BDTIC
2ND BUILDING DIGITAL TWIN International Congress

BIM2TWIN

Carla Tortelli (*ACCIONA*)

ORGANIZED BY:

BUILDING DIGITAL TWIN ASSOCIATION

SPHERE

THIS PROJECT HAS RECEIVED FUNDING FROM THE EUROPEAN UNION'S H2020 PROGRAMME UNDER GRANT AGREEMENT NO. 820805.

BIM2TWIN

OPTIMAL CONSTRUCTION MANAGEMENT & PRODUCTION CONTROL

- European project funded by the Horizon 2020 framework program
- Duration 42 months: 1 November 2020 to 31 May 2023
- Consortium of 17 companies and technology centers from France, England, Finland, Italy, Germany, Denmark and Israel.

OBJECTIVE

to build a Digital Building Twin (DBT) platform for construction management that implements lean principles to reduce operational waste of all kinds, shortening schedules, reducing costs, enhancing quality and safety

Project Partners

Academics

- Università Politecnica delle Marche
- Technion Israel Institute of Technology
- Ruhr Universität Bochum
- RUB
- Technical University of Munich
- TUM
- Aarhus University
- University of Cambridge

Research & Technology centres

- CSTB le futur en construction
- tecnalia Inspiring Business
- Inria

IT Firms

- Siemens
- orange

Contractors

- acciona Construction
- SPADA Construction
- Fira SMART

