

## INNOVATIVE EDUCATIONAL INTEGRATION OF URBAN PLANNING BASED ON BIM-GIS TECHNOLOGIES AND FOCUSED ON CIRCULAR ECONOMY CHALLENGES



2018-1-RO01-KA203-049458

**First International Workshop of UrbanBIM project in  
Sevilla (Spain)  
15th May 2019**



Universitatea  
Transilvania  
din Braşov



ROMANIA  
GREEN  
BUILDING  
COUNCIL



Centro Tecnológico  
del mármol, piedra y materiales



**datacomp**

Warsaw University  
of Technology

Co-funded by the  
Erasmus+ Programme  
of the European Union





## GENERAL INFORMATION OF THE PROJECT

### SUMMARY

- Project title:** Innovative educational integration of urban planning based on BIM-GIS technologies and focused on Circular Economy challenges
- Coordinator:** Universitatea Transilvania din Brasov
- Call:** Erasmus+ 2018. Strategic Partnerships for Higher Education (KA203)
- Key Action:** Cooperation for innovation and the exchange of good practices
- Reference:** 2018-1-RO01-KA203-049458
- Start date:** 01-10-2018  
**End date:** 30-09-2020
- Funding by:** European Union



## GENERAL INFORMATION OF THE PROJECT

### CONSORTIUM



P01. Universitatea Transilvania din Brasov (UTBv). ROMANIA [www.unitbv.ro](http://www.unitbv.ro)



P02. Asociatia Romania Green Building Council (RoGBC). ROMANIA  
[www.rogbc.org](http://www.rogbc.org)



P03. Universidad de Sevilla (USE). SPAIN [www.us.es](http://www.us.es)



P04. Asociación Empresarial de Investigación Centro Tecnológico del Mármol, Piedra y Materiales (CTM) . SPAIN  
[www.ctmarmol.es](http://www.ctmarmol.es)



P05. Politechnika Warszawska (WUT). POLAND [www.pw.edu.pl](http://www.pw.edu.pl)



P06. Datacomp sp. z o.o. (Datacomp). POLAND [www.datacomp.com.pl](http://www.datacomp.com.pl)



## GENERAL INFORMATION OF THE PROJECT

### MAIN OBJECTIVE

#### Main objective of the UrbanBIM project?

The general aim of UrbanBIM project is to deepen the **interconnection of the triple helix**, both in an educational level, as governmental, as well as for professional and to implement **interoperability between metadata generated by the emerging technologies of BIM and GIS**, so that all information can be flow into these systems and reinterpreted to exhaustive knowledge of **urban developments and rehabilitations** from an environmental point of view.





## GENERAL INFORMATION OF THE PROJECT

### OBJECTIVES

1. Integrate BIM/GIS tools across all strands of the triple helix in the construction sector:

Public bodies - companies – universities

2. Implement on municipal public bodies the calculation of CO2 emissions at all stages involved in construction at urban level, both developments and rehabilitations.

3. Increase on awareness of climate change problem in the most influence strata within construction sector.

4. Provide information about the emissions of each product/building/urban plan.

5. Improve interoperability between emerging technologies (BIM) and those already implemented in public bodies (GIS).





## GENERAL INFORMATION OF THE PROJECT

### OBJECTIVES

7. To create a computer tool that is open to researchers, architects, engineers and civil servants in the construction sector, who can improve and refine the project beyond the end of the project to facilitate its adaptability of new metadata capable of being generated by BIM in the future.
8. Contribute to the implementation of digital cities making everything related to urban planning and urban management in a database that multiply their benefits, with the applicability that this will entail in the development of other research areas such as Big-Data and IoT.
9. Gradual implementation in municipalities and then grow nationally and internationally, contributing to a new and more advanced document management model of our cities at urban level.



