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<table>
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<th>DATE</th>
<th>EDITORS</th>
<th>COMMENT</th>
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<td>10/5/2021</td>
<td>IRI UL</td>
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<td>Integration and analysis</td>
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<td>IRI UL</td>
<td>Final version submitted</td>
</tr>
</tbody>
</table>

Table of content
Revision and history chart: ................................................................. 2

0 Executive summary ........................................................................................................... 4

1 Introduction ...................................................................................................................... 7

2 Methodology ....................................................................................................................... 9

2.1 Guidelines ....................................................................................................................... 10

2.1.1 Interview preparations ................................................................................................. 10

2.1.2 Interview realization .................................................................................................... 12

2.1.3 Analysis after the interviews ......................................................................................... 12

2.1.4 Renovation stories ........................................................................................................ 12

3 Renovation stories ............................................................................................................. 13

3.1 Greece (GR) ..................................................................................................................... 13

3.1.1 Interview preparations ................................................................................................. 13

3.1.2 After the interview – ANALYSIS ................................................................................. 15

3.1.3 Renovation story ........................................................................................................... 16

3.2 Hungary (HU) .................................................................................................................. 20

3.2.1 Interview preparations ................................................................................................. 20

3.2.2 After the interview – ANALYSIS ................................................................................. 24

3.3 Italy (IT) ......................................................................................................................... 27

3.3.1 Interview preparations ................................................................................................. 27

3.3.2 After the interview – ANALYSIS ................................................................................. 29

3.3.3 Renovation story ........................................................................................................... 30

3.4 Slovenia (SI) .................................................................................................................. 32

3.4.1 Interview preparations ................................................................................................. 32

3.4.2 After the interview – ANALYSIS ................................................................................. 35

3.4.3 Renovation story ........................................................................................................... 36

3.5 Spain (ES) ....................................................................................................................... 42

3.5.1 Interview preparations ................................................................................................. 42

This Project has received funding from the European Union’s H2020 Framework Programme for Research and Innovation under Grant Agreement No 784972.
The sole responsibility for the content of this report lies with the authors. It does not necessarily reflect the opinion of the European Communities. The European Commission is not responsible for any use that may be made of the information contained therein.
3.5.2 After the interview – ANALYSIS........................................................................................................ 44
3.6 The Netherlands (NL).............................................................................................................................. 46
  3.6.1 Interview preparations ........................................................................................................................... 46
  3.6.2 After the interview – ANALYSIS......................................................................................................... 49
  3.6.3 Renovation story .................................................................................................................................. 51
4 Conclusion.................................................................................................................................................... 55
  4.1 The lessons learned ................................................................................................................................ 55
    4.1.1 From planning to pandemics: Fear and discomfort with the unknown .............................................. 55
    4.1.2 The grounds for decision: Awareness, motivation, willingness, and capacity ............................... 56
    4.1.3 The vehicle and purpose of renovation: The people..................................................................... 58
  4.2 The recommendations derived .............................................................................................................. 60
    4.2.1 Engage community managers ........................................................................................................ 61
    4.2.2 Raise awareness .............................................................................................................................. 63
    4.2.3 Provide a timeline............................................................................................................................ 65
    4.2.4 Enhance transparency ..................................................................................................................... 65
    4.2.5 Demonstrate value and build support............................................................................................. 66
    4.2.6 Identify and engage Local Heroes .................................................................................................. 67
    4.2.7 Accommodate local specifics ......................................................................................................... 68
    4.2.8 Present a feasible financial plan ..................................................................................................... 68
    4.2.9 Involve and empower occupants .................................................................................................. 70
    4.2.10 Pursue long-term behavioural change ......................................................................................... 71
0 Executive summary

The following report is the Delivery 2.4, part of TripleA-reno Work Package 2. It covers outcomes and key findings related to Tasks 2.6, focused on using qualitative (ethnographic) approaches to better understand users’ attitudes and responses to interventions and products designed in the project.

Our research is based on the 4 steps of the People-centred development approach (see Figure 1). The core idea is that people should become an indispensable part of industrial development processes, as a means to achieve new categories of products, services, or business strategies that truly address people’s needs and lead to sustainable innovation. The goal of Tasks 2.6 was to evaluate response of occupants to the interventions done in their homes (sensors and other equipment), effectiveness of tools informing them about IEQ, and possibility for establishing relationships with other stakeholders (building managers, contractors) facilitated by the platform. In this context, 7 focus groups and 21 interviews were planned with people from case studies, with questions partly open, allowing the interviewees to open new topics of conversation (the interviewees data encoded to assure anonymity). Based on this, recommendations for future improvement (of the IT solutions) were prepared.

![Figure 1.- WP2 tasks integrated into the People-centered design & development approach](image)

The original plan for T2.6 research included focus groups, which had to be dismissed due to the COVID-19 crisis. The pandemic had a negative impact on the dynamics of the project and ethnographic approach and a contingency plan was set in order to contain drawbacks caused to the research by social distancing and confinement measures implemented in the different participating countries. Due to capacity limitations and meetings restrictions, one-on-one interviews were conducted instead of focus groups, which was the best compromise to maintain contact and dialogue with research participants as well as collect the necessary user feedback.
The purpose of this report is to indicate how users understand and respond to actions and products designed in TripleA-reno in the context of their home environments to make decision-making for deep and nZEB renovation not only affordable and acceptable, but also attractive.

The report is based on the outcomes of seven ethnographic case studies performed by TripleA-reno consortium members across the EU – Greece, Hungary, Italy, Slovenia, Spain, and The Netherlands. That includes a variety of measures, investments, casual daily household practices and other aspects of everyday life. These practices were recorded by an interdisciplinary group of experts, contributing insights from the fields of architecture, engineering, anthropology and sociology.

Background and methods used to produce the report are discussed in the Introduction (Chapter 1). Then, a section describing the theoretical background, methodology and guidelines distributed to each pilot is described in Chapter 2. The centrepiece of the report is the Catalogue of renovation stories (Chapter 3) – the individual descriptions of the ethnographic case studies by country highlighting the various barriers and drivers related to building renovation, all as outcomes of the ethnographic research. The chapter divided into three subsections – Interview preparation, Interview analysis, and Renovation story where practical implications are presented. The catalogue is followed by Chapter Error! Reference source not found., titled Conclusions. This is divided into two separate sections; Section 4.1, The lessons learned, highlights some of the common threads that can be detected in the collection of stories presented in the report.

Some of the main conclusions derived from that are:

- **Finances play a central role** when it comes to thinking, planning, and doing renovation. References to notions of fear and other forms of discomfort in this context indicate that finances are generally perceived an issue rather than a mean to achieve renovation and retrofitting goals. Nonetheless, references to finances are often a proxy for issues and concerns that result from practical and social challenges associated to renovation and retrofitting projects, such as poor execution of the renovation measures, unexpected technical and practical complications, administrative hurdles, disruption of everyday life, or tensions within the social network of the project’s key stakeholders.

- Each individual building renovation is a story of its own, requiring tailored solutions and case-specific considerations. In cases where building renovation is promoted by agents outside the community of homeowners and dwellers, support and engagement of the community has to be gained through mindful collaborative action. Preparation phase for building renovation should therefore be considered a gradual, step-by-step approach, involving a variety of monitoring and communication activities to work towards building awareness, motivation, willingness, and capacity for renovation. Among others, these activities include argumentation, persuasion, education, and user-engagement.

- The key to a successful project management in the case of building renovations is not so much the knowledge behind the technical and financial aspects, although it is undoubtedly important. The real key is trustworthiness – the ability to evoke trust in the decision-makers, and to guide them towards insights they need to understand regarding building renovation and to decide to support it.

- Empowered individuals and communities that will engage in the project development and realization are undoubtedly among the most valuable resources for those who wish to promote and execute
building renovations. This leads us to conclude that in thinking and planning building renovation, it is people who should be in the centre of attention, not buildings as such.

This is followed by another section containing generalized recommendations formulated as 10 key topical subsections.

These are based in real-life experiences of people participating in the TripleA-reno ethnographic research, and contain both identified issues as well as concrete suggestions on how to address them.

1. Engage community managers
2. Raise awareness
3. Provide a timeline
4. Enhance transparency
5. Demonstrate value and build support
6. Identify and engage Local heroes
7. Accommodate local specifics
8. Present a feasible financial plan
9. Involve and empower occupants
10. Pursue long-term behavioural change

This list of recommendations are related to notions of Affordability, Acceptability and Attractiveness. They were identified for the purpose of designing TripleA-reno building renovations solutions, tools and interventions and verified later. Nonetheless, it provides an abundance of insights for initiatives related to TripleA-reno, which want to understand better the people-related impressions on the deep renovation opportunities and processes. This knowledge can be leveraged in pursuit of positive change in the existing socio-technical systems within and beyond the TripleA-reno.
1 Introduction

The vision of the TripleA-Reno project is to promote widespread energy renovation of existing European housing stock and empower individuals and communities in favour of such developments. Within this context, Tasks 2.6 is focused understanding users’ attitudes and responses to products designed in the project in the context of their home environments.

Our analysis based on ethnographic research methods creates the interdisciplinary value promoted by TripleA-rengo by combining technological knowledge and expertise with socio-cultural insights. As argued by Sovacool¹ and scholars alike², the field of energy research is dominated by technical engineering and interdisciplinary research faces considerable difficulties on virtually all relevant fields and levels – institutional, academic and governmental.

Figure 2.- A map of TripleA-rengo ethnographic case studies.

The study includes cases from six different EU member states – Greece (GR), Hungary (HU), Italy (IT), Slovenia (SI), Spain (ES) and the Netherlands (NL). The research involved a student dormitory building (GR), blocks of social housing flats (ES, IT), blocks of flats with complex ownership structures and mixed purposes of use (HU, SI), as well a case of a privately owned individual semi-detached house (NL). People’s everyday-life experiences were recorded and buildings were observed in various stages of the renovation process and

were found to have a variety of structural and performance issues. Such variety of particular contexts and conditions encountered in their field prompted researchers to apply a variety of research strategies leading to a diverse collection of results reflecting the wide scope of challenges TripleA-reno project aims to address. In D2.3 – Catalogue of habits and practices – these were collected and categorized as a form of social practices linked with energy consumption, IEQ, and building renovation.
2 Methodology

The TripleA-reno tailored qualitative research method combines a variety of methods, including interviews, focus groups, and perhaps most importantly – participant observation, the central method of ethnographic research. The added value of our inductive approach is that it provides concrete reference points for development of goal-oriented tools and solutions based on real life evidence.

In this context, 7 focus groups and 21 interviews were planned with people from case studies, with questions partly open, allowing the interviewees to open new topics of conversation (the interviewees data encoded to assure anonymity).

Nevertheless, is to be noted that COVID-19 crisis modified the ethnographic approach and a contingency plan was set in order to contain drawbacks caused to the research by social distancing and confinement measures implemented in the different participating countries. In order to not losing the closeness and direct contact of present dialogue, focus groups were dismissed, and one-on-one on-line interviews were conducted, and, in some cases, even present interviews one-on-one were conducted, but not focus groups, due to capacity limitations and meetings restrictions.

Guidelines for conducting this research were prepared by IRI UL, in order to allow the Case Study Leaders to implement such studies and report their discoveries in the form of short reports explaining why certain renovation project were (un)successful and what were the key lessons learnt.

These guidelines were prepared in a three steps process:

- First, every partner (case study leader) starts with answering on the questions as they – as experts and external observers – perceive the overall situation.
- Next step are the interviews in which our partners check if their impression of the situation (as indicated through their answers) fits to the impression of the informants (=people that we will interview)
- Last, case study leaders provide an analysis from the collected insights

It was crucial to find out why some cases were unsuccessful (not renovated) and what could we learn out of it. The goal was to understand the barrier and crucial factors “making or braking” the renovation project. In the cases where a neighbouring building has been successfully renovated (as in NL in SI for instance) we also would hear why this was the case (in comparison to the unsuccessful one).
2.1 Guidelines

Text and table templates were distributed among the case study leaders to fill by themselves and guide their actions with their building occupants, as well as for reporting their findings. Templates were divided into 4 sections.

