

The BIM-enabled Learning Environment

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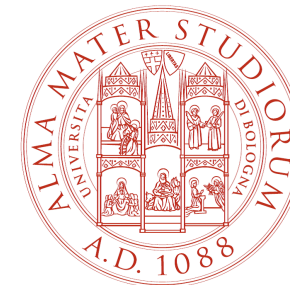
BENEDICT - BIM-enabled Learning Environment for Digital Construction

- Erasmus+ Strategic Partnership project
- 2020-2023
- Leveraging the emerging possibilities of BIM to enhance the education of Real Estate and Construction (REC) sector

Project Partners

Partners

- Tallinn University of Technology (TalTech) - Estonia (Coordinator)
- Tampere University (TAU) – Finland
- University of Bologna (UNIBO) - Italy



Project Associate Partners

Associate Partners

Estonia

- Ehituskeskus (Construction Centre)
- Novarc Group AS (Architectural and engineering consulting firm)

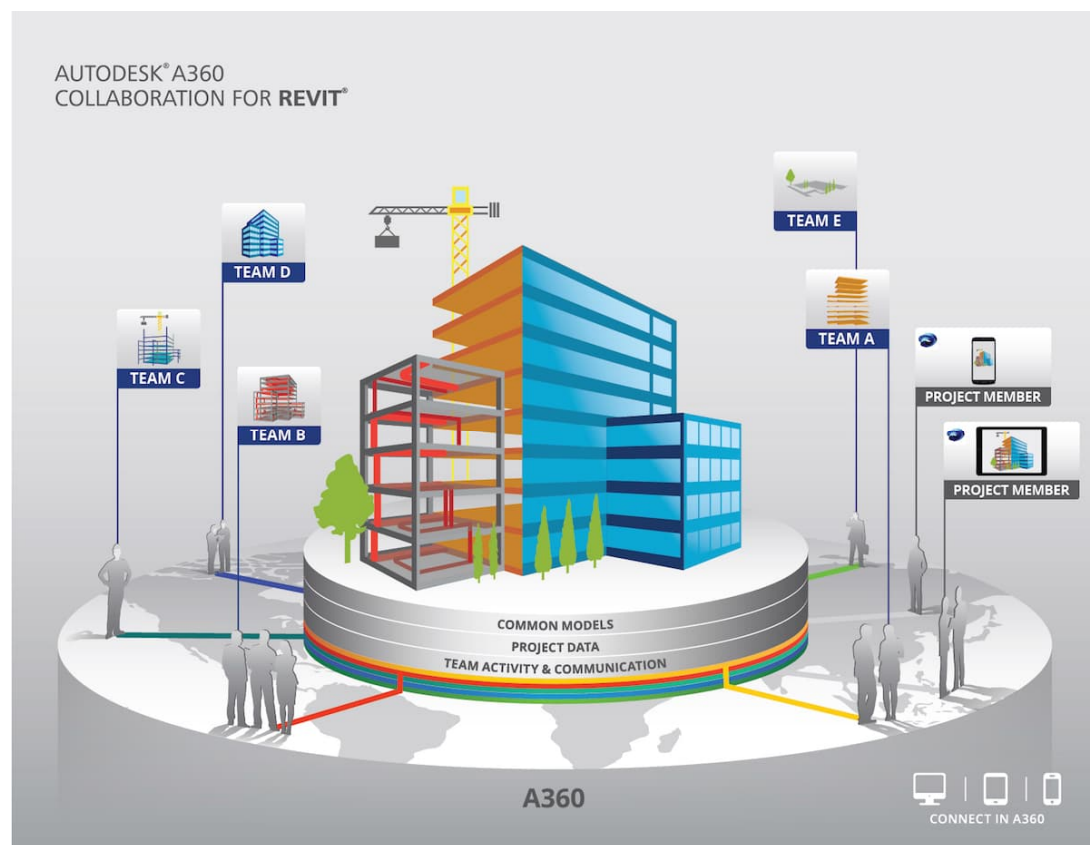
Finland

- Rakennustieto (BuildingSMART Finland)
- RIL (Finnish Association of Civil Engineers)

Italy

- Istituto Istruzione Professionale Lavoratori Edili (Building school)
- CMB Societa Cooperativa Muratori e Braccianti di Carpi (Construction firm)
- Associazione Italiana di Ingegneria Economica (Certified Cost Engineers Society)

Digitalisation of Construction



- Central feature of this digital transformation is Building Information Modelling (BIM).
- Significant digital assets and repositories are emerging.
- Sectoral transition of various processes, services and physical products

