DELIVERABLE REPORT

WP2 Stakeholders' engagement

D2.2

3D PHYSICAL AND DIGITAL MODELS OF THE REAL PILOT

Duedate

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☐ PP - Restricted to other programme participants & EC:
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TYPE

☐ R - Report
☒ DEM - Demonstrator
☐ DEC Websites, patents filling, videos, etc.
☐ OTHER
☐ ETHICS – Ethics requirement
☐ OPRP - Open Research Data Pilot
☐ DATA – Data sets, microdata, etc.

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CONTENTS

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EXECUTIVE SUMMARY

The present document is the accompanying report to Deliverable "D2.2 – 3D Physical and digital models of the real pilot" of the **e-**SAFE project (Grant Agreement No. 893135), funded by the European Commission under its Horizon 2020 Research and Innovation Programme (H2020).

The Deliverable consists of the preparation of several 3D physical and virtual models of the real pilot building in Catania, which are intended to address specific features of the building itself and the **e-**SAFE technologies applied to it. These models are used during the co-design activity with the residents to make them aware of architectural and seismic issues, thus enhancing their conscious participation in the co-design process.

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GLOSSARY OF TERMS

ACRONYM	DESCRIPTION
CLT	Cross Laminated Timber
EC	European Commission
RC	Reinforced Concrete
TPU	Thermoplastic Polyurethane
WP	Work Package

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1. INTRODUCTION

In this Deliverable, we describe how the 3D physical and virtual models have been used for the knowledge of the pilot building and the control and sharing of the first design prefiguration.

The need to know the architectural features and the structural behaviour of the pilot building before applying the **e**-SAFE technology led to the construction of two distinct physical study models: (a) the architectural model and (b) the structural model. Both models were built on the same scale of representation (1:50).

Moreover, the necessity to verify the reaction of the Reinforced Concrete (RC) structure to earthquake motions – with or without the application of **e**-SAFE technology (in particular **e**-CLT) – was satisfied with the construction of third model (c): a portion of the structural frame, representing a generic two-storey, one-bay RC frame. This latter model of the RC frame was made on a more detailed scale (1:10) by means of a 3D printer and it was implemented in two steps.

Models (b) and (c) were used to share the seismic behaviour of the pilot building – before and after renovation – with the residents and participants in the co-design process.

Indeed, the project also aims at the participation of the residents in their building knowledge and the consequent design choices, following a co-design approach. The sharing of knowledge and of the first design choices has also led to a greater awareness of the residents of the themes of seismic risk, energy-saving and architectural renovation.

The preparation of 3D virtual models was carried out in parallel to the construction of the physical models. This instrument, also intended as a complement to others (analysis and design tools), is aimed at the representation of the pilot building both in the analytical and design phase. Each representation thus tends to compose a picture as complete as possible of the pilot real state. At the same time, all representations – virtual and real – contribute to the management of the design process of co-design.

1.1 Deliverable structure

The deliverable is organized as follows.

Section 2 details on the methodological issues, and explains the role of physical and virtual models to assist the co-design process.

Section 3 describes the different models realized within Task 2.4 (architectural model, structural model, RC frame model) and the way they were built, and relates to the workshop that has been organized with the students of the University of Catania (see Appendix 1), where the models were prepared and used with the residents of the real pilot.

Finally, Section 4 resumes the main critical issues encountered during the co-design stage assisted by the physical and virtual models.

1.2 Links with other tasks in the project

The activities of this Task 2.4 "Development of local engagement tools" are strictly connected with those in Task 5.2 "Data gathering and preliminary co-design". Indeed, the physical and virtual models were used during the co-design process with residents in the real pilot.

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1.3 Contribution of the partners

This activity has been carried out by UNICT, by combining different expertise coming from the groups of "Architectural and Urban Design", "Building Construction", "Building Physics", "City and Regional Planning" and "Structural Engineering".

MOVERIM contributed to the dissemination and communication of some of the materials produced during the workshop towards news, newsletter, posts on various social media networks.

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2. 3D PHYSICAL AND DIGITAL MODELS AS A TOOL FOR THE DESIGN PROCESS

In the design processes, the scale models of any artifact have a double instrumental value: they are effective to know the reality and beneficial in controlling the prefiguration of new scenarios. They are powerful tools available to designers for both analysis and design processes: indeed, their use allows "reducing and simplifying, through an intentional selection of parameters, the complexity of the architectural object" [1, p. 94].

In the case of physical models, the consequent abstraction to the real object simplification, however, is compared with the real constructive model. Nevertheless, the building representation cannot be completed with these tools alone, as Bruno Zevi argued [2, p. 45], but without them, some knowledge could not be acquired in the same way as it could not be easily transmitted to non-technical people or insiders. In terms of knowledge, physical models, obliging to make those operations of reduction and simplification for the small-scale artifacts' reproduction, imply choices that cannot be made without a detailed understanding of the work to be reproduced. Every part of it must be known before deciding what to reproduce or not. The choice must be made in such a way that small-scale reproduction communicates what one wants to emphasize and then study. All these choices (geometry, volumes, perforations, materials, colors, technologies, etc.) should be conducted consciously, otherwise, they will induce a misrepresentation.

All this contributes to meticulous real artifact knowledge. Therefore, a physical model could be, for instance:

- volumetric and monolithic, to highlight the relationship between any different parties that compose it
- decomposable and discoverable, to describe the organization of the interior;
- coloured or made with materials that simulate the exterior finishes.

The scale change allows comprehending the reality even more and makes the model a powerful tool for understanding the complex relationships of a building. In addition, the realization of physical handcrafted models allows having direct experience with the construction materials and then with the meaning of construction itself. The model is both abstract and concrete, object and thought at the same time. The concreteness of the construction is indispensable to the designer to know the architecture in a physical and material way. For example, Santin et al. [3] identified key concerns of participants related to the building systems and the renovation process, which were communicated to the designers, who devised mock-up models for specific building elements or systems deemend important (windows, balconys, ventilation systems) to test the solutions and co-create design choices for tenants. The results of the process showed key parameters important to participants related to trust, fairness and threat reduction, support of lifestyles and control over health and comfort.

