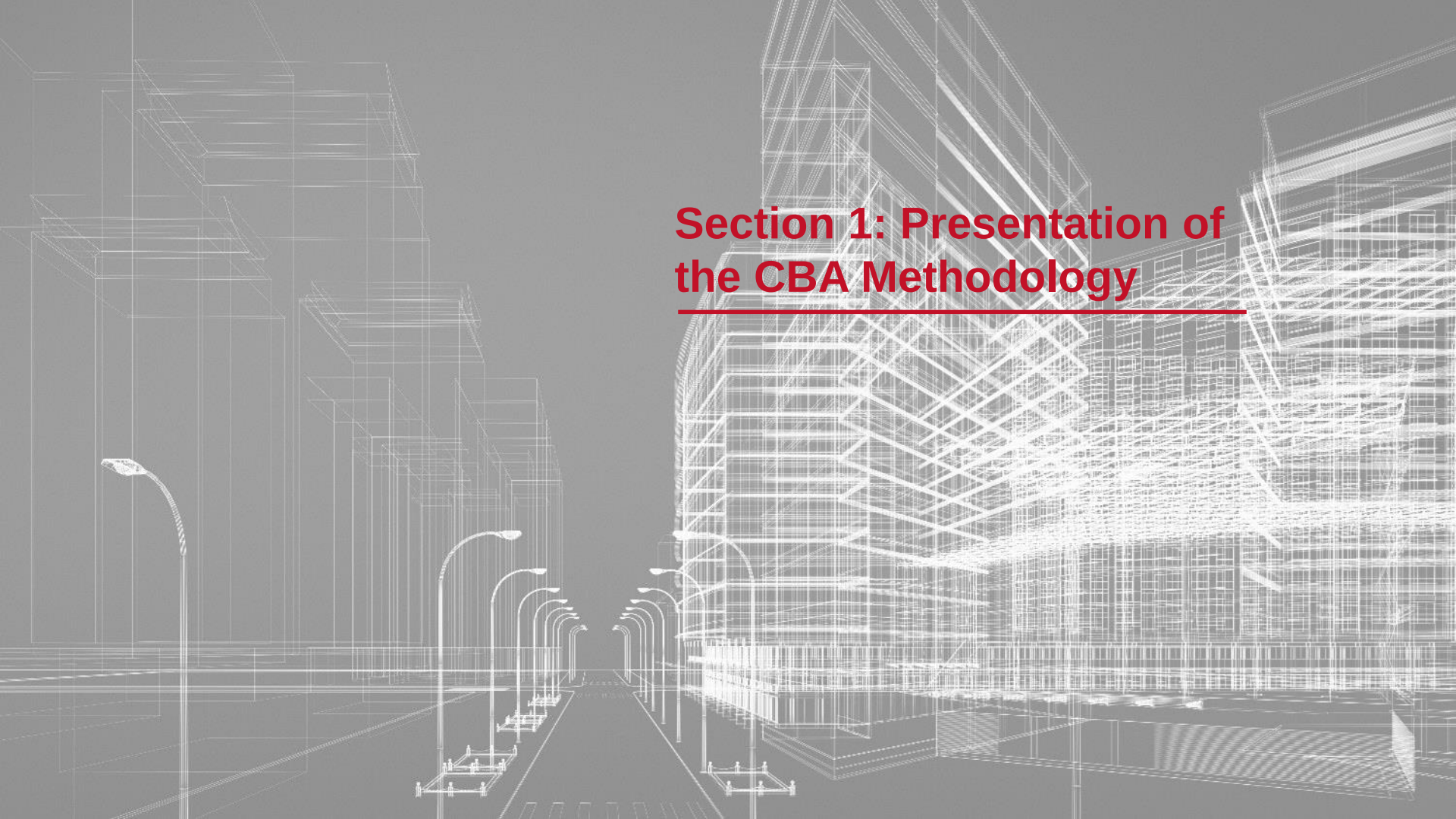
European Commission

Methodology for cost-benefit analysis for the use of BIM in public tenders

Calculating Costs and Benefits for the use of Building Information Modelling in Public tenders

Presentation of the CBA Methodology



Section 1: Presentation of the CBA Methodology

BIM in Public Construction

BIM is not obligatory, but it is **suggested** in the **EU directive** for Public Procurement in 2014*

The Commission is encouraging the use of BIM through "**soft policy**" and close collaboration with the EU BIM Task Group*

The Commission will provide a **recommendation** to promote BIM in public procurement for construction*

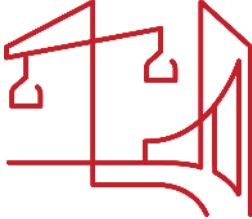
EISMEA has set up a tender to **develop a methodology for cost-benefit analysis for the use of BIM in public tenders**

* DG GROW, The Renovation Wave

Project Details

- **Title:** Methodology for cost-benefit analysis (CBA) for the use of Building Information Modelling (BIM) in public tenders
- **Contract No.:** GRO-SME-20-F-101, EASME/2020/MV/0001
- **Starting Date:** 1st September 2020
- **Duration**: 9 months
- **Main Contractor**: RINA Consulting S.p.A. (Italy)
- **Sub Contractors**: B1P Group (Italy)
- **Funded by:** European Commission (COSME Program)
- **Advisory Group:** EISMEA, DG GROW and EU BIM Task Group

Why a CBA Methodology?



BIM is a critical driver in the digitalisation of the construction sector in Europe. To foster its adoption…

…it is necessary to develop a consistent and replicable methodology for estimating BIM's concrete impact on public tenders

Target Groups of the CBA Methodology

Public policy makers involved in the development of policy for infrastructure or construction sectors

National or local public clients/procurers primarily concerned with service procurement

Operators responsible for the ongoing management and operation of the built asset or environment

Main Objectives

OBJ 1 - Cost-Benefit Model development

the creation of a model that measures the costs and benefits of using BIM in public construction projects, taking into account expenditures, revenues and non-monetary benefits

OBJ 2 – Model validation and case studies

the validation of the CBA model, demonstrating its relevance and practical applicability through six case studies representing various types of projects

OBJ 3 – Handbook creation

the drafting of an informative and easy-to-consult handbook addressed to EU public entities who want to learn more about this analysis model

OBJ 1 - Cost-Benefit Model development

Desk research phase

Identification of **existing models** of measuring costs and benefits in using BIM in public contract or construction works in general

Definition of **monetary and non-monetary indicators** on the use of BIM and their weightings

Consultation phase

- **Online survey** addressed to 122 public entities at different administrative levels
- (national, regional, local)
- **40 interviews** with public entities at different levels (ministry, agency,
- municipality)

Development phase

Developmnt of a **methodology and Cost-Benefit Analysis (CBA) tool** for measuring the costs and benefits (both monetary and non-monetary) of using BIM in public construction projects

OBJ 1 - Cost-Benefit Model development

Desk research – Literature Review (1/2)

- **Five main scientific papers** were selected to provide valuable information on other past cost-benefit analysis experiences
- **Seven additional literature sources** were examined in order to define a suitable list of indicators for capturing the most significant costs and benefits for the adoption of BIM in public tenders
- The key elements which emerged from the analysis of each resource were fundamental for the **identification of indicators** that a consistent CBA should involve

OBJ 1 - Cost-Benefit Model development

Desk research – Literature Review (2/2)