Reshaping education of our professionals

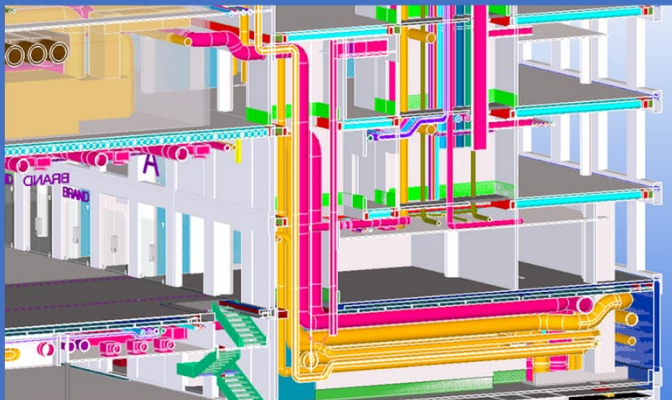


- The use of digital models provides a completely new landscape for the education of our professionals
- Skills can be taught and learned in new ways
- Concerns the whole real estate and construction sector

Understanding BIM-processes and relating tools

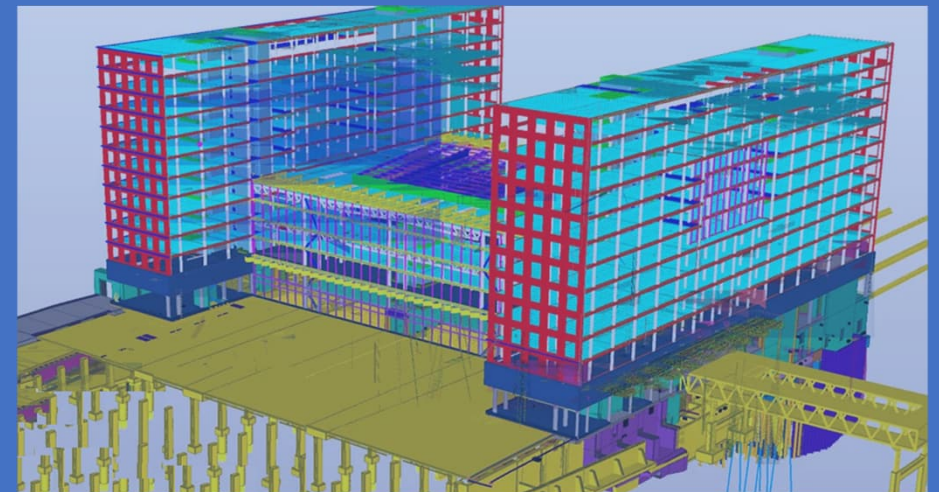
Modelling

- BIM authoring tools
- Model sharing
- Model based communication



Use of digital models (BIM)

- Viewing and analyses of models
- Combined models
- Simulations
- Model editing, updates and change needs



BIM-enabled Learning

- **Learning is embedded in a virtual BIM environment and BIM provides a vehicle for learning**

