InCUBE

sustainable building innovations

Training on the InCUBE R-GUIDE

Carlos Daniel Huertas (RINA-C) | Stelios Zikos (CERTH)

22-6-2026

8 October 2025 | Trento

This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

Agenda

- **Introduction to the InCUBE R-Guide**
- **Components of R-Guide and Functionalities**
- **Q&A**
- **Site Visit**

This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

Introduction to the InCUBE R-GUIDE

This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

Introduction R-GUIDE

The R-GUIDE develops a system to ensure operational continuity, efficiency, and worker safety in on-site retrofitting, while minimizing waste and environmental impact.

It leverages **RINA-C's Resilience Dashboard** and CERTH's **AR/VR training** to support fast, safe renovation and monitoring.
AR tools (smartphones, tablets, smart helmets) provide real-time guidance and training for workers on new technologies. The R-GUIDE will also interface with the InCUBE WINER for value-chain optimization.

This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

Resilience Dashboard

This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

R-GUIDE | Resilience Dashboard

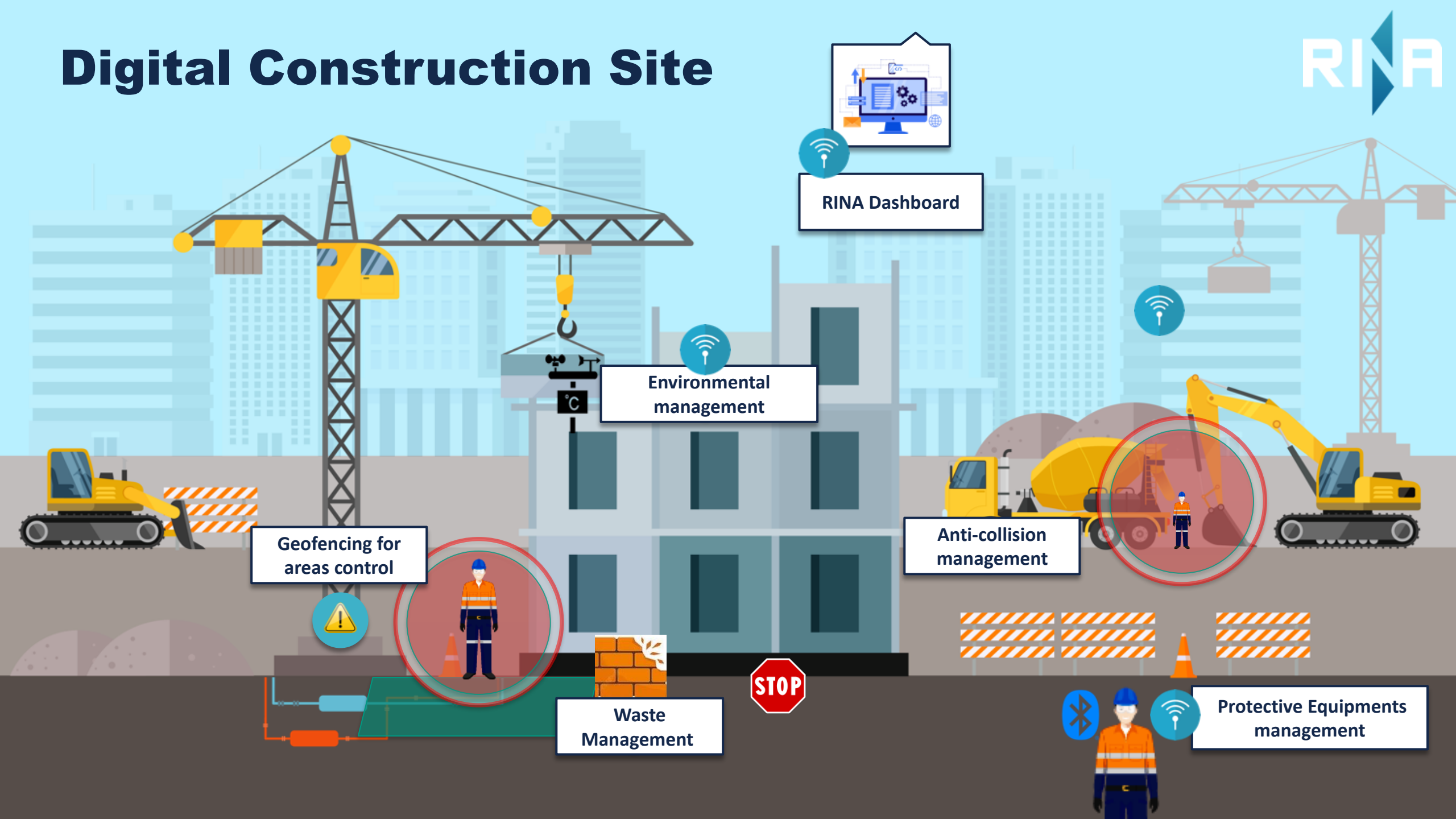
WHAT: Digital Construction Site supports daily site management, ensuring operational continuity. It doesn't replace responsible staff but serves as a platform to collect, process, and share key site information, improving their work.

NEEDS ADDRESSED: Efficient management of site activities, with focus on safety, environment, and monitoring.

BENEFITS: Enhanced safety, protection of people and assets, fewer interruptions and delays, lower incident risk.

This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

Digital Construction Site



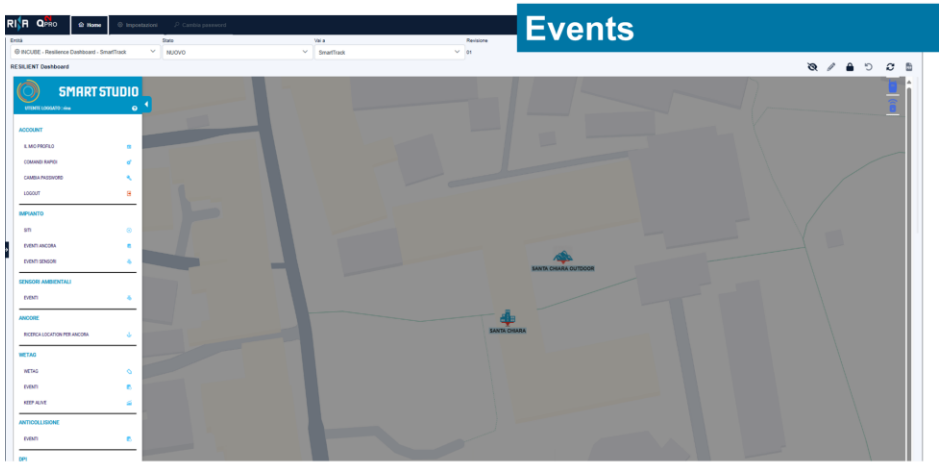
R-GUIDE / Resilience Dashboard

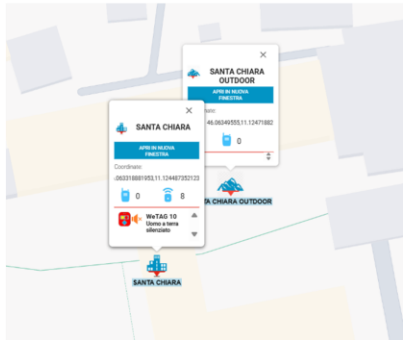
An Integrated System for Construction Worksites:

PPE & Man-Down Monitoring: Helmet sensors and Wetag track PPE use and worker well-being; inactivity alerts signal health risks.

Collision Prevention: Anti-collision and proximity sensors warn when workers approach cranes or heavy equipment. Area Control: Geofencing secures hazardous zones, allowing only authorized access.

Real-Time Monitoring: Live data on alerts, sensors, battery, and worker location shown on a site map for rapid response.





This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

Resilience Dashboard Modules

Safety

The **Wetag** wearable device, worn on the belt, enhances worker safety by allowing **manual help requests and sending alerts when unsafe actions are detected,** such as entering restricted areas.

Realtime

Signal repeaters installed along corridors **enable the PPE antennas to track** the real-time location of workers. On the crane, a **triangulation system detects worker presence in high-risk load zones**.

This setup provides continuous data on worker movements, **time spent in hazardous areas**, and proximity to active equipment, **supporting proactive safety management.**

Historical

An **external sound level meter will assess noise from site activities**, with possible work suspension in **sensitive urban conditions.**

Air temperature and humidity sensors will monitor worker **thermal comfort,** allowing activity suspension during excessive heat.