- The **literature review results** have been **reinterpreted** considering the **public clients' perspectives**
- The research underlined that both a comprehensive **database of BIM adoption experiences** and a **common baseline** for evaluating **BIM implementation impact are still missing**

OBJ 1 - Cost-Benefit Model development

BENEFITS

Desk research – List of Indicators (1/3)

INDICATOR	MEASURABILITY AND COMMENTS
Savings related to early clash detection	These items are related to the reduction of costs from the creation of a high-quality model which enables the detection of interferences and errors during the design phase, preventing expensive changes during the construction stage of a project
Savings related to prevention of changes in construction phase	
Savings associated with schedule reduction	These values are associated with the quantification of the time saved using BIM for a project
Savings associated with accuracy in quantity take-offs	This benefit is associated with more accurate estimates of the required material and the connected activities
Environmental benefits	The environmental benefit is associated with a reduction in the quantity of material wasted and so with the overall CO_2 emissions of the project

OBJ 1 - Cost-Benefit Model development

BENEFITS

Desk research – List of Indicators (2/3)

INDICATOR	MEASURABILITY AND COMMENTS
Savings associated with lower risks (enhanced certainty)	This value is an advantage for the enhanced certainty in expenses. After careful consideration, this benefit was excluded from the CBA as it does not reflect the condition of a large set of public clients across Europe
Savings realized in FM and maintenance activities	Savings made through BIM adoption in the operations phase (once the asset has been completed) are often referred to as those largest in size and being realised over a longer period of time
Savings associated with lower number of litigations	These last two items are event-related benefits whose quantification is strictly dependent upon the occurrence of an event, e.g., a litigation, a claim or an accident, and the associated costs of settling the individual negative issue
Savings related to better H&S	
Enhanced communication and collaboration	These are the most mentioned benefits connected to BIM adoption and cited in the majority of literature sources reviewed. This indicator was excluded from the CBA, as a credible universal estimate of this advantage in monetary terms could not be calculated, especially considering the 'ex-ante' nature of the analysis provided by the CBA methodology

OBJ 1 - Cost-Benefit Model development

COSTS

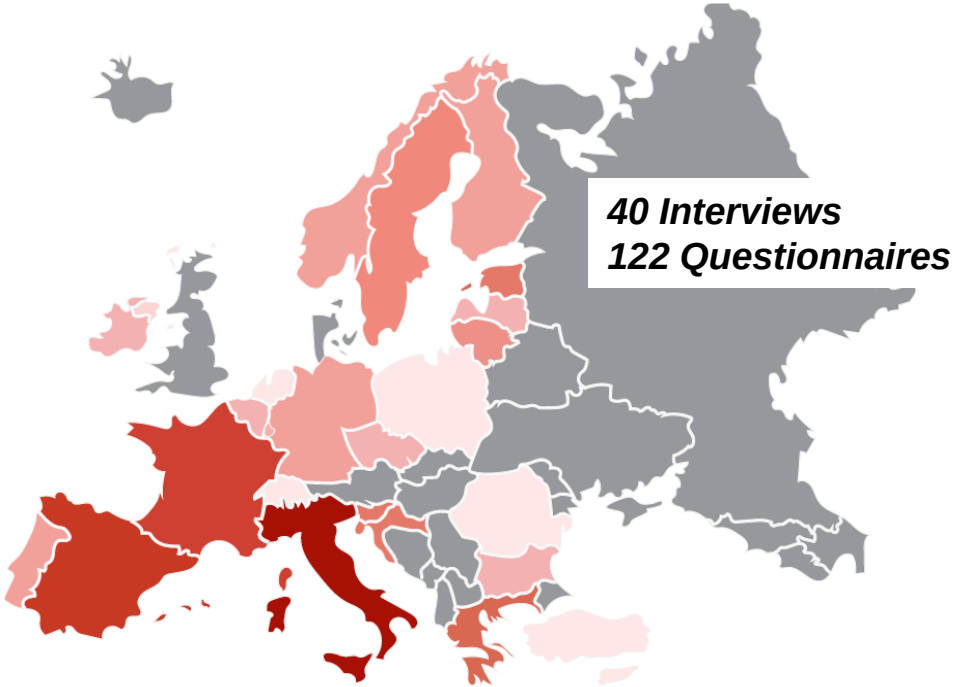
Desk research – List of Indicators (3/3)

INDICATOR	MEASURABILITY AND COMMENTS
Hardware related investments	These three investment items were mentioned in various resources as the most relevant expenses associated to BIM adoption
Software related investments	
Training related expenses	
Design phase cost/ BIM model creation	This cost is associated with the BIM model creation expenses which are charged to the public entity
Consulting costs	This expense appears to be significant (especially in the early stages of BIM adoption)

OBJ 1 - Cost-Benefit Model development

On-site data collection

For accurately quantifying the indicators assessed through the literature review, an **online survey** was distributed to a list of public contractors and **telephone interviews** were conducted with selected stakeholders



Countries involved in the surveys and interviews

OBJ 1 - Cost-Benefit Model development

Interviews

- **40 interviewed stakeholders** (public authorities, national companies, research institutes and universities
- **individual** and **semi-structured interviews** to identify **costs, benefits, strengths** and **weaknesses** of using BIM

BIM adoption in public procurements is a **very long and complex process**, more related to a **deep cultural change** towards digital thinking rather than simply the introduction of new software and hardware to support the regular work

OBJ 1 - Cost-Benefit Model development

Interviews

COSTS

OBJ 1 - Cost-Benefit Model development

BIM ADOPTION IN PUBLIC TENDERS	STRENGTHS	WEAKNESSES
	Improvement in management and coordination	Few or no benefits at the beginning
	Improvement in maintenance activities - operation phase	Low productivity and additional effort required
	Reduction of contingencies through improvement of clash detection and quality check	Specific knowledge and expertise required
	Improved time management and efficiency in time scheduling	High costs of adoption
	Improvement in costs estimation and information management	Complexity and lack of flexibility
	Reduction of total projects' costs	Interoperability issues
	Improvement in projects' quality	

OBJ 1 - Cost-Benefit Model development

BIM ADOPTION IN PUBLIC TENDERS	OPPORTUNITIES	THREATS
	Regularisation and streamlining of the national AEC procedures	Lack of a clear regulatory framework and incentives for adoption
	Digitalisation of the aec sector	Cultural and procedural obstacles
	Specific studies on and analyses of costs and benefits associated with BIM	Monopoly of certain software companies
	Development of a clear regulatory frameworks and introduction of incentives	High costs of adoption