The physical model used during the design process is always a study: it serves to materialize ideas and verify their value; it helps to manage volumetric and dimensional relationships; it supports the choice of building materials; it is necessary to control the acoustics of indoor environments; it is useful to modulate the input of natural light; it serves to assess structural performance; etc. It is a way of thinking about the project. The different scales of realization are used to control the evolution of the design idea and to manage the complexity of the internal and external relations as well as the performance of the work that is intended to be realized in reality. The same work is so conceivable as a 1:1 scale model (the so-called real scale), where every choice and every design detail will be

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subject to the user's test. The design process understood in this way never ends because it is always subject to subsequent checks and any adjustments and/or changes, as it shows and happens in reality. 3D virtual modeling does not allow the experience of constructive concreteness but allows you applying photographic techniques and digital graphics to something that is not yet in reality. However, since each tool has value based on how it is used, even 3D virtual models are powerful tools for designers, both during the design process and at the end of it. Once you have decided with what detail you want to represent the project, 3D virtual model also lends itself as easy support for the processing of two-dimensional images. Actually, the operator and the observer have only a two-dimensional view of the three-dimensional object because they see it on a flat surface, the screen, and the three-dimensional perception is given by the motion of the images in an animation sequence. After the 3D virtual modeling of the architectural object, it is easy to work on mapping, texturing, color, storyboard and lighting for the subsequent production of rendering. Unlike photography, renders produced with 3D virtual models allow the assessment of multiple graphic solutions, the speed of updating of the prefiguration, the immediacy of sharing the steps of the design process and endless experimentation with different materials and finishes.

Finally, the virtual model allows making movies and not only renders. These products – rendering and movies – are powerful tools for the choice of different solutions and subsequent verifications of the development of the project idea. Physical models, as well as 3D virtual models, produce at the end of the project a value – often used for advertising/commercial purposes – of how will the artifact appear once it is realized. In this case, the models are still tools for the designers but even more for the promoters of architecture. However, they continue to be tools of knowledge and evaluation of the project.

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3. THE REPRESENTATIVE MODELS OF THE PILOT

For answering the dual objective of communicating the pilot real state in terms of aesthetic value and structural safety today and then sensitizing and discovering the effects of the **e-**SAFE technology, we have chosen to realize two kinds of models: one that represents an architectural image of the pilot; the other one that is an representation of its structural behavior.

Both models are designed to simulate synchronously and/or diachronically different behaviors and configurations. That is, a basic structure has been realized on which through a few gestures, which consist in removing and replacing easily a small number of model's parts, it has been possible to simulate both the real state and the new image of the renovated pilot, both conditions in parallel. This expedient has allowed obtaining a direct comparison between the different design solutions proposed, promptly detecting emotions and reactions aroused by local stakeholders and residents and starting the co-design activity.

The chosen scale of representation (1:50) has allowed achieving greater ease of transportability and therefore management of the models, an adequate simplification degree and a level of information proportionately detailed. The used materials were:

- 4 mm thick cardboard;
- paper:
- 10 x 10 mm wood strips;
- 2-mm thick plywood panels;
- velcro;
- slow-acting vinyl glue for corrections during assembly;
- fast-acting cyanoacrylate for accurate joints;
- removable spray adhesive for parts to be replaced easily (Figure 1).

These materials offer good workability and allow the various parts to be made with an appropriate precision degree.

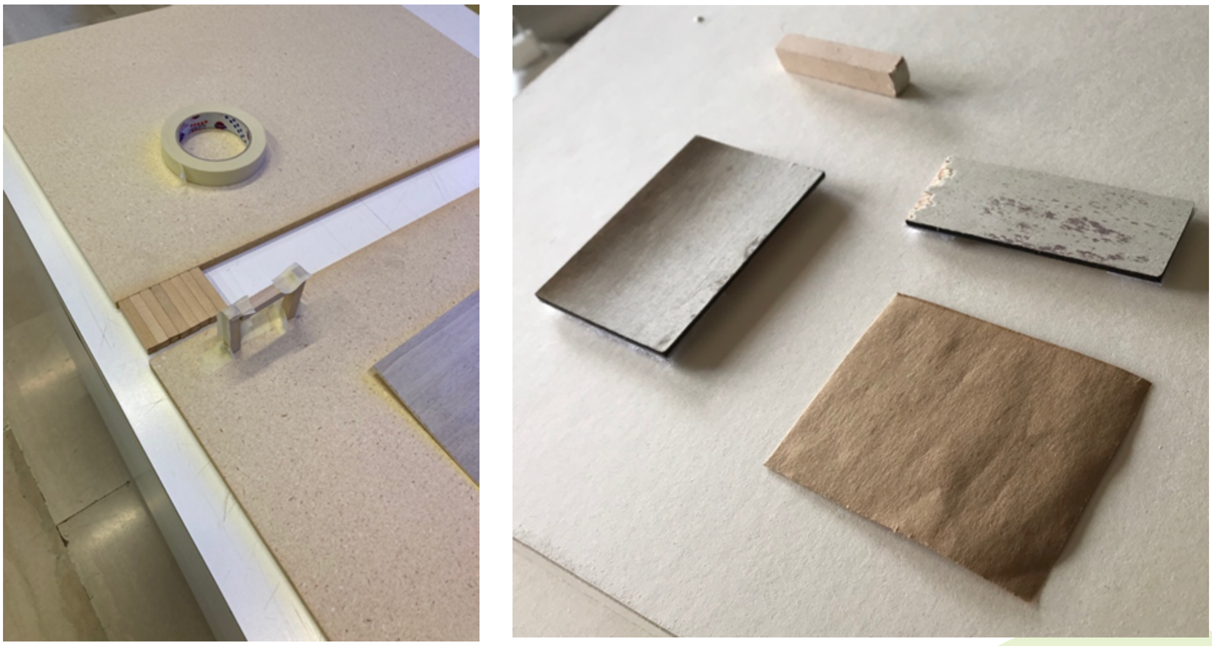

Figure 1: Used materials: 4-mm thick board sheets, paper, 10x10 mm wood strips, 2-mm thick plywood panels, Velcro and three types of glue: vinyl; cyanoacrylate; spray glue.

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3.1 Architectural model

The architectural model was started by printing the images of the real state and then crafting two macro-elements: a single prism of size 470 x 180 x 350 (H) mm, made by composing full parts of cardboard that simulated the shape of the pilot, and the system of balconies with vertical partitions on the south front of the building (Figures 2-3).

The simplification process – a direct consequence of the objectives set and the communication strategy – consists in the lack of openings and "verandas" (i.e. windows that close a balcony creating a sort of bow-window) and the undifferentiation of materials and chromatic variations that characterize the pilot building. This information was not excluded but assigned to the images of the real state, printed and glued to each of the vertical faces of the prismatic volume.