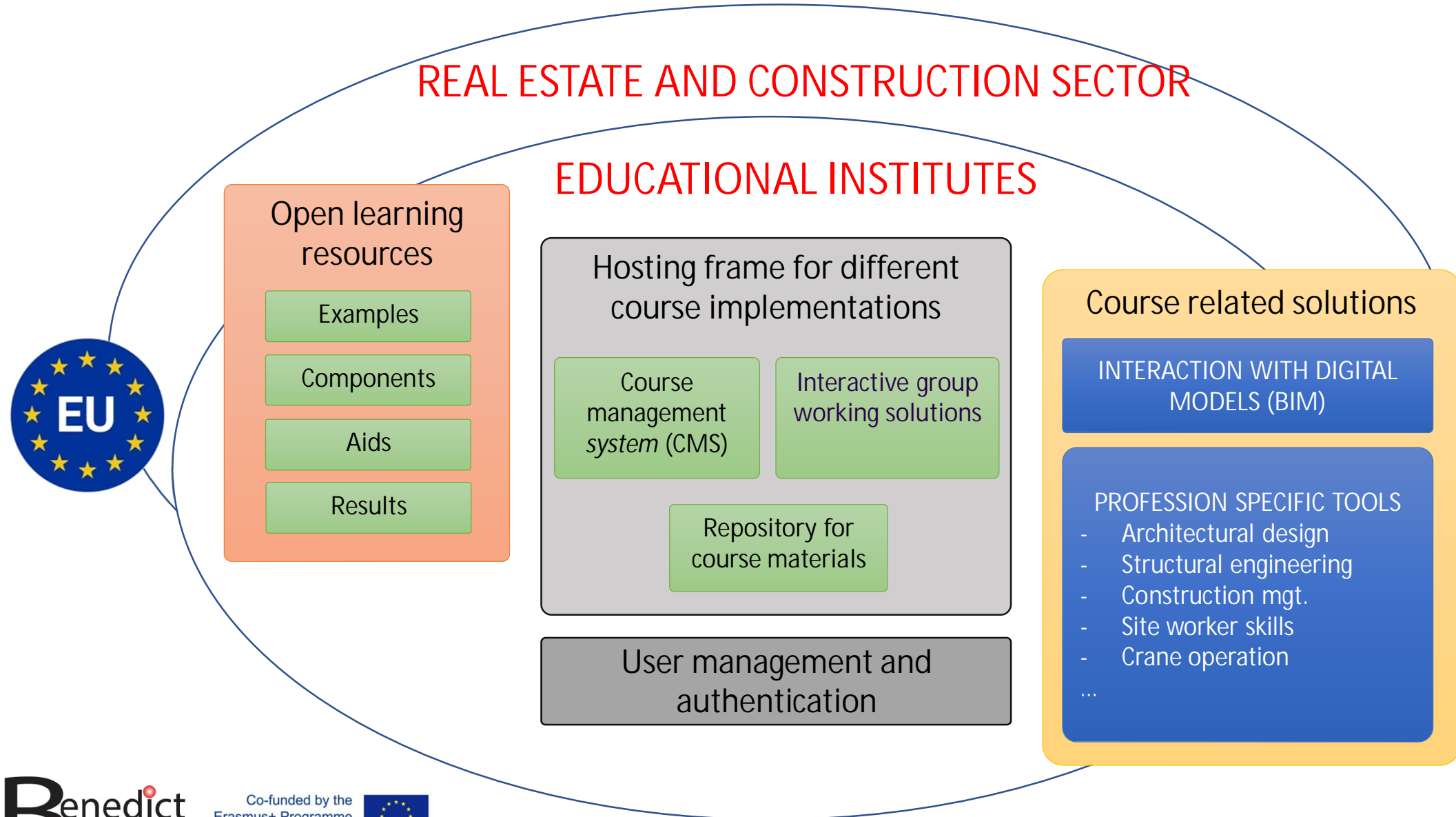


- University degree programs
- Vocational, trade and technical school education
- Continuous competence development

Competent professionals

➔ **BIM-enabled Learning Environment (BLE)**

BIM-enabled Learning Environment



BLE platform as an IT-SOLUTION

Server for open learning resources

- Unibo Drupal application

External user management and authentication

(Edugain)

Hosting frame for all course implementations

1. Logic and flow of the course
 2. Group formation
 3. Collaboration between groups
 4. Tutoring
- Moodle

Repository for course materials

- Moodle
- O365
- Panopto (video streaming)
- O365 (video streaming)