OBJ 1 - Cost-Benefit Model development

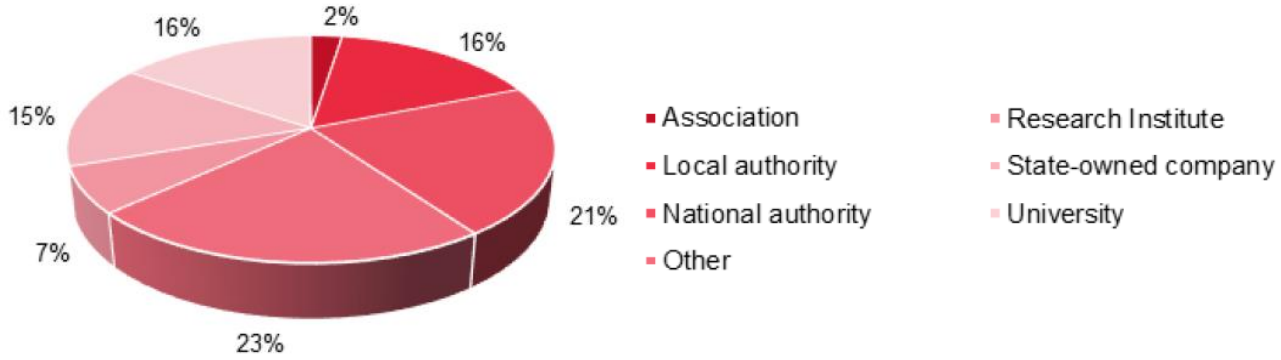
- **Initial costs** of starting to use BIM are **higher than the immediate benefits** gained
- Estimate of **return of investment** associated with BIM adoption can be **assessed only after several years**

AVERAGE COSTS FOR BIM ADOPTION			
Training costs (cost/person)	Software licenses costs - modelling & verification (person/year)	Hardware costs (cost/person)	Total costs (cost/person considering the first year of adoption)
5 - 8 k€	8 – 10 k€	2 - 3 k€	15-20 k€

OBJ 1 - Cost-Benefit Model development

Survey Results

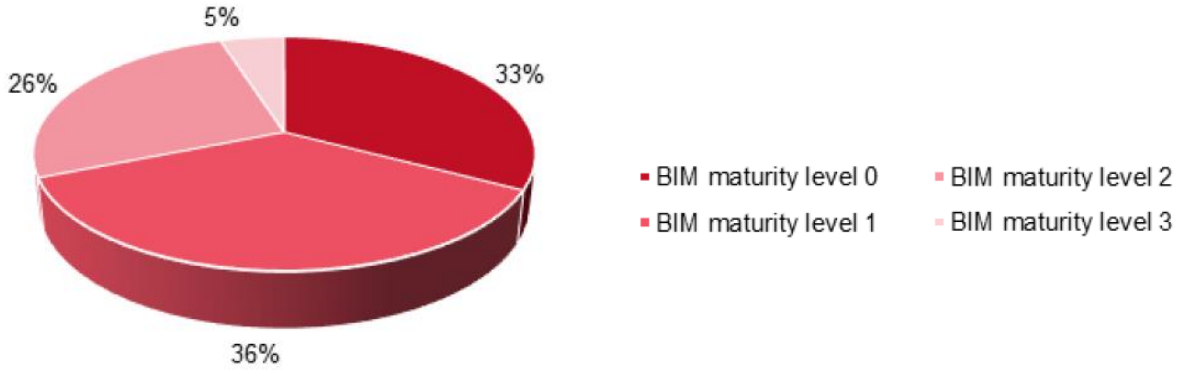
- **Invitation** sent to **+500 stakeholders**
- **122 completed questionnaires**



OBJ 1 - Cost-Benefit Model development

Survey Results

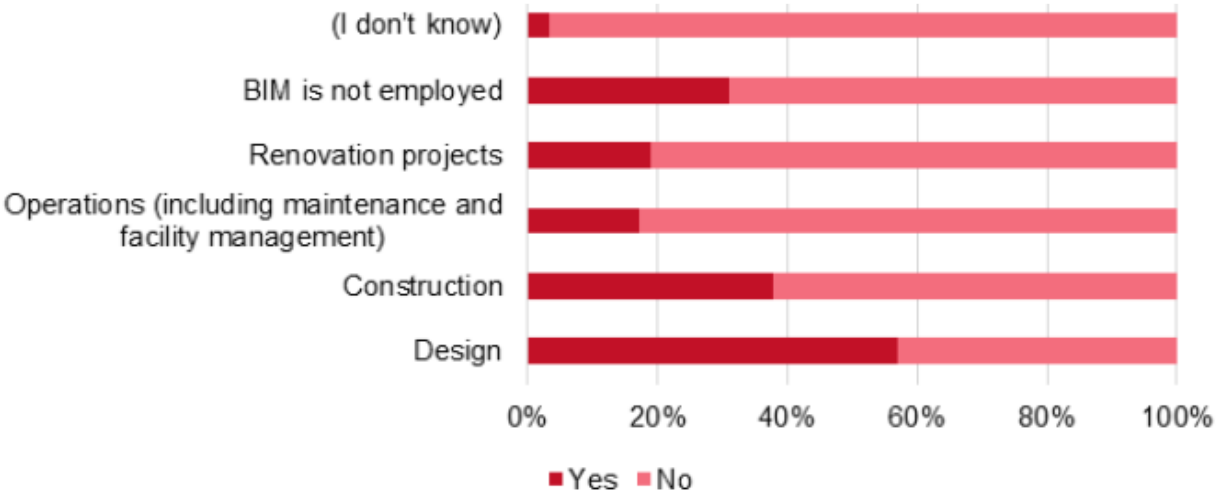
BIM maturity level distribution of the sample



OBJ 1 - Cost-Benefit Model development

Survey Results

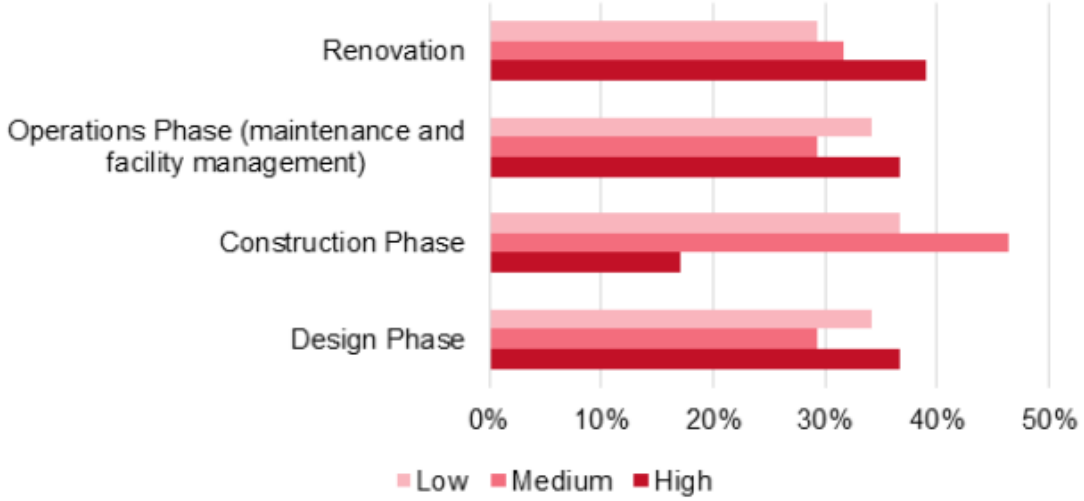
Project phases in which BIM is mostly employed by public procurers



