CAPACITY BUILDING PROGRAM FOR SUSTAINABLE RECONSTRUCTION - REBUILD

Deliverable 3.1
Report Study visit in Bologna

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Technical References

Project Acronym	REBUILD
Project Title	Capacity Building Program for sustainable reconstruction
Project Coordinator	IIPLE
Project Duration	24 months (01.01.2025 – 31.12.2026)

Deliverable No.	3.1
Dissemination level [1]	PU - Public
Work Package	3
Task	Study visit in Bologna
Lead beneficiary	ECECE
Contributing beneficiary(ies)	IIPLE - UNIBO
Due date of deliverable	31.10.2025
Actual submission date	

[1] PU = Public

PP = Restricted to other programme participants (including the Commission Services)

RE = Restricted to a group specified by the consortium (including the Commission Services)

CO = Confidential, only for members of the consortium (including the Commission Services)

Document history

V	Date	Beneficiary	Author
1	10.10.2025	IIPLE	Giulia Pazzaglia
2	17.10.2025	IIPLE	Luisa Sileni
3	21.10.2025	UNIBO	Lorenzo Stefanini
4			

Table of contents

SUMMARY

REBUILD – *Capacity Building Program for Sustainable Reconstruction* is an **international cooperation initiative** co-funded by the **Erasmus+ Programme of the European Union** (Action: *Capacity Building in the Field of Vocational Education and Training – CB-VET*).
The project aims to **strengthen and modernise Vocational Education and Training (VET) systems** in **Ukraine, Georgia, and Moldova**, three Eastern Neighbourhood countries not associated with Erasmus+, through the **transfer of European knowledge, skills, and best practices** for **sustainable and resilient reconstruction**.

Objectives and Rationale
The recent crises and natural disasters affecting Eastern Europe have highlighted the urgent need to **rebuild infrastructure and communities** in ways that are **environmentally sustainable, socially inclusive, and technologically advanced**.
REBUILD responds to this challenge by promoting **capacity building** and **skills development** in the construction and training sectors, with a special focus on the **green and digital transitions**.
The project's **overall objective** is to support **sustainable reconstruction and resilience-building** through enhanced cooperation between **VET providers, industry actors, and public authorities**.
It seeks to strengthen **institutional capacity**, foster **innovation in teaching and learning**, and ensure that VET systems are better equipped to meet labour market needs in post-crisis contexts.

Key Focus Areas
REBUILD's training programme addresses **four core areas** essential to sustainable reconstruction and the modernisation of VET systems:

1. **EU Regulations and Standards**
   Understanding European policies, directives, and technical standards related to energy efficiency, construction quality, and environmental performance.
2. **Economic Tools and Access to Funding**
   Introducing financial instruments, incentives, and funding mechanisms that support reconstruction, innovation, and skills development.
3. **Reconstruction Techniques and Sustainable Building Practices**
   Promoting innovative and resilient construction methods, use of green materials, energy-efficient technologies, and circular resource management.
4. **Digital Innovation in Construction**
   Developing competences in **Building Information Modelling (BIM)**, **digital monitoring**, and **data-driven management systems** to improve quality and transparency in reconstruction projects.

Implementation and Methodology

REBUILD combines **research, training, and transnational cooperation**.

It begins with a **comprehensive needs analysis** in the partner countries to identify gaps in skills, policies, and infrastructure. Based on this, partners will co-develop **modular training content** to be delivered via a **dedicated Moodle platform**, allowing flexible and open access for VET trainers and learners.

The digital training programme will be complemented by **face-to-face activities** such as **international exchanges**, **study visits**, and **expert seminars** that promote **practical, experience-based learning**.

A highlight of the implementation phase is the **Italian Study Visit (Bologna, September 2025)**, hosted by **IIPLE – Construction School of Bologna**, which will showcase real-life case studies of sustainable reconstruction and innovative training models.

Expected Results and Impact

REBUILD will deliver tangible results at multiple levels, individual, institutional, and systemic:

- **Enhanced competences** of VET trainers and educators in sustainable construction, green technologies, and digital innovation;
- **Improved cooperation** between VET institutions, construction companies, and policy makers, strengthening the bridge between education and employment;
- **Creation of digital learning resources** and open-access materials adaptable to diverse national contexts;
- **Support for social resilience** and sustainable recovery in post-crisis regions through improved local skills and expertise;
- **Promotion of innovative teaching methods** such as project-based learning and cross-country peer exchange;
- **Sustainability of results** ensured through a long-term strategy and a **Memorandum of Understanding** among partner organisations.

Strategic Relevance

REBUILD aligns with major **European policy frameworks**, including the **European Green Deal**, the **Digital Education Action Plan**, and the **European Year of Skills**.

By connecting **education, innovation, and sustainability**, the project contributes to the EU's broader objectives for a **green, digital, and inclusive transition**.

REBUILD is not only about rebuilding physical structures: it is about **rebuilding systems, competences, and resilience**. It empowers institutions and professionals to lead reconstruction efforts that are **environmentally responsible**, **technologically advanced**, and **socially fair**.

In doing so, REBUILD positions itself as a **catalyst for transformation** in the Eastern Neighbourhood region, promoting a new generation of **skilled professionals and educators** capable of shaping the future of sustainable reconstruction.

1. AGENDA

Capacity Building Program for sustainable reconstruction – REBUILD PROJECT

Study Visits

*After completing the first technical Work Package 2 (**Deepening Knowledge through Targeted Analyses**), led by University of Bologna, Work Package 3 (**Contents design, digitalisation and platform creation**) starts in July 2025, led by ECECE.*

During the Study Visit, from the 9th to the 11th of September 2025, participants will have the opportunity to observe firsthand examples of good practices and reconstruction techniques implemented.
Site visits will providing practical insights into effective approaches to preservation and revitalization.
Complementing the site visits, lectures dedicated to the topic will offer additional context and guidance.