2.1.1 Interview preparations

To prepare for the Task 2.6 interview, Case Study Leaders answered the following questions, about the renovation:

<table>
<thead>
<tr>
<th>QUESTION</th>
<th>EXAMPLES</th>
</tr>
</thead>
</table>
| What is the current situation in regards to the renovation of the TripleA-Reno case study in your country? | 1) People do not even consider renovations (lack of awareness, knowledge, or motivation).  
2) People find it (too) difficult to undertake a renovation for financial or practical reasons.  
3) Renovation are stressful and frustrating experiences for individuals for a number of reasons.  
4) We are almost there.  
5) Etc. |

Key involved Actors (Protagonists)

Who were typical actors of your (un)successful renovation story? What were their contributions?

Local heroes, housing company, TripleA-Reno partners etc.

Condition(s)

List three typical conditions at the very beginning of your renovation project. What condition(s) were your protagonists facing?

- Difficulty finding a simultaneously competent, trustworthy and financially feasible service supplier.  
- Difficulty coming up with a financially sustainable plan that would be balanced with their needs, wants and expectations.  
- A large number of unknown factors and hurdles in the way – from administrative obstacles to practical factors.

Wants, needs, expectations

List three key aims your protagonist wanted to achieve (or accomplish) with the renovation.

- Improved quality of buildings in terms of use, aesthetics and comfort.  
- Improved energy efficiency.  
- Increased value of the property.

Challenges and antagonists

List three typical challenges/obstacles/antagonists that were in the way of your protagonist on their way to achieving a successful result.

- Lack of finances.  
- Administrative and other non-technical and non-financial obstacles.  
- Fear of unfeasibility of the project (a waste of money, time and effort).

Solutions

- Substantial financial support from public institutions or private investors.
### List three typical solutions/decisive elements leading to a renovation project success (or close to success).

- Highly motivated and driven individuals with invested personal interests.
- Trustworthy and active knowledge ambassadors (such as NGOs, public institutions or businesses).

### Key lessons learnt
Why do you think the renovation was (un)successful? What could we learn out of the experience? If we turned back the time, what would we change to be more successful?

### Why we failed and the other didn’t?
Compared to successful renovation cases in the neighbourhood, what were the key differences? Why were they successful and we were not?

And about the TripleA-reno interventions in the context of their case study:

### TripleA-Reno interventions - general
What are your experiences with TripleA-Reno tools? Do you find them useful, helpful?

- Installed sensors
- Ethnographers as intervention (interviews)
- Labelling scheme
- TAR Platform (if available and used)
- Etc.

### TripleA-Reno interventions – behavioural change
Did anything change because of the TripleA-Reno tools? E.g., did the tools influence the behaviour in relation to energy efficiency? Did they contribute to better home environment, air quality etc.?

### TripleA-Reno interventions – relations with stakeholders
Did the project in general contribute to better relations with key stakeholders involved in renovation?

### Recommendations for future improvements
Based on your experiences with the TripleA-Reno, what would be your suggestions for the future?
Answers to these questions were collected and put together in order to detect common situations and enhance differences.

2.1.2 Interview realization
Then interviews are conducted. These interviews would resemble a conversation about key issues as indicated in the previous tables. They would preferable be recorded or transcribed, and photographs or images are desirable for describing the context and environment of the interview.

2.1.3 Analysis after the interviews
Review the experience(s) shared by your informants and define clear storylines following the scheme of the (failed) hero’s journey. Be as concrete as possible. If the story is complicated and involves several challenges and stages of solution finding, define it as much as possible.

Title:

<table>
<thead>
<tr>
<th>Protagonists:</th>
<th>Antagonists:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key challenge(s):</td>
<td>Key (potential) solutions:</td>
</tr>
<tr>
<td>Helpers:</td>
<td>Decisive moments:</td>
</tr>
<tr>
<td>Location(s) and time(s):</td>
<td>Items &amp; materials:</td>
</tr>
<tr>
<td>Once upon a time...</td>
<td></td>
</tr>
</tbody>
</table>

2.1.4 Renovation stories
Based on the above research, the renovation story of each pilot building can be built in terms of:

- Previous knowledge - Motivation factors
- Major steps - Challenges
- Highlights - Key lessons
3 Renovation stories

Based on the application of the guidelines included in previous section, each country implemented such studies and reported their discoveries in the form of short reports explaining why certain renovation project were (un)successful and what were the key lessons learnt.

3.1 Greece (GR)

Authors: Davide Prati, Lorna Dragonetti and Anastasia Fotopoulou

Location: Athens, Attica region

The Greek case study is a student dormitory building located in the eastern suburb area of the state’s capital Athens.

3.1.1 Interview preparations

To prepare for the interview, the following questions were answered, related to renovation:

<table>
<thead>
<tr>
<th>QUESTION</th>
<th>ANSWER</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the current situation in regards to the renovation of the TripleA-Reno case study in your country?</td>
<td>Renovation (both internally and the implementation of the exoskeleton and the addition) has been approved by the local authorities and it started recently. The case is funded by the H2020 Pro-GET-onE project. This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 723747.</td>
</tr>
</tbody>
</table>

Key involved Actors (Protagonists)

Who were typical actors of your (un)successful renovation story? What were their contributions?

- ProGETonE consortium. Research activities, reporting and detailing technical studies
- National and Kapodistrian University of Athens Key partner of the consortium
- Technical services of the University of Athens Case study owner, permits procedure
- Students Social feedback, interviews, feedback regarding the renovation process
- External experts (engineers) Definitive and executive design

Condition(s)

List three typical conditions at the very beginning of your renovation project. What condition(s) were your protagonists facing?

- Difficulty coming up with a financially sustainable plan for the university of Athens
- A large number of unknown factors and hurdles in the way – from administrative obstacles, legislative barriers to practical factors.
- Degraded existing building, very low energy performance, limited space.
**Wants, needs, expectations**
List three key aims your protagonist wanted to achieve (or accomplish) with the renovation.
- Improved quality of buildings in terms of use, aesthetics, comfort.
- Improved energy efficiency.
- Seismic safety

**Challenges and antagonists**
List three typical challenges/obstacles/antagonists that were in the way of your protagonist on their way to achieving a successful result.
- Lack of finances.
- Administrative and other non-technical and non-financial obstacles.
- Technical feasibility of the project
- Legislative barriers
- Timing

**Solutions**
List three typical solutions/decisive elements leading to a renovation project success (or close to success).
- Substantial financial support from EU with H2020 programme funding
- Highly motivated and driven individuals in the ProGetOne consortium
- Innovative solutions tailored on the building
- Extra funding from the NKUA

**Key lessons learnt**
Why do you think the renovation was (un)successful? What could we learn out of the experience? If we turned back the time, what would we change to be more successful?
The renovation is not concluded yet so no lessons learnt so far. Nevertheless local experts regarding technical issues based also on national building codes should be involved since the beginning of the project.

**Why we failed and the other didn’t?**
Compared to successful renovation cases in the neighbourhood, what were the key differences? Why were they successful and we were not?
And related to TripleA-reno:

**TripleA-Reno interventions - general**
What are your experiences with TripleA-Reno tools? Do
- Installed sensors
- Ethnographers as intervention (interviews)
- Labelling scheme
you find them useful, helpful?

<table>
<thead>
<tr>
<th><strong>TripleA-Reno interventions – behavioural change</strong></th>
<th>The Greek case is the pilot case of H2020 project ProGetOne and because of that the TripleAreno intervention didn’t influence the project so far. This will be examined as expected impact during future time.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did anything change because of the TripleA-Reno tools? E.g., did the tools influence the behaviour in relation to energy efficiency? Did they contribute to better home environment, air quality etc.?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>TripleA-Reno interventions – relations with stakeholders</strong></th>
<th>In the ambient of H2020 projects the network of key stakeholders is essential and always useful for the activities of each project. For example the ethnographers and their input on how to perform a successful interview was very important.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did the project in general contribute to better relations with key stakeholders involved in renovation?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Recommendations for future improvements</strong></th>
<th>We think the best way to exploit TAR approach will be to engage Social Housing Companies before the energy renovation design phase and convince them to involve dwellers in an extensive use of participatory tools to build up tailored energy renovation projects really based on end-users needs Institution of an external “supervisor”, even if only as an observer or a researcher, can have a positive effect on the renovation process. Even more so if imagined in a form of a facilitator – an independent expert on building renovation that catalyses and orchestrates the renovation process.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Based on your experiences with the TripleA-Reno, what would be your suggestions for the future?</td>
<td></td>
</tr>
</tbody>
</table>

3.1.2 After the interview – ANALYSIS

Review the experience(s) shared by your informants and define clear storylines following the scheme of the (failed) hero’s journey. Be as concrete as possible. If the story is complicated and involves several challenges and stages of solution finding, define it as much as possible.

The renovation of a student house in Athens

<table>
<thead>
<tr>
<th>Protagonists:</th>
<th>Antagonists:</th>
</tr>
</thead>
<tbody>
<tr>
<td>ProGETonE consortium</td>
<td>Administrative problems</td>
</tr>
<tr>
<td>NKUA</td>
<td>Lack of finances</td>
</tr>
<tr>
<td>Students</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Key challenge(s):</th>
<th>Key (potential) solutions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical feasibility of the project</td>
<td>Substantial financial support from EU with H2020 programme funding</td>
</tr>
<tr>
<td>Legislative barriers</td>
<td></td>
</tr>
</tbody>
</table>
### Timing

<table>
<thead>
<tr>
<th></th>
<th>Innovative solutions tailored on the building</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Extra funding from the NKUA</td>
</tr>
</tbody>
</table>

#### Helpers:
Highly motivated and driven individuals in the ProGetOne consortium

#### Decisive moments:
Approval of the project

#### Location(s) and time(s):
Athens

#### Items & materials:
- Exoskeleton
- Funds

---

Once upon a time, in the historic city of Athens, stood the National and Kapodistrian University of Athens which had some buildings used as a student houses. One of them was in a state of structural and energy degradation but the university needed funds to be able to renovate it.

Fortunately it became the demo case of the European project ProGETonE, based on the integration of different technologies to achieve a multi-benefit approach to tackle these important needs in existing buildings: safety upgrades to face future earthquakes in seismic zones and nearly zero energy consumption.

The project consortium worked very hard to define a consolidation and improvement project through an exoskeleton and a new prefabricated and plug and play facade and the students were involved with interviews to understand their needs also on the basis of the questionnaires developed by the TripleA-reno project. Thanks to the participation in the project ProGETonE, NKUA obtained a substantial financial support from EU and, thanks to an extra-funding of the NKUA the project could start.

Unfortunately the technical feasibility of the project was very complicated and the project also encountered many legislative and administrative barriers. It was only thanks to the determination of highly motivated and driven individuals in the ProGETonE consortium that innovative solutions tailored on the building were developed and that the project was concluded and approved.

Today NKUA and the consortium work together to ensure that the renovation process is carried out in the best possible way and that students can receive a new, safer, more efficient and more comfortable building.

### 3.1.3 Renovation story

**Renovation of a student house in the University of Athens Campus in Zografou area, Athens, Greece**

In the city of Athens, in the campus of the University (NKUA) in Zogafou area there is a complex of student houses. While most of them were renovated during the Olympics in 2004, one of them remained in a state of structural and energy degradation but the university needed funds to be able to renovate it. It was planned an internal renovation but yet no further actions have been taken until June 2016.
At that moment that building became the demo case of the European project ProGETonE (this project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 723747), which proposes the integration of different technologies to achieve a multi-benefit approach to tackle these important needs in existing buildings: safety upgrades to face future earthquakes in seismic zones and nearly zero energy consumption while adding real estate value through architectural requalification.

