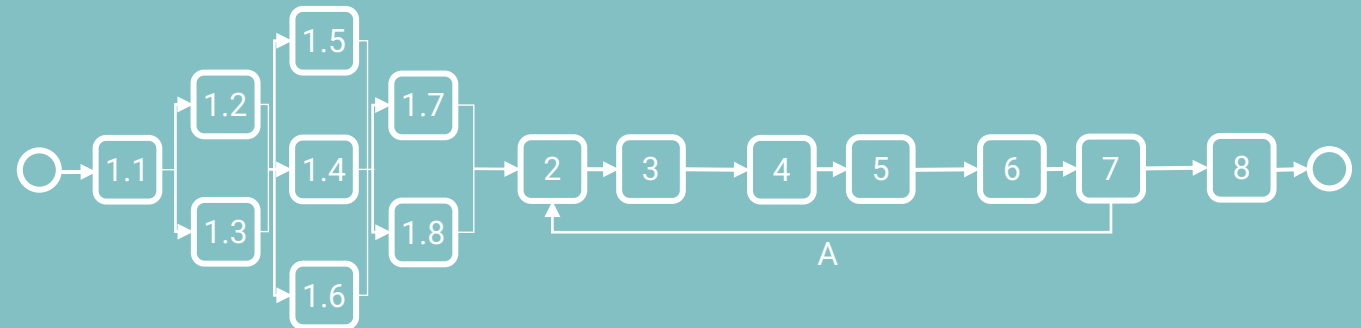
1.4 establish the project's information standard

1.5 establish the project's information production methods and procedures

1.7 establish the project's common data environment

## How to work together legally ?

1.8 establish the project's information protocol



A. Information model progressed by subsequent delivery team(s) for each appointment

NBN EN ISO 19650-2:2019, 5.1.9, Figure 4.

# 2. Invitation to tender NBN EN ISO 19650-2:2019

## How to state the requirements ?

2.1 establish the appointing party's exchange information requirements

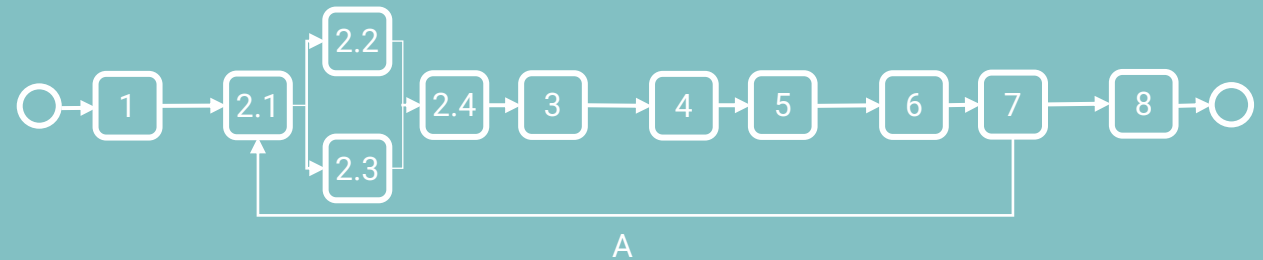
## What are the criteria to select the team ?

2.3. establish tender responses requirements and evaluation criteria

## What is needed to tender ?

2.2 assemble reference information and shared resources  
2.4. compile invitation to tender information

A. Information model progressed by subsequent delivery team(s) for each appointment



NBN EN ISO 19650-2:2019, 5.2.5, Figure 5.