Study Visit Program From the 9th to the 11th of September 2025			
TIME (CET)	**ACTIVITY**		**Additional info**
08 Sep 2025 Late afternoon	*Arrivals and check in at the hotel*		
09 Sep 2025	**1st day of Study Visit**	*IIPLE (Project Coordinator)*	
9:15 am	**3rd Coordination meeting at UNI BO**	*University of Bologna (PP2)*	*Where: room BEA at Campus Risorgimento, via Ugo Foscolo n. 7*
	Technical Visits in Bologna:		
11:30 am	**Chiesa San Francesco**		*Via Ugo Foscolo n. 7 Bologna*
1pm	*Lunch buffet offered by IPPLE at UNI BO*		*20 minutes walking (Via dell'Indipendenza 7 angolo via Altabella 4, Bologna)*
2:30 pm	**Visit "sottotetto Cattedrale San Pietro"**		*Via Pompeo Scipione Dolfi 7, Bologna*
4 pm	**Visit to Open Project**		*Via Gramsci, Bologna*
4:30 pm			

	Visit to worksite "Studentato Gramsci"		
09 Sep 2025 Evening			
10 Sep 2025 **8:30 am** **9:00 am** **10:30 am**	**2nd day of Study Visit** **Visit of IIPLE** *Transfer to Ravenna* **Technical Visit in Ravenna: Faculty of environmental sciences** *Light Lunch in Bagni di Romagna*	*IIPLE (Project Coordinator)* *University of Bologna (PP2)*	*Via del Gomito 7 Bologna* *1 hour transfer*
10 Sep 2025 Afternoon	***Transfer to Spoleto*** *Visit of the town of Spoleto*	*IIPLE (Project Coordinator)*	*4 hours transfer*
10 Sep 2025 Evening	*Joint dinner in Spoleto (paid by participant) - 900 casual restaurant*		
11 Sep 2025 **9:30 am** **11:30 am** **1 pm**	**3rd day of Study Visit** **Technical Visit in Spoleto:** **Convento e Chiesa di S. Maria di Costantinopoli, comune di Cerreto di Spoleto** **Abbazia di Sant'Eutizio** *Light lunch*	*University of Perugia (Associated partner)*	*Località Piedivalle, 06047 Preci PG*
11 Sep 2025 Afternoon	**Transfer to Bologna**	*IIPLE (Project Coordinator)*	*5 hours transfer*
12 Sep 2025	*Check out and departure from Bologna*		

2. REPORT ON THE ITALIAN STUDY VISIT

The REBUILD Italian Study Visit, hosted by IIPLE – Construction School of Bologna, **from 9 to 11 September 2025**, marked a significant milestone in the implementation of the **REBUILD – Capacity Building Program for Sustainable Reconstruction** project. As a core activity within the project's knowledge exchange framework, the visit provided participants from Ukraine, Moldova, and Georgia, the three partner countries most affected by recent crises, together with representatives from Poland and Italian experts, with a first-hand immersion into **European best practices in sustainable and resilient reconstruction.**

The event, structured around **technical site visits, thematic workshops, and peer-learning sessions**, combined academic insights and practical demonstrations to highlight the interconnection between education and reconstruction, skills development and innovation, and the green and digital transitions shaping the construction sector in Europe. It also strengthened **transnational cooperation among VET institutions, public authorities, and professional organisations**, which is one of the central pillars of REBUILD.

<u>**Challenges and Opportunities in Sustainable Reconstruction**</u>

During the study visit, participants identified a series of systemic and operational challenges that are particularly relevant to post-crisis reconstruction in Eastern Europe.
Among these were the **limited alignment between national policy frameworks and technical implementation, the shortage of skilled professionals trained in sustainable construction techniques, and the fragmented adoption of green materials and energy-efficient solutions** in rebuilding processes.

Experts and host institutions also underlined the importance of integrating resilience principles, including **seismic safety, adaptive design, and circular resource management**, into both infrastructure planning and training curricula for VET students and professionals.

At the same time, the discussions brought to light significant opportunities emerging from the current European policy landscape. The EU Green Deal, the Renovation Wave initiative, and the European Year of Skills have generated unprecedented momentum for greening the built environment, enhancing digital capacity, and strengthening vocational excellence. Participants observed that technological advances such as **Building Information Modelling (BIM), digital twin applications, and renewable energy integration** provide a scalable foundation for sustainable reconstruction.

The study visit reaffirmed that **multi-stakeholder collaboration**, between education providers, enterprises, local governments, and research bodies, is essential to ensure both knowledge transfer and long-term resilience. This cooperative model, already central to IIPLE's regional training ecosystem, was recognized as a reference point for the partner countries seeking to modernise their VET systems.

<u>Insights into Green and Digital Transitions</u>

The Italian experience offered tangible illustrations of how the construction and VET sectors are evolving in response to digitalisation and sustainability imperatives.
Through guided visits to selected REBUILD **case studies** participants observed how **innovative design, energy efficiency, and heritage preservation can be harmonised in post-crisis contexts.**

Technical demonstrations showcased the application of digital monitoring systems, BIM-based project management, prefabricated modular structures, and low-impact materials. These examples revealed how data-driven design and Life Cycle Assessment (LCA) methodologies can reduce waste, extend building lifespan, and support compliance with Circular Economy principles and CAM (Minimum Environmental Criteria) requirements, an area in which IIPLE is highly active.

Peer discussions focused on how these approaches could be adapted and transferred to the Ukrainian, Moldovan, and Georgian contexts, taking into account differences in regulatory environments, available materials, and educational infrastructures. Participants emphasised the need to **upskill VET teachers and trainers in digital tools, green technologies, and competency-based learning methods, ensuring that sustainability principles become a core component of vocational education and training rather than an optional specialization.**

<u>Preliminary Outcomes and Implications for REBUILD</u>

The study visit generated strategic insights that will directly contribute to the project's Work Package 3 – Content Design, Digitalisation and Platform Creation.
Field observations, expert exchanges, and focus group discussions provided input for the design of training modules and digital resources addressing topics such as sustainable design, energy and resource management, heritage preservation, disaster risk reduction, and community resilience planning.

The visit also reinforced the REBUILD consortium's commitment to experience-based learning, where real-life case studies and hands-on applications complement theoretical instruction. This approach is crucial to preparing **a new generation of VET learners and professionals capable of leading sustainable reconstruction processes in post-crisis environments.**

Furthermore, the event strengthened institutional linkages between IIPLE and the partner VET centres, paving the way for joint capacity-building initiatives, digital platform exchanges, and **pilot training sessions that will test the newly developed REBUILD curricula.**
Participants agreed that the Italian Study Visit should serve as a model of inter-country cooperation, aligning education, innovation, and sustainability goals in line with EU policy frameworks and the broader objective of promoting green, inclusive, and resilient recovery in the VET sector.

3. SITES VISITED

Bologna (Emilia-Romagna):
(I) Basilica of San Francesco
(II) Cathedral of San Pietro
(III) Open Project

Ravenna (Emilia-Romagna):
(IV) Environmental Sciences Headquarters and campus expansion

Umbria (Municipalities of Spoleto & Preci):
(V) Church of St. Mary of Constantinople
(VI) Monastic Complex of San Eutizio.