All stakeholders involved, managed to define the project and the buildings’ problems:

- The facades were in a state of decay and needed isolation.
- Windows had too low thermal performance and they were single glazed
- Plants needed to be replaced
- Additional space was needed as the rooms were very small (about 10m²)
- Lack of private bathrooms
- Small balconies/common space
- HVAC systems needed to be replaced and be integrated with innovative solutions
- Low energy performance

The first step was the definition of the main interventions:

- realization of insulation applied at the entire external envelope of the building, including the roof and the ceiling of the porch on the ground floor.
- replacing windows with new ones having transmittance characteristics in line with current regulations.
- seismic consolidation interventions
- the use of exoskeleton as seismic reinforcement
- addition of extra rooms/sunspaces/balconies as extra space integrated with the exoskeleton
- internal renovation
- private bathrooms
- addition of RES
- Integrated HVAC systems
- Monitoring with smart meter tools
- nZEB

Unfortunately the technical feasibility of the project was very complicated and the project also encountered many legislative and administrative barriers. It was only thanks to the determination of the highly motivated and driven partners in the ProGETonE consortium that innovative solutions tailored on the building’s and users’ needs were developed and that the project design was concluded and approved by the authorities.

NKUA as owner of the building and the students as main users had expectation about the results of this innovative renovation, in particular:

- Improved quality of the building in terms of use, aesthetics and comfort
• Improved energy efficiency
• Increased value of the property
• Increase of living private space
• Indoor comfort

The project consortium worked very hard to define a consolidation and improvement project through an exoskeleton and new prefabricated and plug and play façade components. The students, however, did not have much trust, they had waited many years for someone to take an interest in their situation and were afraid that they would be disappointed also this time.

To gain trust and to share knowledge with them, the students were interviewed to better understand their needs and habits and were helped to understand how the renovation process works. This experience made them feel part of the process and helped create a relationship of trust with NKUA, Pro-GET-onE consortium and all stakeholders involved to the renovation process.

There were also other challenges to overcome before the renovation could begin:

• Administrative and other non-technical and non-financial obstacles.
• Fear of unfeasibility of the project (a waste of money, time and effort).
• Delays due to Covid-19 pandemic
• Legislative barriers
• Technical criticalities
• Time and deadlines
• Costs

The Pro-GET-onE partners involved with their determination, expertise and experience managed to overcome all difficulties and finally the project was approved and the renovation has started. Finally the students were optimistic about the renovation of their student house and have regained trust in the technical services and in their institution.

The renovation started on June 2021 and is planned to finish by the end of April 2022, according to the timeline of Pro-GET-onE. At this time though, there as some difficulties in the material supply, covid restrictions and bureaucratic procedures that delay some processes. The increase of the material costs is also an important issue to be tackled to all the construction sector around EU.

Today NKUA and the consortium work together to ensure that the renovation process is carried out in the best possible way and that students can receive a new, safer, more efficient and more comfortable building.

After the first interviews before the renovation, there were no official statements from the stakeholders involved and the users, but through informal talks and from this experience we can learn a lesson: dwellers and owners are not always ready to participate in a co-design process. Dwellers usually lack of knowledge especially regarding ICT tools and energy renovation aspects, the profits they may have etc. Companies, on the other side, have difficulty to adapt to innovative strategies and promote new technologies out of fear of loosing more time and of spending more money for long time investments.
Projects such as TripleA-reno can help companies/institutes/public authorities to involve the inhabitants since the initial phase of the renovation process, in order to adapt it to the needs of the end users and to engage them to the whole process. In addition, the figure of an external intermediary can have a positive impact on the process and on the perception of it by all the people involved.
3.2 Hungary (HU)

Authors: Gabor Nemeth, Zoltan Magyar

Location: Szigetszentmiklos, Pest county

The Hungarian case is located in Szigetszentmiklos, a town on the Danube river 30 min car drive south of the national capital Budapest. It is a residential block of flats with some storage space used for business purposes. The apartments are privately owned. Informants of the Hungarian case are all in their 60s, financially independent, and pleased with the location of their home, but not necessarily with the building’s physical qualities and performances.

3.2.1 Interview preparations

To prepare for the interview, the following questions were answered, related to renovation:

<table>
<thead>
<tr>
<th>QUESTION</th>
<th>ANSWER</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the current situation in regards to the renovation of the TripleA-Reno case study in your country?</td>
<td>The building manager said the most of the occupants support the renovation, however they did not vote on the general meeting for implementing the renovation due to the high investment cost. The renovation is very expensive. Prices have been significantly increased in the construction industry in the recent years in Hungary, especially in the last one year. The most important barriers of the renovation are definitely the extremely high investment cost and the lack of financial subsidies. Despite the highly motivated occupants the renovation project has not been started yet, because most of the occupants need financial grant, there is only a narrow layer of people who can afford the expenses of the renovation. Furthermore the COVID-19 crisis also has a negative effect on the renovation market. Many people lost their job and people are very careful about high financial expenses, like a complex building renovation project. During the COVID-19 emergency status, the general meeting of the building occupants and the building manager was not allowed therefore they were even not able to vote for the renovation project for months.</td>
</tr>
<tr>
<td>Key involved Actors (Protagonists) Who were typical actors of your (un)successful renovation story? What were their contributions?</td>
<td>The key involved actors were the building manager, three occupants and a contractor company. The intention for the renovation was very clear. All the interviewed occupants agreed that the thermal insulation of the external walls and the renovation of the heating system is the most necessary. In the existing condition the overheating is very typical in all the flats in the Hungarian demo building, so an appropriate control of the heating system would result less heating energy use and increase thermal comfort. The measurement campaign was made in three apartments and the results were reported.</td>
</tr>
</tbody>
</table>
The building manager also supported the renovation, however it has not been implemented so far because of the lack of financial subsidies and the COVID-19 crisis.

<table>
<thead>
<tr>
<th>Condition(s)</th>
<th>In the beginning of 2020, before COVID-19 crisis, the contractors visited the site and provided detailed quotations on the complex renovation that we proposed. We assembled the quotations and sent to the building manager. An information letter was also sent to the building manager, by introducing the technical content of the planned renovation, the expected positive effects of the renovation, the expected energy saving, and the most important conditions of the renovation. Unfortunately when all these information sent to the building manager, the COVID-19 crisis has just begun, and they had no chance to organize general meetings for months. The general meeting can be organized only in the autumn of 2020, but the occupants did not want to start any project which requires high investment cost.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wants, needs, expectations</strong></td>
<td>1. Energy cost saving. 2. Improved quality of buildings in terms of use, aesthetics and comfort. 3. Increased value of the property.</td>
</tr>
<tr>
<td><strong>Challenges and antagonists</strong></td>
<td>1. Lack of finances. 2. High investment costs. 3. COVID-19 crisis, uncertainties of salaries.</td>
</tr>
<tr>
<td><strong>Solutions</strong></td>
<td>1. Substantial financial support from public institutions 2. Highly motivated and driven individuals with invested personal interests. 3. Trustworthy contractor</td>
</tr>
<tr>
<td><strong>Key lessons learnt</strong></td>
<td>As the building manager said the residents regularly inquire about whether there is a grant application possibility. In Hungary, there was 50-75% non-refundable financial support for the renovation for many years, however in the recent years, there is no available financial grant, only 0% loan interest, which is definitely not enough.</td>
</tr>
</tbody>
</table>
| experience? If we turned back the time, what would we change to be more successful? | The government did the necessary steps and a thorough study was made last year which proposes to introduce again a financial grant together with VAT reduction for renovation projects in the residential sector.  
- In Hungary, the most of the multi apartment buildings were renovated with significant financial grants. Without grant support the occupants have no possibilities to implement complex renovation project, which requires very high investment cost. |
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<tr>
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<th></th>
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</thead>
<tbody>
<tr>
<td>Why we failed and the other didn’t? Compared to successful renovation cases in the neighbourhood, what were the key differences? Why were they successful and we were not?</td>
<td>Other similar buildings in the surroundings and even in other places were renovated when significant financial grant support was available. In the recent years there has not been available grant support therefore renovation of multi apartment buildings was practically stopped down in Hungary.</td>
</tr>
<tr>
<td>And related to TripleA-reno:</td>
<td></td>
</tr>
</tbody>
</table>
| **TripleA-Reno interventions - general**  
What are your experiences with TripleA-Reno tools? Do you find them useful, helpful? | - The monitoring campaigns showed new aspects and provided useful recommendations.  
- The combined labelling helps to understand the energy performance and the IAQ and well-being aspects of the analysed dwellings and provides useful recommendations how to improve energy efficiency and comfort. |
| **TripleA-Reno interventions – behavioural change**  
Did anything change because of the TripleA-Reno tools? E.g., did the tools influence the behaviour in relation to energy efficiency? Did they contribute to better home environment, air quality etc.? | - The overheating is very typical in the Hungarian demo building. The monitoring campaign helped to prove this and the recommendations were easy to understand how to prevent overheating with thermostatic radiator valves. The interviewed occupants understood the importance of appropriate heating control, which reduces heating energy consumption and increases thermal comfort in the heating season.  
- The indoor thermal comfort in the cooling season can be improved also with some easy interventions, like closing the windows and doors during daytime in hot periods and open them in the evenings and nights, when the outdoor temperature is moderated. |
| **TripleA-Reno interventions – relations with stakeholders**  
Did the project in general contribute to better relations with key stakeholders involved in renovation? | - The focus group interview – as part of the ethnography research – was very useful, when the occupants, the building manager and the potential contractor shared their views on building renovation project. It was definitely helped to answer the risen questions and to make discussions on topics related the preparation, the implementation and the finish of a renovation project. |
| Recommendations for future improvements | - |

Based on your experiences with the TripleA-Reno, what would be your suggestions for the future?
3.2.2 After the interview – ANALYSIS

Review the experience(s) shared by your informants and define clear storylines following the scheme of the (failed) hero’s journey. Be as concrete as possible. If the story is complicated and involves several challenges and stages of solution finding, define it as much as possible.

Szigetszentmiklos, Hungary

<table>
<thead>
<tr>
<th>Protagonists:</th>
<th>Antagonists:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Majority of occupants.</td>
<td>Few occupants.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Key challenge(s):</th>
<th>Key (potential) solutions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Lack of information.</td>
<td>1. Focus group interview was very effective to answer questions and share information on the renovation project.</td>
</tr>
<tr>
<td>2. Extremely high investment costs.</td>
<td>2. Still no solution for high investment costs, renovation of buildings practically stopped down in Hungary.</td>
</tr>
<tr>
<td>3. Lack of financial subsidies.</td>
<td>3. Still no available financial grant. A potential financial grant scheme has been presented by the ministry in a recent workshop in 2021, so everybody hopes it will be available in the near future.</td>
</tr>
<tr>
<td>4. Covid-19 crisis.</td>
<td>4. There are still negative effects of Covid-19 crisis, but the situation is getting better due to national and international actions.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Helpers:</th>
<th>Decisive moments:</th>
</tr>
</thead>
<tbody>
<tr>
<td>TripleA-Reno anthropologists</td>
<td>Unfortunately, occupants have not decided the renovation yet.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location(s) and time(s):</th>
<th>Items &amp; materials:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Szigetszentmiklos, Hungary</td>
<td>IAQ meters</td>
</tr>
<tr>
<td></td>
<td>Combined labelling report</td>
</tr>
</tbody>
</table>

The Hungarian demo building is located in Szigetszentmiklos, 30 km far from Budapest. The building was built in 1982 with prefabricated concrete panel construction technology. The building has a total of 60 apartments. The walls and the roof have a poor thermal characteristic. Most of the windows were replaced to new PVC framed windows. The building is connected to the district heating system, which provides thermal energy for heating and domestic hot water purposes. Within the building there is a 1-pipe heating system, the heating appliances are radiators equipped with a manual valve.

During the interviews with the occupants and the monitoring campaigns it was revealed that most of the occupants support the renovation for these reasons:
- They would like to save energy cost.
- They would like appropriate heating control, because overheating is very typical in the apartments.
- They would like to improve quality of the building in terms of aesthetics.
- They expect increased value of the property due to the renovation.