Interactive group working solutions

- O365
- Solution of their choice

Internal user management and authentication

Unity

IFC.js based solutions

Course related solutions

BIM data extraction

BIM creation, editing, version management, sharing

BIM checking

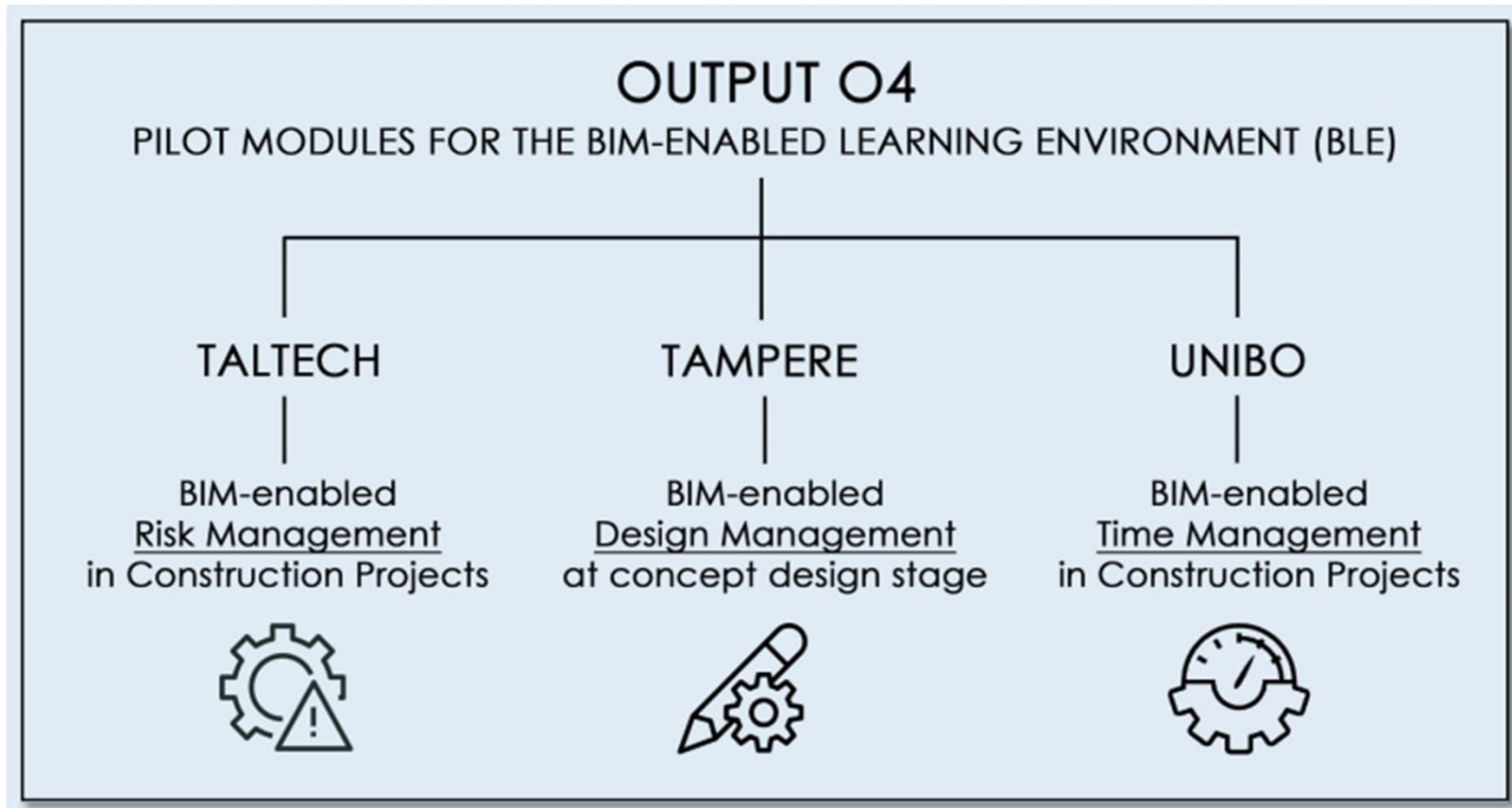
BIM viewing

XR

The prototype of BLE platform

- + Generic solution for different sector-wide needs
 - + Vendor independence → open source software solutions
 - + openBIM (ifc)
 - + Scalability
 - + For different pedagogical approaches
 - + Low cost possibilities for various educational needs
- It is a prototype