OBJ 1 - Cost-Benefit Model development

Survey Results

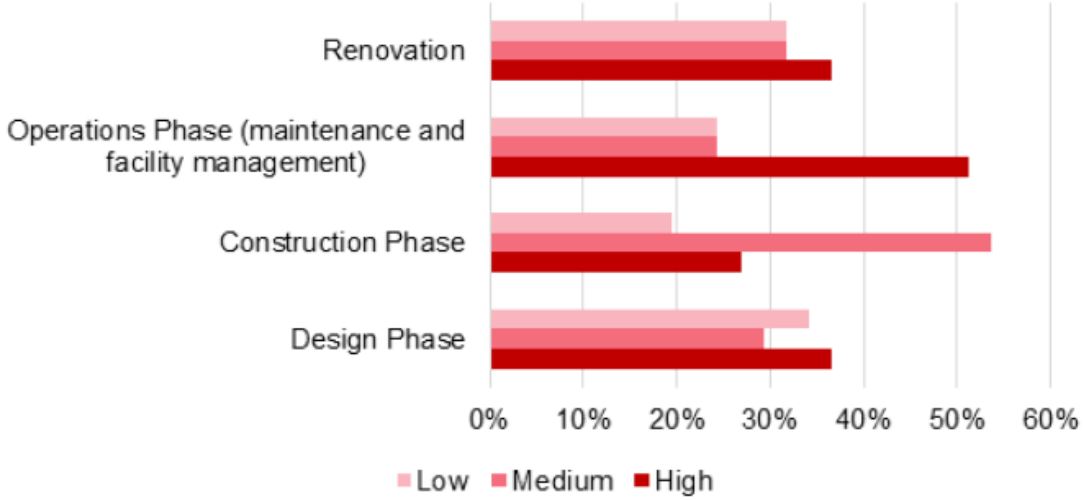
BIM adoption associated costs for each phase



OBJ 1 - Cost-Benefit Model development

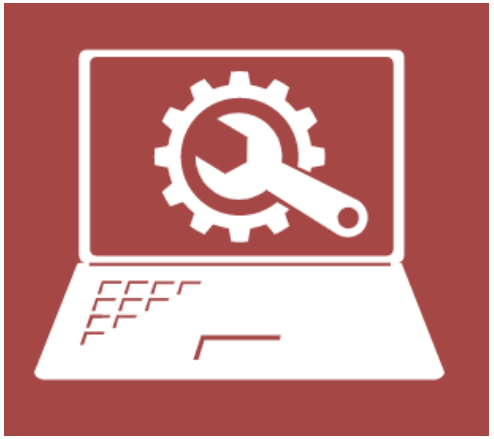
Survey Results

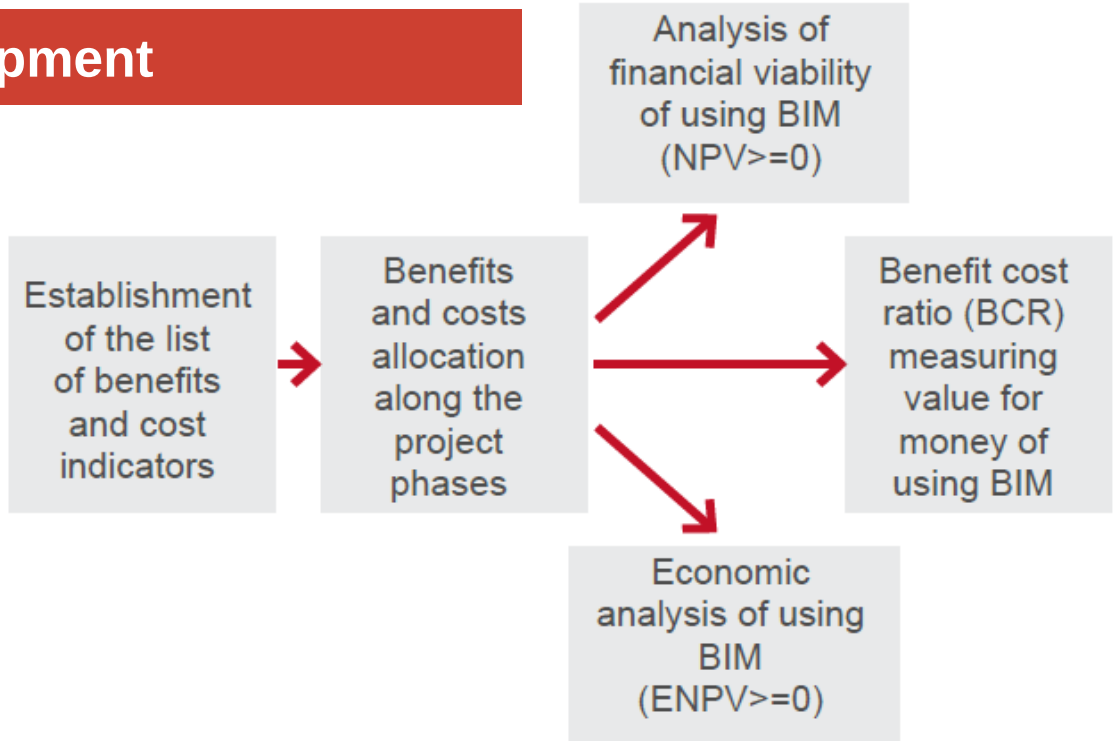
BIM adoption associated benefits for each phase



OBJ 1 - Cost-Benefit Model development

Tool Development





OBJ 1 - Cost-Benefit Model development

COSTS

Indicators on the CBA Tool

Public entity personnel labour cost increase during pre-tendering phase	Costs related to lower productivity and additional effort required
Public entity personnel labour cost increase during tendering phase	
Public entity personnel labour cost increase during post-award phase	
Increased cost for consulting services to the public procurement process	
BIM modelling activity cost	
Public entity hardware upgrade investment	BIM related investment costs - share allocated to the specific project
Public entity annual software license fee	
Personnel training costs	
BIM coordination cost	

OBJ 1 - Cost-Benefit Model development

BENEFITS

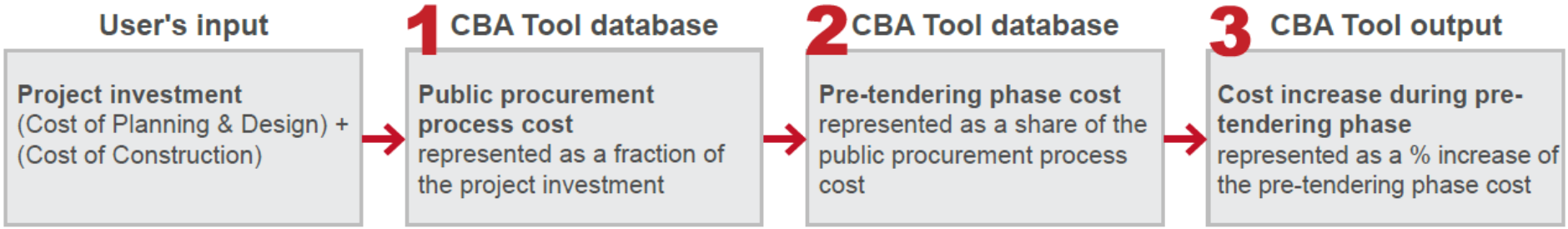
Indicators on the CBA Tool

Cost reduction due to early clashes and errors detection with subsequent reduction of changes necessary during construction phase
Cost reduction associated to more precise quantity take-offs
Cost reduction related to lower costs for claims/litigations
Time savings in design and construction phases and associated project duration reduction
Public entity personnel labour cost reduction due to faster document analysis for facility management and maintenance
Cost reduction associated with more efficient annual maintenance
Cost reduction attributable to the government/society due to better Health & Safety
CO_2 emission reduction due to reduced material wasted