In the beginning everything went well, the monitoring campaigns implemented in winter and summer time and the combined labelling proved the necessity of the renovation project. The well-being and IEQ indicators of the technical building systems were evaluated during the combined labelling and the result was weak for “apartment 1” and “apartment 2”, and acceptable for “apartment 3”. The main reason for the low level of well-being and IEQ performance of the technical building systems is the central building temperature control in the heating system; thus, the occupants cannot control the indoor temperature according to their specific needs. Typically, when the indoor temperature is good in apartments at the edge of the building, there can be overheating in the intermediate apartments without apartment or room control.

Based on the combined labelling the technical content of the renovation project was defined by the TripleA-reno team.

- The thermal insulation of the walls and the roof is recommended, which results in less heating energy use and improves IEQ.
- Installing thermostatic valves on the radiators is recommended, ensuring room control of the heating system, reducing heating energy use, and improving thermal comfort (no more overheating) and well-being (automatic operation).
- Installing a thermal solar collector system for the whole building is suggested, which reduces the energy use of domestic hot water production and increases renewable energy ratio.

In the beginning of 2020, before COVID-19 crisis, the contractors visited the site and provided detailed quotations on the complex renovation that we proposed. We assembled the quotations and sent to the building manager. An information letter was also sent to the building manager, by introducing the technical content of the planned renovation, the expected positive effects of the renovation, the expected energy saving and the most important conditions of the renovation. Unfortunately when all these information sent to the building manager, the COVID-19 crisis has just begun and they had no chance to organize general meetings for months. The general meeting can be organized only in the autumn of 2020, but the occupants did not want to start any project which requires high investment cost.

Prices have been significantly increased in the construction industry in the recent years in Hungary, especially in the last one year, which affects strongly the decision of the occupants. The most important barriers of the renovation are definitely the extremely high investment cost and the lack of financial subsidies. Despite the highly motivated occupants the renovation project has not been started yet, because most of the occupants need financial grant, there is only a narrow layer of people who can afford the expenses of the renovation. Furthermore the COVID-19 crisis also has a negative effect on the renovation market. Many people lost their job and people are very careful about high financial expenses, like a complex building renovation project.

As the building manager said the residents regularly inquire about whether there is a grant application possibility. There was 50-75% non-refundable financial support for the renovation for many years in
Hungary, however in the recent years there is no available financial grant, only 0% loan interest, which is definitely not enough. In Hungary, the most of the multi apartment buildings were renovated with significant financial grants. Without grant support the occupants have no possibilities to implement complex renovation project, which requires very high investment cost. Other similar buildings in the surroundings and even in other places in Hungary were renovated when significant financial grant support was available. In the recent years there has not been available grant support therefore renovation of multi apartment buildings was practically stopped down in Hungary. The Hungarian government did steps and a thorough study was made last year which proposes to introduce again a financial grant together with VAT reduction for renovation projects in the residential sector.

Apart from that the building was not renovated within the project timeframe, the TripleA-reno project proved the necessity of the renovation and proposed the content of the renovation, increased the motivation of occupants, which will definitely ease the renovation process, when occupants decide to start it. On the other hand the combined labelling of homes provides recommendations which requires no or very low investment cost, but it can help to improve both energy efficiency and comfort of homes. These are as follows:

1. Opening of the windows should be avoided when outdoor particulate matter load is high (vehicle traffic is stronger, solid fuel heating pollute the air).
2. During winter, it is recommended to use air humidifiers in the apartment (e.g. radiator hanging humidifier) in order to avoid “dry air” feeling.
3. Installing thermostatic valves on the radiators is recommended, which provides room control of the heating system, reduces heating energy use and improves thermal comfort and well-being.
3.3 Italy (IT)

Authors: Davide Prati, Lorna Dragonetti and Anastasia Fotopoulou

Location: Concordia Sagittaria, Veneto region

The Italian case-study is a social housing block of flats located in Concordia Sagittaria.

3.3.1 Interview preparations

To prepare for the interview, the following questions were answered, related to renovation:

<table>
<thead>
<tr>
<th>QUESTION</th>
<th>ANSWER</th>
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</thead>
</table>
| What is the current situation in regards to the renovation of the TripleA-Reno case study in your country? | 1) The renovation project is approved and the construction is about to start after a delay due to difficulties to supply materials. These are because of the high number of construction sites activated in the last year.  
2) The delay of the operation has affected the involvement of the dwellers and their distrust, which seemed to have been overcome after the interviews and the focus group work, has grown again. The relationship established with the ATER company, on the other hand, is still fruitful and it is desirable that TripleA-reno's approach will be adopted in the future. |

Key involved Actors (Protagonists)

Who were typical actors of your (un)successful renovation story? What were their contributions?

- The dwellers
- Experts (project planner, institute for building excellence, contractors, etc.)
- TripleA-Reno partners (Davide)

Condition(s)

List three typical conditions at the very beginning of your renovation project. What condition(s) were your protagonists facing?

- Lack of finances
- Mistrust of the dwellers
- Administrative and other non-technical and non-financial obstacles.
- Fear of unfeasibility of the project (a waste of money, time and effort).

Wants, needs, expectations

List three key aims your protagonist wanted to achieve (or accomplish) with the renovation.

- Improved quality of buildings in terms of use, aesthetics and comfort.
- Improved energy efficiency.
- Increased value of the property.

Challenges and antagonists

List three typical challenges/obstacles/antagonists.

- Lack of finances.
- Administrative and other non-technical and non-financial obstacles.
nists that were in the way of your protagonist on their way to achieving a successful result.

**Solutions**
List three typical solutions/decisive elements leading to a renovation project success (or close to success).

<table>
<thead>
<tr>
<th>Solutions</th>
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</thead>
<tbody>
<tr>
<td>- Fear of unfeasibility of the project (a waste of money, time and effort).</td>
<td></td>
</tr>
<tr>
<td>- Substantial financial support from public institutions or private investors.</td>
<td></td>
</tr>
<tr>
<td>- Highly motivated and driven professionals of the Social Housing Company that were deeply interested in a people-centered approach for energy renovation.</td>
<td></td>
</tr>
<tr>
<td>- People need to recognition of their status. The renovation of the building is perceived as a step up in the social consideration of the neighbours</td>
<td></td>
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</tbody>
</table>

**Key lessons learnt**
Why do you think the renovation was (un)successful? What could we learn out of the experience? If we turned back the time, what would we change to be more successful?

Italian building stock is old, and the social housing building stock is in poor maintenance conditions but dwellers and owners are not ready to accept the participatory design process. Dwellers are usually elderly, not fond of ICT tools and energy savings issues. Companies are, on the other side, focused mainly on not spending money for long time investments. The most crucial point to take care of seems to be the change of mentality of those involved.

**Why we failed and the other didn’t?**
Compared to successful renovation cases in the neighbourhood, what were the key differences? Why were they successful and we were not?

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</table>


And related to TripleA-reno:

| TripleA-Reno interventions - general | - Installed sensors - useful but not easily understandable by dwellers  
| - Ethnographers as intervention (interviews) - This was the most successful and interesting experience, but it is high time consuming  
| - Labelling scheme - the labelling was tested only by the experienced user already involved in the project  
| - TAR Platform (if available and used) - NO, the project was already designed before the TAR Platform was ready |

| TripleA-Reno interventions – behavioural change | - Unfortunately we don’t think that the TAR intervention radically changed the project path. The only real contribution was the trust gaining activity carried out during interviews and focus group |

| TripleA-Reno interventions – relations with stakeholders | The Social Housing company and dwellers used to face conflicts for the maintenance of the building. The gap in their mutual relationship was partially filled by the intervention of a third party figure such as the TAR facilitator (Davide) |

| Recommendations for future improvements | - We think the best way to exploit TAR approach will be to engage Social Housing Companies before the energy renovation design phase and convince them to involve dwellers in an extensive use of participatory tools to build up tailored energy renovation projects really based on end-users needs Institution of an external “supervisor”, even if only as an observer or a researcher, can have a positive effect on the renovation process. Even more so if imagined in a form of a facilitator – an independent expert on building renovation that catalyses and orchestrates the renovation process.  
| - Local hero - a person that takes the project as their personal challenge - makes a difference. |

3.3.2 After the interview – ANALYSIS

Review the experience(s) shared by your informants and define clear storylines following the scheme of the (failed) hero’s journey. Be as concrete as possible. If the story is complicated and involves several challenges and stages of solution finding, define it as much as possible.
Renovation of a building in Venice: a story of inhabitants and social housing company

<table>
<thead>
<tr>
<th>Protagonists:</th>
<th>Antagonists:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dwellers and ATER VENEZIA (social housing company)</td>
<td>Not a physical antagonist, but the condition of mistrust of the dwellers and the lack of public finances.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Key challenge(s):</th>
<th>Key (potential) solutions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finding public funding</td>
<td>Mediation by a third party person (es. TripleA-reno intermediary)</td>
</tr>
<tr>
<td>Gaining the trust of the dwellers</td>
<td>Public fund for social housing</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Helpers:</th>
<th>Decisive moments:</th>
</tr>
</thead>
<tbody>
<tr>
<td>TripleA-Reno intermediate (Davide)</td>
<td>Days with TripleA-reno intermediate</td>
</tr>
<tr>
<td>Veneto region</td>
<td>Approval of the project</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location(s) and time(s):</th>
<th>Items &amp; materials:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concordia Sagittaria</td>
<td>Funds</td>
</tr>
<tr>
<td></td>
<td>Interviews</td>
</tr>
</tbody>
</table>

Once upon a time, in a small town near Venice named Concordia Sagittaria, a group of dwellers in a ruined, old apartment block. The building was owned by Ater Venezia, a social housing company, while the inhabitants were elderly people, they lived in that place for a long time and despite complaining of the conditions in which the palace was poured for a long time, they had given up hope and didn’t think anyone would ever help them.

Actually, ATER Venezia cared about the inhabitants, and wanted to help them by redeveloping the building in order to improve their living conditions and lowering the energy consumption, but unfortunately this type of intervention is expensive and ATER needed to find funding and resources, but it was often blocked by bureaucracy.

Fortunately, the Veneto region provided funds for the energy upgrading of social housing buildings and ATER Venezia commissioned a designer to finish the project. By now, however, the inhabitants no longer trusted and did not believe that the project would be finished.

One day Davide, an intermediary of TripleA-reno project arrived at Concordia Sagittaria, and helped the inhabitants to understand the aspects of the renovation process and interviewed them to understand how they lived in their homes, their degree of comfort and their habits, making them finally feel like they were part of the process.

Finally the project was approved, but soon the works stopped because there were problems with the supply of materials throwing the inhabitants back into mistrust. Today the inhabitants are still waiting for the renovation work to start, but this time the relationship with ATER is stronger and they look forward to the renovation of their homes, ATER, on the other hand, has understood the importance of involving the inhabitants and wants to use the TripleA-Reno tools for other projects.

3.3.3 Renovation story

Renovation of a social housing building in Venice
In a small town near Venice called Concordia Sagittaria, there was an old, ruined building property of ATER Venezia, a social housing company. The dwellers were elderly people and during the years they had complained several times about the state of the building. ATER wanted to help them but they needed to find how to finance the renovation project.

Finally, in 2019, the Veneto region funded the renovation process and ATER Venezia managed to define the project. At this point they knew which were the buildings’ problems:

- The facades were in a state of decay and needed isolation.
- Windows had too low thermal performance
- The heat generator had to be replaced

The first step was the definition of the project and the main interventions:

- realization of a coat insulation applied at the entire external envelope of the building, including the roof and the ceiling of the porch on the ground floor.
- replacing windows with new ones having transmittance characteristics in line with current regulations.
- replacing of the heat generation system by converting it from gas oil to natural gas and installation of a solar thermal plant for the production of hot water
- seismic consolidation interventions

ATER had expectation about the results of the renovation, in particular:

- Improved quality of buildings in terms of use, aesthetics and comfort.
- Improved energy efficiency.
- Increased value of the property.