Waste Management

A **dashboard** form allows **nearby recyclers** and the resilient manager to input data on recyclable materials, **available quantities, and material flows.**

This **maps outgoing site** waste and incoming recycler supply, **supporting circular material management.**

This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

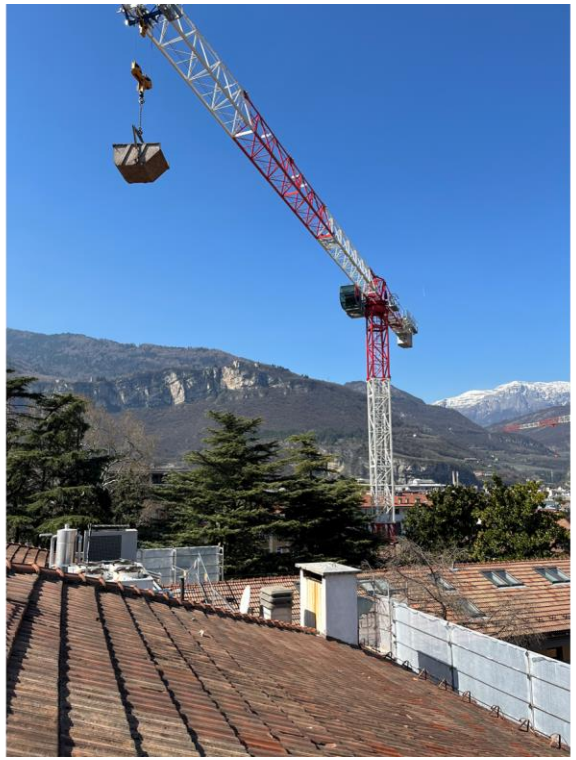
Resilience Dashboard Modules

STREAM	SENSOR	WHAT	IMAGE
WORKERS MANAGEMENT	Anchors	Signals gathering from/to sensors and communication	
	WeTAG and Smart Helmet	Worker's safety to get triggers and alarms thanks to positioning the worker in the site	 
	Collision Prevention System	Send alarms in the proximity of vehicles	
ENVIRONMENT & WASTE MANAGEMENT	Waste track management	Optimize waste management IN/OUT the site	
	Environmental Probe	Get measures on temperature, wind, humidity, etc.	
	Acoustic Probe	Get information on noises and acoustic emissions during works	

This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

Resilience Dashboard | Anti-Collision System (ACS)

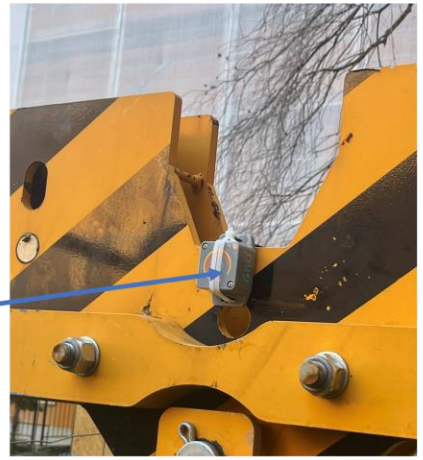
Anti-collision System (ACS) - Trento

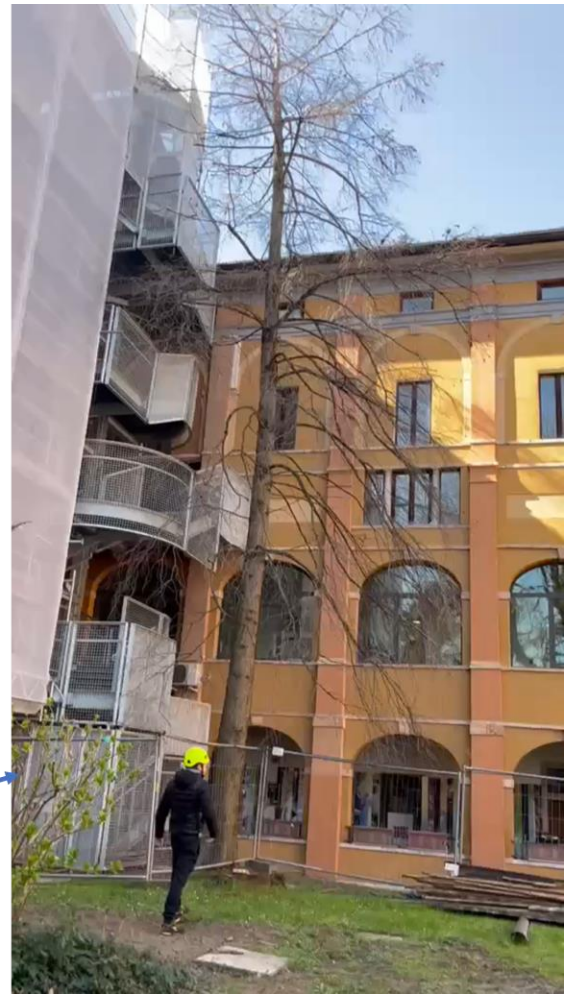


This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

Resilience Dashboard | Anti-Collision System (ACS)