Engineering

- IDP engineering · environment · architecture

Tech transfer

- UniSMART Fondazione Università di Padova

Construction tech startup

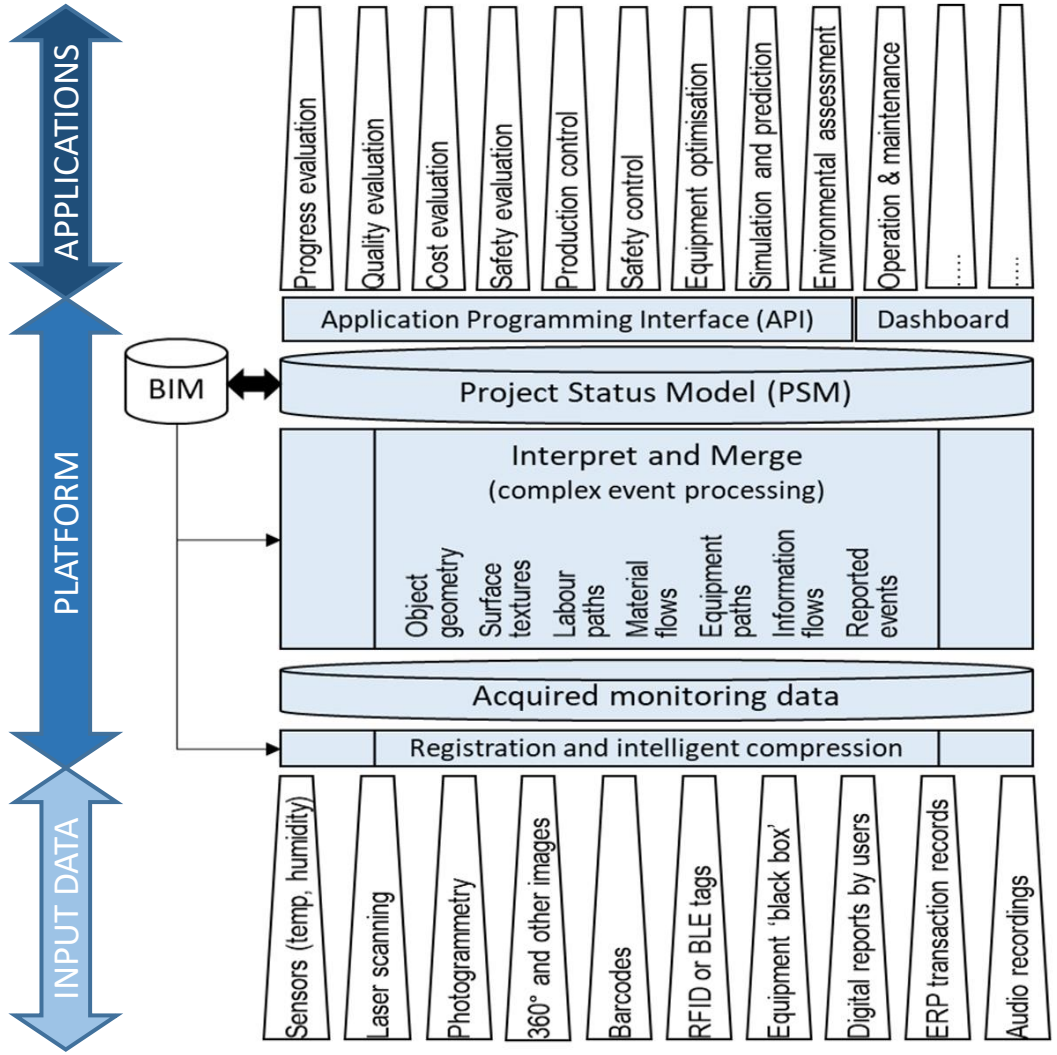
- INTSITE

Platform Applications

Project structure of technical Work Packages according to the different functionalities and services of the platform:

PROJECT DOMAINS

- Progress Monitoring & quality control:
  - For volumetric building
  - For surface & textural work
- Occupational Safety & Health of workers
- Equipment optimization
- Production planning



Progress Monitoring & Quality Control

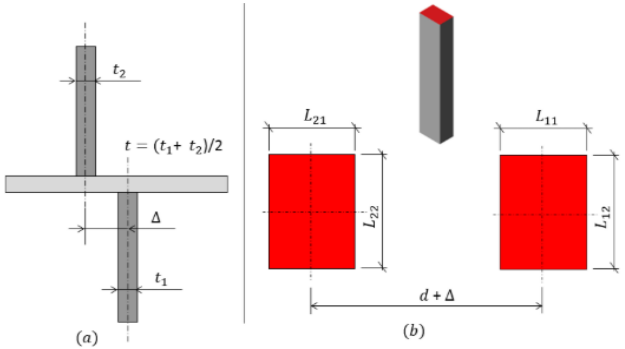
Progress monitoring and quality control of the execution in terms of <u>spatial properties (volumetry)</u>

- Point clouds & Set of 2D images to reconstruct volume
- Comparison – As-built X As-planned / As-designed
- Deviations in the geometry or position of elements.

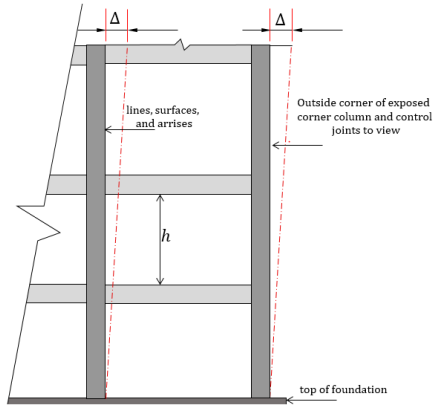
PROGRESS MONITORING

QUALITY CONTROL

1) Axis Deviation



2) Verticality deviation (Plumb)



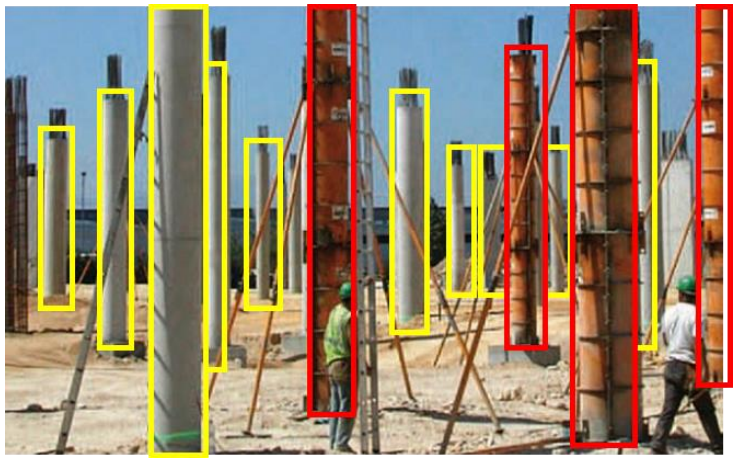
Authors: CSTB

Progress Monitoring & Quality Control

Progress monitoring and quality control of the execution in terms of Surface Finish and Texture