The inhabitants, however, did not have much trust, they had waited many years for someone to take an interest in their situation and were afraid that they would be disappointed also this time.

In the meantime, however, the building was chosen to participate as a case study in the TripleA-reno project. As part of this project, the inhabitants were interviewed to better understand their needs and habits and were helped to understand how the renovation process works by Davide, an intermediary of the project. This experience made them feel part of the process and helped create a relationship of trust with ATER.

There were also other challenges to overcome before the renovation could begin:

- Administrative and other non-technical and non-financial obstacles.
- Fear of unfeasibility of the project (a waste of money, time and effort).
- Delays due to Covid-19 pandemic

But ATER’s technicians with determination managed to overcome these difficulties and finally the project was approved. Finally the inhabitants were optimistic about the renovation of their apartments and had regained trust in ATER and in the institutions.Unfortunately the renovation process, which was supposed to begin in September 2021, is now stopped due to difficulties to supply materials. These are because of the high number of construction sites activated in the last year in Italy where lot of incentives were given for energy retrofitting actions.This delay of the operation has affected the involvement of the dwellers and
growing again a sense of distrust, which seemed to have been overcome after the interviews and the TripleA-reno focus group work. Anyway, the relationship established with the ATER seems is still fruitful and the company thinks that would be desirable to adopt TripleA-reno's approach in the future.

After the first interviews, there were no official statements from the inhabitants, but through informal talks and from this experience we can learn a lesson: Italian social housing building stock is in poor maintenance conditions but dwellers and owners are not always ready to participate in a co-design process. Dwellers are usually elderly, not fond of ICT tools and energy renovation aspects. Companies are, on the other side, focused mainly on not spending money for long time investments. Projects such as TripleA-reno can help convince social housing companies to involve the inhabitants before the project phase of the renovation process, in order to adapt it to the needs of the end users. In addition, the figure of an external intermediary can have a positive impact on the process and on the perception of it by all the people involved.

3.4 Slovenia (SI)

Authors: Domen Bančič, Gregor Cerinšek, and Jure Vetršek

Location: Zagorje, Zasavje region

The Slovenian case is a residential block of flats located in a town of Zagorje, an appx. 7000 people strong urbanised administrative centre for the municipality of Zagorje ob Savi.

3.4.1 Interview preparations

To prepare for the interview, the following questions were answered, related to renovation:

<table>
<thead>
<tr>
<th>QUESTION</th>
<th>EXAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the current situation in regards to the renovation of the TripleA-Reno case study in your country?</td>
<td>- Renovation is finished. - People find the experience of the renovation a lengthy, rather stressful, and frustrating experience. In Slovenia case this is largely due to conflicts of interests between various stakeholders involved in the project. 3) Nonetheless, they are proud of the finished project and happy that it is finished.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Key involved Actors (Protagonists)</th>
<th>Local hero (Nadja)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who were typical actors of your (un)successful renovation story? What were their contributions?</td>
<td>A group of engaged homeowners</td>
</tr>
<tr>
<td></td>
<td>Experts (project planner, institute for building excellence, contractors, etc.)</td>
</tr>
<tr>
<td></td>
<td>Zagorje housing company, TripleA-Reno partners</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Condition(s)</th>
<th>- Complications about technical solution of putting insulation to brick façade,</th>
</tr>
</thead>
<tbody>
<tr>
<td>List three typical conditions at the very beginning of your renovation project. What condition(s) were your protagonists facing?</td>
<td>- Dilemmas related to the architectural value of the building – aesthetic appearance, urbanistic context, architect’s author’s rights, etc.</td>
</tr>
<tr>
<td>Wants, needs, expectations</td>
<td></td>
</tr>
<tr>
<td>-----------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>List three key aims your protagonist wanted to achieve (or accomplish) with the renovation.</td>
<td>- Improved quality of the building, particularly in terms of aesthetics and comfort.</td>
</tr>
<tr>
<td></td>
<td>- Improved energy efficiency.</td>
</tr>
<tr>
<td></td>
<td>- Increased value of the property.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Challenges and antagonists</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>List three typical challenges/obstacles/antagonists that were in the way of your protagonist on their way to achieving a successful result.</td>
<td>- Lack of finances for some homeowners or business owners.</td>
</tr>
<tr>
<td></td>
<td>- Administrative and other non-technical or non-financial obstacles (challenges in financial planning).</td>
</tr>
<tr>
<td></td>
<td>- Partial interests of individual owners – balanced sharing investment costs and benefits.</td>
</tr>
<tr>
<td></td>
<td>- (mixed ownership and mixed purpose of the building).</td>
</tr>
<tr>
<td></td>
<td>- Fear of failure/unfeasibility of the project (a waste of money, time and effort).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Solutions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>List three typical solutions/decisive elements leading to a renovation project success (or close to success).</td>
<td>- Substantial financial support from public institutions or private investors (e.g. Eco Fund).</td>
</tr>
<tr>
<td></td>
<td>- Highly motivated and driven individuals with invested personal interests.</td>
</tr>
<tr>
<td></td>
<td>- Trustworthy and active knowledge ambassadors (such as NGOs, public institutions or businesses).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Key lessons learnt</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Why do you think the renovation was (un)successful? What could we learn out of the experience? If we turned back the time, what would we change to be more successful?</td>
<td>- The renovation was successful because of skills, experiences, but most of all, determination of the local hero, who was the engine of the housing community’s efforts for the project’s success.</td>
</tr>
<tr>
<td></td>
<td>- We can learn that the “people” factor is a crucial element in the realization of renovation projects – both in positive and negative aspects.</td>
</tr>
<tr>
<td></td>
<td>- Local hero, who took the project as a personal challenge, was the decisive element that made the realization of the project possible.</td>
</tr>
<tr>
<td></td>
<td>- The energy efficiency is not as significant as expected or wanted by some homeowners.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Why we failed and the other didn’t?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>- Our project was comparatively complex</td>
<td>o The building was technically challenging because of the decorative brick-façade and concrete details/elements</td>
</tr>
</tbody>
</table>
Compared to successful renovation cases in the neighbourhood, what were the key differences? Why were they successful and we were not?

- Mixed-ownership & mixed-purpose of use – businessowners (owners of business space within the building) felt that they are paying disproportionately large share for the renovation, because for them the effects of the investments will have negligible benefits in terms of IEQ and savings in comparison to the homeowners.
- Our project has been successful, but relative complexity of the project (both technical and social aspects) has made it particularly challenging and prolonged the renovation process.

And related to TripleA-reno:

<table>
<thead>
<tr>
<th>TripleA-Reno interventions - general</th>
<th>Installed sensors for 3 years (continuous measurements)</th>
</tr>
</thead>
<tbody>
<tr>
<td>What are your experiences with TripleA-Reno tools? Do you find them useful, helpful?</td>
<td>- Ethnographers as intervention (interviews with all key stakeholders)</td>
</tr>
<tr>
<td></td>
<td>- Labelling scheme</td>
</tr>
<tr>
<td></td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TripleA-Reno interventions – behavioural change</th>
<th>Occupants particularly liked the sensor for air quality; reports were made of opening/closing windows when the light on the sensor turned red.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did anything change because of the TripleA-Reno tools? E.g., did the tools influence the behaviour in relation to energy efficiency? Did they contribute to better home environment, air quality etc.?</td>
<td>- Awareness about indoor air quality was raised and building use practices were changed.</td>
</tr>
<tr>
<td></td>
<td>- On the negative side, the sensors were not always functional and accessible to some homeowners due to connectivity issues.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TripleA-Reno interventions – relations with stakeholders</th>
<th>The occupants experienced our presence – as TripleA-reno researchers, e.i. external observers – as a positive intervention that contributed to acceleration of the renovation process.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did the project in general contribute to better relations with key stakeholders involved in renovation?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recommendations for future improvements</th>
<th>Reliability and effortless access to monitoring tools for IEQ is a necessary element of the work.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Based on your experiences with the TripleA-Reno, what would be your suggestions for the future?</td>
<td>- Institution of an external “supervisor”, even if only as an observer or a researcher, can have a positive effect on the renovation process.</td>
</tr>
<tr>
<td></td>
<td>Even more so if imagined in a form of a facilitator – an independent expert on building renovation that catalyses and orchestrates the renovation process.</td>
</tr>
</tbody>
</table>
3.4.2 After the interview – ANALYSIS

Review the experience(s) shared by your informants and define clear storylines following the scheme of the (failed) hero’s journey. Be as concrete as possible. If the story is complicated and involves several challenges and stages of solution finding, define it as much as possible.

Making buildings pretty and comfortable in the miners’ town of Zagorje

<table>
<thead>
<tr>
<th>Protagonists:</th>
<th>Antagonists:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community of owners and dwellers.</td>
<td>A coalition of businesses owners that have their business space in the same building (bars or storage space).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Key challenge(s):</th>
<th>Key (potential) solutions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negotiating the costs and benefits balance between the dwellers and business-premises owners (mixed ownership); business premises have a different function and, in contrast to dwellings, such large areas that offer low returns on investments (due to specific use).</td>
<td>Eagerness of involved individuals (local heroes). Establishing space for mediation or engaging an outside mediator. Engaging in a legal action or mediation. Financial compensation of individual investments into the building renovation.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Helpers:</th>
<th>Decisive moments:</th>
</tr>
</thead>
<tbody>
<tr>
<td>TripleA-Reno anthropologists</td>
<td>When business owners agreed to participate</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location(s) and time(s):</th>
<th>Items &amp; materials:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zagorje municipality</td>
<td>Windows (brown colour of the frame!) Glass wool Anchors for the insulation material.</td>
</tr>
</tbody>
</table>

Once upon a time, in the green post-mining town of Zagorje, a group of owners and dwellers in a block of flats gathered. They realised that all over Slovenia and their municipality homes and blocks of flats are being renovated, and people living in the renovated buildings are walking around proud of their fresh and comfortable building in addition to paying less for their monthly expenses and having better living quality.

They decided that they want to renovate their block of flats as well. Their start of the project was promising. They ordered design plans from local firm, gathered the necessary financial resources to set up a viable financial framework, information, built needed share of interested owners, sought out professionals and established a good idea of what they want to achieve – a new façade and roof.

Someday, however, they encountered a big problem – a semi-clandestine coalition of disinterested business premises owners. These were not keen on investing money into the renovation, claiming that it is unfair to expect them to pay a proportionally equivalent amount of money for renovation while the...
value of their property is not going to be significantly changed and their energy saving will be minimal. In addition, the quality of premises use with regard to their activity is not going to be significantly affected. In short, they had no financial or other incentive to engage in the renovation. In addition, some of them would potentially encounter significant financial fall-outs during the renovation process due to being unable to exercise their business. The coalition tried to hinder the renovation process in a variety of ways – from obstructing the process of decision-making referring to administrative processes, to threatening with poorly based legal actions and lobbying among more undecided building owners and dwellers as well as with other agents with political power in the local environment.

The coalition at first had issues finding a successful approach to tackling the issue. Instead of moving on with project planning, operations, preparations etc., they had to tackle clandestine and insidious tactics by the coalition of business owners.

However, following the lead of several strongly involved individuals, they eventually managed to push their agenda far enough. They gathered a significant amount of money to make the financial plan financially feasible. They gathered enough information and knowledge to make a convincing case in case of legal action. They also invested heavily in trustworthy expert opinion and professional advice regarding the most challenging aspects of their renovation.

Finally, they managed to negotiate a deal with business premises owners to avoid a lengthy and potentially futile legal action that would negatively affect both parties.

They managed to move the project in the right direction and start with the renovation in February 2020. The renovation was successful and today the block of flats looks amazing, people are happy with the result, and the coalition of businessmen go on with their business, with little to no objections to the final result.