Then, the prismatic volume was fixed on a rectangular wooden base (595 x 420 mm, 10-mm thick). This volume was the support on which it was possible to overlap, remove and promptly replace the images of the real state as well as different design solutions. The system of balconies, in plywood, were designed to be autonomous and easily removable. For the anchoring system to the base structure, it was provided with a pair of screws at the upper of the volume. Each system of balconies was then hung on this pair of screws (Figures 4-5-6-7). This combination has made it possible to ensure the easy removal and replacement of both the system of balconies and their anchoring system. Then, the basic structure of the architectural model was overlaid with images of the real state elevations and with design solutions to be shown to local stakeholders. Thus, six different design solutions were elaborated by 3D virtual modeling, edited, printed and overlaid on the architectural model (Figures 8a-8b-8c-8d-8e-8f-9a-9b).

Consequently, a movie about the different design solutions has been created. It was shown to the residents and is now available on the official **e-**SAFE website at the following link:

http://esafe-buildings.eu/en/news/news-15-co-design-workshops-and-mutual-learning-with-stakeholders-at-the-pilot-site-in-catania/

e-SAFE promoted the video on its social media channels such as **e-**SAFE YouTube (video available here https://www.youtube.com/watch?v=VNnq_dVaQeg); **e-**SAFE LinkedIn and Facebook pages, **e-**SAFE Instagram and Twitter profiles. After editing the video with an English explanation, the disssemination campaign will be repeated.

Creating visual content increases the interest in **e-**SAFE social media pages and profiles, and it helps in incrementing our stakeholders' engagement in the activities carried out by all partners. Therefore, spreading the activities carried out by UNICT in this deliverable was of great value for the project promotion.

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Figure 2: The construction of the architectural model.

Figure 3: The construction of the architectural model. A single prismatic cardboard volume is the basis on which it is possible to glue, remove and replace images of the real state and design solutions.

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Figure 4: The autonomous system of balconies.

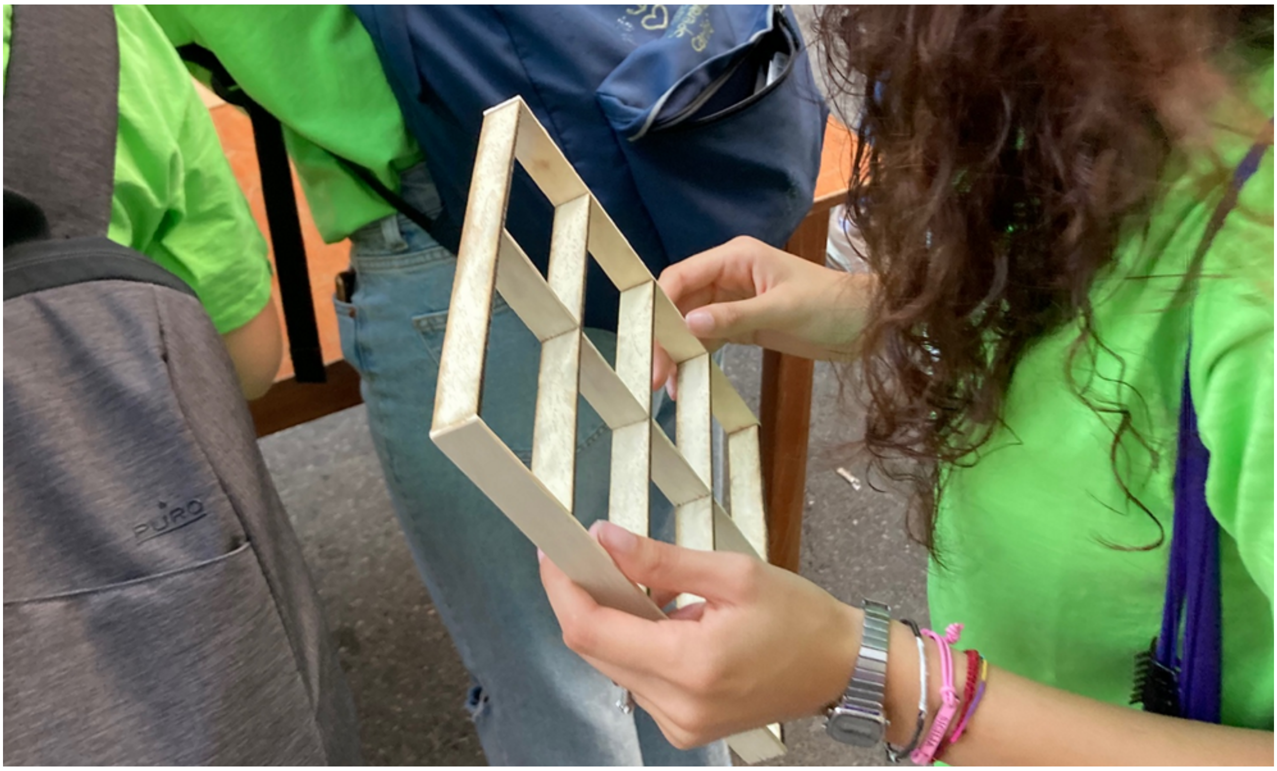

Figure 5: The system of balconies is easily removable.

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Figure 6: The architectural model.