I. CHURCH OF SAN FRANCESCO, Bologna

The Basilica of S. Francis stands as a testament to the early adoption of French Gothic architectural principles in Italy, particularly evident in features such as the flying buttresses, the polygonal apse with radiating chapels, and the use of ogival arches.
The damage sustained during the 2012 earthquakes, particularly to the flying buttresses and façades, is a sobering reminder of the vulnerability of historic monuments to natural disasters. Restoration interventions aim to stabilise the façades and vaults, demonstrating the ongoing commitment to preserving this architectural treasure for future generations.

The Basilica of St. Francis in Bologna is widely recognized as one of the earliest and most faithful examples of French Gothic architecture in Italy. The construction of the church and convent was largely supported by public funds and received direct papal approval. In a brief dated May 28, 1237, Pope Gregory IX praised the Podestà and the Municipality of Bologna for granting the Franciscans the desired land.

The decision to build the Basilica outside the second city walls ("dei torresotti") was not merely pragmatic, but reflected a broader trend in the early Middle Ages. Mendicant orders, such as the Franciscans, which emphasized direct involvement with the population and often operated outside traditional monastic cloisters, needed large spaces for preaching and meetings. Cities were already dense, so peripheral locations offered the necessary land.

The beginning of construction dates back to 1236 or 1240. The high altar was consecrated surprisingly early, in 1251, by Pope Innocent IV. The church was largely completed in 1263, although

some sources suggest completion in 1269. This rapid construction for such a monumental building underscores the fervour and resources devoted to the project, despite its complexity.
The construction was not without challenges. In August 1254, two archivolts in the central nave collapsed, killing 16 people, including two monks. The arches were rebuilt in 1255, and the church was enlarged at this time. The municipality provided substantial subsidies for the rapid repairs, highlighting the community's commitment to completing the project.

The Basilica of St. Francis in Bologna is a remarkable architectural synthesis, primarily celebrated as the "first example in Italy of French-derived Gothic style." However, its façade retains strong Romanesque-Gothic forms, dating back to around 1250, showing a transitional phase common in medieval Italian architecture.

Figures 1 and 2: vintage photo, left, and positioning of the props, right

The exterior is characterized by its Romanesque-Gothic façade. While the original article mentions a "Lombard Gothic façade", research points to a fusion of Romanesque and French Gothic influences, making the description "Lombard" less accurate in this context. The façade underwent restoration in the second half of the 19th century (completed in 1905) and after severe war damage in 1943. The external portico, completed in 1646, features lunettes depicting scenes from the life of St. Anthony of Padua, adding a later Baroque layer to the medieval structure.

A key feature reflecting French Gothic influence is the presence of "flying buttresses." These external supports absorb the lateral thrust of the high vaults, allowing for thinner walls and larger windows, a hallmark of Gothic cathedrals. The interior is articulated by octagonal pillars, which support the cross vaults. The choir features a polygonal apse with an "apse ambulatory with a crown of nine radiating chapels," a direct adaptation of French Gothic design that was rare in Italy at the time, demonstrating a bold architectural choice.

The Basilica is the second largest Franciscan church in terms of size, artistic and historical importance, and its construction was finally completed in 1263. The Basilica is the first church in Italy with three naves in pure ogival style, measuring approximately 63 m in length and 27 m in width. Documents attest to the construction of the radial or apsidal chapels between 1330 and 1348. The Basilica has three naves with an east-west axis. The apse consists of a choir, ambulatory, and nine radial chapels. Outside, a series of flying buttresses unfolds on the east side.

The vertical load-bearing structure is made of ordinary masonry with bricks fired in the Corticella kilns; the stone and sandstone used to build the load-bearing columns of the apse come from the Varignana quarries. The attic consists of masonry vaults and the roofs of the three naves are made of solid wood, with reinforced concrete trusses inserted into the roof of the central nave, following damage caused during the last world war.

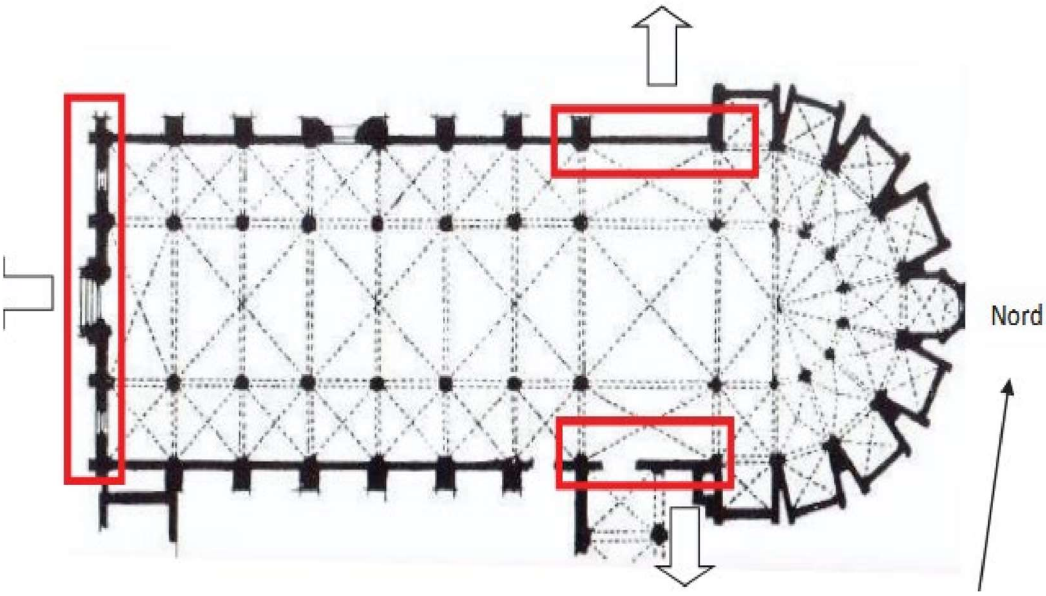
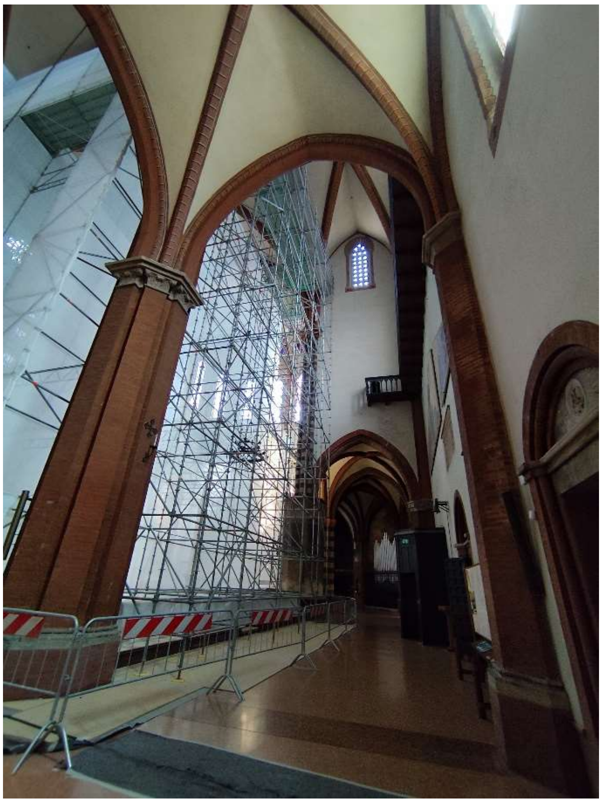