Anti-collision System (ACS) - Trento

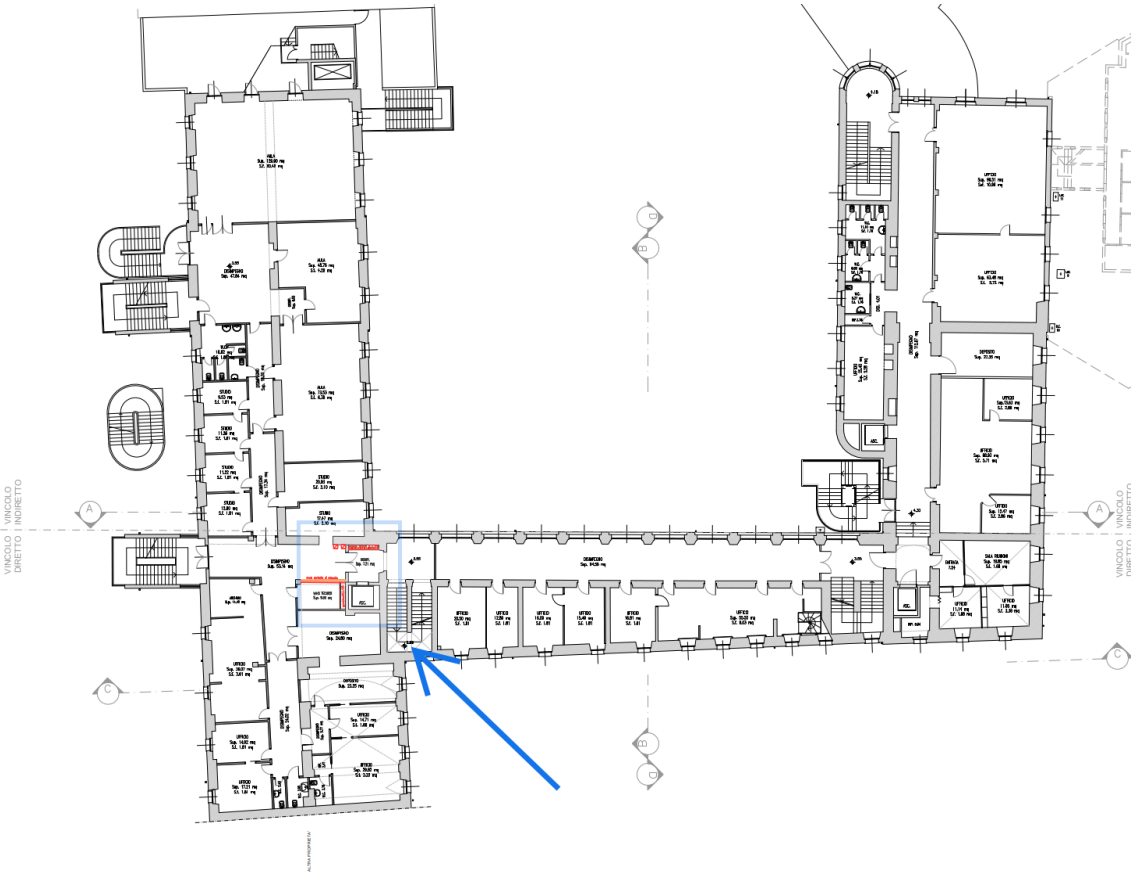




This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

Resilience Dashboard | Area Boundary (AB) System

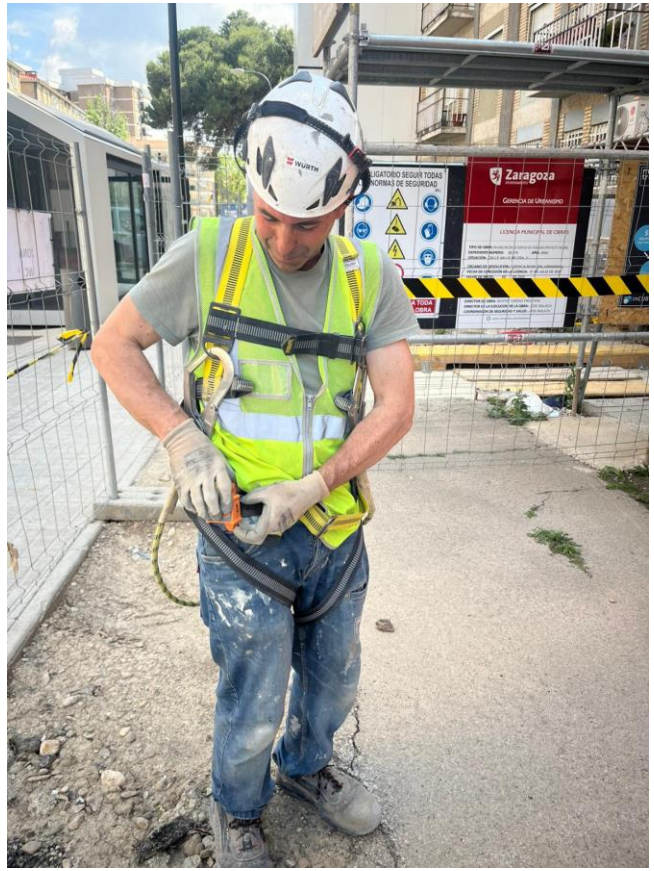
Area Boundary (AB) System - Trento

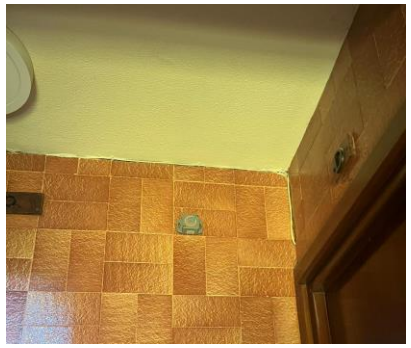


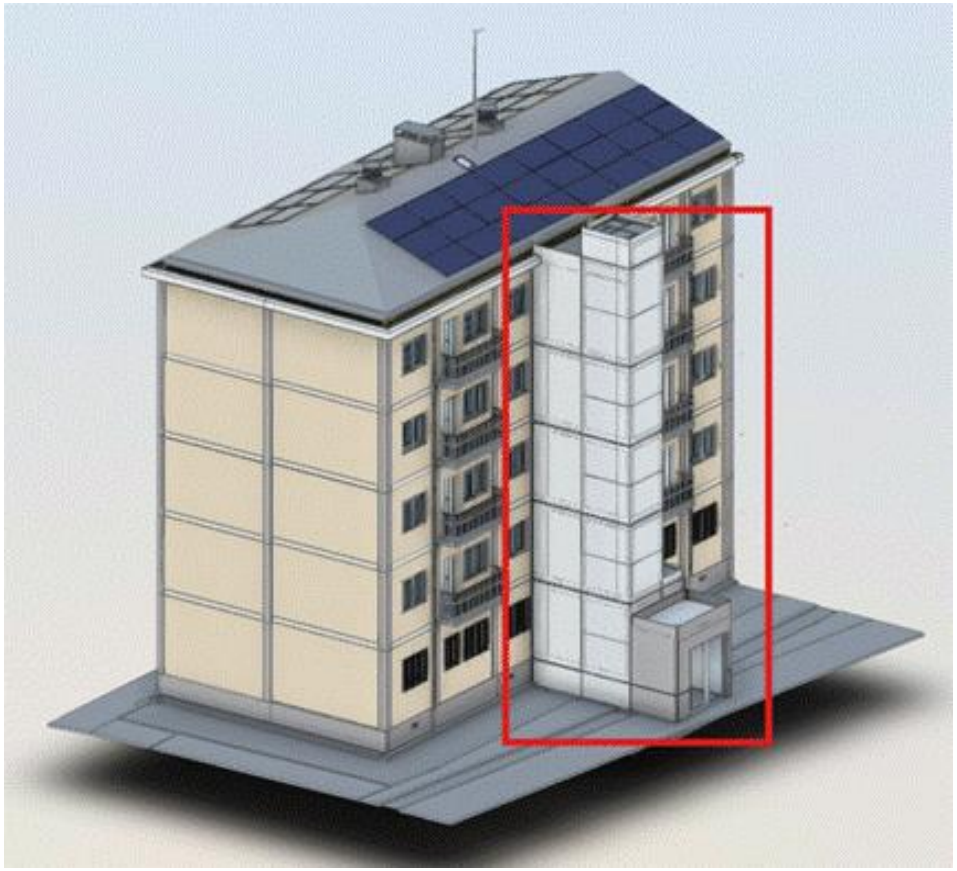
This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

Resilience Dashboard | Area Boundary (AB) System

Area Boundary (AB) System - Zaragoza







This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

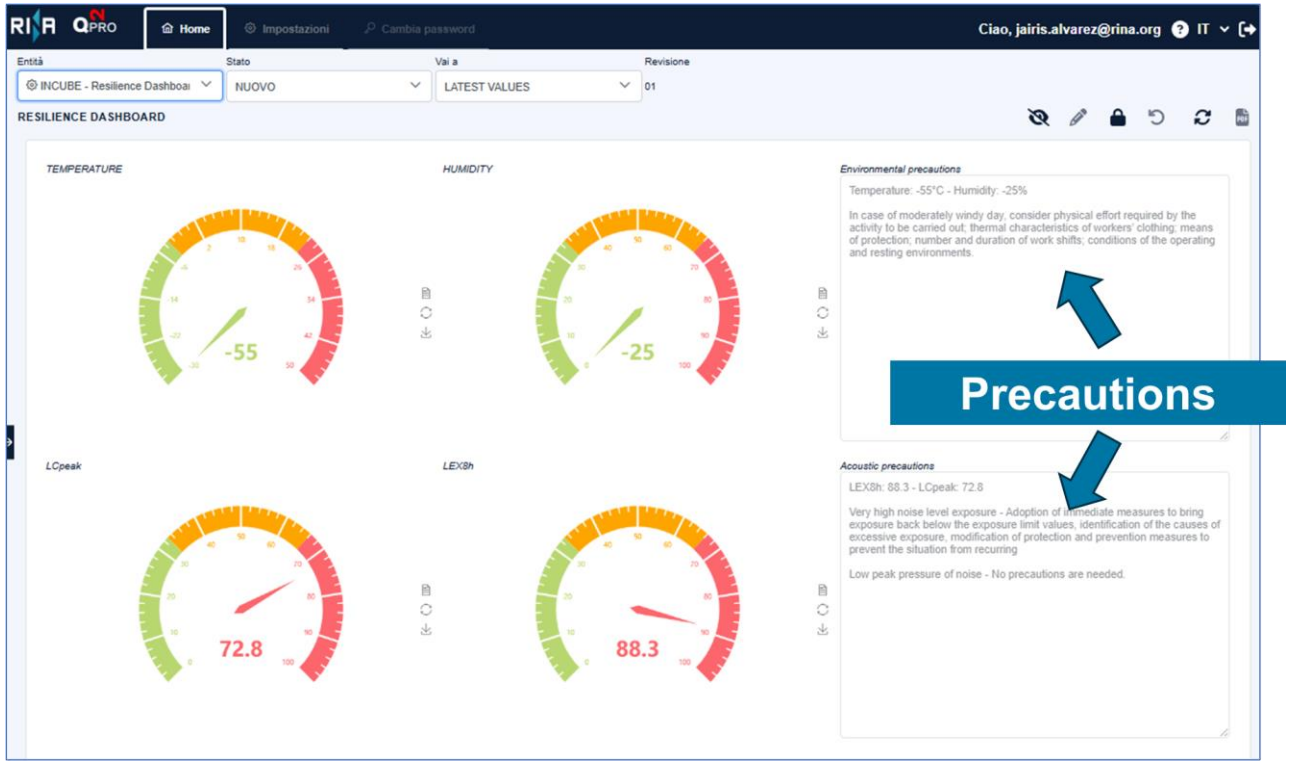
Resilience Dashboard | Realtime Module

The "Realtime" module allows to monitor environmental and acoustic parameters.

- Temperature and Humidity (environmental)
- LCpeak and LEX8h (acoustic)

In addition to displaying the values detected by the sensors, the module also provides guidance on the precautions to follow based on those values.

It also presents plots that show the real-time trends of the recorded parameters.