## GENERAL INFORMATION OF THE PROJECT

### RESULTS

#### Expected results of the project:

- New skills or competences acquired by students or professionals. More training, more employment possibilities.
- Changes in the sector's legislation in relation to the use of BIMs and environmental impact indicators
- Incorporation of environmental impact indicators in BIM tools for the promotion of the use of construction products with less environmental impact.
- Generalized change of attitude regarding the use of environmental impact indicators in construction.



## GENERAL INFORMATION OF THE PROJECT

### PRODUCTS

The main results of the project are:

01. Online Educational Collaborative Platform of UrbanBIM project.
02. Establishment of common learning outcomes on methodologies of utilisation of BIM for calculation of LCA during urban development planning.
03. IT production of integrated training materials in UrbanBIM.
04. Developing of Educational software of UrbanBIM learning application.





## GENERAL INFORMATION OF THE PROJECT

### PRODUCTS

#### **O1. Online Educational Collaborative Platform of UrbanBIM project**

O1/A1. Building the Collaborative Platform

O1/A2. IT production of Collaborative Platform

O1/A3. Collaborative Guide for LCA of urban construction materials

O1/A4. Continuous compilation of training material related LCA and BIM/GIS applications



## OECP



In this open-access platform, you can access all the information collected during and beyond the end of the project. The platform provides more information for self-learning educational field in the methodologies covered by the project. You can create a personal account and have access to a private area in order to update information. It is totally free!

[DIRECT ACCESS](#)

[PRIVATE AREA](#)



## GENERAL INFORMATION OF THE PROJECT

### PRODUCTS

#### **O2. Establishment of common learning outcomes on methodologies of utilisation of BIM for calculation of LCA during urban development planning**

O2/A1. Content of the common learning outcomes

O2/A2. Methodology for calculation of LCA of urban construction materials and processes applied to BIM/GIS

O2/A3. Common European Curricula on methodologies of utilization of BIM/GIS for calculation of LCA during urban development planning



## GENERAL INFORMATION OF THE PROJECT

### PRODUCTS

#### **O2. Establishment of common learning outcomes on methodologies of utilisation of BIM for calculation of LCA during urban development planning**

##### O2/A1. Content of the common learning outcomes

O2/A1.1 Report on LCA legislation and its application in in construction sector

O2/A1.2 Study of Environmental Regulations in construction sector

O2/A1.3 Study of Regulations related to BIM technologies in construction sector

O2/A1.4 Report on the degree of implantation of BIM in participant countries,

## Task 02/A1.1

# REPORT ON COMPILATION ON LEGISLATION OF LCA AND ITS APPLICATION IN CONSTRUCTION SECTOR IN ROMANIA

## 1. Introduction

Life cycle assessment is increasingly being used worldwide to quantify the environmental performance of buildings, set impact reduction targets, and ensure a safe environment for future generations.

Life-cycle assessments (LCAs) involve cradle-to-grave analyses of production systems and provide comprehensive evaluations of all upstream and downstream energy inputs and multimedia environmental emissions. LCAs can be costly and time-consuming, thus limiting their use as analysis techniques in both the public and private sectors. Streamlined techniques for conducting LCAs are needed to lower the cost and time involved with LCA and to encourage a broader audience to begin using LCA. It has emerged as a valuable decision-support tool for both policy makers and industry in assessing the cradle-to-grave impacts of a product or process. Three forces are driving this evolution. First, *government regulations* are moving in the direction of "life-cycle accountability;" the notion that a manufacturer is responsible not only for direct production impacts, but also for impacts associated with product inputs, use, transport, and disposal. Second, *business is participating in voluntary initiatives* which contain LCA and product stewardship components. Together these developments have placed LCA in a central role as a tool for identifying cradle-to-grave impacts both of products and the materials from which they are made [3].

The "life-cycle" impacts include the extraction of raw materials; the processing, manufacturing, and fabrication of the product; the transportation or distribution of the product to the consumer; the use of the product by the consumer; and the disposal or recovery of the product after its useful life.