BLE –FIRST LIVE TRIAL COURSES

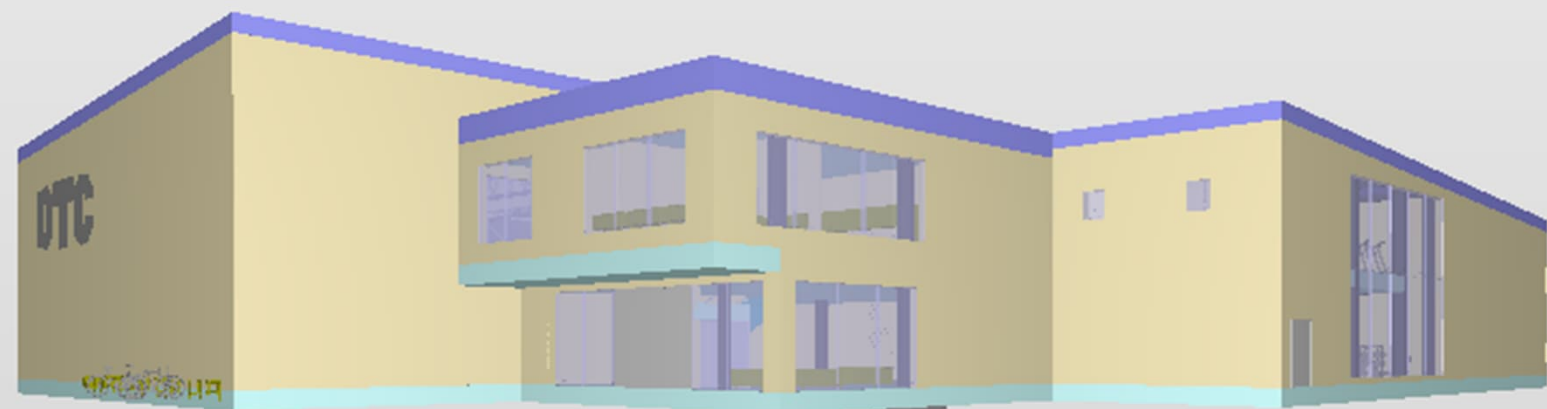


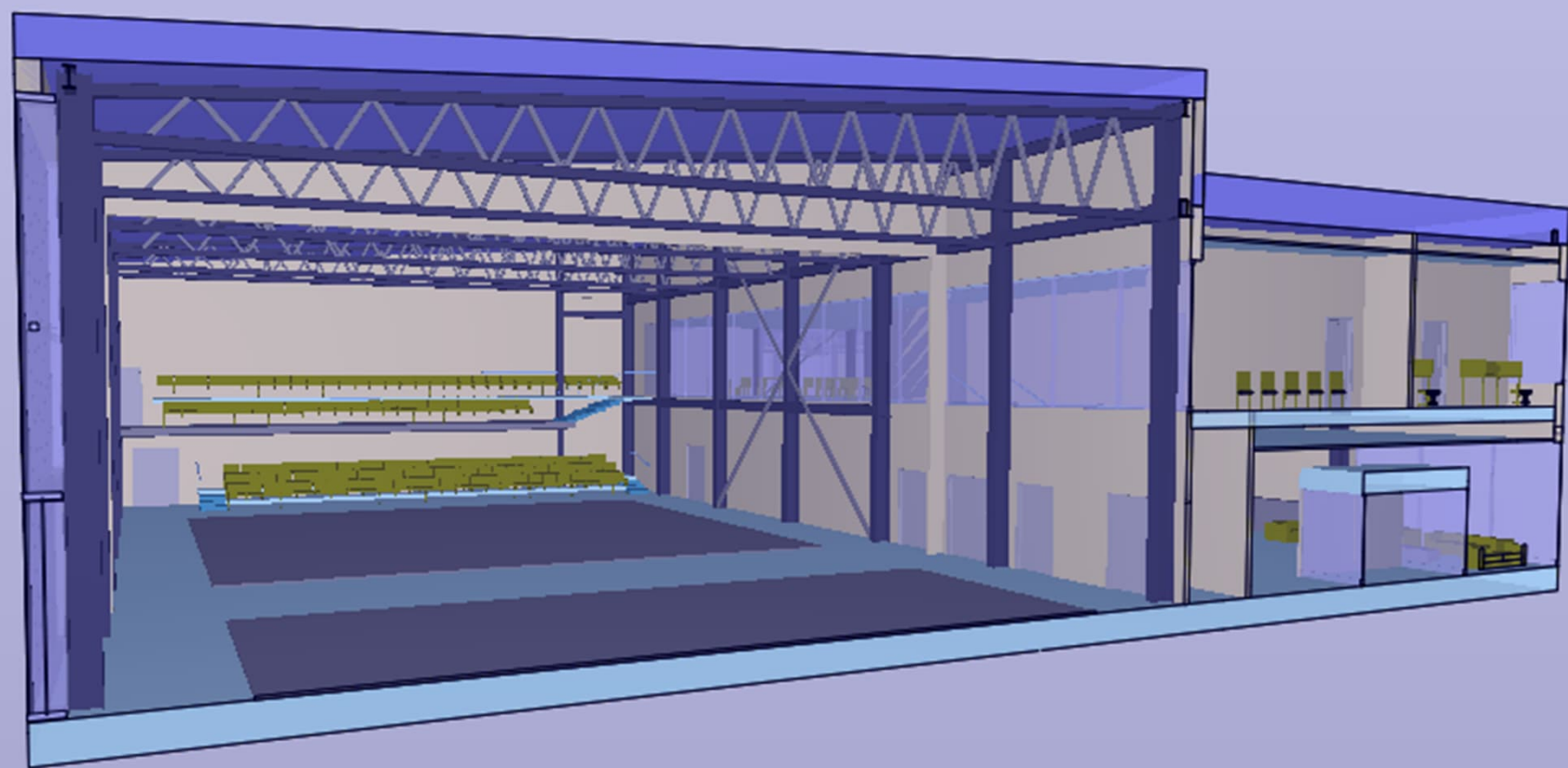
Design Management pilot

