BIM in Public Tenders: Methodology for a Cost-Benefit Analysis
BIM in Public Tenders: Methodology for a Cost-Benefit Analysis

- **RINA Consulting S.p.A** (RINA) and its subcontractor **B1P Group** are responsible for the implementation of the service contract GRO-SME-F-101 “Methodology for cost-benefit analysis for the use of BIM in public tenders” awarded by the Executive Agency for Small and Medium Enterprises (EASME), acting under the powers delegated by the European Commission.

- The contract is funded by the contribution of COSME Programme of the European Union
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
- **Starting Date:** 1st September 2020
- **Duration:** 9 months
- **Main Contractor:** RINA Consulting S.p.A. (Italy)
- **Sub Contractors:** B1P Group (Italy), Apollis (Italy)
- **Funded by:** Executive Agency for Small and Medium-sized Enterprises (EASME)
- **Advisory Group:** EASME, DG GROW and EU BIM Task Group
BIM in Public Procurements

**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*

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

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* DG GROW, The Renovation Wave
Overview of the Approach

A. Methodology to measure the costs and benefits of using BIM in public construction projects

The proposed approach leverages on different phases: i) a desk research phase, ii) a consultation phase and iii) a development phase

B. Methodology for Cost & Benefit Model validation and application

Validation of the Cost-Benefit model through the analysis of 6 case studies chosen among EU tenders

C. Methodology for Handbook Creation

The preparation of an informative, easy to read and illustrative document that will serve as a handbook addressed to EU public entities that wish to learn about the BIM cost benefit analysis
Methodology to measure the costs and benefits of using BIM in public construction projects

Main challenges

Identification and quantification of main monetary and non-monetary costs

Customization of the model for all EU market states

Address online survey to 150 stakeholders
Methodology to measure the costs and benefits of using BIM in public construction projects

**Approach**

**Desk research phase**
- Desk Research analysis of existing models of measuring costs and benefits in using BIM in public contracts
- Desk Research definition of monetary and non-monetary indicators on the use of BIM and their weightings

**Consultation phase**
- Online stakeholders’ consultation and desk research validation by means of structured interviews

**Development phase**
- Definition of a Model for the CBA analysis of using BIM in Public Tender
From Desk Research to the Selection of Indicators: Costs

- These indicators have been selected considering the findings of a literature review process.
- The list is under validation through a survey submitted to a list of stakeholders.
- The reported list might undergo changes reflecting comments and suggestions collected through the survey and basing on the measurability of the proposed alternatives.

<table>
<thead>
<tr>
<th>Cost indicators</th>
<th>Type of Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public entity personnel labour cost increase during pre-tendering phase</td>
<td>Monetary</td>
</tr>
<tr>
<td>Public entity personnel labour cost increase during tendering phase</td>
<td>Monetary</td>
</tr>
<tr>
<td>Public entity personnel labour cost increase during post-award phase</td>
<td>Monetary</td>
</tr>
<tr>
<td>Consulting costs increase for the public procurement process</td>
<td>Monetary</td>
</tr>
<tr>
<td>Increase of the value of the contract when the public entity requires BIM</td>
<td>Monetary</td>
</tr>
<tr>
<td>adoption (associated to the creation of the model)</td>
<td></td>
</tr>
<tr>
<td>Public entity hardware upgrade investment</td>
<td>Monetary</td>
</tr>
<tr>
<td>Public entity software purchase/upgrade investment</td>
<td>Monetary</td>
</tr>
<tr>
<td>Personnel training costs</td>
<td>Monetary</td>
</tr>
<tr>
<td>New employees cost required for BIM adoption in tenders (if necessary)</td>
<td>Monetary</td>
</tr>
</tbody>
</table>
From Desk Research to the Selection of Indicators: Benefits

- These indicators have been selected considering the findings of a literature review process.
- The list is under validation through a survey submitted to a list of stakeholders.
- The reported list might undergo changes reflecting comments and suggestions collected through the survey and basing on the measurability of the proposed alternatives.

<table>
<thead>
<tr>
<th>Benefit Indicators</th>
<th>Type of Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost reduction due to early clash detection and construction phase change reduction</td>
<td>Monetary</td>
</tr>
<tr>
<td>Cost reduction associated to more precise quantity take-offs</td>
<td>Monetary</td>
</tr>
<tr>
<td>Cost reduction due to overall project duration reduction</td>
<td>Monetary</td>
</tr>
<tr>
<td>Cost reduction related to lower costs for litigations</td>
<td>Monetary</td>
</tr>
<tr>
<td>Annual contingency amount reduction</td>
<td>Non-monetary/Monetary</td>
</tr>
<tr>
<td>Public entity personnel labour cost reduction due to document analysis for facility management and maintenance</td>
<td>Monetary</td>
</tr>
<tr>
<td>Cost reduction associated to more efficient facility management</td>
<td>Monetary</td>
</tr>
<tr>
<td>Cost reduction associated to more efficient maintenance</td>
<td>Monetary</td>
</tr>
<tr>
<td>Cost reduction attributable to the government/society due to better Health &amp; Safety</td>
<td>Non-monetary/Monetary</td>
</tr>
<tr>
<td>CO2 emission reduction due to reduced material wasted</td>
<td>Non-monetary/Monetary</td>
</tr>
</tbody>
</table>
Methodology to measure the costs and benefits of using BIM in public construction projects