There are four linked components of LCA [3] [5]:

*Goal definition and scoping:* identifying the LCA's purpose and the expected products of the study, and determining the boundaries (what is and is not included in the study) and assumptions based upon the goal definition;

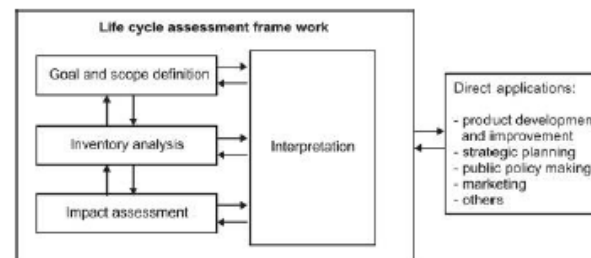


Figure.1 - LCA stages under the ISO 14040 guidelines [2]





## Task O2/A1.2

# SPANISH REGULATIONS REGARDING ENVIRONMENT IN CONSTRUCTION



# SPANISH REGULATION REGARDING ENVIRONMENT IN CONSTRUCTION SECTOR

	
<a href="#">UNE-EN ISO 14025:2010. Etiquetas y declaraciones ambientales. Declaraciones ambientales tipo III. Principios y procedimientos.</a>	UNE-EN ISO 14025:2010. Environmental labels and declarations. Type III environmental declarations. Principles and procedures.
<a href="#">UNE- EN ISO 14020:2002 Etiquetas ecológicas y declaraciones ambientales. Principios generales.</a>	UNE-EN ISO 14020:2002 Environmental labels and declarations. General principles.
<a href="#">UNE-EN 15804:2012+A1:2014. Sostenibilidad en construcción. Declaraciones Ambientales de producto. Reglas básicas de categorías de productos de construcción.</a>	UNE-EN 15804:2012+A1:2014. Sustainability in construction. Environmental Declarations of product. Core rules for the product category of construction products.
<a href="#">UNE-CEN/TR 16970:2016 (Ratificada). Sostenibilidad en la construcción. Directrices para la implementación de la norma EN 15804 (Ratificada por la Asociación Española de Normalización en enero de 2017.)</a>	UNE-CEN/TR 16970:2016. Sustainability of construction works - Guidance for the implementation of EN 15804 (Endorsed by Asociación Española de Normalización in January of 2017.)
<a href="#">UNE-CEN ISO/TS 14027:2018. Etiquetas y declaraciones ambientales. Desarrollo de reglas de categoría de producto.</a>	UNE-CEN ISO/TS 14027:2018. Environmental labels and declarations - Development of product category rules.
<a href="#">ISO 14021:2002. Auto declaraciones medioambientales (Etiquetado ecológico Tipo II).</a>	ISO 14021:2001. Self-declared environmental claims (Type II environmental labelling)
<a href="#">ISO 14024:2001. Etiquetado ecológico Tipo I. Principios generales y procedimientos.</a>	ISO 14024:2001. Type I environmental labelling. Principles and procedures.
<a href="#">UNE-EN ISO 14040:2006 Gestión ambiental. Análisis de ciclo de vida. Principios y marco de referencia.</a>	UNE-EN ISO 14040:2006 Environmental management. Life cycle analysis. Principles and reference framework.
<a href="#">UNE-ISO 14044:2006 Gestión ambiental. Análisis de ciclo de vida. Requisitos y directrices.</a>	UNE-ISO 14044:2006 Environmental management. Life cycle analysis. Requirements and guidelines.