3.4.3 Renovation story

Renovation of Kidričeva 4 in Zagorje ob Savi

In 2014, in an apartment block in Zagorje ob Savi, a small group of apartment owners gathered to discuss a big idea - renovating their building. At that point in time, before deciding to do the renovation, they knew the following things:

- Apartment blocks are being renovated all over Slovenia, and especially their home municipality was one of the leading municipalities in building renovations in Slovenia, particularly in relative terms for renovations of multiple-occupancy buildings.
- Residents from the renovated buildings liked to express their satisfaction with the improved quality of living in the renovated building, its beauty, and also about lower costs of heating in comparison to the pre-renovation standards.
- Some apartments in their block of flats have problems with mold due to thermal bridges or poor thermal insulation of the building envelope.
They already have certain funds collected in the building’s reserve fund\(^3\) that they could potentially use for renovation.

In line with their **key motivation factors**, with the renovation they wanted to:

- Improve the poor aesthetic appearance of the building,
- Improve the energy efficiency of the building,
- Improve the cost efficiency of the building (especially lower running costs of heating and cooling the building), and
- Improve thermal comfort or. quality of the indoor environment.

The very first and arguably most important step towards the realisation of their plan was to build a strong consensus in the entire community of property owners and building dwellers, that they all agree with the idea to go through with the renovation. A tangible sign of commitment to this decision was their agreement to raise the monthly contribution into the building’s reserve fund to a point that is significantly higher than the one required by law\(^4\).

**Other important steps** in the phase of preparation included:

- Building a consensus on what they want to achieve with the renovation (what and how they want to renovate; in this particular case this was insulation of the facade and roof);
- Making an agreement with a local designer to produce a renovation plan that provided the basis for obtaining correct bids and an impact assessment;
- As there was doubt whether the building could be insulated at all, due to the unfavourable composition of the wall (brick facade), they commissioned a study by the ZRMK Institute\(^5\) to identify possible technical solutions.
- Collecting necessary (written) approvals of the residents of the block (achieving the required proportion of approvals),
- Getting, comparing, and choosing appropriate offers of potential contractors,
- Building common ground with the building manager and other important stakeholders, etc.

**There were many varied challenges along the way**, including:

- Lack of knowledge and experience with such projects,
- Obtaining owners’ consents (in this regard, mixed purpose of use and dispersed ownership were among the most challenging factors).
- Extent of financial burden on individual members of the housing community and other owners,

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\(^3\) By Slovenian Housing Law, multiple-occupancy buildings managed by a housing manager are required to have an official fund for ongoing maintenance and investments. Minimal monthly contribution towards the fund is defined by the law (see below) and varies depending on the size of the property.


• Extent of work (organization / coordination of the project, which includes effort and time commitments), etc.

Among all the problems encountered during the project, lack of collaboration and responsiveness by some members of the community of owners was most problematic. This is particularly true for owners of non-residential parts of the building (commercial spaces). Some of these even opposed the idea as they were not in favour of the renovation due to the following considerations:

• **Renovation would result in a disproportionate financial burden for business-property owners.** They argued that it was unfair to expect them to pay a relatively equivalent amount of money for the renovation relative to the ownership area, while the value of their assets would not change significantly, and energy savings would be minimal. Even before the renovation, they paid relatively low heating costs due to the other purpose of using the premises (catering premises, warehouses, etc.).

• **Little benefits for their purpose of use.** They also claimed that the renovation of the facility would not have a significant positive effect on the quality of use of the premises in terms of their activity.

• Some of them claimed the renovation would result in major financial losses during the renovation process because they would not be able to do their business (e.g. catering).

The owners of business premises therefore did not have much motivation to renovate. They therefore argued against and threatened to **obstruct the renovation process various ways**:

• By obstructing the decision-making process related to administrative proceedings,

• By threatening with litigation, despite the poor arguments to do so,

• By lobbying against the renovation between undecided apartment owners and residents.

The resident community has had considerable difficulty in coping with these barriers. Dealing with them required a lot of time and energy - organizing and finding solutions, all in their spare time engaged individuals of the housing community. Instead of dealing with the already demanding management of such a large renovation project - project planning, preparation, and implementation - they had to deal with the problems created by the opponents of the renovation.

Over time, however, they managed to move their plan far enough, mostly with the effort of highly **motivated and engaged individuals (local heroes).** In addition to strong personal motivation for the realization of the project, these individuals also had:

• The necessary organizational experience,

• Basic knowledge and expertise in the field of construction (and renovation) or. ability to communicate with experts,

• Useful network of acquaintances and access to the necessary information; this also includes TripleA-reno researchers and activities conducted in the context of TriplaA-reno project.

From the point of project management, the first important aspect to cover in order to achieve the project objectives was a sustainable **financial construction of the project.** At the end this included:

• Money from the reserve fund (owner’s personal contributions),
A subsidy by the Eco Fund⁶ - a Slovenian governmental agency subsidizing sustainable construction and renovation.

An affordable commercial credit (5 year pay-off period; roughly 50 to 70 EUR/month per apartment, depending on the size of the apartment)

The second step was covering the technical aspects, namely investing into a quality project. The housing community decided not to spare expenses with quality, and decided to pay trusted experts for making plans and the necessary research on the most demanding aspects of the block renovation. A particular thing to note in this regard is that they tried to involve mostly local experts. Also, involved residents made sure to stress how happy they are with work done by their contractor, who went an extra mile to make sure that the community feels comfortable with the renovation. The following aspects were particularly stressed:

- Ease of communication and personal engagement of the company’s representative(s),
- Transparency and responsiveness,
- Flexibility and commitment to good quality work,
- Quick and professional response to minor faults, which were all fixed.

The third and key step, as the fate of the project largely depended on it, was managing the social aspects of the project. In this regard, an agreement with the owners of the business premises. The path to solution included:

- Gathering enough of information and knowledge for various scenarios (including, for example, a possible court proceedings),
- Obtaining enough support (political power) at the local level,
- Running one-to-one conversations (and negotiations) with all of the stakeholders involved.

Previously mentioned possibility of litigation processes would have a negative impact on both sides. In order to avoid it, the community of residents made a deal with the owners of commercial premises, agreeing to compensate financially the individuals who presented strong-enough arguments that the renovation will harm them financially during the period of renovation (in this particular case, the argument was that scaffolding will force their business to stop operating for a period of renovation). This ultimately weighed in favor of the realization of the project. When the project ultimately moved from the preparation into the execution phase, none of the involved actors was actively opposing it.

Renovation of the building started at the beginning of March 2020. The works stopped in the preparatory phase on the 20th of March for a period of three months due to COVID 19 lockdown. Work restarted in May and was finished by the end of August with minor improvement works in September 2020. Works were officially finished and handed over in September 2020

The renovation was therefore successfully completed and the building looks fabulous. Community of residents and owners believes the project is a success and an example of good practice. This is especially true concerning technical and financial aspects of the renovation. Despite some disagreements regarding the project in the stage of project development, there are no notable tensions between any of the involved

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stakeholders or within the residential community. A minor point that could have been addressed was the
design of the window shelves, which after the renovation do not enable putting on objects, such as decorative
plants.

Renovation also left a positive impression on the extended local community. Representatives of the building
community claim that they have only heard positive comments regarding the renovation. Comments such as
that the building is a true “refreshment of the town” were mentioned. Representatives of the local
municipality have stated that the building presents “an urbanistically exemplary model” for high-rises with
brick facades. And that is particularly relevant because Zagorje has several such buildings where the practice
could be replicated. The renovated apartment block on Kidričeva therefore presents a tangible proof that
similar buildings can indeed be successfully renovated. As such, the project continues to inspire local a wide
range of local residents and passer-byers to consider investing in building renovation.

To people who are considering renovation, community members engaged in the project advise:

● Do not simply trust “the experts”. Be curious and engaged! Do not let individuals force their quasi
  knowledge-authority on you, but always give yourselves time to investigate all possibilities.

● Your primary goal must be quality, not low financial investment.

● Specifically in multiple-occupancy buildings, it is best to have a small team of engaged individuals
  who run the project. Other owners and members of the residential community, who do not want to
  engage, should support the core team in their efforts by periodically following up with the project
developments and trusting the core team to represent in the ongoing business.

● The best way to succeed is through community work and togetherness.

To policy makers, businesses, and other actors who co-create the value chain and market of building
renovation and retrofitting, they say:

● Support community action and policies that favor building renovations.

Regarding TripleA-reno interventions, residential community representatives pointed out the following:

● Involvement of researchers in the renovation project was generally positive. For future reference,
  however, they said that researchers could and should get more actively involved to get the project
  moving faster and easier.

● Sensors and measuring devices were noted, but barely had any considerable impact on their quality
  of life. Only one research participant asked to keep one of the sensors, namely the air quality sensor.

● The air quality sensor was generally the most positively commented on. All of the research
  participants noted their presence. Two participants stated that they opened the window when the
  sensor indicated poor air quality (the light turned orange or red), the third noted that it virtually
  never turned orange because they always open windows to enable air flow.
● One of the residents thanked to TripleA-reno representative to intervene when contractor did not put back externa temperature sensor for the heating systems regulation. The residents said, the heating costs were lower the next month.

● One of the residents stressed their gratitude to the TripleA-reno project’s technicians, who noticed a burning electrical cable in their apartment, an issue that was fixed by the electrical company soon after to avoid potential fires.
3.5 Spain (ES)

Authors: Ana Sanchis, Miriam Navarro and Leticia Ortega

Location: Alicante region, Almoradi

The Spanish case study is a block of flats rented as social housing located in a Spanish town of Almoradi.

3.5.1 Interview preparations

To prepare for the interview, the following questions were answered, related to renovation:

<table>
<thead>
<tr>
<th>QUESTION</th>
<th>ANSWER</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>What is the current situation in regards to the renovation of the TripleA-Reno case study in your country?</strong></td>
<td>Our case study is currently in stand by due to both the pandemic and the previous terrible flood in the area. However, the testing campaigns were right, and we’ll proceed for a final. The worst the communication with the residents, because there’s been a distancing with them, and not in the pandemic sense. There weren’t any other meetings with them, and it is now the moment to contact them again to continue the communication and take their feedbacks. In other terms, some of the refurbishing works in the blocks have been started, but no one is related to the energy efficiency requirements involving TripleA-reno because they were schedule previously. Further works will attend TAR retrofitting intervention.</td>
</tr>
<tr>
<td><strong>Key involved Actors (Protagonists)</strong></td>
<td>At present, the residents were the only key involved actors in our case study. They provided both the permission for measurement campaigns and the interviews to take their initial information and feedbacks</td>
</tr>
<tr>
<td>Who were typical actors of your (un)successful renovation story?</td>
<td></td>
</tr>
<tr>
<td>What were their contributions?</td>
<td></td>
</tr>
<tr>
<td><strong>Condition(s)</strong></td>
<td>The tenants are the crucial actor for the testing campaigns to be developed. On other hand, they don’t have any decisions on the renewals to be developed on the buildings, what produces a sort of disconnection to the project process. On a third step, the users are the final recipients of TripleA-reno bill-saving advantages.</td>
</tr>
<tr>
<td>List three typical conditions at the very beginning of your renovation project. What condition(s) were your protagonists facing?</td>
<td></td>
</tr>
<tr>
<td><strong>Wants, needs, expectations</strong></td>
<td>1. Energy cost savings. 2. Improved quality of buildings in terms of use, aesthetics and comfort. 3. Increased social requalification of the property.</td>
</tr>
<tr>
<td>List three key aims your protagonist wanted to achieve (or accomplish) with the renovation.</td>
<td></td>
</tr>
<tr>
<td><strong>Challenges and antagonists</strong></td>
<td>1. Tenants category as residents, that make them switching off about the interventions</td>
</tr>
</tbody>
</table>
List three typical challenges/obstacles/antagonists that were in the way of your protagonist on their way to achieving a successful result.

2. Mistrust among disadvantaged people

**Solutions**
List three typical solutions/decisive elements leading to a renovation project success (or close to success).