OBJ 1 - Cost-Benefit Model development

Approach 1 used to obtain the values of the following indicators

- public entity personnel labour cost increase during pre-tendering phase
- public entity personnel labour cost increase during tendering phase
- public entity personnel labour cost increase during post-award phase
- increased cost for consulting services to the public procurement process



OBJ 1 - Cost-Benefit Model development

Approach 2 used to obtain the value of BIM modelling activity cost

User's input

Asset architecture and structure
(size, complexity, level of standardization)
Asset systems
(area served and complexity)
Level of detail (LOD)
BIM Specialist hourly cost

→

1 CBA Tool database

Asset modelling time
a. Combination of user's input with basic effort (time) per area and system
b. Computation of total effort (time) adjusted for level of standardization and areas complexity

→

2 CBA Tool database

Additional activities
+30% of the computed modelling time representing additional activities

→

3 CBA Tool output

BIM modelling activity cost
Modelling and additional activities time priced with the BIM Specialist hourly cost

OBJ 1 - Cost-Benefit Model development

Approach 3 used to obtain the value of BIM related investment costs

User's input

Number of employees involved in BIM related activities
needing to attend training and/or start to use BIM-related software
Average number of projects per year that adopt/will adopt BIM
in case of organizations without prior experience with BIM

CBA Tool database

Hardware upgrade investment
1. Combination of the two user's input to obtain the number of employees affected by BIM introduction assigned to each project
2. Combination of the previous result with the average hardware upgrade cost per employee extracted from the survey

CBA Tool output

Hardware upgrade investment allocated to the project
Considering an average cost per employee applied on every project

OBJ 1 - Cost-Benefit Model development

Tool for calculating the costs and benefits of adopting BIM in public tenders

Inputs

The following list of questions is expected to capture a set of information that is necessary for computing the costs and benefits of adopting BIM in public tenders, by public organisations. The information collected refers to features of the public organisation involved in the construction project and of the project under analysis. The questions have been designed so that organisations with different levels of experience with BIM (even those with no experience) can employ this tool and obtain the necessary insights on costs and benefits.

Please answer the following questions, entering what is requested in the blank spaces (please DO NOT COMPLETE the grey cells)
All questions are mandatory unless otherwise stated

RINA B1P GROUP

1	Please indicate the information required below describing your organisation experience with BIM.	
1.1	Does your organisation have previous experience with BIM (has it started any pilot project or completed one adopting BIM)?	
1.2	In how many projects is BIM adopted, every year, on average?	

Clear cells content

OBJ 2 – Model validation and case studies

Case Studies

- Practical usage of CBA methodology demonstrated through the analysis of the **six case studies**
- **small-scale infrastructures and buildings** of **various budgets** and covered **various phases of the life cycle** (e.g., design, planning, construction and operation)

Location of 6 case studies

OBJ 2 – Model validation and case studies

Case Studies Objectives

- **Supporting the development of the CBA tool** by providing useful information on the definition of the ad hoc database estimating the time and the cost of the BIM modelling activity and feeding the dataset underlying the CBA tool

- **Validating the usability of the CBA tool** with respect to the two BIM maturity levels considered (level 1 and 2)

OBJ 2 – Model validation and case studies

Construction of a a sport centre

Maintenance and renovation project of a road

New port construction project

Renovation project for a public building

Public administrative building construction

New residential building construction project

OBJ 2 – Model validation and case studies

Case Study 1: Construction of a sport centre

Asset Category	Building
Project category	New asset construction
Document phase	Detailed design
BIM maturity level	0
Estimated investment	Less than 1 million €
Gross Floor Area	Less than 1500 m^2

OBJ 2 – Model validation and case studies

Case Study 2: Maintenance and renovation project of a road

Asset Category	Infrastructure
Project category	Work on an existing asset
Document phase	Detailed design
BIM maturity level	0
Estimated investment	Between 10 and 15 million €
Infrastructural asset surface	About 40,000 m^2

OBJ 2 – Model validation and case studies

Case Study 3: Works on an existing port with new ancillary buildings

Asset Category	Mixed
Project category	Work on an existing asset
Document phase	Basic design
BIM maturity level	0
Estimated investment	Between 1 and 5 million €
Infrastructural asset surface	Less than 5600 m^2

OBJ 2 – Model validation and case studies

Case Study 4: Renovation project for a public building

Asset Category	Building
Project category	Work on an existing asset
Document phase	Detailed design
BIM maturity level	1
Estimated investment	Between 15 and 20 million €
Gross Floor Area	Less than 5000 m^2

OBJ 2 – Model validation and case studies

Case Study 5: Public administrative building construction

Asset Category	Building
Project category	New asset construction
Document phase	Detailed design
BIM maturity level	2
Estimated investment	Between 40 and 45 million €
Gross Floor Area	About 6000 m^2

OBJ 2 – Model validation and case studies

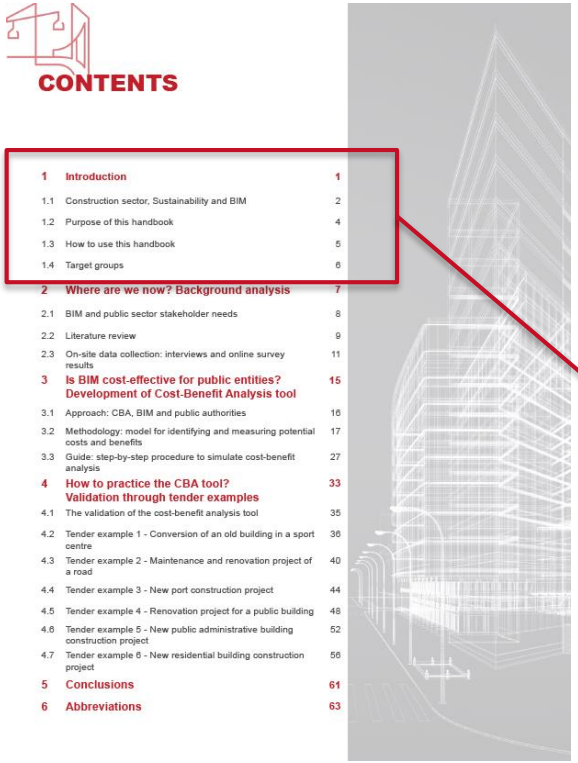
Case Study 6: New residential building construction project

Asset Category	Building
Project category	New asset construction
Document phase	Basic design
BIM maturity level	0
Estimated investment	Between 1 and 5 million €
Gross Floor Area	Less than 2600 m2

OBJ 3 – Handbook creation

Downloadable at
http://www.eubim.eu/

OBJ 3 – Handbook creation



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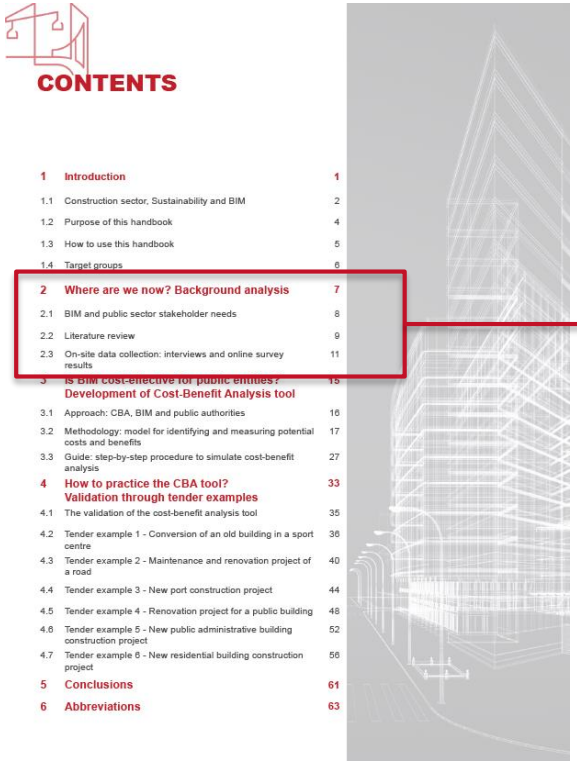
Handbook Chapters