## POLISH REGULATION REGARDING BIM TECHNOLOGIES IN CONSTRUCTION SECTOR

### Task O2/A1.3

## POLISH REGULATIONS REGARDING BIM TECHNOLOGIES IN CONSTRUCTION SECTOR

	
<p><a href="https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0024&amp;from=PL">https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0024&amp;from=PL</a></p> <p><a href="https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0024&amp;from=PL">DYREKTYWA PARLAMENTU EUROPEJSKIEGO I RADY 2014/24 / UE z dnia 26 lutego 2014 r. w sprawie zamówień publicznych, uchylająca dyrektywę 2004/18 / WE -</a></p> <p><a href="#">zgodnie z postanowieniami niniejszego dokumentu:</a></p> <p><a href="#">Artykuł 22 Ustęp 4, W odniesieniu do zamówień publicznych na roboty budowlane i konkursów, państwa członkowskie mogą wymagać stosowania specjalnych narzędzi elektronicznych, takich jak narzędzia do modelowania danych elektronicznych dla danych budowlanych lub tym podobnych. W takich przypadkach instytucje zamawiające muszą oferować alternatywne środki dostępu zgodnie z ust. 5, dopóki takie narzędzia nie stają się publicznie dostępne w rozumieniu ust. 1 akapit pierwszy ust.</a></p> <p><a href="#">Artykuł 90 Ustęp 1</a></p> <p><a href="#">„Państwa członkowskie wprowadzają w życie przepisy ustawowe, wykonawcze i administracyjne niezbędne do wykonania niniejszej dyrektywy do dnia 18 kwietnia 2016 r. Niezwłocznie przekazują Komisji tekst tych przepisów”.</a></p>	<p><a href="https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0024&amp;from=PL">https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0024&amp;from=PL</a></p> <p><a href="https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0024&amp;from=PL">DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL 2014/24 / EU of 26 February 2014 on public procurement, repealing Directive 2004/18 / EC -</a></p> <p>in accordance with the provisions of this document: Article 22 Paragraph 4</p> <p>‘With regard to public works contracts and design contests, Member States may require the use of specific electronic tools, such as electronic data modeling tools for construction data or the like. In such cases, contracting authorities must offer alternative means of access in accordance with paragraph 5 until such tools become publicly available within the meaning of paragraph 1. The first sentence of the first subparagraph of paragraph 1.’</p> <p>Article 90 Paragraph 1</p> <p>‘Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive by 18 April 2016. They shall forthwith communicate to the Commission the text of those provisions.’</p>





## SURVEY

### DEGREE OF IMPLANTATION OR USE OF BIM AT PROFESSIONAL LEVEL

Q00 Questionnaire supplied by:

- Universitatea Transilvania din Brasov (UTBv).
- Asociația România Green Building Council (RoGBC).
- Universidad de Sevilla (USE).
- Asociación Empresarial de Investigación Centro Tecnológico del Mármol, Piedra y Materiales (CTM).
- Politechnika Warszawska (WUT).
- Datacomp sp. z o.o. (Datacomp).
- Otro \_\_\_\_\_

Q01 What is your gender?

- Male.
- Female.

Q02 What is your age?

- Less than 18 years old.
- 18 to 25 years old.
- 26 to 35 years old.
- 36 to 45 years old.
- 46 to 55 years old.
- 56 to 65 years old.
- More than 65 years old.

Q03 In which country do you study/work?

- Spain.
- Poland.
- Romania.
- Other \_\_\_\_\_

Q04 What is your current employment situation?

- Independent self-employment.
- Subordinate employment.
- Student.
- Unemployment.

Q05 What profession are you linked to?

- Architect.
- Constructor.
- Engineer.
- Project Manager.
- Quantity Surveyor/Building Engineer.
- Sustainability Consultant.
- Developer.
- Public servant.
- Other \_\_\_\_\_



Q06 Which discipline best fits the organisation in which you work/study?

- Architecture.
- Building engineering.
- Engineering.
- Development.
- Construction.
- Urbanism.
- Other \_\_\_\_\_

Q07 For how many years have you worked linked to in construction sector?

- Less than 2 years.
- 2 - 5 years.
- 6 - 10 years.
- 11 - 15 years.
- 16 - 20 years.
- More than 20 years.

Q08 Do you know BIM (Building Information Modelling) methodology?

- Yes, slightly.
- Yes, on some issues.
- Yes, in depth.
- No.

Q09 Have you received BIM training? What kind of training?

- Yes, self-taught.
- Yes, induction course.
- Yes, expert course.
- Yes, master.
- Yes, doctorate.
- I don't have received any type of BIM training.
- Other \_\_\_\_\_

Q10 Do you plan to expand your BIM training?