Figure 3: areas of intervention

The earthquakes that struck the Emilian Po Valley in 2012 caused very evident cracking both inside and outside the Basilica of St. Francis.



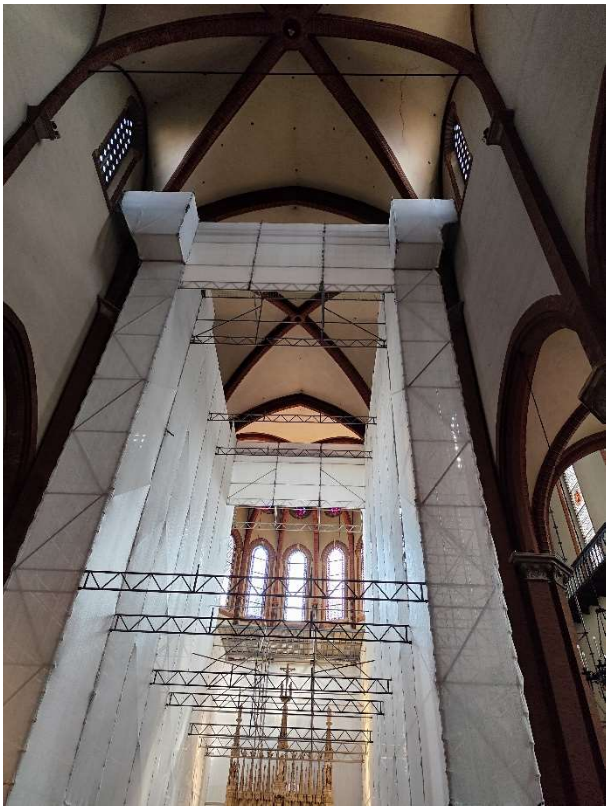


Figure 4 e 5: the internal construction site of the Basilica of San Francesco

Obvious damage caused by the earthquake can be seen in the flying buttresses on the north side, which are no longer able to fully counteract the pressure of the central nave roof, as well as widespread damage to the concrete and glass infill panels on the north and south sides of the central nave. The purpose of the planned interventions is to restore the balance of the west-facing façades on Piazza San Francesco and the portions of the north and south-facing façades limited to the transept area, at the wooden walkways that allow access to the attic of the side aisles. The main cause of damage to the vaults and façades mentioned above is, in fact, due to the "dragging" of the aforementioned façades out of their plane as a result of the orthogonal actions on the walls caused by the earthquake.

II. CHURCH OF SAN PIETRO, Bologna

San Pietro Cathedral is located in the historic centre of Bologna. The church has a rectangular layout (49 by 60 meters) with three naves and side chapels. The central nave is 25 meters wide and 40 meters high. The cathedral's origins likely date to the 4th century, but its existence is documented from the 11th century.
The timber roof is supported by eighteen large trusses, most from the 17th century, with two from the 18th century. These trusses are unique for their size and structural design, featuring a discharging arch system and additional supports resting on the lateral walls.

San Pietro Cathedral in Bologna is located on the city's main street, Via dell'Indipendenza, in the core of the old town.

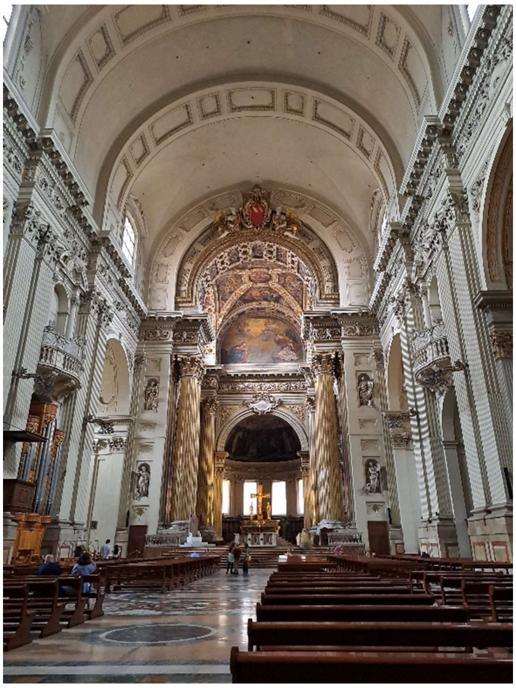
The church layout is inscribed in a rectangular 49 meters wide and 60 meters long. Its interior space is composed of three naves with side chapels. The central nave has a width of about 25 meters and a height of 40 meters, while the side naves measure about 5 meters. The central nave is made up of five rectangular bays covered with barrel vaults supported by 5-meter square brick pillars.

The origin of San Pietro's Cathedral probably dates back to the first decades of the 4th century, while its existence has been documented only since the first half of the 11th century. In 1141, the church was destroyed by fire and rebuilt according to a three-nave triapsidal basilica layout. In 1254, the bell tower was finished, and in 1570 the presbytery was designed and rebuilt by architect Domenico Tibaldi.

Subsequently, construction work was suspended, and it restarted only in 1613 when Bishop Niccolò Ludovisi finally approved Donati's design. The 16th-century antechorus and Romanesque naves were demolished, and a large hall for the faithful and two minor side naves were built, resulting in a five-nave church with central bays punctuated by square masonry pillars. The completion of the new Cathedral occurred more than a century later. In 1734, the work romoted by Cardinal Prospero Lambertini began under the direction of architect Alfonso Torreggiani, and in 1744 the construction of the current Baroque façade finally started.