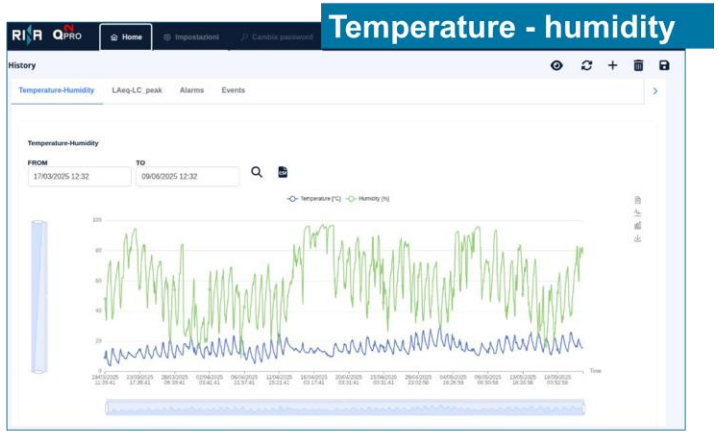


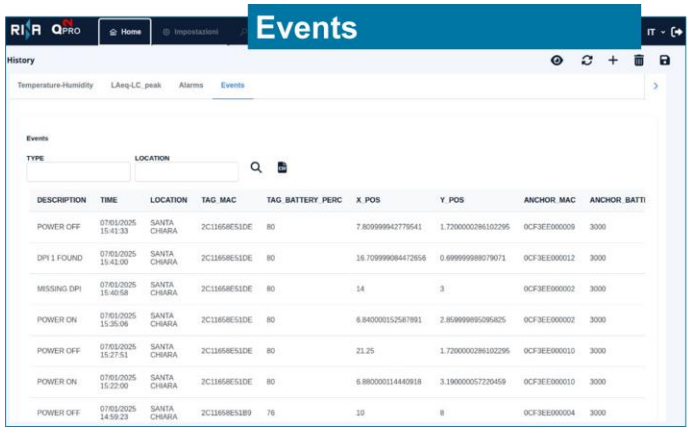
This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

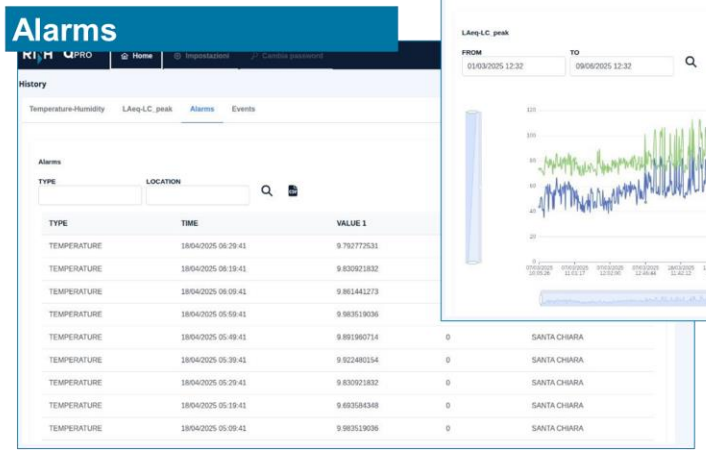
Resilience Dashboard | Historical Module

The "Historical" module consists of 4 submodules and allows to explore historical data related to:

- Environmental parameters:
  - Temperature - humidity
  - LA equivalent - LC peak
- Alarms for exceeding pre-established thresholds
- Events from safety sensors (PPE, Anti-collision, Geofencing)







This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

Waste MGMT

PARAMETERS

Waste volume estimation (m3)	*Weight of waste (Tn)*
84,00	134,34
Number of expected different cointainers	*Available space on site to store waste (% of total construction site)*
4	17,7%
Construction year Italy	*Type of work*
Period 1	Partial demolition
Most connection types to be dismantled	*Removables*
Hard chemical	21,00%
Distance to nearest recycling facilities (kg CO2) - INERT	*Distance to nearest recycling facilities (kg CO2) - MIXED WASTE*
14,95	5,33
Distance to nearest recycling facilities (kg CO2) - SPECIAL WASTE	*Distance to nearest recycling facilities (kg CO2) - WOOD*
10,27	5,33
Distance to nearest recycling facilities (kg CO2) - SCRAP	*Distance to nearest recycling facilities (kg CO2) - ASPHALT*
44,33	30,29
Contribution to Climate Change	*Level of transformation required for recycling/reuse*
-49,77	Contaminated
Distance to nearest recycling facilities (€) - INERT	*Distance to nearest recycling facilities (€) - MIXED WASTE*
13,9265	4,9651
Distance to nearest recycling facilities (€) - SPECIAL WASTE	*Distance to nearest recycling facilities (€) - WOOD*
9,5669	4,9651
Distance to nearest recycling facilities (€) - SCRAP	*Distance to nearest recycling facilities (€) - ASPHALT*
9,5669	27,2475

DEMOLITION ANALYSIS

NETSCORE

DEMOLITION TYPE: Selective demolition is recommended only if the reuse of construction and demolition waste (CDW) is planned on-site

AR/VR Training Suite

This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

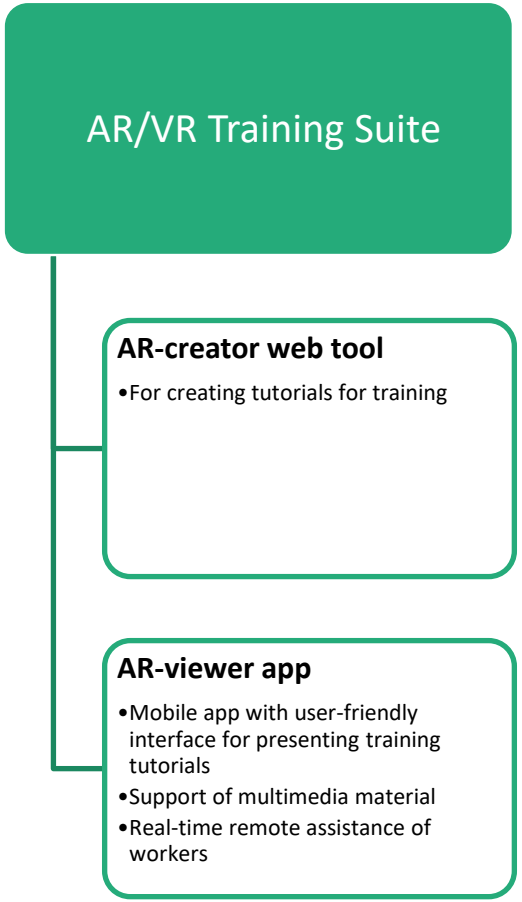
AR/VR Training Suite

Goal

"Empowering next-level training through augmented/virtual reality"

What is the AR/VR Training Suite?

A suite of tools that leverages augmented reality services to train workers on new technologies or procedures in a simulated environment.



This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

AR/VR Training Suite | Applications

- Critical procedure tutorials
- Step-by-step task guidance (installation, assembly, maintenance, etc.)
- Reminders on infrequent tasks
- Real-time remote assistance to workers through video calls
- Presentation of additional information & safety alerts

This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

AR/VR Training Suite | Advantages

Advantage #1

- No need for new workers to be on-site to execute a training tutorial

Advantage #2

- Ideal for new and inexperienced users (on-screen hints provided)

Advantage #3

- Use of multimedia material such as images, videos, 3D models, animations, documents