- Yes, in the long term.
- Yes, in the medium term.
- Yes, in the coming months.
- No.

Q11 What is the main reason that has led you to implement BIM in your projects/designs?

- Own initiative.
- Customer requirement.
- Promoter requirement.
- Administration requirement.
- Requirement by other construction agents.
- Do not use BIM.
- Other \_\_\_\_\_

Q12 How long have you been using BIM?

- More than 5 years.
- Less than 5 years.
- Less than 1 year.
- Do not use BIM.



Q13 In what type of projects do you mainly use BIM? (multiple choice)

- Residential.
- Commercial.
- Offices.
- Urban planning.
- Civil engineering.
- Industrial.
- Hospital buildings.
- Schools.
- Other \_\_\_\_\_

Q14 For which phase of the Project do you mainly use BIM? (multiple choice)

- 3D modelling.
- Complete Project drafting.
- Measurements and budgets.
- Project documents.
- Structural analysis.
- Analysis of the construction details.
- Work monitoring.
- Energy analysis.
- Life Cycle Assessments.
- Infrastructures.
- Environmental impact analysis.
- Maintenance.
- Urbanism.
- Do not use BIM.
- Other \_\_\_\_\_

Q15 What is the level of implementation of BIM in your organisation/studies centre?

- Used in 100% of the projects.
- Used in more than 50% of the projects.
- Used in less than 50% of the projects.
- Used in less than 10% of the projects.
- Do not use BIM.

Q16 How many people work in your organization/studies centre?

- 1 (independent self-employment).
- 2 - 5.
- 6 - 15.
- 16 - 25.
- 26 - 50.
- 51 - 100.
- 101 - 250.
- 251 - 500.
- More than 500.
- Dk/Da.

Q17 What is the proportion of people in your organisation/studies centre who use BIM?

- 0 - 25%.
- 26 - 50%.
- 51 - 75%.
- 76 - 100%.
- Do not use BIM.

Q18 What are the main benefits that BIM has brought to your projects?

- Cost reduction.
- Reduction of errors.
- Improvement of company's image and marketing.
- Increasing of the quality project.
- Meeting construction deadlines.
- Increasing of projects and opportunities.
- Increased fees.
- Greater control of environmental parameters.
- None.
- Other \_\_\_\_\_

Q19 Which of the following do you consider to be the primary cause for a company's failure to adopt BIM?

- Lack of information
- The high cost of licences
- The work can be done by other means
- Lack of demand
- Lack of training of staff
- Customers don't pay for it
- The investment needed
- Other \_\_\_\_\_

Q20 Indicate your degree of agreement/disagreement with the following assertion: "BIM is not sufficiently standardized yet".

- Fully agree
- Fully disagree
- Agree
- Disagree
- Neither agree nor disagree
- Dk/Da.

Q21 Do you think BIN will replace CAD?

- In the short term
- In the medium term
- In the long term
- BIM will not replace CAD

Q22 What factors do you think may influence more widespread use of BIM?

- The establishment by the government of a national strategy
- A lower price for the software
- A higher educational offer
- Wider use among professionals
- Mandatory use in certain projects
- Other \_\_\_\_\_





## GENERAL INFORMATION OF THE PROJECT

### PRODUCTS

#### **O3. IT production of integrated training materials in UrbanBIM.**

O3/A1. Integration of LCA in objects based on common BIM format

O3/A2. Interactive Handbook of LCA construction materials linked to UrbanBIM

O3/A3. Environment test and implementation of IT improvements



## GENERAL INFORMATION OF THE PROJECT

### PRODUCTS

#### **O4. Developing of Educational software of UrbanBIM learning application**

O4/A1. Guideline notes and functional specifications

O4/A2. IT production of Beta Version of UrbanBIM Application

O4/A3. Technical implementation

O4/A4. Pedagogical implementation



THANK YOU FOR YOUR  
ATTENTION!