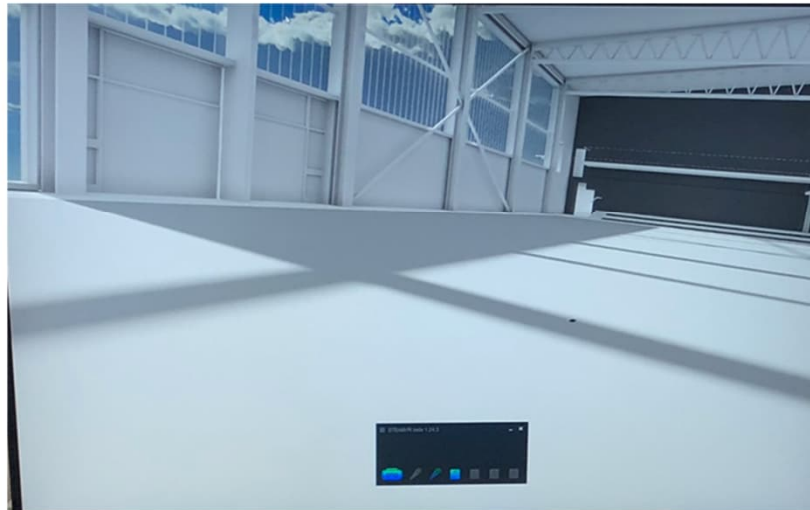
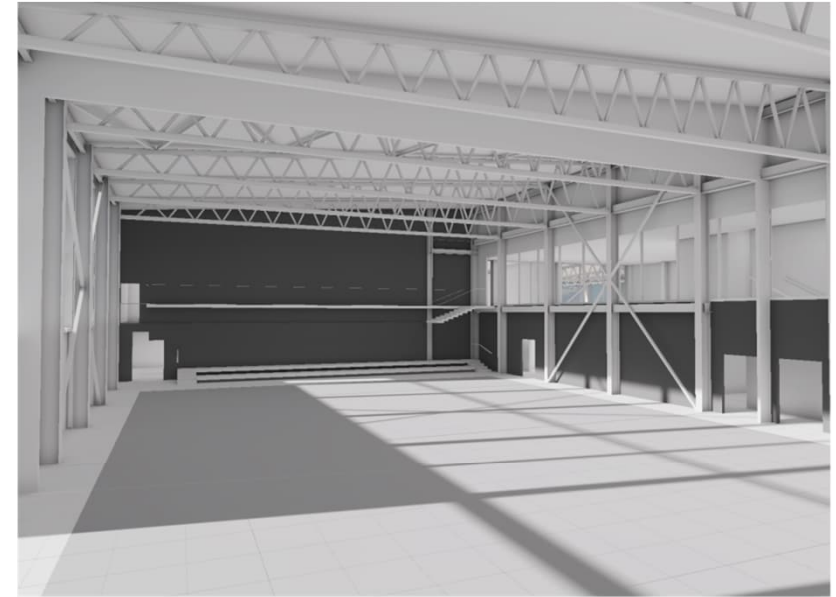
Training and competition centre for Dream Team Cheerleaders