- Effective bill savings among tenants.
- Confidence increasing campaigns for tenants.
- Results dissemination among the residents.

**Key lessons learnt**
Why do you think the renovation was (un)successful? What could we learn out of the experience? If we turned back the time, what would we change to be more successful?

- Residents just collaborate if granted by bill discounts.
- Social Services assistance is needs for dealing with some specific portion of the residents.
- As residents are just tenants, they can only improve into behavioural practices, concerning their own savings more than for the common advantages for the block.

**Why we failed and the other didn’t?**
Compared to successful renovation cases in the neighbourhood, what were the key differences? Why were they successful and we were not?

- Our blocks’ peculiarity of mostly tenant population condition every further intervention to take place on them.
- The better social conditions, the most successful intervention.

And related to TripleA-reno:

**TripleA-Reno interventions - general**
What are your experiences with TripleA-Reno tools? Do you find them useful, helpful?

- Surprisingly both sensor installations and ethnographic interviews were welcome and appreciated.
- Further steps such as the new labelling scheme or TAR Platform use requires a greater dissemination effort than at usual resident areas.

**TripleA-Reno interventions – behavioural change**
Did anything change because of the TripleA-Reno tools? E.g., did the tools influence the behaviour in relation to energy efficiency? Did they contribute to better home environment, air quality etc.?

- A new point of view on the importance of caring about the blocks and dwellings have been experienced.

**TripleA-Reno interventions – relations with stakeholders**

- Renovation is not developed yet.
Did the project in general contribute to better relations with key stakeholders involved in renovation?

Recommendations for future improvements
Based on your experiences with the TripleA-Reno, what would be your suggestions for the future?

- A previous social connecting campaign remains essential to announce and prepare any intervention on this kind of social groups. Communication programmes are crucial.

3.5.2 After the interview – ANALYSIS
Review the experience(s) shared by your informants and define clear storylines following the scheme of the (failed) hero’s journey. Be as concrete as possible. If the story is complicated and involves several challenges and stages of solution finding, define it as much as possible.

Making dwellings more efficient and comfortable at Almoradi Dwelling Group (Alicante, ES)

<table>
<thead>
<tr>
<th>Protagonists:</th>
<th>Community of tenants and dwellers at Almoradi group buildings.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antagonists:</td>
<td>Uncooperative tenants actions to prevent any kind of agreement to accept further interventions in the blocks.</td>
</tr>
<tr>
<td>Key challenge(s):</td>
<td>Tenants fear to be involved in a sort of increase of their bills, due to the low income population living in the dwellings.</td>
</tr>
<tr>
<td>Key (potential) solutions:</td>
<td>Interviewing collaborative tenants to improve substantial gains for their dwellings.</td>
</tr>
<tr>
<td>Helpers:</td>
<td>EVHA social workers in charge of building maintenance</td>
</tr>
<tr>
<td>Decisive moments:</td>
<td>When tenants refused to take part in monitoring campaigns.</td>
</tr>
<tr>
<td>Location(s) and time(s):</td>
<td>Almoradi municipality, Alicante province (ES)</td>
</tr>
<tr>
<td>Items &amp; materials:</td>
<td>/</td>
</tr>
</tbody>
</table>

Asunción Cruañes Social Group of Dwellings at Almoradi is a typical low income population block in the outskirts of the town. It is formed by 3 blocks in a C shaped around a central, free urban space. The blocks are 3-storey high, and they contain 74 flats in 7 staircases. These are part of the Public Dwelling Stock managed by EVHA belonging to the regional autonomous government Generalitat Valenciana. As said, these buildings are the home for very low income families in a vulnerable situation.

As tenants in social dwellings the occupants usually don’t take part in refurbishing issues. They just apply any malfunction or inconvenience in the buildings to be attended by EVHA maintenance service, that is assisted partial by technical staff and, specifically, by social workers personnel. Into this dynamics of just seeing the works going on, this has been a special opportunity to take part in the refurbishing process. The good was that some tenants were excited and decided to collaborate actively. The bad aspect was that a
sort of pessimism to get better of even an idea of everlasting misfortune imbued a huge part of the tenants’ mind.

But, fortunately, our colleagues at Alicante province Mangagement Office intervention, as really professional social workers who know most of the flat tenants, was the ultimate solution to make them to take part. A hard door by door additional effort was required to engage flats to take part in the monitoring campaign, whose initial announcement was answered with a confusing awkward silence.

Thanks to the a few number of collaborative flats the initial monitoring campaign was produced. Collected data were used to close one of the programmed refurbishing projects, in an increasing friendly atmosphere created by both the first campaign and the interviews sessions. These were in fact a turning point on the general idea for the rest of tenants in the group because they could check another way of doing things and, specially, they felt protagonists for once in their blocks improving works.

The refurbishing works have been scheduled in two phases. The first one is just finished, and it was best seen from the general tenant population and another perception of their participation possibilities is increasing. The idea of taking part is proportionally connected to the respect to the work, that in many cases were really damaged almost immediately. Now, the works are part of the tenants themselves because of their participation, and as a result a better maintenance has been proved.

On the other hand, even more important for each family flat, final works will contribute to make more efficient their homes so they shall see interesting down draws in their bills.

The second phase that is the most important concerning thermal isolation of the buildings. These works will provide real benefits to the families as well as a general significant improvement of living together in social blocks.
3.6 The Netherlands (NL)

Authors: Merle Savelberg and Haico van Nunen

Location: Eindhoven, Brainport region

The Dutch case-study took place in Eindhoven, in the neighbourhood called Gerardusplein. The building featuring in this case is a typical Dutch style semi-detached house reflecting the architectural style of 1930s, which is the era of its construction.

3.6.1 Interview preparations

To prepare for the interview, the following questions were answered, related to renovation:

<table>
<thead>
<tr>
<th>QUESTION</th>
<th>ANSWER</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the current situation in regards to the renovation of the TripleA-Reno case study in your country?</td>
<td>People do not consider renovations, as there is a lack of awareness, knowledge and motivation. Next to that, because there is a lack of knowledge, that makes it difficult to undertake a renovation. The other side of this, is that often there are no or little financial means to renovate, though we have seen that due to covid-19 (and not being able to travel and such) a lot of people do things in their homes.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Key involved Actors (Protagonists)</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who were typical actors of your (un)successful renovation story? What were their contributions?</td>
<td>The actor that did his renovation can be seen as a local hero or an ambassador in his neighbourhood. The company that did the installation of the heat pump, is currently a local company and there was contact with BouwhulpGroep in order for the installation to be completed.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Condition(s)</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>List three typical conditions at the very beginning of your renovation project. What condition(s) were your protagonists facing?</td>
<td>Difficulty getting the heat pump financed through a subsidy (as it was not yet on the list in the Netherlands as a national recognised working solution, testing still had to be done in order to apply for subsidies)</td>
</tr>
<tr>
<td></td>
<td>A large number of unknown factors and hurdles in the way – from administrative obstacles to practical factors.</td>
</tr>
<tr>
<td></td>
<td>Difficulty with installation as it was one of the first times the heat pump was installed.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wants, needs, expectations</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>List three key aims your protagonist wanted to achieve (or accomplish) with the renovation.</td>
<td>Improved quality of comfort</td>
</tr>
<tr>
<td></td>
<td>Improved energy efficiency</td>
</tr>
<tr>
<td></td>
<td>Logical next step to take, as there had already been done several other energy decreasing measures over the last couple of years</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Challenges and antagonists</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>List three typical challenges/obstacles/antagonists that were in the way of</td>
<td>Lack of finances (mainly as it was not subsidized yet)</td>
</tr>
<tr>
<td></td>
<td>Administrative and other non-technical and non-financial obstacles (as there was a problem with the construction in the house, that had to be solved before the installation of the heat pump)</td>
</tr>
<tr>
<td>Solutions</td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td></td>
</tr>
<tr>
<td>List three typical solutions/decisive elements leading to a renovation project success (or close to success).</td>
<td></td>
</tr>
</tbody>
</table>

- Fear of not getting the subsidy ready on time (as they were working on a deadline, before the heat pump was placed within the house) |
- Subsidies were approved during the testing phase of the heat pump, which means larger market sales |
- Highly motivated and driven individual with invested personal interest |
- Trustworthy and active knowledge ambassadors (the home-owner himself was very knowledgeable about the heat pump) |

<table>
<thead>
<tr>
<th>Key lessons learnt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Why do you think the renovation was (un)successful? What could we learn out of the experience? If we turned back the time, what would we change to be more successful?</td>
</tr>
</tbody>
</table>

- Before doing this renovation, perhaps an inspection of the home would be nice, in order to oversee any trouble beforehand (like with the construction of the house in the bathroom) |

<table>
<thead>
<tr>
<th>Why we failed and the other didn’t?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compared to successful renovation cases in the neighbourhood, what were the key differences? Why were they successful and we were not?</td>
</tr>
</tbody>
</table>

- |

And related to TripleA-reno:

<table>
<thead>
<tr>
<th>TripleA-Reno interventions - general</th>
</tr>
</thead>
<tbody>
<tr>
<td>What are your experiences with TripleA-Reno tools? Do you find them useful, helpful?</td>
</tr>
</tbody>
</table>

- Sensi monitoring |
- Ethnographers as intervention (interviews) |
- Labelling scheme (useful in order to go over the collected data in detail) |

<table>
<thead>
<tr>
<th>TripleA-Reno interventions – behavioural change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did anything change because of the TripleA-Reno tools? E.g., did the tools influence the behaviour in relation to energy efficiency? Did they</td>
</tr>
</tbody>
</table>

- We did not really measure a difference in the home environment. The home owner himself mentions that it is a different way of living (heating the house takes more times and the radiators do not get as hot as before the renovation, but it is still quite comfortable in the house so that is not a problem) |
<table>
<thead>
<tr>
<th><strong>TripleA-Reno interventions – relations with stakeholders</strong></th>
<th><strong>Recommendations for future improvements</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Did the project in general contribute to better relations with key stakeholders involved in renovation?</td>
<td>Based on your experiences with the TripleA-Reno, what would be your suggestions for the future?</td>
</tr>
<tr>
<td>- It did not improve the relations with the home-owner, we were already on good terms. He was happy when the renovation was done and the heat pump installed. Even though some things got in the way before the installation which led to a delay, he was in the end quite happy as that problem was also taken care of (he did not need to worry about other things)</td>
<td>- It takes quite some time to motivate people to do renovations. We were lucky as this home-owners had previously done some energy reducing measures himself and knew what he was talking about, but we would definitely place more times in interacting with possible clients for renovations and motivating them to do the renovation.</td>
</tr>
</tbody>
</table>
3.6.2 After the interview – ANALYSIS

Review the experience(s) shared by your informants and define clear storylines following the scheme of the (failed) hero’s journey. Be as concrete as possible. If the story is complicated and involves several challenges and stages of solution finding, define it as much as possible.

Renovating a private home-owner’s home

<table>
<thead>
<tr>
<th>Protagonists:</th>
<th>Antagonists:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home-owner who lives in Gerardusplein</td>
<td>None</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Key challenge(s):</th>
<th>Key (potential) solutions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ensuring the heat pump was followed up for subsidy</td>
<td>Eagerness of involved individuals (local heroes).</td>
</tr>
<tr>
<td>Research on the home, due to unforeseen troubles during installation</td>
<td>Eagerness of the companies involved in getting the subsidy finalized for the heat pump</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Helpers:</th>
<th>Decisive moments:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technicians</td>
<td>When home-owner agreed to participate</td>
</tr>
<tr>
<td>Heat house Groningen</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location(s) and time(s):</th>
<th>Items &amp; materials:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gerardusplein, Eindhoven</td>
<td>Durocan installation packet for the heat pump</td>
</tr>
</tbody>
</table>

The renovation took place in Gerardusplein, Eindhoven. The home-owner that renovated his home is a single father of two teenagers. He is forty-three years old. The household is financially secure. He works on a self-employed basis for different companies. He bought the house several years back when his grandparents decided to move away from the house. The house has been renovated over the last twenty years, taking small steps into becoming energy efficient.