# 3. Tender Response NBN EN ISO 19650-2:2019

## Which BIM responsibilities will take the team ?

3.1 nominate individuals to undertake the information management function

## How to meet the exchange information requirements ?

3.2 establish the delivery teams (pre-appointment) BIM execution plan

## What is the ability and capacity of the team to undertake the project ?

3.3 asses task team capability and capacity

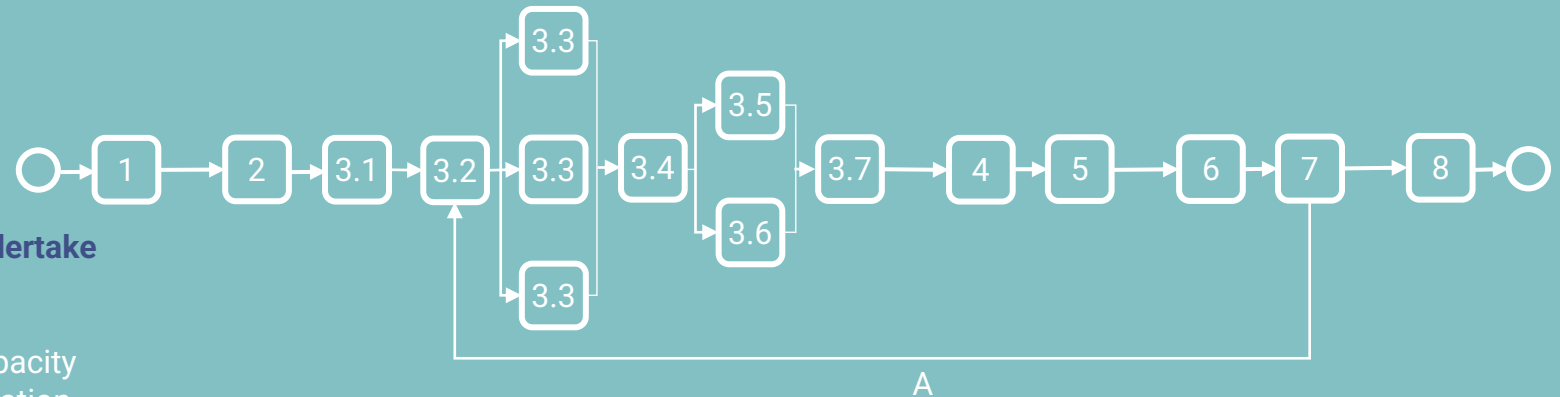
3.4 establish the delivery team's capability and capacity

3.5 establish the proposed delivery team's mobilization plan

3.6 establish the delivery team's risk register

## What is needed to respond to the tender ?

3.7 compile the delivery team's tender response



NBN EN ISO 19650-2:2019, 5.3.8, Figure 6.

A. Information model progressed by subsequent delivery team(s) for each appointment

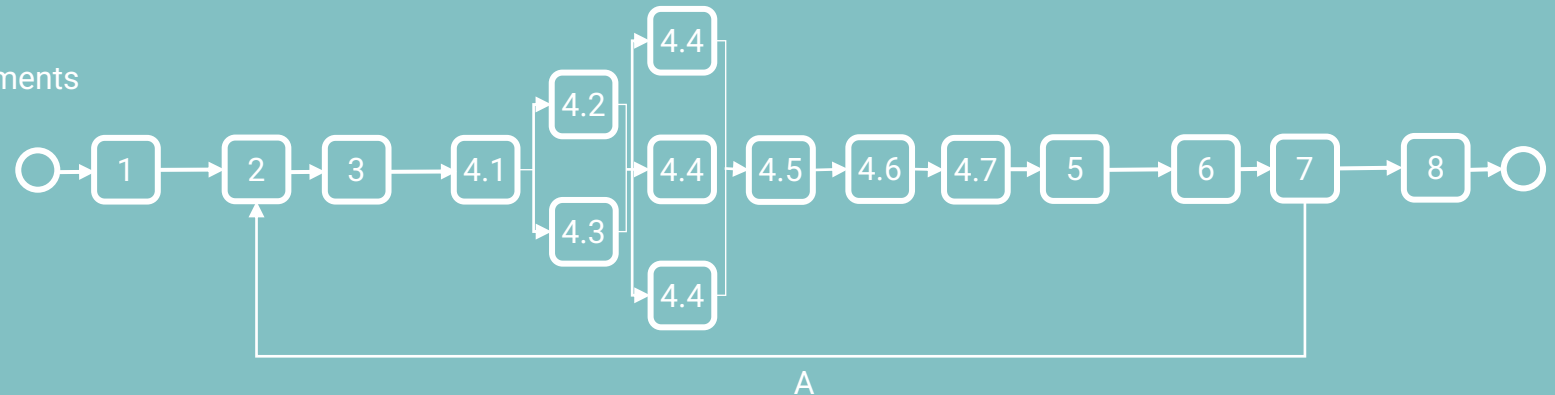
# 4. Appointment NBN EN ISO 19650-2:2019

## How to make the appointment specific ?

- 4.1 confirm the delivery team's BIM execution plan
- 4.2 establish the delivery team's detailed responsibility matrix
- 4.3 establish the lead appointed party's exchange information requirements
- 4.6 complete lead appointed party's appointment documents
- 4.7 complete appointed party's appointment documents