The Cathedral's timber roof covers the vaults of the central nave. The first supporting structure consists of eighteen 26-meter-span timber trusses, and the second roof frame is composed of 36 purlins parallel to the nave direction that support wooden planks and shingles.

The long construction history of the building explains why not all the roof trusses are coeval. In fact, sixteen of them date back to the first decades of the 17th century, while the two at the main front of the church were made in the mid-18th century, following the enlargement of the church directed by Torreggiani. These latter show evident differences from the others, such as some cross-sections of the elements and peculiar joints between them.



Figures 6 and 7: The interior of the Cathedral and the vault seen from the attic.

San Pietro's trusses are unique. They have an average span of 25.7 meters and a height of 5.6 meters and are spaced from 2.7 to 3.5 meters apart. While in the all-other case studies, trusses are of the queen post truss type, with minor variations in the number and size of beams, supports, and joints, San Pietro's ones have an additional discharging arch system; the king post divides the straining beam into two parts, and the elements are slightly inclined towards the queen posts. In addition, each tie beam is supported by a supporting trestle that rests on the lateral walls.

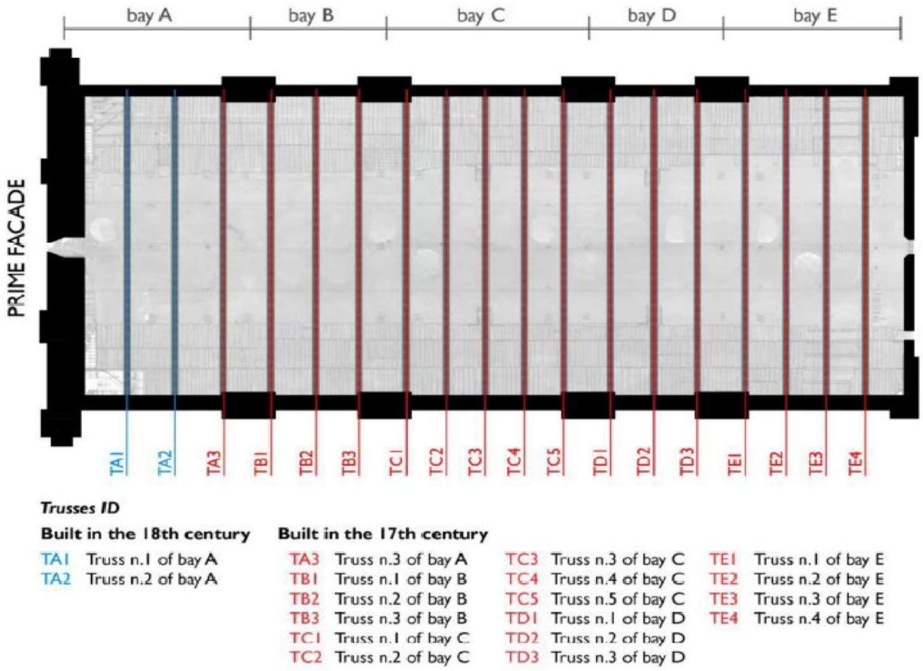


Figure 7: The roof plan of the church s nave identifies the trusses

III. STUDENT HOUSE ON VIA GRAMSCI, Bologna

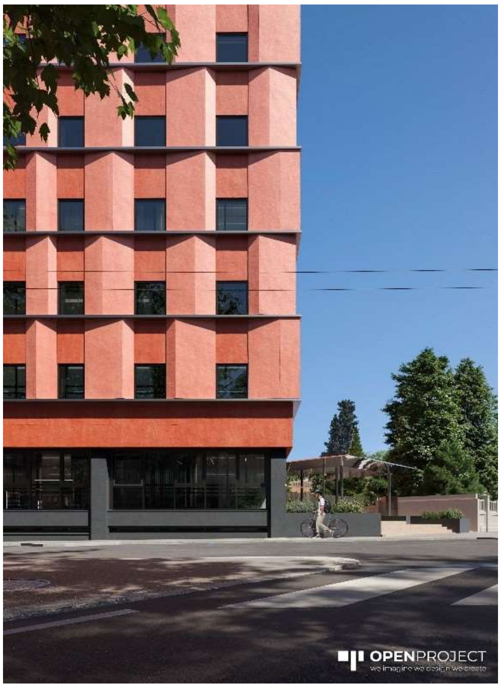
The project for the former INPS building in Bologna's historic centre addresses the pressing need for student accommodation but also exemplifies a holistic approach to urban regeneration, social responsibility, and architectural quality. The project's scope is ambitious, involving a complete strip-out of the existing structure to create 540 rooms of varying types.

Inaugurated in 1968, the new INPS (National Institute of Social Security) headquarters on Via Gramsci was designed by architect Sergio Bucci, an employee of the institution's Technical Office in Rome and also the designer of the INPS building in Ferrara.
The redevelopment of the former INPS building, situated in the historic centre of Bologna, entails a change of use from office space to student accommodation, revitalising the building and, consequently, the surrounding area.

The project involves the total strip-out of the existing building to create 540 rooms of different types. Thanks to the creation of a large internal courtyard, it will also involve the construction of an additional floor by recovering the volume demolished inside. Of the approximately 520 beds intended primarily for students, 52 beds (10% of the total) are subject to an agreement aimed at the public and general interest of providing affordable accommodation even for students whose income is insufficient to cover the costs of accommodation on the open market. In addition, upon reservation, certain services will also be made available to students of the University of Bologna and ER.GO, such as study rooms, common rooms with kitchens, and multipurpose spaces.

From a functional distribution point of view, all the common areas serving students and customers have been concentrated on the lower floors, mainly overlooking the new internal courtyard, while the rooms have been located on the first to seventh floors, overlooking both the internal courtyard and the external fronts.
For the design of the new façades, a contemporary architectural language was sought to facilitate the integration of the project into its surroundings, to improve the energy and acoustic performance of the building envelope.

Figures 9 and 10: the old solution for the facades and the current construction site



Figures 12 and 13: details of the new facades

IV. ENVIRONMENTAL SCIENCES, Ravenna Campus

The expansion of the Environmental Sciences building complex is characterized by the distinctive form of a bridge building, supported by floor-high steel pylons and trusses. It features a steel framework structure, transparent glass infill panels with perforated aluminium sunshade sand opaque infill panels.