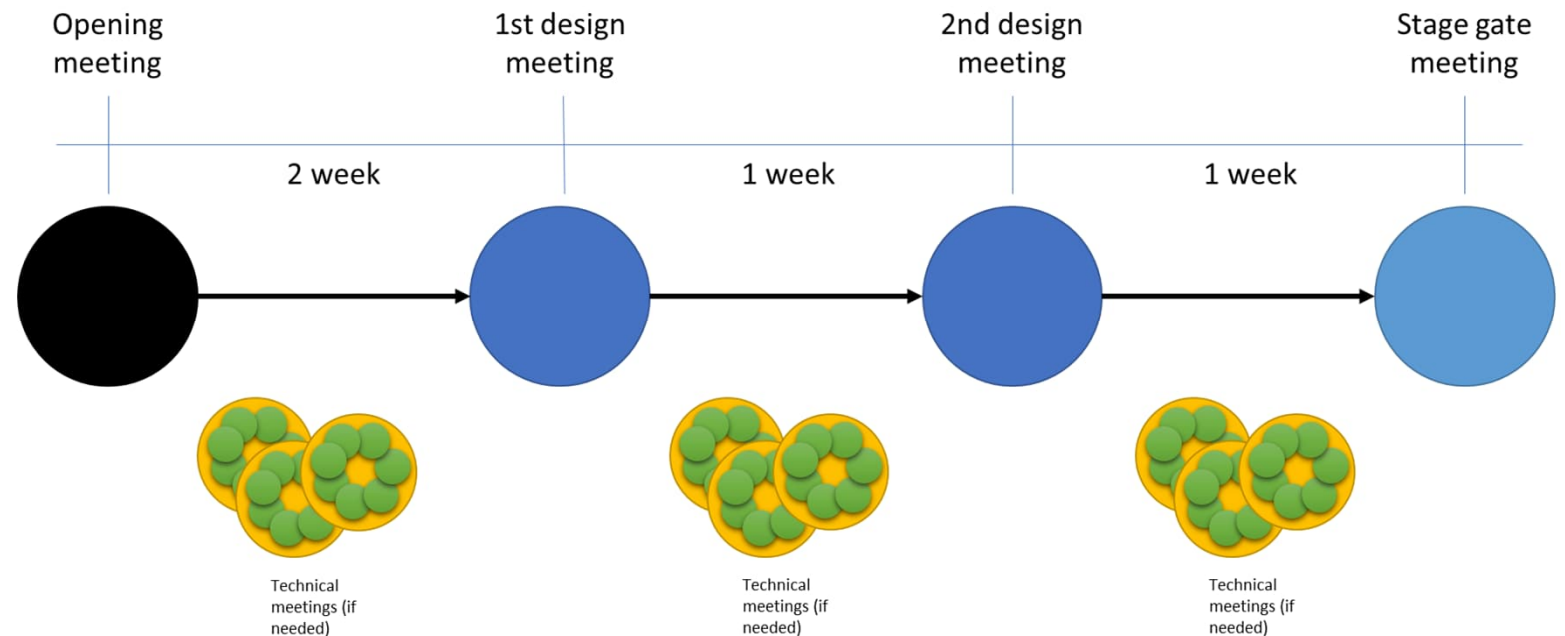




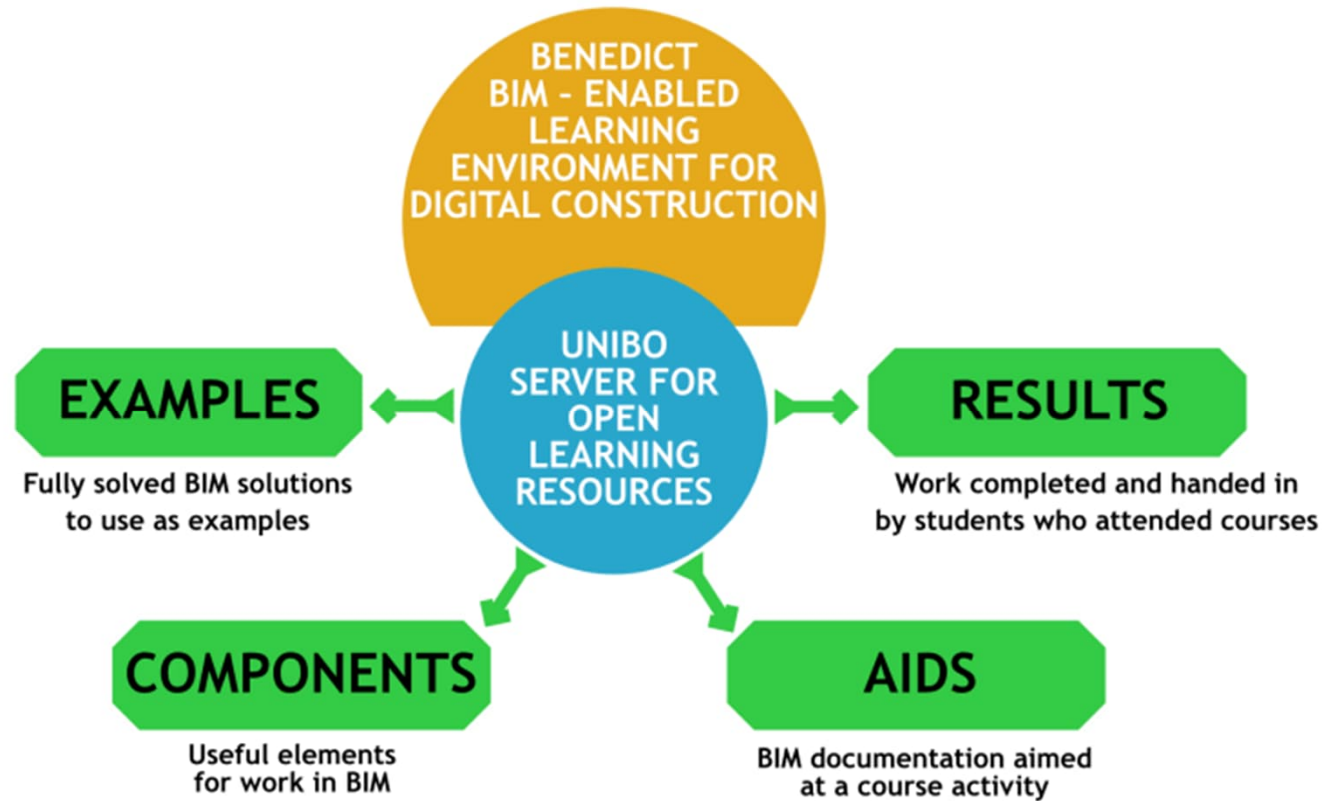
Design Management pilot

Part of Construction Management course (5 credits)

- Year 2, Sustainable Urban Development, Bachelor's degree
- 7-week delivery (pilot module 4 weeks, 4 x 2-hour session) in September – October 2022
- 11 bachelor students with limited understanding of building construction



Server solution for sharing different open learning resources



- A web site and repository, where all BIM models, examples and data can be stored and use
- <http://ble.unibo.it>
- For learners, teachers and system administrators
- Towards widening use of BLE in the real estate and construction sector

and next...

- <https://benedictproject.eu/>



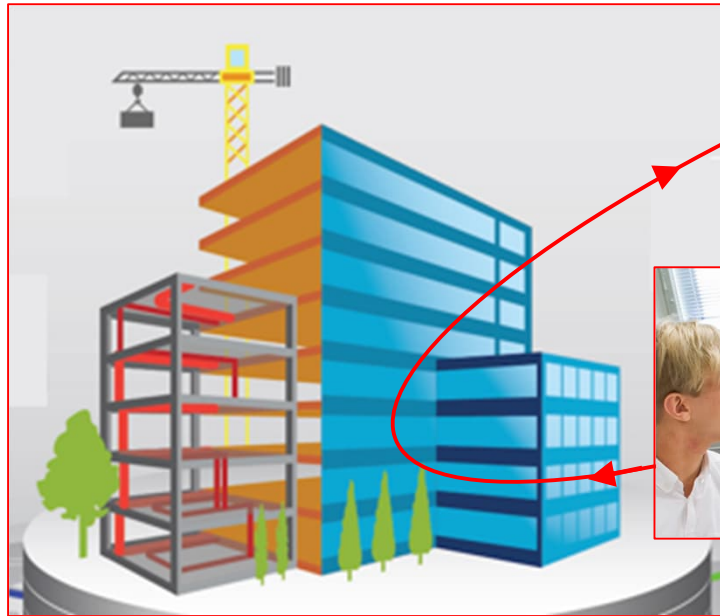
THE BENEDICT VISION!



REAL ESTATE AND CONSTRUCTION SECTOR

EDUCATIONAL INSTITUTES

BIM-enabled Learning



EDUCATION OF QUALIFIED PROFESSIONALS

- City planners
- Land surveyors
- Architects
- Mechanical and structural engineers
- HVAC engineers
- Electrical engineers
- Project managers
- Building inspectors
- Site workers
- etc



Conclusions

- BLE platform provides an IT Infrastructure for BIM-enabled-learning