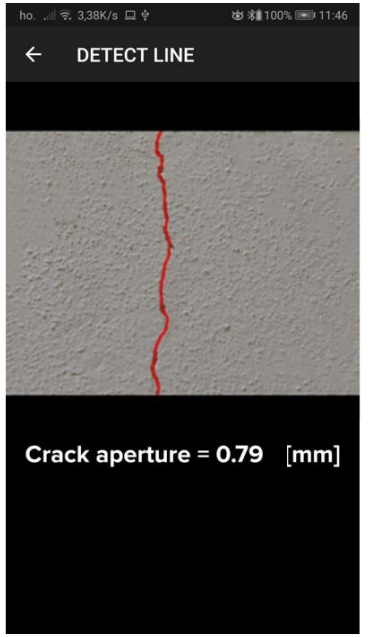
- 2D images
- Comparison – As-built X As-planned / As-designed
- Surface to be controlled by visual features (colour, texture, shape)

PROGRESS MONITORING



Authors: TECNALIA

QUALITY CONTROL

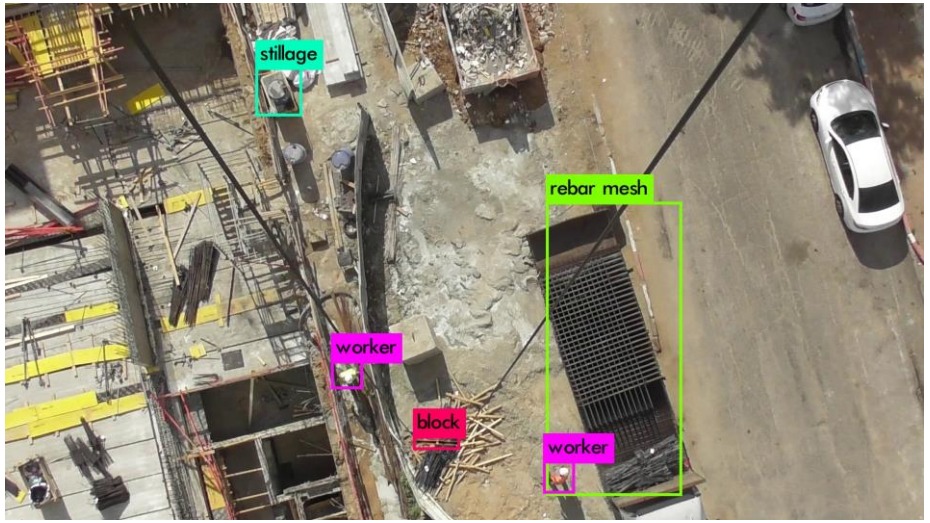


Authors: UNIVPM

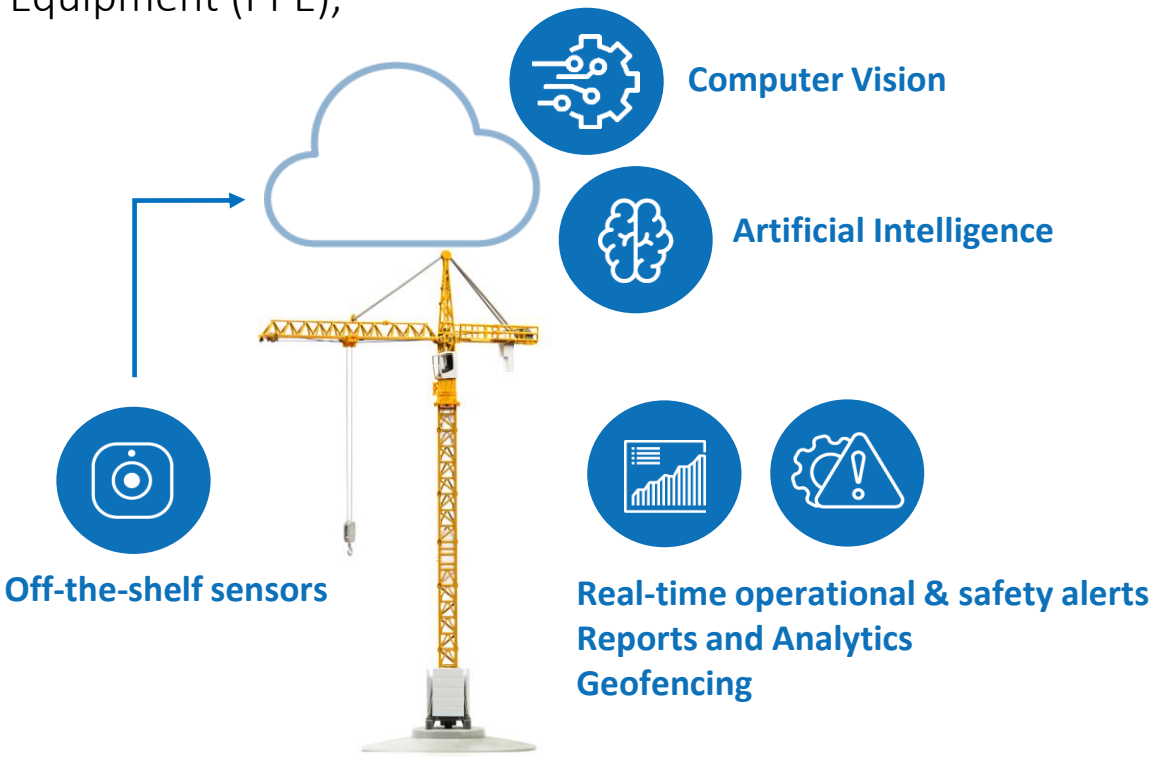
Occupational Health & Safety

Occupational Health and Safety on site of construction workers, detecting deviations in real time that may pose a risk. Achieved through system of prevention, including for example:

- Identification of workers not wearing Personal Protective Equipment (PPE),
- Conformance checking of guardrails and platforms,
- Real time detection of hazard situations on site.



Object detection

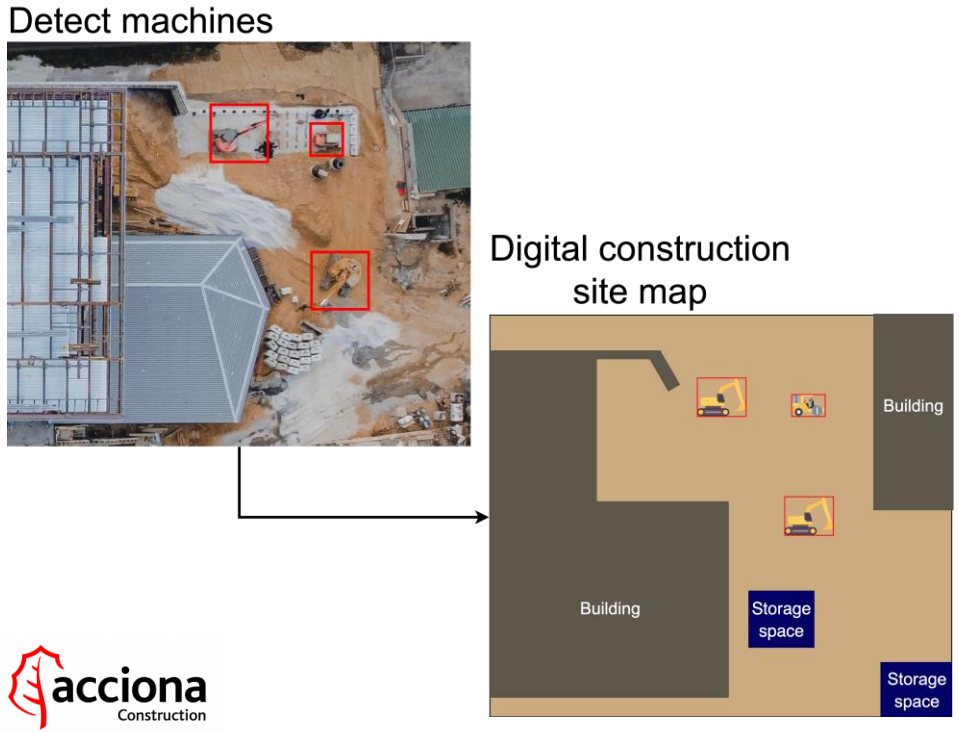


Equipment Optimization

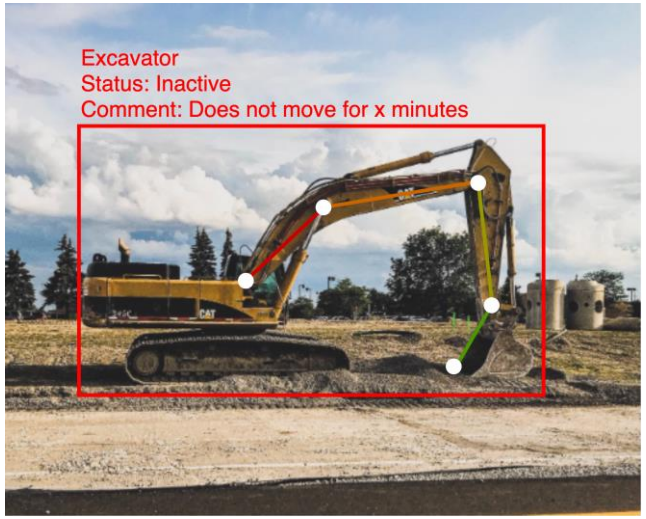
Optimization of construction site management through machinery use, real-time situation monitoring, planning/forecasting of movement flows and usage time.