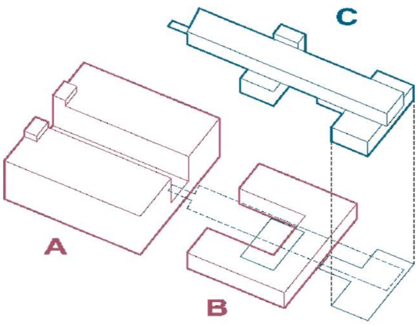
The building is located on an 18,400 square meter site granted by the Province of Ravenna to the University under building rights until 2094.
In the early 2000s, the first building intended for research laboratories was constructed, with a floor area of approximately 3,700 square meters (A). A second lot was planned, doubling the size.

In 2016, as the need to expand the research spaces ceased, the construction of teaching spaces was deemed a priority, and a second building (B - Classroom Block) with a floor area of approximately 660 square meters was constructed. Until that point, teaching had been carried out at the adjacent Higher Education School (ITAS), which, however, had begun demanding the return of its spaces.
ITAS Higher Education School subsequently requested the return of spaces previously held by the University, used as a library and teaching chemistry laboratories. So, planning an expansion of the classroom block became necessary.

The expansion program, therefore amounted to approximately 1,124 square meters on two levels (ground floor and first floor), including the construction of 4 small classrooms, 3

chemistry and biology laboratories for teaching purposes, 1 computer room, 1 library (later downgraded to a study room), 3 additional restrooms, 1 foyer with lounge area.
Since it was not possible to directly raise the classroom block for technical reasons, the creation of a "bridge" building (C) was planned, bypassing the classroom block and connecting the research laboratory building (A). Aims of environmental sustainability (minimizing the use of new soil) and the need to ensure interconnection between the different buildings addresses the project.
The building thus took on its distinctive shape with floor-high steel pylons and trusses that, bypassing the classroom block, connect via a pedestrian walkway to the research laboratories.

The building has a steel framework structure, with transparent glass infill panels shaded with perforated aluminum sunshades. The opaque infill panels are dry-built with fiber cement panels and plasterboard, clad in exposed corrugated sheet metal.
Internally, the partitions are dry-built, the staircases are steel, and the floors and walls are made of large-format stoneware. The heating and cooling systems are powered by the central heating system that serves the entire complex.



Figures 12 and 13: organization pf the building complex

Figures 14: photo from the construction site

V. CHURCH OF ST. MARY OF CONSTANTINOPLE, Spoleto

The shrine, dedicated to Our Lady of Constantinople, is part of a tradition prevalent in central and southern Italy. The complex suffered repeated damage from earthquakes, most notably in 1703 and, more recently, during the seismic events of 2016. The latter caused significant structural instability, necessitating immediate safety interventions by the fire department to prevent collapse. Further assessments in 2019 identified urgent needs for internal stabilization to avert the risk of collapse of vaulted structures.

The complex is one of a number of shrines dedicated to Our Lady of Constantinople, which are particularly common in central and southern Italy, where ethnic minorities from the other side of the Adriatic Sea were present.

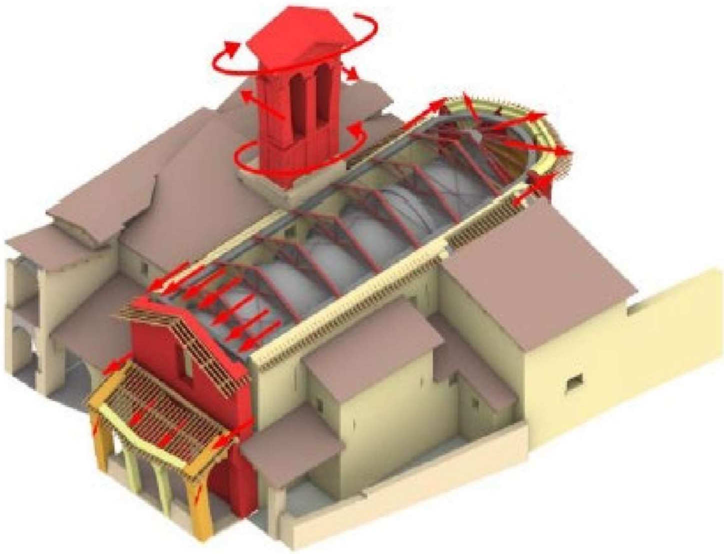
Since the 13th century, about a mile from the current church, an image of the Madonna and Child, known as "Santa Maria di Costantinopoli," was painted on a piece of wall embedded between four oak beams, near a shelter hut for grazing.
Around the image, considered miraculous, in a simple shrine along the road, a 'capannella' (small hut) was built with donations and alms from the devout, which served as a shelter for travelers, then a chapel, until in 1619 Ortensio Comandini, with the help of the faithful of Cerreto, erected a small church that included an altar and a sacristy and where festive Mass was celebrated.

The small church, which was enriched with many votive offerings and soon proved insufficient for the devotional needs of the population, was enlarged and decorated in 1650. In 1667, a bell was installed, and it was later embellished with rich decorative stucco and woodwork.

In 1688, Father Antonio di Trevi, provincial minister of the Reformed Order of Umbria, accepted the request of the authorities and inhabitants of Cerreto di Spoleto to build a convent near the ancient chapel dedicated to Mary of Constantinople. In 1703, the structures, still under construction, were damaged by a devastating earthquake; however, the work was soon completed. The complex, which had meanwhile passed to the Capuchins, suffered both Napoleonic and Italian suppression and was closed definitively in 1866. A private residence since 1880, the convent building is now used for hospitality.

Figures 15 and 16: The current construction site and the meshes for the consolidation of wall surfaces

The earthquakes of August 24th, 2016 severely damaged the church. In November 2016, to avert the danger of collapse towards the outside, posing a threat to public safety and the adjacent convent, the Terni Fire Department carried out safety measures by bracing the bell tower, works to prevent the main façade from collapsing, bracing the pillars, and shoring up the arches of the portico in front of it. In November 2019, a project was developed to implement urgent safety measures, necessary to stabilise the most compromised vaulted structures within the church and prevent the imminent possibility of internal collapse.