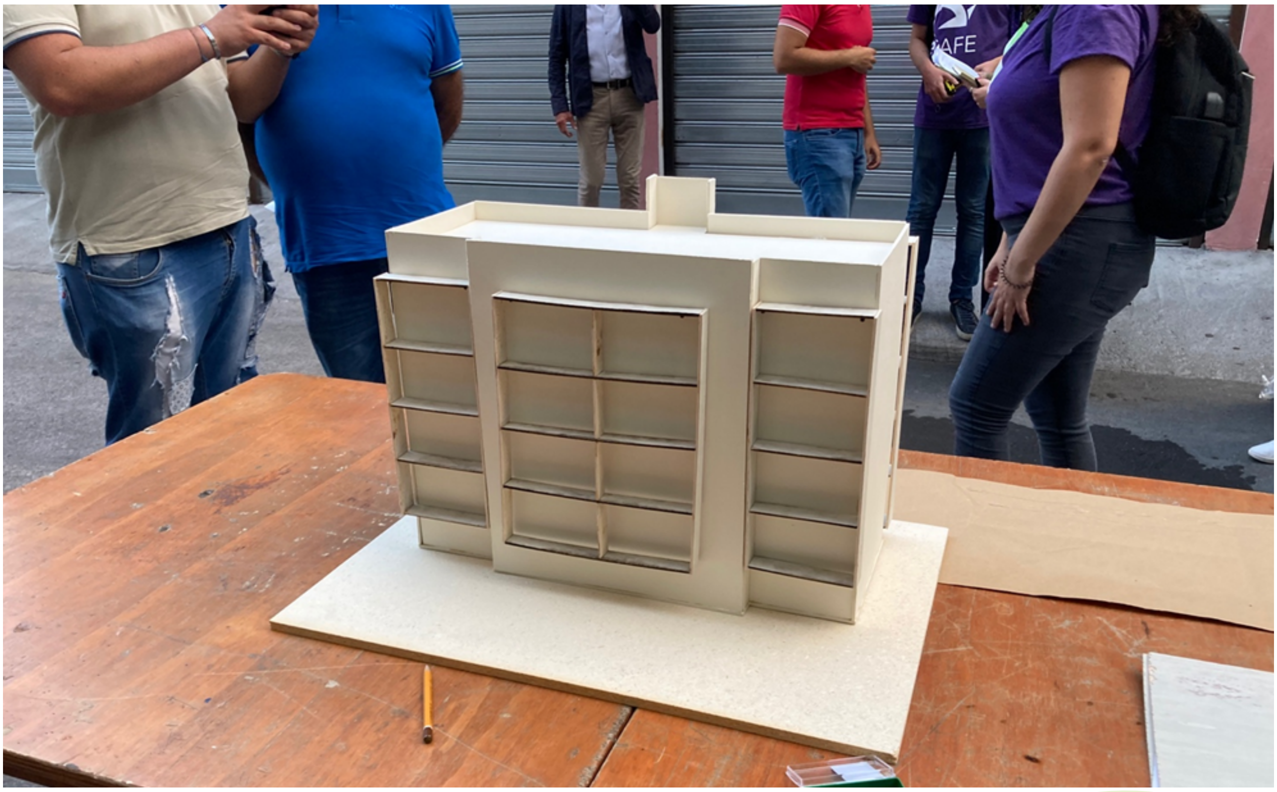

Figure 7: The systems of balconies were hung by a system of screws placed at the top of the volume.

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Figure 8a: G1 solution_perforated aluminum panels

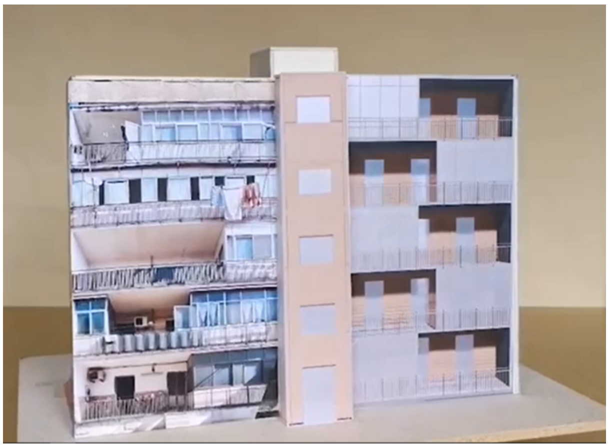

Figure 8b: G2 solution_glass fiber reinforced concrete (GFRC) panels

Figure 8c: G3 solution_Wpc shields panels

Figure 8d: G4 solution_Folded aluminum panels

Figure 8e: G5 solution_glass fiber reinforced concrete (GFRC) and bricks panels

Figure 8f: G6 solution_glass fiber reinforced concrete (GFRC) panels

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Figure 9a: The architectural model with overlaid images of the pilot real state.

Figure 9b: The architectural model with overlaid images of the pilot real state.

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3.2 Structural model

Unlike the architectural model, which was conceived as a single volume, the structural one was created by composing five independent modules (470 x 180 x 65 mm), as if the pilot had been dissected into five parts and each of them represented one floor of the pilot building (Figure 10).

Once printed the existing structural system, the composition of each module is extremely simplified. A grid of twenty-five vertical wooden elements (square section 10 x 10 mm) reproduces the system of RC columns and two surfaces of cardboard simulate ceilings and floors slabs (Figures 11a-11b-12-13a-13b).

For extremizing the simulation of the structural behavior it was essential at this point to choose the type of union between columns and slabs (Figures 14-15-16-17-18). Using glue was not adequate to achieve the intended purpose, as it simulated a fixed connection and the model was too rigid. It was therefore decided to cut out paper scotch-tape rectangles properly sized and to place them both at the base and the top of each wooden element. So, this solution reproduced a pinned connection between the parts. Then, the model was subjected to horizontal stresses to simulate the application of seismic force.

Completed each of the five modules, each ceiling-slab was glued with the respective floor-slab. The basic structure of the completed model was so ready to be "dressed" in interchangeable parts. In order to simulate the existing walling, we cut rectangles of paper (50 x 60 mm). We glued the upper end to the ceilings and the lower one to the floors. To simulate the **e-**CLT panel, we cut rectangular plywood elements (25 x 60 mm), which are more resistant to external stresses, using a CNC machine (Figure 19). These were then anchored by adhesive Velcro strips to the floor and ceiling slab of the model to simulate the **e-**CLT dampers. In this simplified way, we have shown the effects of the **e-**CLT panel application on the pilot. So, the model was subjected to horizontal forces by hands and its behavior was empirically observed, in particular the storey drift. At the end of the simulation, we placed between the floors plywood elements reproducing the **e-**CLT panel. Then, also in this configuration, we applied horizontal forces by hands, showing its better structural behaviour with reduced storey drift (Figures 20-21-22-23).

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Figure 10: The construction of the structural model.

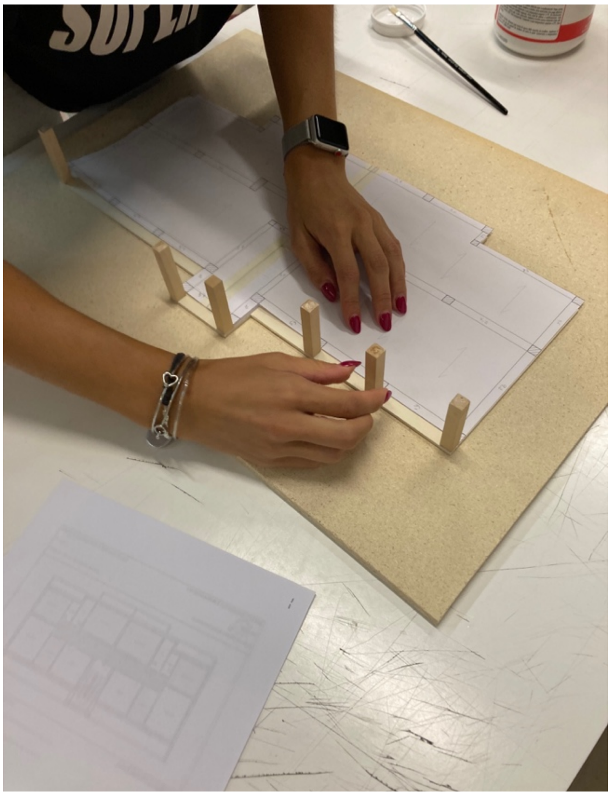

Figure 11a: The printed plan of the real structural system allows to cut out slabs and twenty-five wooden elements (columns) 75 mm long.