OBJ 3 – Handbook creation



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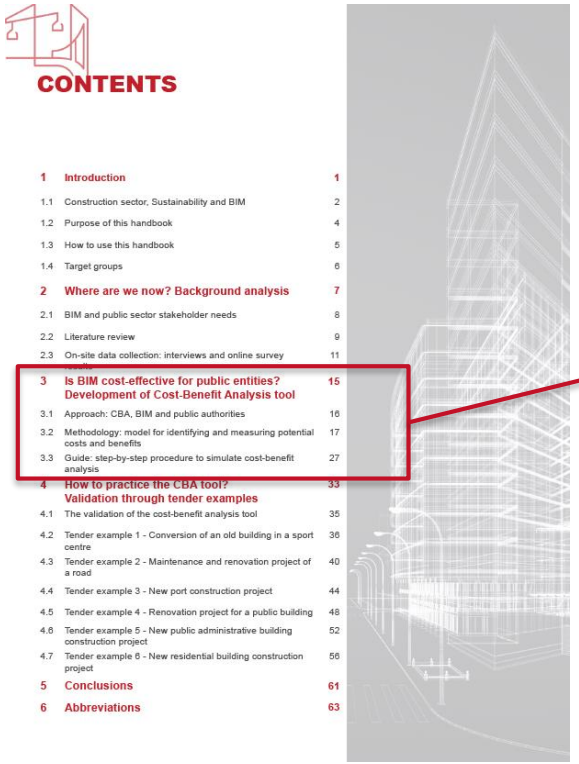
Handbook Chapters

OBJ 3 – Handbook creation



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Handbook Chapters

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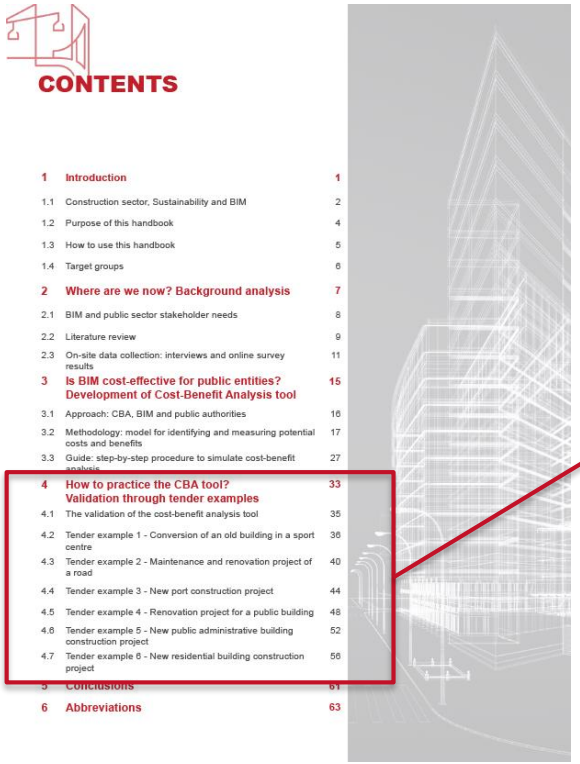

Handbook Chapters

OBJ 3 – Handbook creation

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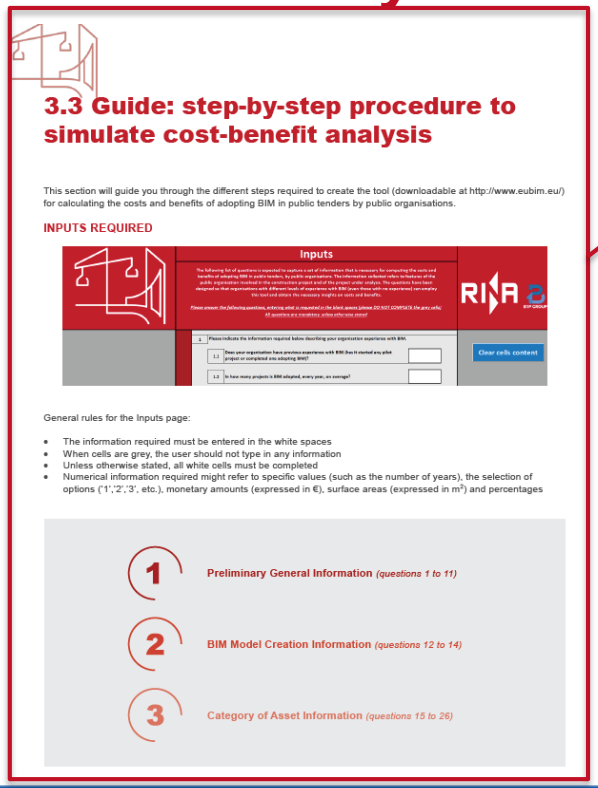
Handbook Chapters

5 Conclusions 61

Step-by-step procedure to simulate cost-benefit analysis



3.3 Guide: step-by-step procedure to simulate cost-benefit analysis

This section will guide you through the different steps required to create the tool (downloadable at http://www.eubim.eu/) for calculating the costs and benefits of adopting BIM in public tenders by public organisations.

INPUTS REQUIRED

Inputs

Clear cells content

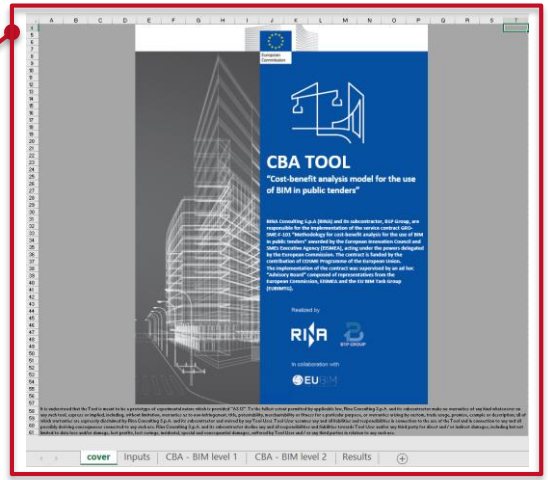
General rules for the Inputs page:

- The information required must be entered in the white spaces
- When cells are grey, the user should not type in any information
- Unless otherwise stated, all white cells must be completed
- Numerical information required might refer to specific values (such as the number of years), the selection of options ('1','2','3', etc.), monetary amounts (expressed in €), surface areas (expressed in m²) and percentages

1 Preliminary General Information *(questions 1 to 11)*

2 BIM Model Creation Information *(questions 12 to 14)*

3 Category of Asset Information *(questions 15 to 26)*



The guide is organized in two sections:

A. Inputs required by the Cost-Benefit Analysis (CBA) tool

B. Outputs obtained

Inputs Required by the CBA tool

Steps to complete the “Input sheet”

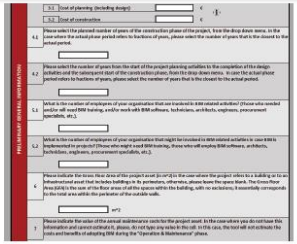
1. **Preliminary General Information** *(questions 1 to 11)*
2. **BIM Model Creation Information** *(questions 12 to 14)*
3. **Category of Asset Information** *(questions 15 to 26)*

Descriptions of the steps and the information to be completed in each section

1 Preliminary General Information *(questions 1 to 11)*

Here you are required to answer a set of questions which serve to acquire general information on the use of BIM in the public organisation involved in the project, and on the characteristics of the projects where BIM is or might be adopted.
The user is required to provide information on:

- the organisation's experience with BIM
- the number of tenders in which BIM is or is expected to be used every year
- the project costs and timing
- internal employees
- other specific data necessary for defining the main features of the project

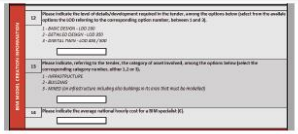


2 BIM Model Creation Information *(questions 12 to 14)*

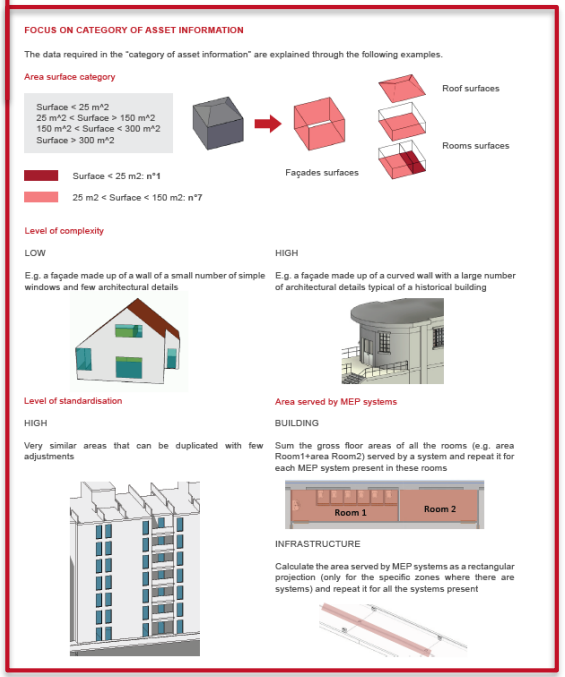
This section is made up of three questions respectively on:

- the level of detail (LOD) of the model needed in the tender
- the asset category ('Building', 'Infrastructure' and 'Mixed')
- the average cost of a BIM specialist in the country (for enabling the tool to adapt costs computations to the national context of the user)

Depending on the answer to the second of these questions, you will be required to fill in one, two or all subsequent sections as explained in the following point.

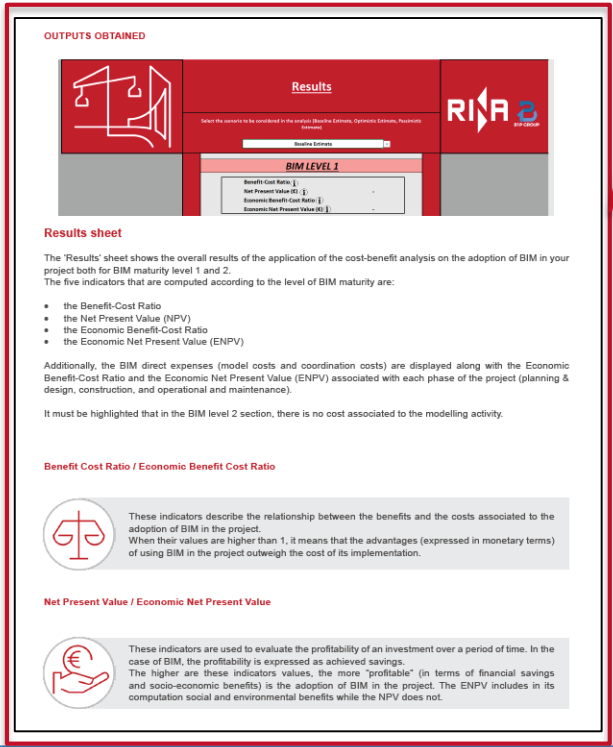


Insights and examples on the inputs required



Outputs Obtained from the CBA tool

The Results sheet (BIM Level 1&2)



OUTPUTS OBTAINED

Results

BIM LEVEL 1

Benefit-Cost Ratio:
Net Present Value (€):
Economic Benefit-Cost Ratio:
Economic Net Present Value (€):

Results sheet

The 'Results' sheet shows the overall results of the application of the cost-benefit analysis on the adoption of BIM in your project both for BIM maturity level 1 and 2.
The five indicators that are computed according to the level of BIM maturity are:

- the Benefit-Cost Ratio
- the Net Present Value (NPV)
- the Economic Benefit-Cost Ratio
- the Economic Net Present Value (ENPV)

Additionally, the BIM direct expenses (model costs and coordination costs) are displayed along with the Economic Benefit-Cost Ratio and the Economic Net Present Value (ENPV) associated with each phase of the project (planning & design, construction, and operational and maintenance).

It must be highlighted that in the BIM level 2 section, there is no cost associated to the modelling activity.

Benefit Cost Ratio / Economic Benefit Cost Ratio

These indicators describe the relationship between the benefits and the costs associated to the adoption of BIM in the project.
When their values are higher than 1, it means that the advantages (expressed in monetary terms) of using BIM in the project outweigh the cost of its implementation.

Net Present Value / Economic Net Present Value

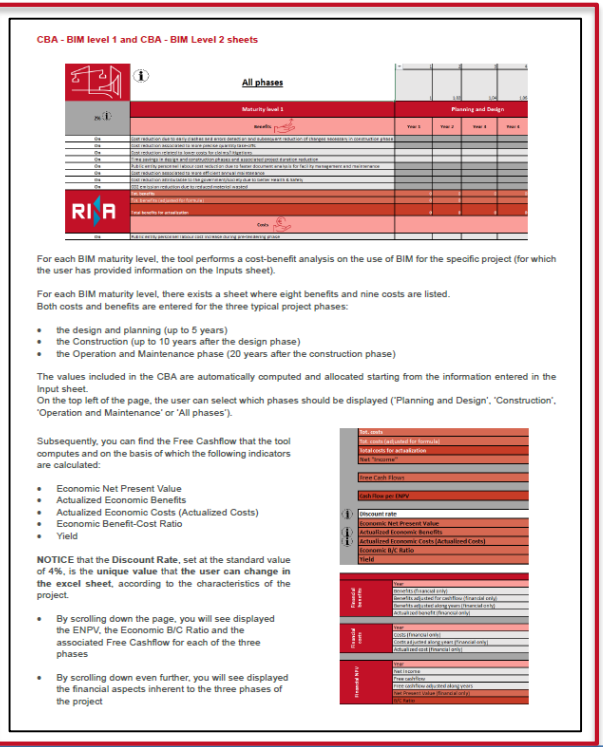
These indicators are used to evaluate the profitability of an investment over a period of time. In the case of BIM, the profitability is expressed as achieved savings.
The higher are these indicators values, the more "profitable" (in terms of financial savings and socio-economic benefits) is the adoption of BIM in the project. The ENPV includes in its computation social and environmental benefits while the NPV does not.