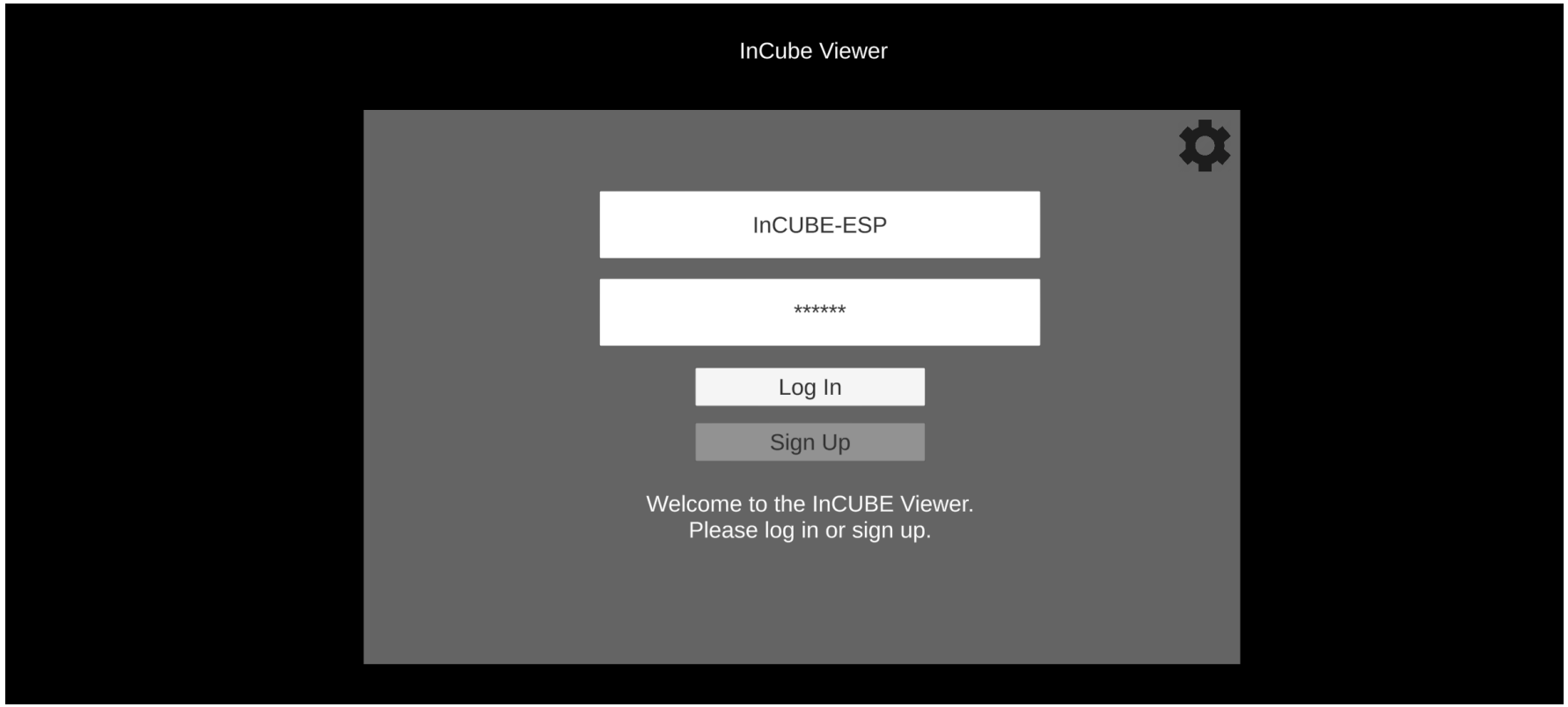
Advantage #4

- AR-mode: Viewing 3D models within the real-world through camera

This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

AR/VR Training Suite | AR Viewer

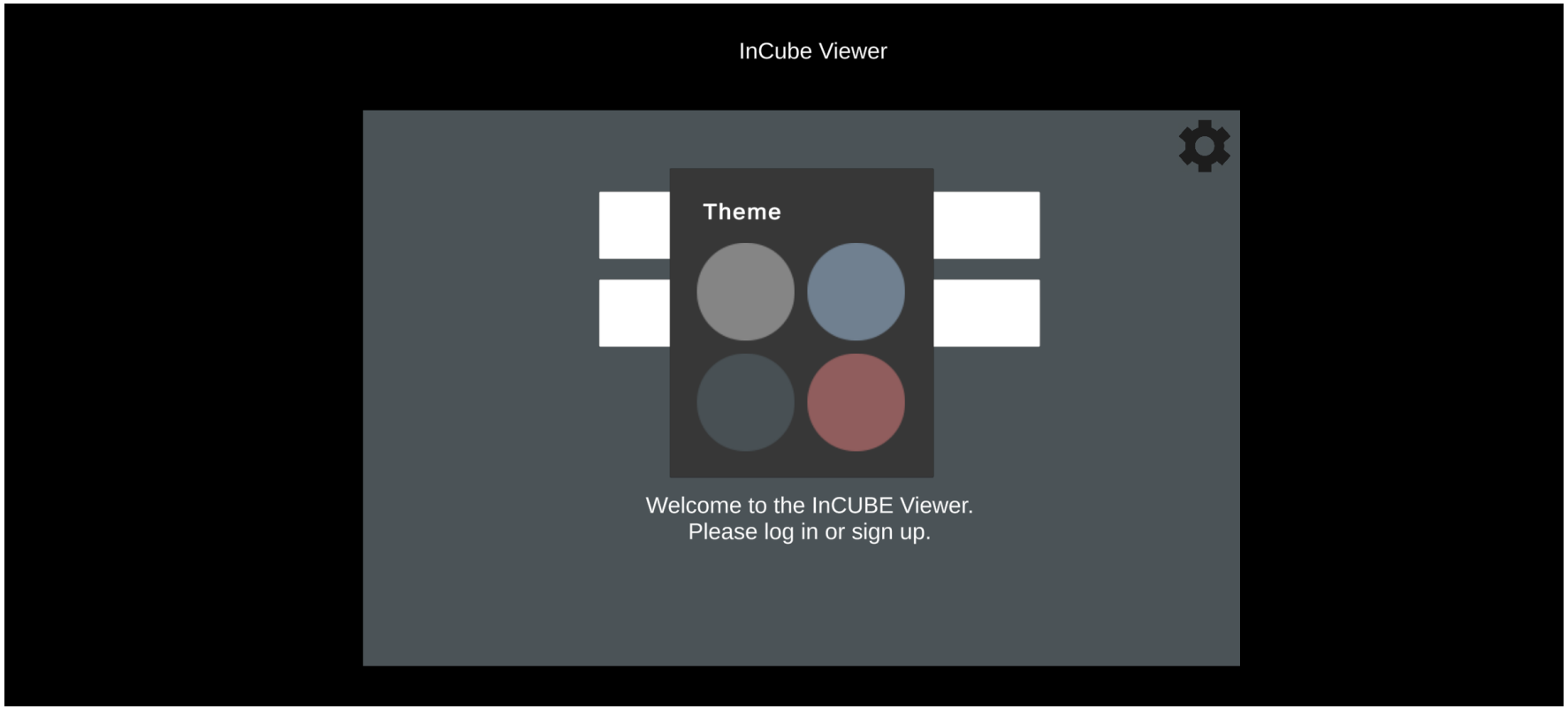
AR Viewer User login



This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

AR/VR Training Suite | AR Viewer

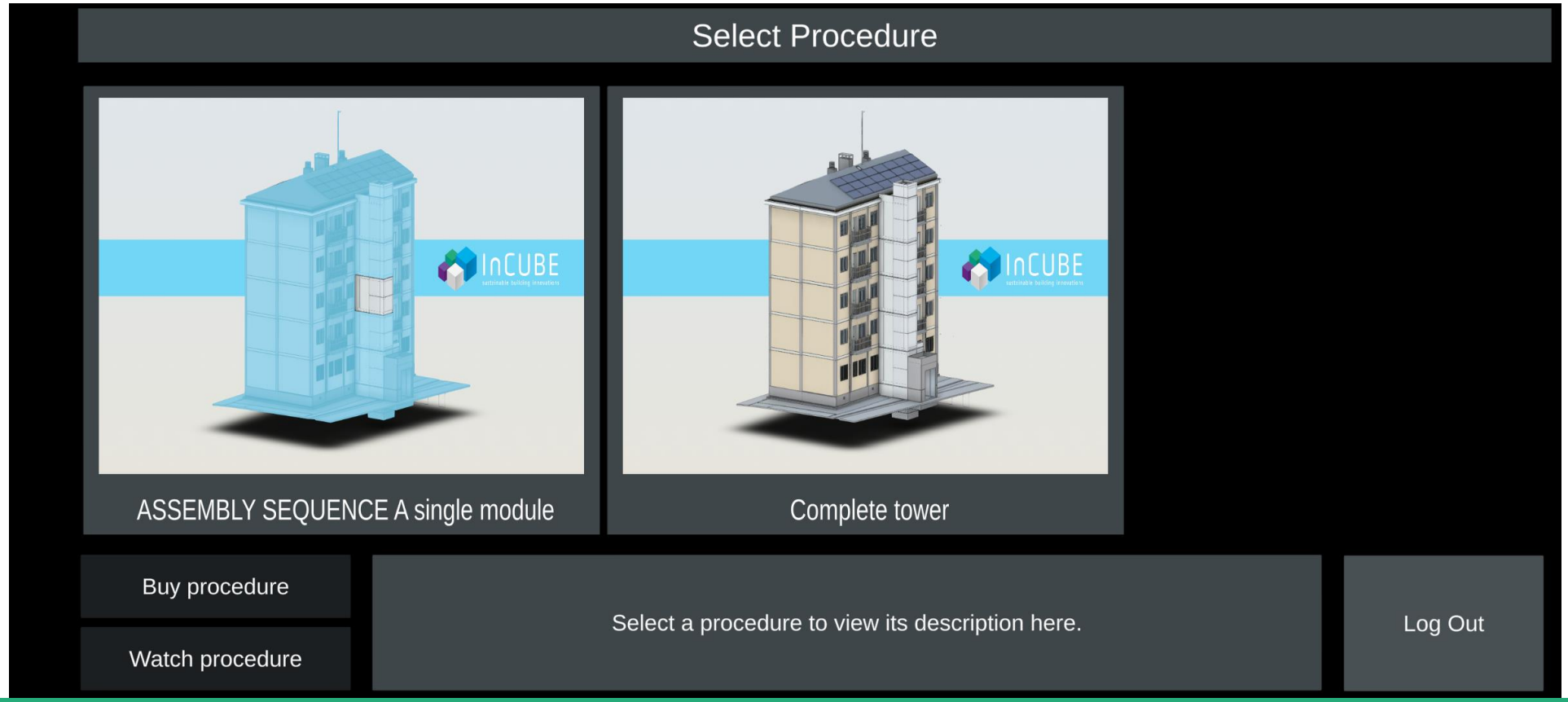