## Who does what and when ?

- 4.4 establish the task information delivery plan(s)
- 4.5 establish the master information delivery plan



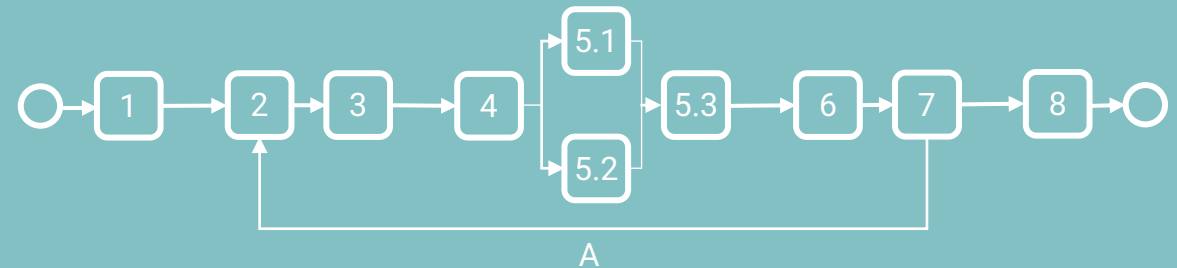
- A. Information model progressed by subsequent delivery team(s) for each appointment

NBN EN ISO 19650-2:2019, 5.4.8, Figure 7.

# 5. Mobilization NBN EN ISO 19650-2:2019

## What needs to be done before the actual start of the project ?

- 5.1 mobilize resources
- 5.2 mobilise information technology
- 5.3 test the project's information production methods and procedure



NBN EN ISO 19650-2:2019, 5.5.4, Figure 8.

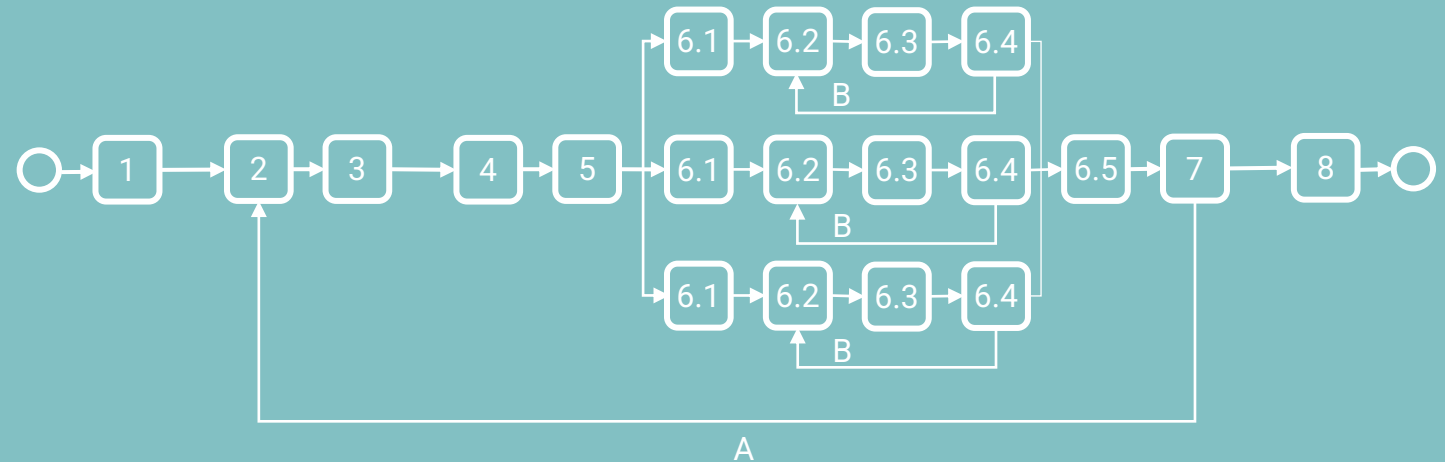
- A. Information model progressed by subsequent delivery team(s) for each appointment

# 6. Collective production of information NBN EN ISO 19650-2:2019

## What must be produced ?

### What is the production process ?

- 6.1 check availability of reference information and shared resources
- 6.2 generate information
- 6.3 complete quality assurance check
- 6.4 review information and approve for sharing
- 6.5 information model review



NBN EN ISO 19650-2:2019, 5.6.6, Figure 9.