Description and explanation of the:

- **Benefit-Cost Ratio**
- **Net Present Value**
- **Economic Benefit-Cost Ratio**
- **Economic Net Present Value**

Presentation of all the features of the CBA sheets (e.g. switching on and off the cost and benefits indicators)

The CBA sheets (BIM Level 1&2)



CBA - BIM level 1 and CBA - BIM Level 2 sheets

All phases

For each BIM maturity level, the tool performs a cost-benefit analysis on the use of BIM for the specific project (for which the user has provided information on the Inputs sheet).

For each BIM maturity level, there exists a sheet where eight benefits and nine costs are listed.
Both costs and benefits are entered for the three typical project phases:

- the design and planning (up to 5 years)
- the Construction (up to 10 years after the design phase)
- the Operation and Maintenance phase (20 years after the construction phase)

The values included in the CBA are automatically computed and allocated starting from the information entered in the Input sheet.
On the top left of the page, the user can select which phases should be displayed ('Planning and Design', 'Construction', 'Operation and Maintenance' or 'All phases').

Subsequently, you can find the Free Cashflow that the tool computes and on the basis of which the following indicators are calculated:

- Economic Net Present Value
- Actualized Economic Benefits
- Actualized Economic Costs (Actualized Costs)
- Economic Benefit-Cost Ratio
- Yield

NOTICE that the **Discount Rate**, set at the standard value of 4%, is the **unique value** that **the user can change in the excel sheet**, according to the characteristics of the project.

- By scrolling down the page, you will see displayed the ENPV, the Economic B/C Ratio and the associated Free Cashflow for each of the three phases
- By scrolling down even further, you will see displayed the financial aspects inherent to the three phases of the project

OBJ 3 – Handbook creation

4.2 TENDER EXAMPLE 1
Conversion of an old building in a sport centre

MAIN PROJECT CHARACTERISTICS

- TIPOLOGY: BUILDING *conversion*
- SIZE: 1680 m²
- INVESTMENT: 1.174.800 €
- LEVEL: DETAILED DESIGN

DESCRIPTION

The building is an old and disused one-floor factory (around 8 metres high) on the edge of the city. The two longest façades are made from metal plates, which give an industrial look to the building, while the other two are brick walls with a simpler aspect.

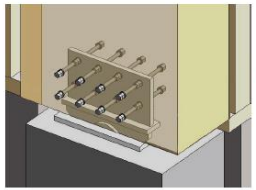
PURPOSE OF THE PROJECT AND PLANNED INTERVENTIONS

The project destination is a sports centre for the community, composed of two different parts: a large ice rink and a small office and locker room with showers. All the rooms are situated in front of the ice rink area, where the grandstand for the events is located.
The interventions required are summarised as:

- demolition of the interior of the building
- creation of the space for the ice rink including all service mechanical, electrical, plumbing and special systems
- construction of two rooms and the permanent grandstand

Tender requirements
The tender requires the detailed design for the interventions described for the renovation project.

No particularly relevant solutions are foreseen from a technological, architectural or structural point of view. The creation of a BIM model is required in order to extract the drawings and the Quantity take-offs (QTO) from it.



Example of 3D BIM model required: detailed design representation of structural element

PRELIMINARY GENERAL INFORMATION

Does your organisation have previous experience with BIM?	No
In how many projects per year, on average, might BIM be adopted?	6
Project category (New asset construction / Work on an existing asset)	Work on an existing asset (No BIM model available)
Cost of planning (including design) (€)	106800
Cost of construction (€)	1068000
Number of years for construction	2
Number of years for planning and design	1
Number of employees that might be involved in BIM activities in case BIM is implemented in projects	12
Gross Floor Area (m²)	1680
Value of the annual maintenance costs of the project asset	32172 €
BIM coordination is carried out internally/externally?	Externally
Average annual salary of an employee of your organisation (€)	15781
Is a Common Data Environment (CDE) going to be employed in the project?	Yes
Indicate the inflation rate for the project period (%)	2

BIM MODEL CREATION

LOD Required in the tender (200/350/450/500)	2 (350)
Asset Category (Infrastructure/Building/Mixed)	2 (Building)
BIM Specialist national hourly cost (€/h)	13

ARCHITECTURE AND STRUCTURE

Area surface category	Yes/No	Level of complexity (1/2/3)	Number of areas per category	Level of standardization (1/2/3)
Surface < 25 m²	Yes	2	4	1
25 m²< Surface < 150 m²	Yes	2	4	
150 m²< Surface < 300 m²	No	-	-	
Surface > 300 m²	Yes	1	6	

MEP DESIGN

System	Yes/No	Level of complexity (1/2/3)	Area served by the system
Mechanical (e.g. HVAC)	Yes	1	400 m² < Surface < 1500 m²
Piping	Yes	2	1500 m² < Surface < 3000 m²
Electrical and lighting	Yes	1	400 m² < Surface < 1500 m²
Special (e.g. safety systems)	Yes	1	Surface < 400 m²

NOTES

- The hourly cost of a BIM Specialist has been estimated starting from the data indicated in "BIM Salary Report" (2020 Edition), published by BIM Corner. It has been considered the average annual gross salary of a "BIM Technician/BIM Modeler" working in Poland. The hourly wage has been estimated and increased by 50%, assumed it as the company mark-up for the hourly rate charged to the public client
- The average annual salary of employees of the public organisation has been extracted from the report (Ms Excel file) available at: https://stat.gov.pl/files/gfx/portalinformacyjny/en/defaultaktualnosci/3292/1/44/1/employment_wages_and_salaries_in_national_economy_in_2019.xlsx. The data employed refers to "Public administration and defence; compulsory social security"

OUTPUTS FROM THE TOOL

BIM MATURITY LEVEL 1

ECONOMIC IMPACT

Project General Indicators:

- Net Present Value (NPV): 40.414 €
- Benefit-Cost Ratio: 1.46

BIM direct expenses:

- BIM Model Cost: 4.945 €
- BIM Coordination Cost: 1.775 €

Phase Focus:

- Operation and Maintenance
  ENPV: -10.127 € - EBC Ratio: 0.81

Most Relevant Economic Indicator:

- Efficient maintenance: 54.575 €
- BIM based Quantity Take-Off (QTO): 37.268 €

ENVIRONMENTAL IMPACT

- CO_2 Emissions Reduction: 533 €
- Economic Net Present Value (ENPV): 158.508 €

CONSIDERATIONS

- Despite the negative ENPV of the Operation and Maintenance phase, the overall project NPV is positive and the associated B/C Ratio is slightly higher than 1: the adoption of BIM in this example is expected to be advantageous and sustainable
- The most relevant indicators chosen for this tender example are the benefits associated to enhanced accuracy of the quantity take off and improved efficiency in maintenance activities. The latter, despite presenting a substantial value, does not offset the cost associated with a BIM modelling software license, hence the ENPV of the maintenance phase appears to be negative

TIPS

Each cost and benefit indicator could be switched off if its calculation is considered not consistent with the project. In this tender example, the full list of benefits and costs are calculated, so no indicator has been switched off.