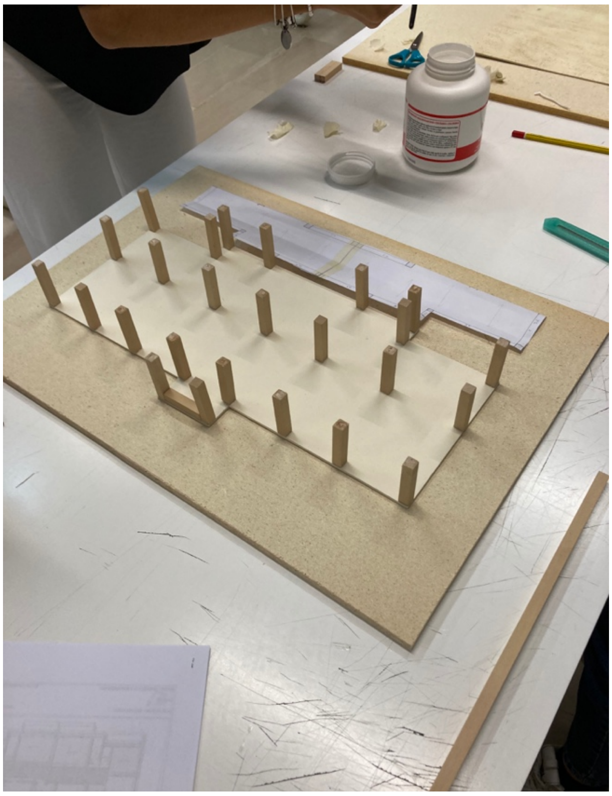

Figure 11b: Twenty-five wooden elements simulate the twenty-five ranforced concrete columns.

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Figure 12: For the construction of the structural model, five modules were created, equal to the number of pilot floors.

Figure 13a: Each module is composed of slab-floor and slab-ceiling made of cardboard and twenty-five wooden elements.

Figure 13b: Each module is autonomous.

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Figure 14: The structural model.

Figure 15: The modules, simulation of the five pilot floors, constitute the base of the structural model on which the interchangeable parts apply: the walls and the panels of the **e-**SAFE system.

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Figure 16: The wall system was simulated by paper rectangles of size mm 50 x 60 glued between the floor and ceiling slabs.

Figure 17: The wall system.

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Figure 18: The assembly of each module.

Figure 19: The **e**-SAFE technology was simulated using 25 x 60 mm plywood rectangles. One part of the structural model was covered with paper rectangles, the other with plywood.

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Figure 20: The assembly phases of the structural model.

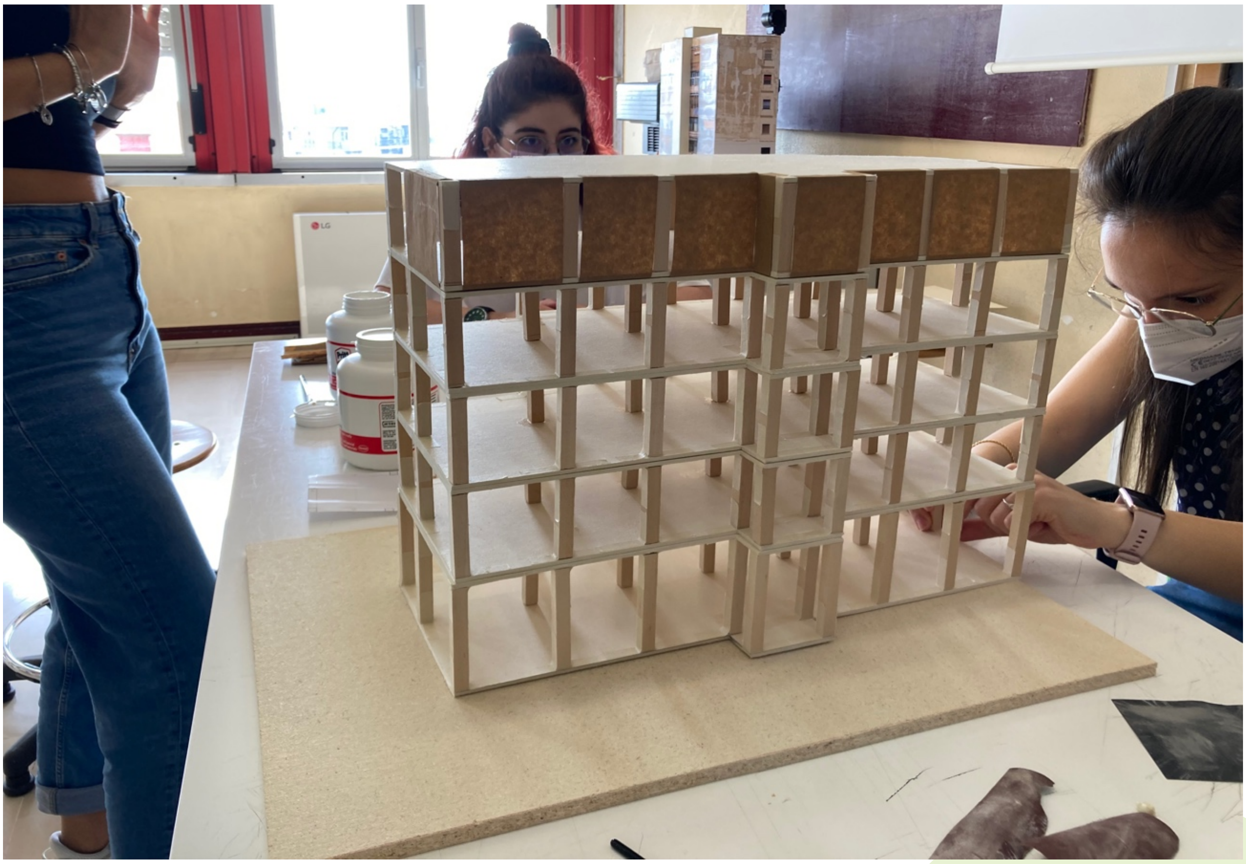

Figure 21: The assembly phases of the structural model.

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Figure 22: The assembly phases of the structural model.

Figure 23: The structural model.

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3.3 RC frame model

This model simulates in scale 1:10 one bay of the bare RC structural frame of the building, without infill walls. It is designed to be equipped with **e-**CLT panels and friction dampers (seismic dissipation devices), in order to communicate in a simple way, even to non-experts, the behavior of the building when it is under seismic actions.

The model was realized in two steps that are described as follows.