Figures 17 and 18: Temporary wall confinement system and the diagram of seismic actions acting on the building

The planned structural interventions, aimed both at repairing the damage caused by recent seismic events and at improving structural performance in the event of an earthquake, are of various types:

- interventions on the foundations, through the installation of micropiles and the creation of a ventilated crawl space with a reinforced slab above;
- work on the walls, involving the insertion of helical steel bars and subsequent injections of lime mortar and stitching work using materials appropriate to the type of existing masonry;
- consolidation of the bell tower, involving the installation of vertical steel tie rods;
- consolidation of the façade, through the installation of steel fiber tie rods;
- renovation of the roof, following demolition and reconstruction of the wooden floor and installation of a steel coping;
- consolidation of the triumphal arch and cross vault;
- consolidation of the rose window by means of nailing;
- work on the surfaces, both on the fresco murals by means of pre-consolidation and consolidation of the paint film and constituent layers, and on the plastered parts after a preliminary series of tests.

VI. MONASTIC COMPLEX OF SAN EUTIZIO, Preci

The Abbey of St. Eutizio is among the oldest monastic complexes in Europe, dating back 536 AD. The abbey underwent significant restoration and expansion beginning in 1180.
The entire abbey was damaged by the 1997 earthquake and subsequently restored. The complex was again severely damaged by the earthquakes of October 26 and 30, 2016, which caused the destruction of significant parts.

The Abbey of St. Eutizio, one of the oldest monastic complexes in Europe, stands on a high travertine cliff, in the center of an area that offers the most important evidence of pre-Benedictine monasticism. For several centuries, it was the inspirational center of all activities in the valley. According to Iacobilli, the monastery was founded in 536, when Eutizio became abbot "...and because he expanded it, the monastery was named after him" (Iacobilli).

From that date onwards, information is very fragmentary, but it is likely that by the year 1000 it was already the major political and economic center of the area. In fact, in a context of great economic and cultural decline, the Benedictine monks played a decisive role: they took on the ministry of caring for the souls and economic salvation of the rural populations, developing their social function linked to the rule of ora et labora, giving life to a true work of colonization of the territory on a spiritual, cultural, and economic level. Life revolved around the Abbey for the surrounding communities of Acquaro, Valle, and Collescille (villages founded by the monks themselves), which together with the monastery formed a civil and religious entity known as the Guaita di S. Eutizio. In 1180, Abbot Teodino I began work on the restoration and enlargement of the church. As attested by the inscription in the lunette of the Romanesque portal, the work was completed in 1236 under his successor, Teodino II (Abbot), who in 1200 had the magnificent rose window, typical of Umbrian Romanesque architecture, built with the symbols of the evangelists.

In 1956, the church was reopened for worship and, in 1989, it became a "house of welcome" and prayer, resuming its ancient role as a spiritual and cultural center. Inside the abbey, a museum has been set up containing paintings from nearby churches, chalices dating back to the 18th century, paters, and surgical instruments from the Preciana School of Surgery.

A small community lives in the abbey, alternating prayer with active life. They carry out apostolic work, devote themselves to working the land, and welcome tourists. At the Abbey of St. Eutizio, you can admire a collection of instruments that belonged to the Precian School of Surgery. It is believed that Precian surgical art originated as a direct emanation of the knowledge and healing arts introduced into the Castoriana Valley around the 5th century by Syriac monks and jealously guarded and handed down by the local Benedictines through the ancient medical codes preserved in the abbey's rich library, which has unfortunately been lost today.

The abbey complex overlooks two courtyards: the first, larger one, dominated by the church, is beautifully embellished by two splendid 14th-century mullioned windows. In the second courtyard, a stone transenna, carved with lozenges, dating back to the 8th century and belonging to the ancient church dedicated to the Virgin Mary, has been placed as an ornament to a fountain.

The caves where St. Eutizio and St. Fiorenzo took refuge are very evocative. They were dug into the rocky spur overlooking the abbey, on top of which the 17th-century bell tower was later erected by the papal architect Crescenzi.

Like all other Benedictine monastic complexes, the Abbey of St. Eutizio had an oratory, accommodation for the poor and pilgrims, a pharmacy, a school of paleography and miniature painting, a scriptorium, and a library rich in illuminated manuscripts.

The entire abbey was damaged by the 1997 earthquake and subsequently restored. The complex was again severely damaged by the earthquakes of October 26 and 30, 2016, which caused the destruction of significant parts.

Figure 19: Restoration of the Abbey of Sant'Eutizio – reconstruction of the rose window
Figure 20: Scaffolding and protective structures during restoration works.

Figure 21 and 22: the abbey before and after the seismic event of the 2016

Conclusion

The series of visits allowed participants to gain a comprehensive understanding of the Italian approach to reconstruction, combining heritage preservation, technical innovation, and sustainability. These experiences offered valuable references for developing training modules and policy recommendations within the REBUILD project, reinforcing the link between education, craftsmanship, and resilient rebuilding practices.

4. EXPERTS AND TECHNICAL GUIDES INVOLVED IN THE STUDY VISIT

To ensure that the Study Visits offered participants meaningful learning opportunities and high-quality technical insights, IIPLE E UNIBO involved experienced professionals and experts in the fields of architecture, engineering, conservation, sustainable design, and training.
Their participation brought strong technical depth and practical perspective, bridging the gap between theoretical principles of sustainable reconstruction and their concrete implementation in real contexts.
Each visit was guided by qualified specialists, who encouraged dialogue and exchange between the hosting institutions and the international delegation, enriching the overall learning experience.
Study Visits
During the Study Visit programme, the delegation — composed of representatives from all partner organisations — had the opportunity to visit a series of emblematic sites and institutions representing different aspects of sustainable reconstruction, heritage restoration, and innovation in the construction sector.
Each visit was conducted under the guidance of qualified experts, who provided detailed technical explanations and insights. The visits offered participants a comprehensive overview of how Italy integrates tradition, technology, and resilience in post-disaster recovery and vocational education and training (VET).

Church of San Francesco – Bologna

The visit to the Church of San Francesco was guided by **Eng. Michele Naldi**, who provided an in-depth explanation of the basilica's history and the recent restoration works.
The restoration of the Church of San Francesco in Bologna showcased advanced techniques for the structural consolidation of historical buildings affected by seismic vulnerability. Participants observed how interdisciplinary collaboration among architects, engineers, and conservators ensures that historical and artistic value is preserved while improving structural safety. The visit highlighted the importance of diagnostic surveys, digital documentation, and the use of compatible materials to maintain authenticity throughout the restoration process.

Cathedral of San Pietro – Bologna

At the Cathedral of San Pietro, the group was guided by **Eng. Angelo Massafra** from the University of Bologna, who led participants through the monumental religious complex, explaining the ongoing maintenance and seismic risk mitigation works.

The visit provided valuable insight into how preventive conservation and continuous structural monitoring contribute to the protection of cultural heritage. Eng. Massafra underlined the integration of traditional craftsmanship with modern engineering solutions, offering a practical demonstration of how innovation can enhance long-term resilience in historic buildings.