- Use of digital models (not merely modelling itself) reshapes education in a profound manner
- Education of REC sector professionals must adapt!

Publications

- <https://benedictproject.eu/>
 - Project reports and pilot documents
 - Full list of publications
- The most recent publications
 - Olowa, T.; Witt, E.; Morganti, C.; Teittinen, T.; Lill, I. (2022). DEFINING A BIM-ENABLED LEARNING ENVIRONMENT—AN ADAPTIVE STRUCTURATION THEORY PERSPECTIVE. Buildings, 12 (3), 1–19. DOI: 10.3390/buildings12030292.
 - Bragadin, M., Morganti, C., Ricci, P.C., Witt, E.D.Q., Kahkonen, K. and Puolitaival, T. (2023) BIM-BASED OPEN LEARNING RESOURCES REPOSITORY FOR THE BENEDICT PROJECT, Proceedings of VR2023 23rd International Conference on Construction Applications of Virtual Reality, University of Florence, Florence, Italy, November 13-16, 2023
 - Morganti, C., Coraglia, U.M., Bragadin, M.A., Rissolo, D., Witt, E., and Kähkönen, K. (2023) TEACHING BIM: A COMPARISON BETWEEN ACTUAL AND FUTURE PERSPECTIVES, Proceedings of the 2023 European Conference on Computing in Construction, 40th International CIB W78 Conference, Heraklion, Crete, Greece, July 10-12, 2023