Questionnaire sent to public stakeholders

✓ All participants to the GA EU BIM Task Group are kindly invited to contribute by filling in the questionnaire
✓ It will be of help to have as much input as possible!

Link to questionnaire:
Methodology for costs and benefits model validation and application

**Main challenges**

- Choose the most accurate and “EU-wide” case studies
- Analyse the results of the CBA

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<table>
<thead>
<tr>
<th>Input Data</th>
<th>Output Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design sheets</td>
<td>Analysis and development of the BIM 3D Model</td>
</tr>
<tr>
<td>Bill of Quantities</td>
<td>follows the same workflow for each EU public entity</td>
</tr>
<tr>
<td>Tender Documents</td>
<td></td>
</tr>
</tbody>
</table>

Tenders can be from every EU public entity
# Methodology for Cost & Benefits Model Validation and Application

## Main challenges & solutions

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification of the “costs” of a 3D BIM Model</td>
<td>3D Modeling of Public Tenders to be used as Case Studies</td>
</tr>
<tr>
<td>Identification of the QtO/MtO benefit using BIM</td>
<td>Merge and Match of the QtO/MtO from the Case Studies tender documents Lev. 0 and the QtO/MtO exported from the 3D Model</td>
</tr>
<tr>
<td>Identification of the Benefit of using BIM for Lev 2 &amp; 3 implementation</td>
<td>Analysis of BIM Lev. 1 Public Tenders to inspect the Benefits of using BIM for the next Level of implementation</td>
</tr>
</tbody>
</table>
Methodology for Cost & Benefits Model Validation and Application

Approach

Case study independent from the geographical location

3D Modelling for BoQ and h/effort

Results valid EU-wide
Methodology for Cost & Benefits Model Validation and Application

Case Study: BIM lev 1 - Renovation and construction of the PALM site

COMMISSION EUROPÉENNE
OFFICE POUR LES INFRASTRUCTURES ET LA LOGISTIQUE - BRUXELLES
OIB-02 - Budget, finances et marchés publics

PLANNING DIRECTEUR
(Annexe 2.1)

Appel d’offres n° OIB/2019/RP/0024

Travaux de rénovation, de construction et d’aménagement du site Palm, sis avenue Palmerston 6–14 et rue des Éburons 77–79, 1000 Bruxelles, destiné à être aménagé en crèche et garderie postscolaire
Methodology for Cost & Benefits Model Validation and Application

Case Study: BIM lev 1 - Renovation and construction of the PALM site

Currently working on the Structural and Architectural elements
Methodology for Cost & Benefits Model Validation and Application

Case Study: BIM lev 0 - Works of conformity and infrastructural upgrading of the port

Currently working on the Structural elements
Methodology for Cost & Benefits Model Validation and Application

Case Study: BIM lev 0 - Works of conformity and infrastructural upgrading of the port

Checking each element that can be found on the sheets and that will be 3D modeled

Management system for electrical and water services, consisting of a remote workstation including a console for programming transponder keys. Applications for managing ports and systems. Including installation, configuration and staff training.

Supply and installation of ceiling light fixture for LED emergency light. For ceiling or wall installation. Degree of protection: IP40 - Power: 11 W. Complete with inverter power supply unit with batteries and flush-mounting kit. Minimum autonomy 120 min. Cat 11 - Pier above breakwater and dock between dock and root above breakwater - electrical, lighting and water system. Local safety lighting
Methodology for Handbook Creation

Main challenges

- Provide a clear description of the new BIM cost benefit methodology
- Provide a practical and easy to understand guide for assessing Costs & Benefits of using BIM in public projects
- Provide the support to enable Governments and public sector clients to transition construction to the digital era
Methodology for Handbook Creation

Approach

Focus on clarity and ease of use

Privileging graphical content over text when possible

Main topics presented:
- Problem definition
- Approach
- Model
- Case studies

Handbook

Target Groups

Public entities

at different administrative levels (national, regional, local) interested in understanding the main challenges in the adoption of the BIM in public projects.
Methodology for Handbook Creation

Indicative Layout of the Handbook
Next Steps

Final Selection of Case Studies

Completion of online survey and interviews

Completion of cost & benefit analysis model

BIM Modelling of 6 Case Studies and CBA Model Validation


Handbook

End of Project: May 2021
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