- In the first one, a one-storey one bay planar frame was created. It was equipped with a scale model of **e-**CLT panel and dissipative connection devices to simulate the operation of this technology in the event of earthquake (Figure 24a-24b, 25a-25b). This first part of the model served during the co-design process to show residents the difference in behaviour between the current RC frame and the one equipped with e-CLT panels.
- In the second step the model was implemented to simulate a more detailed scheme of the building considering a spatial frame. It was decided to simulate a single-bay two-storeys spatial RC frame to combine the needs of portability of the model and representation to the right scale of its components (Figure 26a-26b).

The components of the building were made with the same materials both in the first and in the second phase. The columns (30 x 30 mm) and beams (30 x 50 mm) were created with a rapid prototyping process using a 3D printer with TPU (Thermoplastic polyurethane) filament. This material was chosen because it allows obtaining components with a good degree of elasticity so as to make visually appreciable the deformation suffered by the frame in case of horizontal stress. The slabs were made of plywood panels (20 mm thick) and glued to the frames in order to simulate a rigid slab.

The **e-**CLT panels were represented with medium-density fibreboards (8 mm thick) while the friction dampers were created with rapid prototyping 3D process using PLA (Polylactic Acid) filament that has much less flexibility than TPU. The "anchor profile" of the damper was connected to the beam, as it will happen in the real case, through anchors represented with self-tapping screws. The "free profile" of the damper was provided with a slotted hole and it was connected to the "anchor profile" by a system of bolt, washer and nut (Figure 27).

Once completed, the model has been placed on a vibrating table to simulate the behavior of the frame subjected to seismic action (Figure 28). The video made during this activity will be used to communicate in a simplified but incisive way the improvement of the behavior of the building in case of earthquake determined by the intervention.

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Figure 24a: First one-strorey one-bay planar frame.

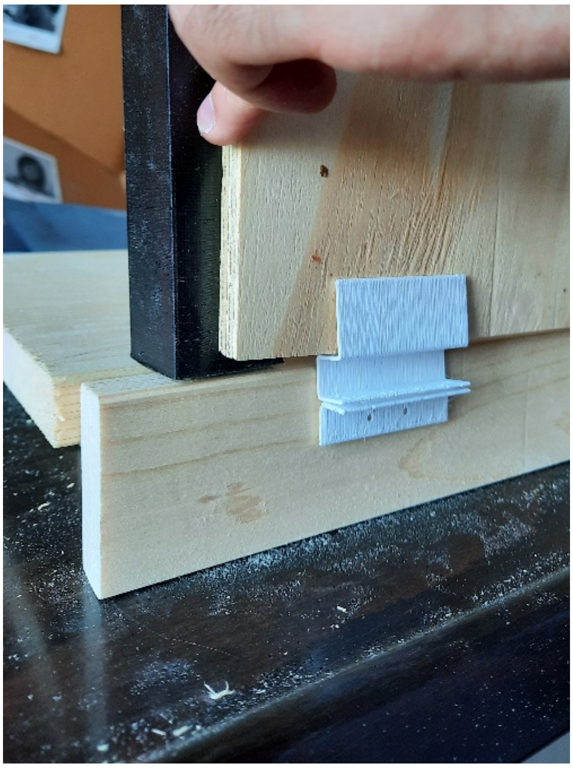

Figure 24b: Alignment between “free profile” and “anchor profile” of the damper.

Figure 25a: The "anchor profile".

Figure 25b: First step of the model equipped with the **e**-CLT panel.

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Figure 26a: The bare frame of the final model

Figure 26b: The final model equipped with **e**-CLT panels

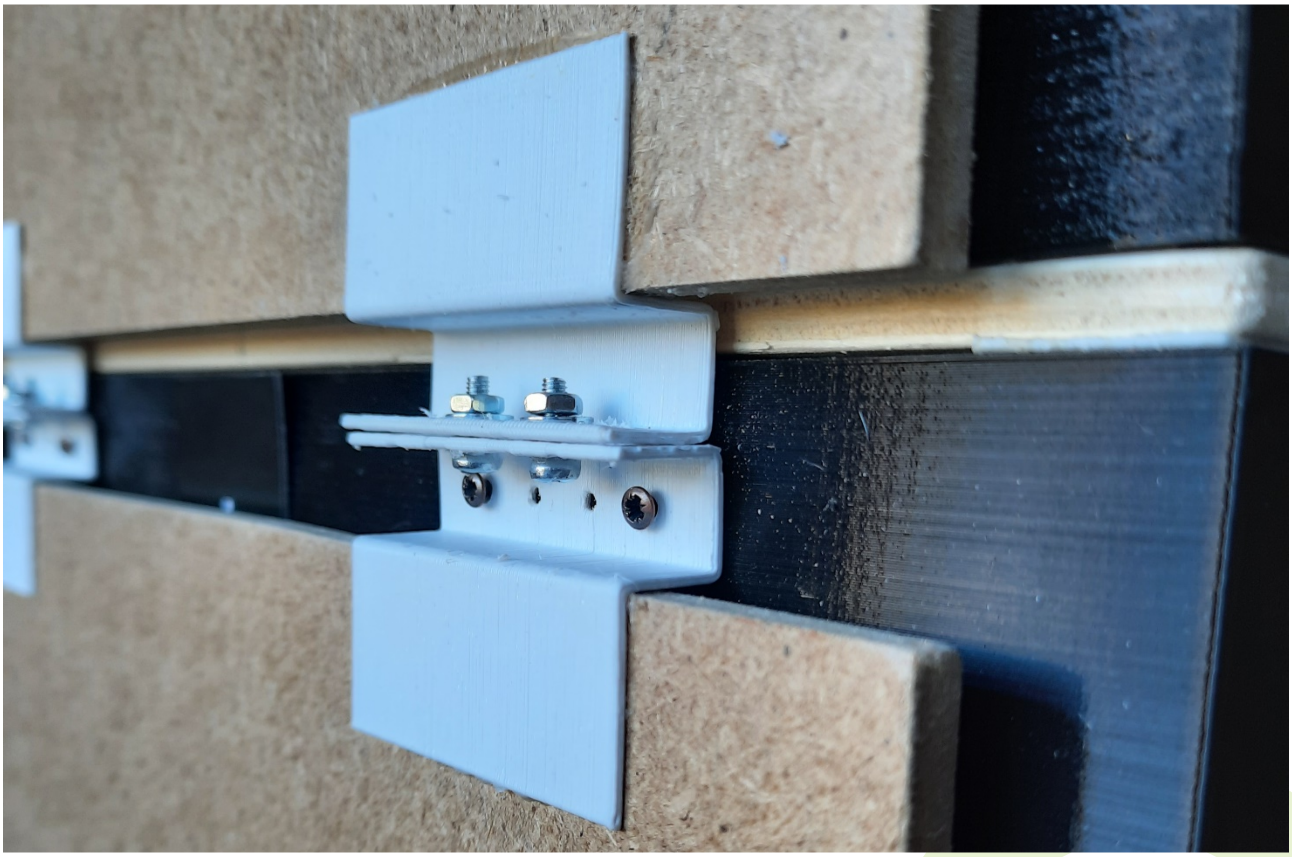

Figure 27: The connection between the “free profile” and the “anchor profile” of the dampers.