Student housing construction site, via Gramsci Bologna and Open Project headquarter in Bologna

During the tour of the student housing construction site on Via Gramsci, participants were able to delve into the technical aspects of the redevelopment project for the former INPS headquarters, as illustrated by the Open Project designers and Eng. Marco Faccini, the site manager. The project, which involves a renovation with a change of use, involves stripping out (a selective demolition process involving the removal of all non-structural elements from a building), which will result in the complete conversion of the building into student residences. It was presented as an example of sustainable urban regeneration, characterized by careful energy and acoustic design of the new façades, the use of low-impact materials, and the creation of common spaces geared toward socializing and inclusion. The Site Manager explained the architectural and structural solutions adopted to combine aesthetic quality, efficiency, and sustainability.

In addition, the delegation visited Open Project, a leading architecture and engineering firm, where **Eng. Andrea Bozzini**, Project Lead and Member of the Board of Directors, provided a comprehensive presentation of the company's activities together with Eng. Arch. Francesco Conserva, the vice president of the firm.

The visit offered a forward-looking perspective on digital design, sustainability, and energy efficiency in construction. Open Project illustrated its approach to BIM-based design, lifecycle assessment of materials, and the development of smart, low-impact buildings. Discussions focused on how digitalisation can support both new construction and heritage rehabilitation, fully aligning with the principles of the EU Green Deal.

Faculty of Environmental Sciences – University of Bologna, Ravenna Campus

At the Faculty of Environmental Sciences in Ravenna, the delegation met The designer from the Technical Office of the University of Bologna, Arch. Federico Foschi, presented the new wing that is about to be inaugurated.

The building was introduced through a classroom presentation, during which the main design features were described and images from the construction phase were shown. Participants had the opportunity to ask questions and compare their own experiences with the Italian context described.

The second part of the visit included an on-site tour of the actual building, where the designer was able to show, in the field, the outcome of the now-completed work and the results of the construction solutions that were adopted. The session emphasised the importance of research–education collaboration in training professionals capable of addressing complex reconstruction challenges through scientific rigour and innovative methodologies. The exchange of experiences also demonstrated how academic research supports practical interventions in post-crisis reconstruction (see Annex 1).

Church of Santa Maria di Costantinopoli – Cerreto di Spoleto (Umbria)

The visit to the Church of Santa Maria di Costantinopoli in Cerreto di Spoleto was led by **Eng. Massimo Tosti**, who guided the group through the restoration site and provided detailed explanations on the intervention strategies adopted.

This small-scale restoration project, carried out within a rural community, was presented as an example of community-driven reconstruction, where local stakeholders collaborated to safeguard cultural identity and traditional building practices. Participants discussed how such community-based approaches can foster resilience, sustainability, and local empowerment in post-disaster contexts.

Abbey of Sant'Eutizio – Preci (Umbria)

The Abbey of Sant'Eutizio represents one of the most significant restoration interventions undertaken after the 2016 earthquake in Umbria. The site manager, Eng. Paolo Capaldini, during the visit in the construction site, illustrated a complex and multifaceted restoration process, carried out under the High Supervision of the Superintendency of Umbria.

Participants learned how the restoration follows a meticulous documentary and archaeological approach, beginning with the post-collapse recovery phase. During this phase, the accumulated debris was analysed to identify material characteristics and collapse mechanisms — essential steps for reconstructing the original configuration of the building elements.

Each recovered fragment was catalogued, photographed, and classified: the fragments of the rose window were stored at the Deposito del Santo Chiodo in Spoleto, while masonry blocks were preserved on-site. Subsequent phases focused on the dry reassembly of the fragments, preceded by detailed 3D scanning and surveying to document geometry and assess losses.

This process represents the first step in a long-term conservation strategy, which will culminate in the final reassembly of the rose window and its reintegration into the church façade, reconstructed using a similar anastylosis-based methodology.

The case exemplifies the balance between historical integrity and structural safety, illustrating both the possibilities and limitations of anastylosis as a post-disaster reconstruction practice.

List of Experts and Technical Guides

- Church of San Francesco – Bologna
  Eng. Michele Naldi – Structural Engineer

- Cathedral of San Pietro – Bologna
  Eng. Angelo Massafra – University of Bologna

- Open Project – Bologna
  Eng. Andrea Bozzini – Project Lead and Member of the Board of Directors, Open Project.
  Eng. Marco Faccini - Site manager
  Eng. Arch. Francesco Conserva – Open Project vice president

- Faculty of Environmental Sciences – University of Bologna, Ravenna Campus
  Arch. Federico Foschi - Designer of the building

- Church of Santa Maria di Costantinopoli – Cerreto di Spoleto (Umbria)
  Eng. Massimo Tosti – Structural Engineer

- Abbey of Sant'Eutizio – Preci (Umbria)
  Eng. Paolo Capaldini - Site manager

5. PICTURES

6. CONCLUSIONS

The Italian Study Visit represented a pivotal moment in the REBUILD project's journey toward strengthening VET systems for sustainable reconstruction. Beyond the technical insights gained, the experience fostered a shared understanding among participants of **how education, innovation, and territorial resilience can be integrated into coherent reconstruction strategies.**

Through the visits to Bologna, Ravenna, and Umbria, participants were able to observe how Italy has successfully combined heritage conservation, seismic risk mitigation, and environmental sustainability within a unified framework of technical excellence and vocational training. The dialogue between institutions, educators, and professionals confirmed the importance of linking training provision with real-life construction challenges, thus ensuring that the next generation of VET learners is equipped with both theoretical knowledge and practical competences.

The study visit also reinforced the **transnational collaboration** at the heart of REBUILD, creating lasting professional networks and a shared vision for post-crisis recovery rooted in European values of innovation, inclusion, and sustainability. The lessons learned will serve as a foundation for the upcoming phases of the project, particularly the co-design of **training modules** and digital learning materials**, ensuring that the principles of green transition, digitalisation, and resilience are embedded across all partner contexts.**

Ultimately, the Italian experience demonstrated that **rebuilding is not only a technical process but a cultural and educational endeavour.** By integrating sustainability into both construction practices and training methodologies, REBUILD contributes to shaping a more responsible, forward-looking, and cohesive European approach to reconstruction and vocational education.

Capacity Building Program for sustainable reconstruction

REBUILD

Project: 101182786 — REBUILD — ERASMUS-EDU-2024-CB-VET

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