AR Viewer: Colour theme selection



This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

AR/VR Training Suite | AR Viewer

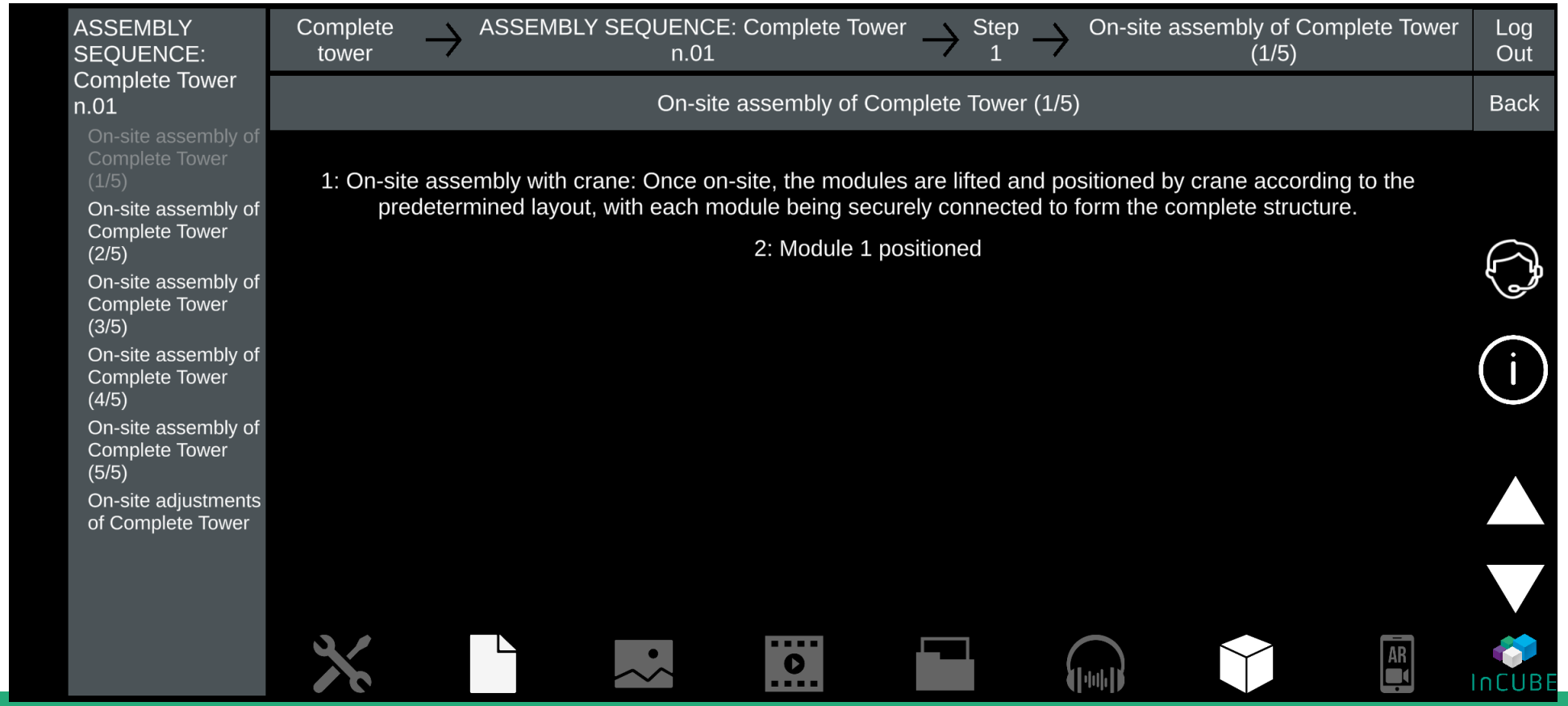
AR Viewer: Tutorial selection



This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

AR/VR Training Suite | AR Viewer

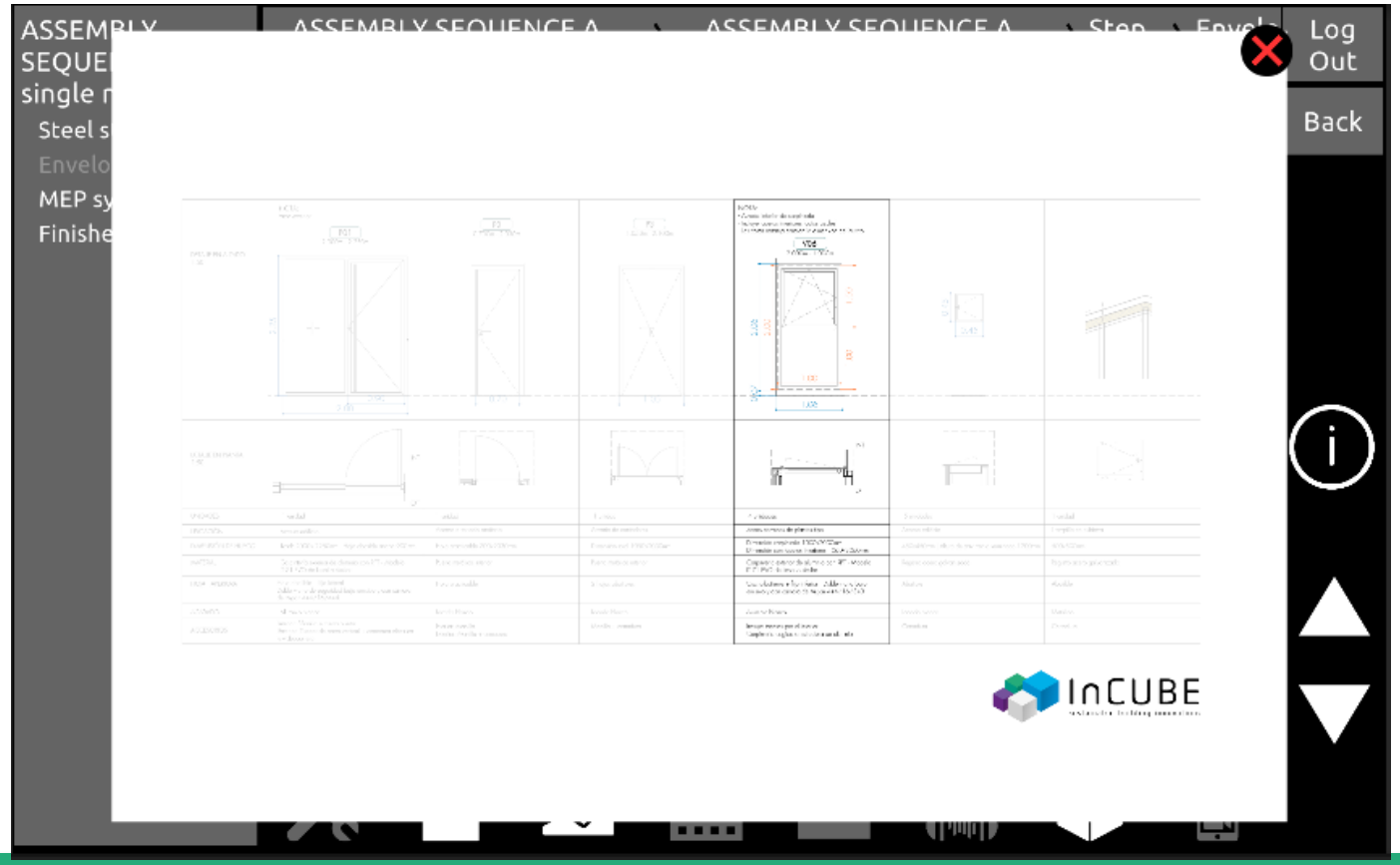
AR Viewer: Tutorial of process presented in steps