- A. Information model progressed by subsequent delivery team(s) for each appointment
- B. New information container revision

# 7. Information model delivery NBN EN ISO 19650-2:2019

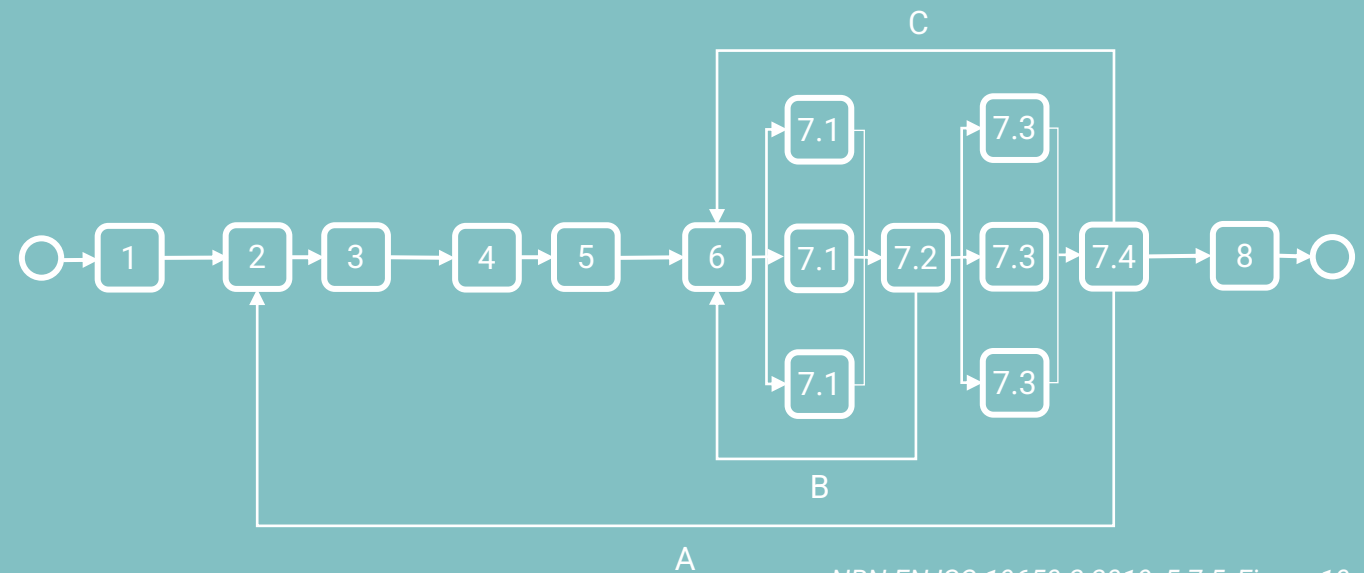
## What is the delivery process ?

7.1 submit information model for lead appointed party authorization

7.2 review and authorize the information model

7.3 submit information model for appointing party acceptance

7.4 review and accept the information model



NBN EN ISO 19650-2:2019, 5.7.5, Figure 10.

- A. Information model progressed by subsequent delivery team(s) for each appointment
- B. Information model rejected by lead appointed party
- C. Information model rejected by appointing party

# 8. Project close-out



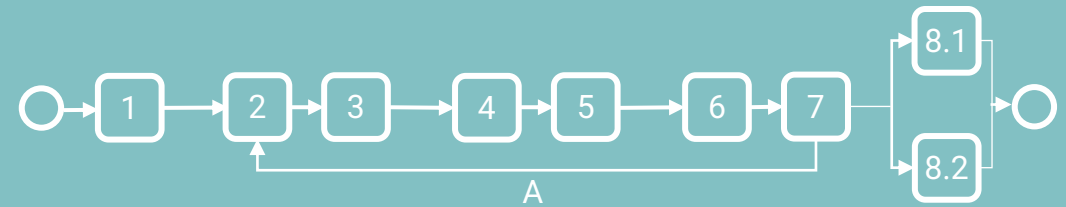
NBN EN ISO 19650-2:2019

## How to prepare for the next steps ?

8.1 archive the project information model

## Are there lessons learned for future projects ?

8.2 compile lessons learned for future projects



NBN EN ISO 19650-2:2019, 5.8.3, Figure 11.

A. Information model progressed by subsequent delivery team(s) for each appointment



# Dans le cadre des projets :



**BIM & digital  
construction**