- Control the location, activity and status of machinery in real time to optimize its use on site.
- Optimize flows and machinery movement
- Prevent clashes with worker and avoid crane load traffic

1. Position



2. Status



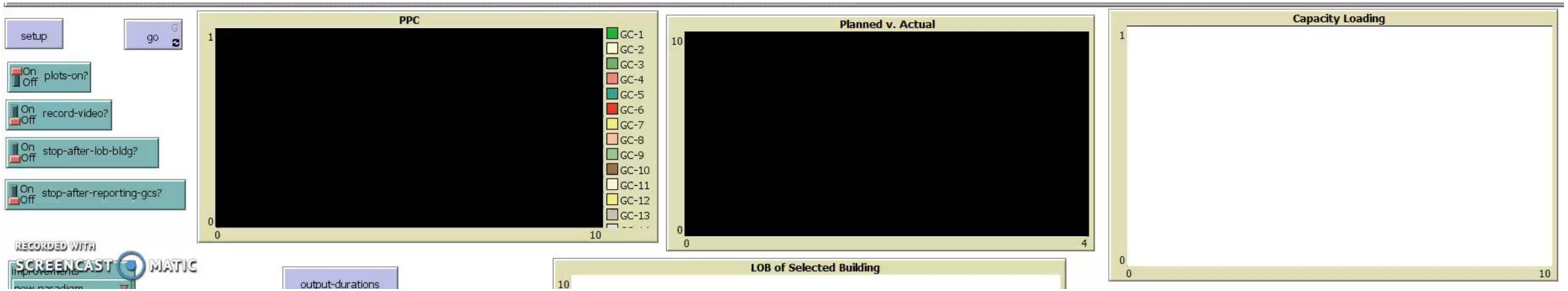
3. Movement

Authors: RUB

Production Management

Advanced planning management based on lean principles

- Capture real time situation from construction site to react and optimize the workflow
- Predict the impact of certain decisions on site planning
- Simulate planning alternatives based on current status, performance and equipment behavior.

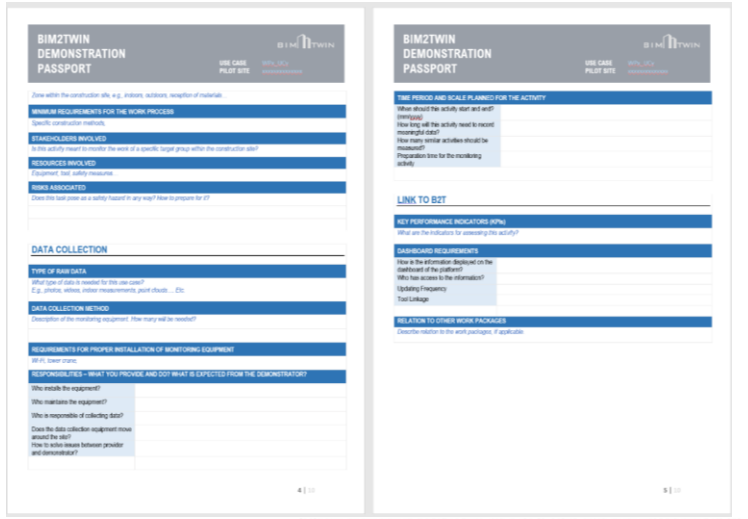


Demonstration

- Demonstration phase to test and evaluate the BIM2TWIN platform in <u>real construction environments</u>
- Validation of end-user requirements, and recommendations of the ways in which DBT models can be used.
- Collection of raw data to train algorithms

MAIN CHALLENGES

- Access construction sites and install monitoring equiment while deploying privacy measures
- Fitting schedule of available construction sites with the project's plan
- Projects and construction sites do not always fulfill the technical requirements for the implementation of the platform – e.g., not digitised sufficiently.



Next Steps

Integrate in a single DBT platform different construction management tools

Collect raw data from real construction environments to consolidate use cases

Test the platform, integrating monitoring technologies with management applications

Demonstrate platform operation and measurable impacts in real pilots

Develop exploitation pathways and business models for the DBT platform

Contact

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