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Figure 28: The RC frame model placed on the vibrating table.

3.4 The workshop for the construction of the models

The workshop activity has been structured into different phases. The first phase concerned the training of the twelve UNICT students on the objectives of the workshop and the **e-**SAFE technology. Several days were dedicated to the aesthetic and technological aspects of the **e-**CLT structural panels and the non-structural **e-**PANEL. Subsequently, the design and modelling phase were organized defining working groups according to the design skills and abilities of each student. Six groups of two students were created to both adapt the **e-**SAFE technology to the real pilot conditions and design six possible renovation and design solutions. These hypotheses were then elaborated by 3D virtual modeling, edited and printed.

This led to the creation of the physical models illustrated in Section 3.1 and 3.2: the architectural and structural models. All the students contributed to both models. The preliminary operations were essential for achieving the objectives set. They were an integral part of the workshop process because they were discussed and debated during all the modeling phases. They related to the choice of materials and construction tools, type of scale of representation, form and structure of the model pursuing the objective of raising awareness of the conditions of the building in terms of aesthetic value, structural safety and co-design processes. Once the basic module of both models was completed, the workshop continued to simulate the different conditions. It was thus verified that the interchangeability of these images took place quickly and that the comparison between the different configurations and design solutions was clear. Instead, the structural model was subjected to different forces. At first, paper components to simulate walls were applied to the base structure.

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After applying horizontal forces by hands the model's behavior as a result of a seismic action was empirically observed. When the plywood elements simulating the **e-**CLT panels were placed between the floors, the improved seismic resistance was clearly shown.

By looking at all the proposed models (Figures 29-30), the residents were able to choose their own angle of view and to have their perception of each design solution. It was a tool to raise awareness and make their gaze more aware of the aesthetic and spatial sense created. From the words and looks of amazement in front of the work carried out, far from those of initial distrust, it seems they have recognized the objectives of the workshop and the **e-**SAFE project. Being an integral part of the design process and believing in the opportunity to live a more beautiful, more sustainable and safer building has made the residents of via Acquicella Porto more confident and aware of the opportunities offered by the **e-**SAFE technology. More detailed information will be provided at M33 in D2.7 "Preliminary e-SAFE Co-design Protocol".

Figure 29: The architectural (left), the structural (right) and the first RC frame (midde) models.

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Figure 30: The three models – architectural, structural and RC frame models – are shown to the residents of via Acquicella Porto.

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4. RESULTS AND CRITICAL ISSUES

The implementation of the models of the pilot building for the application of **e-**SAFE technology made it possible to achieve the following objectives:

- knowledge of building conditions;
- simulating the structural behavior in case of an earthquake, before and after the application of the e-SAFE renovation technologies;
- raising awareness among residents of the conditions and behavior of their building;
- verification of initial design assumptions;
- initiating and participating in the co-design process.

The verifications with physical and 3D virtual models have also brought out some critical aspects that otherwise would not have come to light. It usual for certain problems to not be identified at the early stages of a participatory design process.

Through the models, which are easy and immediate tools of communication between the actors involved in the co-design process, each actor was able to express his/her own opinion and questions that highlighted the urgency of certain issues. Their immediate knowledge allowed considering it in an early stage and therefore gives the possibility of finding suitable solutions in the next stages.

The main findings are:

- the difficulty for the residents in recognizing, both in the physical and in the virtual model, the materials proposed as finishing;
- lack of representation of the energy system and internal thermal comfort;
- lack of representation of the individual conditions (organization of the internal environments and consequences on the external image of the building) of each apartment;
- little attention from the residents to simulations with the structural model.

Nevertheless, there has been a considerable degree of awareness on the pilot problems, so much that all the residents have accepted to continue participating in the co-design process and above all to sacrifice the modifications made individually in their apartments (such as the "verandas") for the benefit of a general improvement solution for everyone.

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APPENDIX 1 – WORKSHOP DOCUMENTATION

e-SAFE

Energy & Seismic AFfordable rEnovation solutions

Un **sistema costruttivo innovativo, economico e poco invasivo, per la ristrutturazione sismico- energetica** degli edifici moderni multipiano - accompagnato da **sistemi di finanziamento innovativi** - capace di diffondersi sul mercato europeo, anche a fronte di significativi ostacoli socio-economici.

WORKSHOP DI CO-DESIGN
PER LA RIQUALIFICAZIONE SISMICO-ENERGETICA
DELL'EDILIZIA RESIDENZIALE PUBBLICA

17 settembre - 16 ottobre 2021

Il workshop della durata di 75 ore (pari a 3 CFU) è rivolto agli allievi del corso di laurea in Ingegneria Edile-Architettura e Architettura dell'Università degli Studi di Catania interessati a fare una esperienza di **action-learning** (apprendimento nel corso dell'azione) sui temi del co-design e della riqualificazione del patrimonio edilizio moderno, con un focus sull'edilizia residenziale pubblica, a partire da un reale processo di ristrutturazione sismico-energetica.

In particolare, gli studenti lavoreranno al progetto di riqualificazione di un condominio dell'IACP di Catania, sito in via Acquicella porto 27, utilizzando il sistema costruttivo innovativo progettato nell'ambito del progetto H2020 e-SAFE (Energy and Seismic AFfordable Renovation Solutions). L'esperienza progettuale verrà condotta secondo i principi del co-design, a partire dalla sensibilizzazione e dalla partecipazione attiva degli abitanti alla trasformazione e alla riqualificazione energetica, strutturale e architettonica del fabbricato in cui vivono.

I giovani progettisti, dopo una fase di formazione preliminare, costituiranno dei **gruppi di progettazione e apprendimento mutuo con gli abitanti dell'edificio pilota** e con essi affronteranno, nei diversi incontri programmati, i temi relativi alla trasformazione del proprio edificio. Tra le attività del workshop sono incluse:

- seminari a cura dei ricercatori del progetto e-SAFE sulle finalità e sugli aspetti multidisciplinari del progetto;
- formazione sulle modalità di conduzione di un processo partecipativo di progettazione e sugli strumenti utilizzati nel corso del workshop;
- attività laboratoriali collaborative con i residenti, anche attraverso la realizzazione di modelli di analisi e di studio e la prefigurazione delle possibili soluzioni;
- allestimento di una una mostra per la presentazione pubblica degli esiti progettuali.