This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

AR/VR Training Suite | AR Viewer

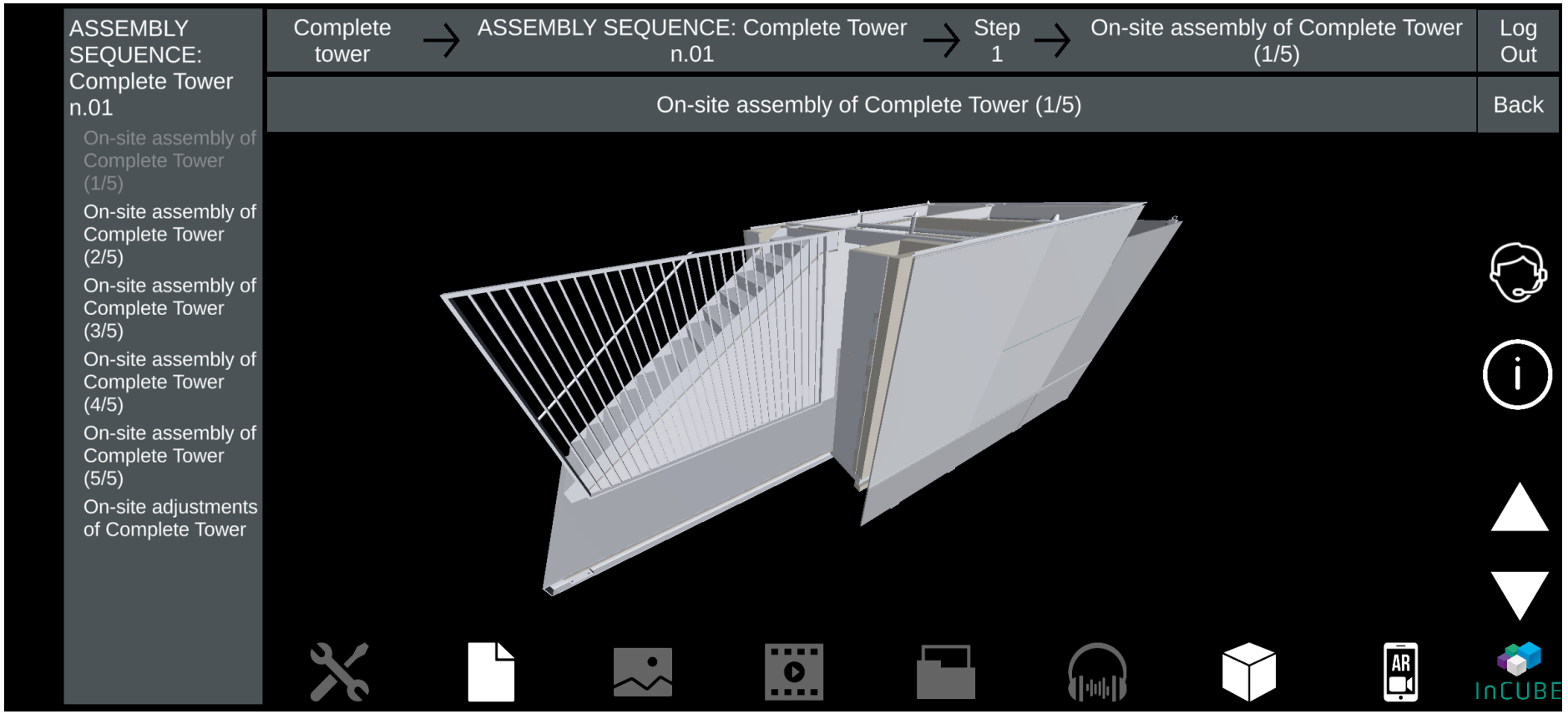
AR Viewer: Display of images



This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

AR/VR Training Suite | AR Viewer

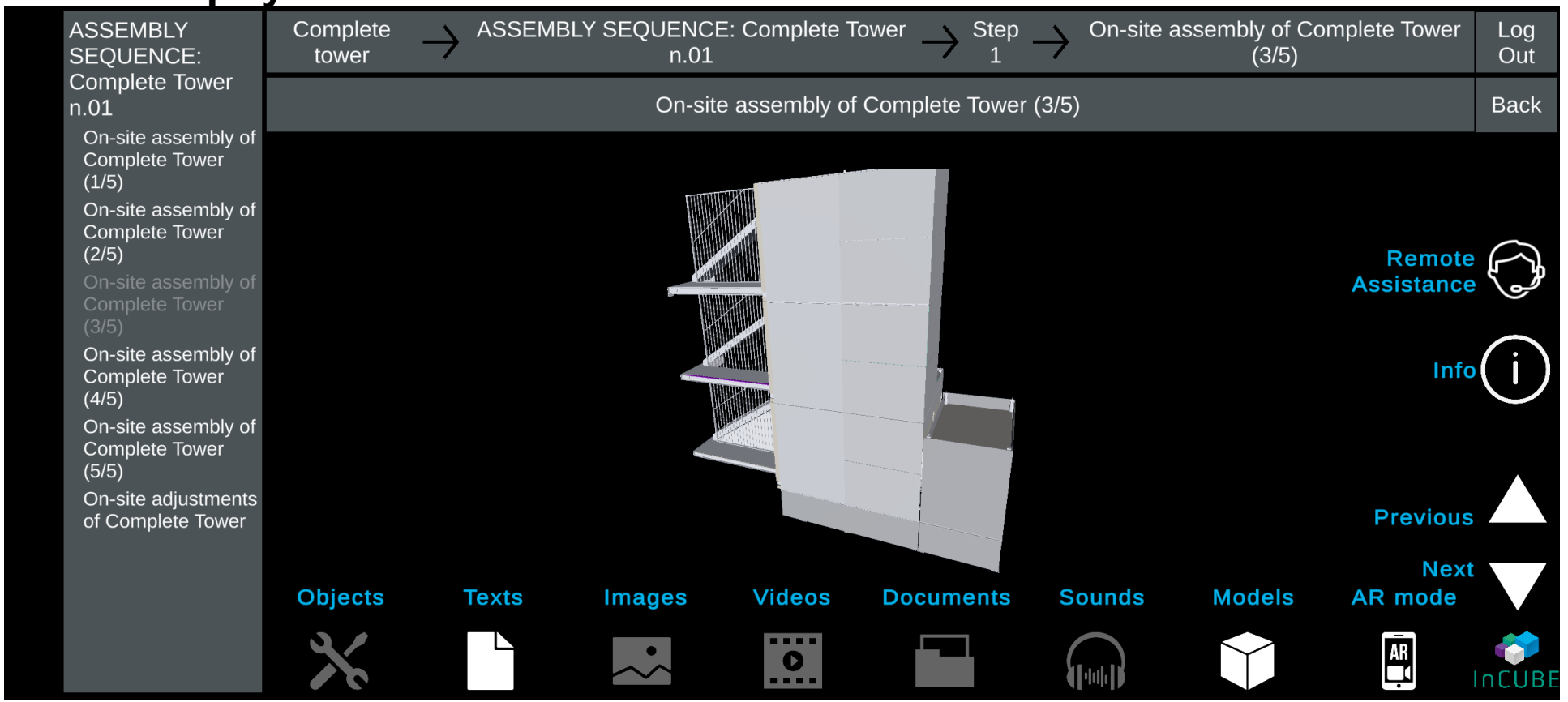
AR Viewer: 3D model view



This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

AR/VR Training Suite | AR Viewer

AR Viewer: Display of Hints



This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

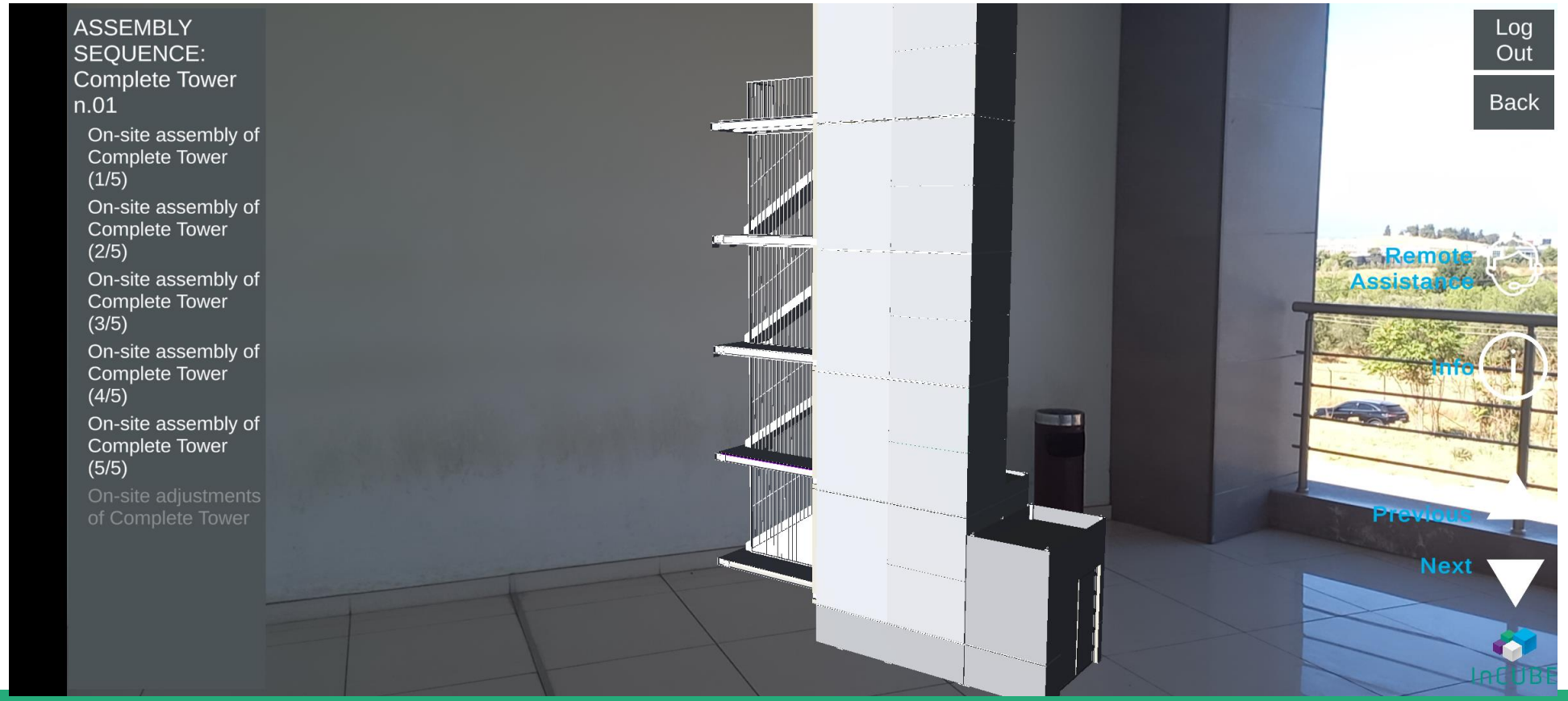
AR/VR Training Suite | AR Viewer

AR Viewer: Augmented Reality mode

This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

AR/VR Training Suite | AR Viewer

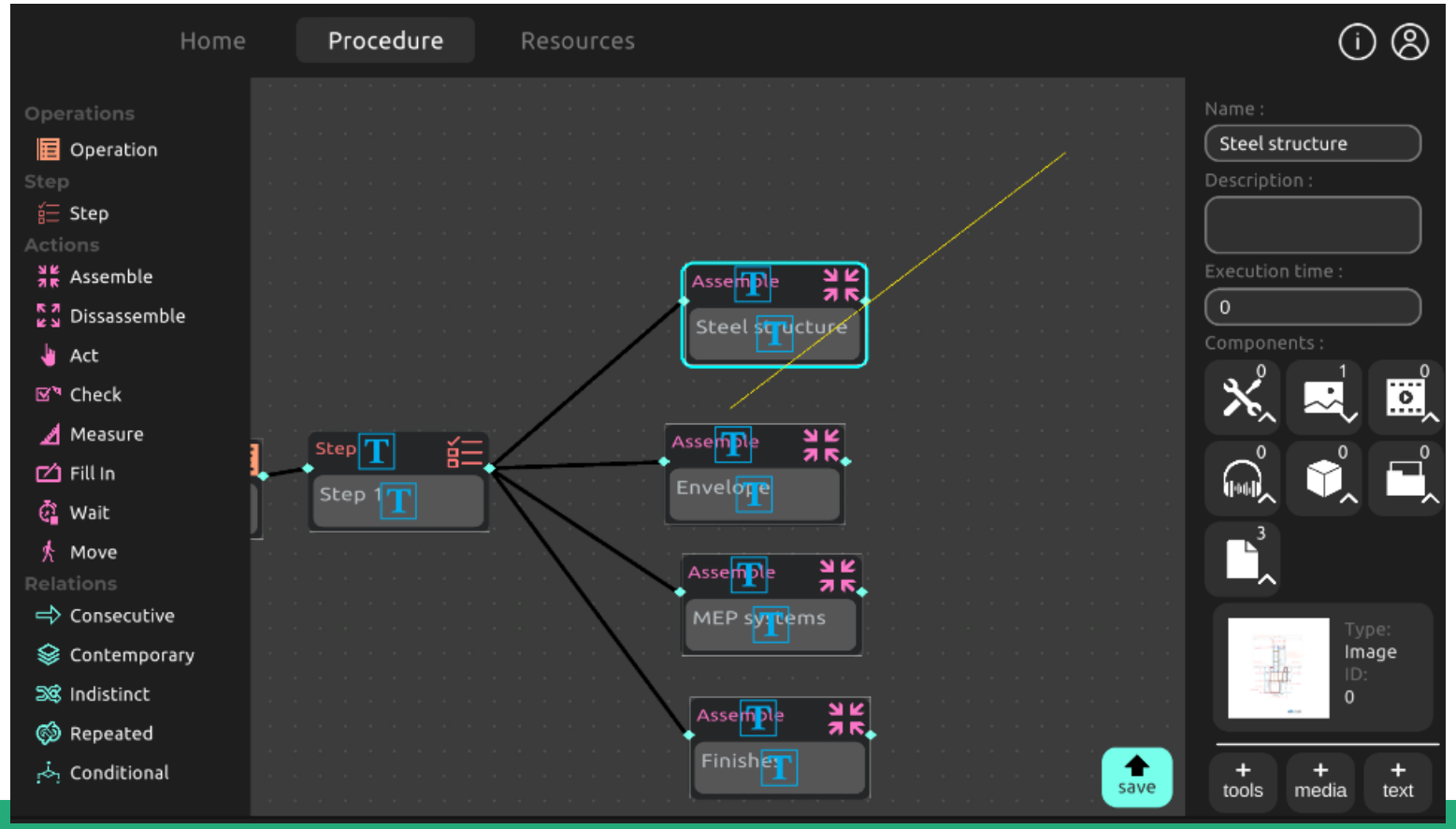
AR Viewer: Augmented Reality mode showing 3D model



This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

AR/VR Training Suite | AR Creator

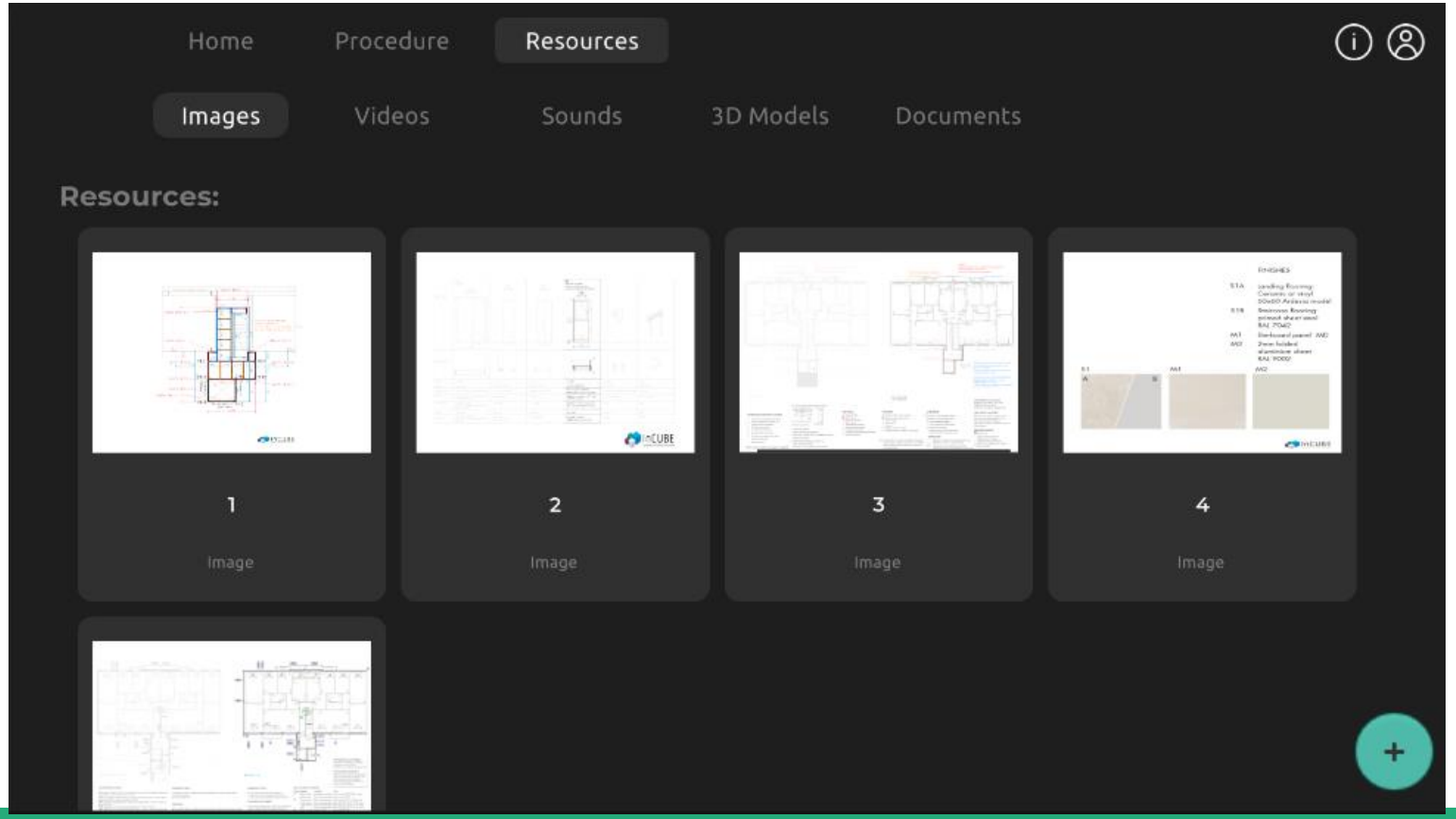
AR Creator: Designing the structure of a tutorial



This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

AR/VR Training Suite | AR Creator

AR Creator: Adding resource files in a tutorial



This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

Thank you!

R-Guide & Resilience Dashboard
Carlos Daniel Huertas Caballero
carlos.huertas@rina.org

AR/VR Training Suite
Stelios Zikos
szikos@iti.gr

This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.

This project is funded by the European Union’s 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors’ view only and the European Commission is not responsible for any use that may be made of the information it contains.

www.incubeproject.eu

This project is funded by the European Union's 'Horizon Europe Research & Innovation programme' under grant agreement no. 101069610. This publication reflects the authors' view only and the European Commission is not responsible for any use that may be made of the information it contains.