DOVE E QUANDO?
Le attività del workshop si svolgeranno presso l'aula IT del DICAr dell'Università degli Studi di Catania (DICAr) e presso il complesso residenziale IACP di via Acquicella Porto 27 in Catania (Pilot) per un totale di 75 ore articolate in 14 diversi incontri distribuiti nel periodo che va dal 17 settembre al 16 ottobre 2021 (il dettaglio nel programma riportato sul retro).

MODALITÀ DI PARTECIPAZIONE
Gli studenti interessati a partecipare possono inviare **entro l'8 settembre 2021, ore 13:00**, una e-mail all'indirizzo ***esafe.unict@gmail.com*** avente:

- per oggetto [*cognome - richiesta partecipazione workshop co-design 2021*];
- nel testo una breve dichiarazione di interesse in cui spiegare le proprie motivazioni a partecipare;
- in allegato un CV in cui siano dettagliati gli esami universitari sostenuti e la relativa votazione.

L'avvenuta selezione per la partecipazione verrà notificata entro il 10 settembre 2021.

DICAR

DIEEI

IACP Catania

Fondazione Ordine Ingegneri
Provincia di Catania

OAPPC CT – ORDINE ARCHITETTI PIANIFICATORI PAESAGGISTI CONSERVATORI PROVINCIA DI CATANIA

FOAPPC CT – FONDAZIONE ORDINE ARCHITETTI PIANIFICATORI PAESAGGISTI CONSERVATORI PROVINCIA DI CATANIA

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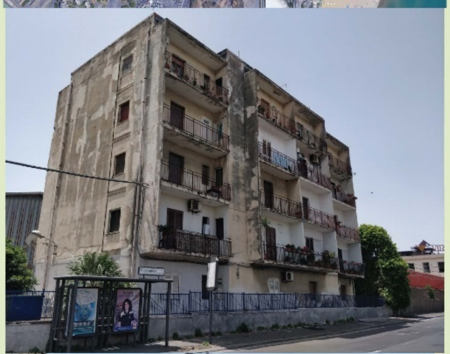


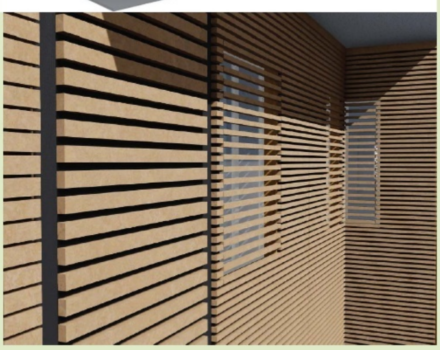

PROGRAMMA

I INCONTRO, VEN 17 SETT 2021 (ore 9-14, DICAr)
- Saluti istituzionali e presentazione del workshop
- Formazione e informazione preliminare dei partecipanti a cura dei ricercatori e-SAFE

II INCONTRO, VEN 17 SETT 2021 (ore 17-20, Pilot)
- Presentazione dei partecipanti al workshop
- Introduzione del progetto e-SAFE e co-definizione e sigla dell'accordo tra i partecipanti al workshop di mutuo apprendimento
- Rinfresco di fine giornata dei lavori

III INCONTRO, SAB 18 SETT 2021 (ore 9-14, DICAr)
- Laboratorio di progettazione

IV INCONTRO, SAB 18 SETT 2021 (ore 16-19, Pilot)
- Introduzione ai residenti degli aspetti tecnico-impiantistici del progetto
- Quali dati servono e perché?
- Sopralluoghi all'interno degli appartamenti
- Rinfresco di fine giornata dei lavori

Tra il IV e il V incontro sistematizzazione e digitalizzazione dei dati raccolti durante i sopralluoghi, in sede propria e per la durata di circa 2 ore

V INCONTRO, GIO 23 SETT 2021(ore 9-19, DICAr)
- Laboratorio di progettazione

VI INCONTRO, VEN 24 SETT 2021 (ore 9-14, DICAr)
- Formazione su finalità e procedure dei sopralluoghi
- Laboratorio di progettazione

VII INCONTRO, VEN 24 SETT 2021 (ore 17-20, Pilot)
- Sopralluoghi in sito a cura dei partecipanti al workshop
- Rinfresco di fine giornata dei lavori

VIII INCONTRO, SAB 25 SETT 2021 (ore 9-14, DICAr)
- Laboratorio di progettazione

IX INCONTRO, SAB 25 SETT 2021 (ore 17-20, Pilot)
- Laboratorio di co-produzione del modellino con i residenti
- Lancio del photo-voice e co-organizzazione fasi finali

X INCONTRO, VEN 1 OTT 2021 (ore 17-20, Pilot)
- Laboratorio di co-produzione modellino con i residenti

XI INCONTRO, VEN 15 OTT 2021 (ore 9-14, DICAr)
- Laboratorio di progettazione

XII INCONTRO, VEN 15 OTT 2021 (ore 17-20, Pilot)
- Laboratorio di co-design con i residenti
- Rinfresco di fine giornata dei lavori

XIII INCONTRO, SAB 16 OTT 2021 (ore 9-14, DICAr)
- Laboratorio di progettazione

XIV INCONTRO, SAB 16 OTT 2021 (ore 17-20, Pilot)
- Laboratorio di co-design con i residenti
- Conclusione del workshop e programmazione della presentazione dei lavori di co-design
- Rinfresco di fine giornata dei lavori

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Co-Design Workshop for Seismic and Energy Renovation of Public Housing

Catania, 17th September – 16th October 2021

Professors

Sebastiano D'Urso (Workshop coordinator)

Gianpiero Evola

Giuseppe Margani

Edoardo Marino

Laura Sajia

Vincenzo Sapienza

Tutors

Antonio Artino

Carla Barbanti

Vincenzo Costanzo

Dario Distefano

Giulia Li Destri Nicosia

Grazia M. Nicolosi

Vera Pavone

Gianluca Rodonò

Carola Tardo

Workshop designers (UNICT students)

Twelve students of the Architectural Engineering Degree Course (C.d.L. "Ingegneria Edile-Architettura")

Residents of the Pilot Building of via Acquicella Porto 27, Catania

Nine families

IACP Catania

Ida Maria Baratta

Professionals Associations of Architects and Engineers – Province of Catania

President of the Engineers' Association

President of the Foundation of Engineers' Association

President of the Architects' Association

President of the Foundation of Architects' Association

Two tutors of the Engineers' Association

Three tutors of the Architects' Association

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