The home-owner is actively trying to reduce the energy usage in his house and has taken several steps before this research and the placement of the heat pump in order to prepare his house for the change. The energy consumption in the house has been reduced in the last couple of years, mainly by adapting several measures. The next logical step, according to the home-owner, is to place a heat pump in his house and start heating the house through this, instead of natural gas. To convert the entire house to a low temperature delivery system was not something the home-owner would want to do, and so he decided to choose the Durocan heat pump that functions with high temperature.

Step by step the renovation took place. The first thing the private home-owner did was the ‘30 second test developed by Alliantie+: an online tool where home-owners can gather information about their house and where they get a general overview of the information that is available for the type of house they lives in. The online test gives an insight in the qualities of the house and results in a personal ‘Woning Paspoort’ that advises the home-owners in the renovation products that are most suited for their house in order to become more sustainable. These solutions are no-regret solutions and give the home-owners the possibility of step-by-step renovation at logical moments of large maintenance.
Our home-owner decided to place the heat pump as the energy consumption in the house had already decreased in recent years due to various measures. The logical next step would be to start heating the house with a heat pump instead of natural gas. Converting the entire home to a low temperature delivery system was not something that was preferred. Instead, the home-owner chose the Durocan at high temperature, as this heat pump only replaced the boiler.

The installation of the Durocan was planned as the only point of renovation, but at the same time the home-owner also wanted to upgrade the bathroom, instead of having a mess in his house two times. That is why this was included as well. However, this has messed up the schedule to install the heat pump in early November. When the old tile floor in the bathroom was removed, a dormant leak was discovered. A bearing beam was affected. As a result, the entire cement floor was removed and a new supporting beam was installed. After this, the bathroom was rebuilt. As a result of this delay, the installation/adjustment of the heat pump had taken a bit longer to be done that was planned. By February 2020 the heat pump was fully in use.

The heat pump has been in use for several years now. The house heats up a bit more slowly than with a central boiler as was previously the case. The radiators become less hot than before, but still they get warm enough to create a cozy and warm home. The current temperature range over the radiators is 60°C supply and 40°C return. This is also the reason why it takes longer for the house to heat up overall. The underfloor heating in the bathroom provides extra comfort to the feet.

Because the house heats up more slowly, the heat pump is more continuously trying to warm up the house, instead of just turning on the radiators in the morning. During the night the temperature in the will not drop below a certain point, in order to create sufficient heat during the day.

The home-owner now takes into account that it takes a bit longer to heat up his home. So, the use of the heating system is different and that takes also a different approach than what one is used to.
3.6.3 Renovation story

Renovation Story – the Netherlands

The case study house

The house that has been chosen for the case study is located on the Balsemienstraat in Eindhoven and is a typically Dutch home:

- The house is semidetached
- Built in 1930
- Approximately 96 m²
- Roof is sloped and flat where the dormer is situated
- The ground floor contains smaller windows that are made of stained glass, an accent known for that time period in the Netherlands
- Façade is brown brick and the roof has ceramic red tiles
- The house previously belonged to the grandparents of the current owner and he has bought the house several years ago

The house itself is located to the South West of the neighborhood Gerardusplein in Eindhoven and has a park located nearby. Statistics of the neighborhood:

- This is an older part of the city
  - 3.390 inhabitants
  - 14% is social rent
  - 69% is privately owned
  - 80% of the households are single-family households
  - 20% are multi-family households

The community of Gerardusplein is more prominent than in most neighborhoods. In 2002 Stichting Plus was established, with the aim to increase the solidarity among neighbors and thus increase the enjoyment of living and safety in Gerardusplein. To achieve that, they mainly want to do fun things together. Stichting Plus is currently headed by six inhabitants of Gerardusplein. They are people who voluntarily devote time and energy in order to create a nice and safe environment to live in.

The home-owner

The house that has been selected for this case study is privately owned. He is a single father of a son and daughter that are respectively twelve and seventeen years old. He is forty-three years old. The household is financially secure. He works on a self-employed basis for different companies. He bought the house several years back when his grandparents decided to move away from the house. The house has been renovated over the last twenty years, taking small steps into becoming energy efficient.

He is actively trying to reduce the energy usage in his house and has taken several steps before this research and the placement of the heath pump in order to prepare his house for the change:
The energy consumption in the house has been reduced in the last couple of years, mainly by adapting several measures. The next logical step, according to Rik, is to place a heat pump in his house and start heating the house through this, instead of natural gas. To convert the entire house to a low temperature delivery system was not something Rik would want to do, and so he decided to choose the Durocan heat pump that functions with high temperature.

**The company used for the renovation**

Durocan is the developer and supplier of high temperature heat pumps, with CO₂ as refrigerant. Durocan is also the company that delivered the heat pump that is placed in demo house. The heat pump that has been placed in the house is an air-to-water heat pump:

- An air-to-water heat pump takes heat from the air. The heat collected from outside is transferred by the heat pump to the central heating water that is used to warm the house. In fact, the heat pump works the same as a reverse refrigerator. Just like a refrigerator, a heat pump consumes electricity.
- Due to the high efficiency of the system, the total amount of heat that the system supplies is considerably higher than the electricity it uses. The efficiency of the Durocan heat pump is expressed in COP (Coefficient of Performance). The COP of the Durocan is 5.
- The Durocan heat pump has a heating output temperature up to 78°C. This means it can be connected to existing pipes, radiators and underfloor heating. The old gas boiler can simply be replaced by a Durocan.
- The required investments are therefore drastically lower. The breaking out of floors, pipes, radiators, stucco and paint work is no longer necessary.

**The process of renovation**

The first step in the process of renovation was to do the ‘30 second test developed by Alliantie+. The ‘30 second test is an online tool where a private home-owner can gather information about his/her house and where he/she gets a general overview of the information that is available for the type of house he/she lives in. The online test gives an insight in the qualities of the house and results in a personal ‘Woning Paspoort’ that advises the private home-owner in the renovation products that are most suited for his/her house in order to become more sustainable. These solutions are no-regret solutions and give the private home-owner the possibility of step-by-step renovation at logical moments of large maintenance. The five steps of the Woning Paspoort:

- The dwelling typology is given based on the address data
- Additional information is added concerning household size and energy usage
- Information is provided about previous renovations/maintenance moments
- The building inspection is done by the private home-owner
- Experts check all data and provide the private home-owner with the Woning Paspoort

Owner decided to place the heat pump as the energy consumption in the house has decreased in recent years due to various measures. The logical next step would be to start heating the house with a heat pump.
instead of natural gas. Converting the entire home to a low temperature delivery system was not something that was preferred. Instead, he chose the Durocan at high temperature, as this heat pump only replaced the boiler.

Some statistics of the heat pump:

- The Durocan heat pump uses CO\textsubscript{2} (eco-friendly natural gas) as a refrigerant
- It absorbs heat from the outside air to heat water – saving energy and reducing greenhouse gas emissions. The global warming potential = 1 (in contrast to conventional heat pumps; GWP > 1300)
- The Durocan contains the SANCO\textsubscript{2} heat pump (third generation) from Sanden. Sanden is a large Japanese manufacturer of heat pumps. The SANCO\textsubscript{2} has more than proved itself. Sanden’s climate-friendly CO\textsubscript{2} technology is widely used in Japan, North America, Canada and Australia
- In terms of installation, the Durocan heat pump is easy to assemble. Every professional installer can connect the Durocan heat pump. The outdoor unit of the rotating heat pump is qualified as “whisper quiet”. The noise level is 37dB (A) and is not meant to disturb the resident and its neighbors.

The Durocan comes with an installation package that contains all the necessary elements for a correct installation and assembly of the heat pump system, except piping, couplings and wall brackets for the placement of the outdoor unit. Prior to installation, the delivery note and manual have to be read carefully.

Tools that were needed for the installation:

- Tools for bending and tailoring the copper pipework
- A wall drill of 16 mm for a PVC electricity line
- A wall drill of 12 mm for key bolts
- A wall drill of 25 mm for piping wall transit

As Rik is a private home-owner there was no problem with placing the heat pump as there were no other parties involved that had influence over the renovation of the home. This made it a lot easier to do the renovation.

**Problems that occurred during the renovation**

The installation of the Durocan was planned as the only point of renovation, but at the same time owner also wanted to upgrade the bathroom, instead of having a mess in his house two times. That is why this was included as well. However, this has messed up the schedule to install the heat pump in early November. When the old tile floor in the bathroom was removed, a dormant leak was discovered. A bearing beam was affected. As a result, the entire cement floor was removed and a new supporting beam was installed. After this, the bathroom was rebuilt. As a result of this delay, the installation/adjustment of the heat pump had taken a bit longer to be done that was planned.

By February 2020 the heat pump was fully in use.

**After the renovation**
The heat pump has been in use for several years now. The house heats up a bit more slowly than with a central boiler as was previously the case. The radiators become less hot than before, but still they get warm enough to create a cozy and warm home. The current temperature range over the radiators is 60°C supply and 40°C return. This is also the reason why it takes longer for the house to heat up overall. The underfloor heating in the bathroom provides extra comfort to the feet.

Furthermore, owner now takes into account that it takes a bit longer to heat up his home. So, the use of the heating system is different and that takes also a different approach than what one is used to.

Because the house heats up more slowly, the heat pump is more continuously trying to warm up the house, instead of just turning on the radiators in the morning. During the night the temperature in the will not drop below a certain point, in order to create sufficient heat during the day.
4 Conclusion

The stories collected through the TripleA-reno ethnographic have a number of common threads. Below we tried to meaningfully connect them in loosely structured topical sections. These tend to indicate some key conclusions which can be derived from work done under Task 2.6. This is followed by a sub-chapter which serves as a list of recommendations based on all outcomes from the TripleA-reno ethnographic research.

4.1 The lessons learned

4.1.1 From planning to pandemics: Fear and discomfort with the unknown

When it comes to planning building renovation, finances are an issue. In one or another way, implicitly or explicitly, this conclusion echoes in virtually all of the presented case studies. In relation to the Greek case, our colleagues pointed out that it is a difficulty coming up with a financially sustainable plan, which is made harder by the fact that people do not always have the necessary knowledge and insight to understand potential financial benefits they may expect as a result of the investment. In the Spanish case, our researchers noted that building residents are more likely to collaborate if they are granted bill reductions. In Hungary, the building manager noted that most of the occupants support the renovation, however, they did not vote to realize it due to the high investment cost. All these references indicate that finances certainly play a central role when it comes to thinking, planning, and doing renovation.

Our Dutch partners described uncertainties related to finances, specifically subsidies and related paperwork, as presence of fear among decision-makers, or to be exact, “fear of not getting the subsidy ready on time”. Aversion to making decisions often comes from feelings of discomfort, fear of change and the unknown, and feeling of lack of agency (lack of control or ability to influence the renovation). In relation to the Greek case, a large number of “unknown factors and hurdles” were noted – from administrative obstacles, to legislative barriers and practical factors. Some of these fears and discomforts can be linked to demographic and socio-cultural factors. As Italian partners pointed out for their case, the dwellers in their case study were “elderly people, not fond of ICT tools and energy savings issues”, meaning that although the sensors installed for the purpose of TripleA-reno monitoring campaign were recognized as useful, they were not easily understandable for all of the research participants. Another interesting fear-related aspect was again highlighted in the Greek case, where companies are said to have difficulty to adapt to innovative strategies and promote new technologies out of fear of losing more time and of spending more money for long time investments.

Some of those fears might actually be very well based. Fact is that renovations are relatively long and complex processes that do not always lead to the expected results. For example, our Slovenian colleagues report that energy efficiency after the renovations is not as significant as expected or wanted by some homeowners. Similarly, the home owner from the Netherlands described living in the renovated house “different” in a mildly disappointed tone. It is still quite comfortable in the house, our Dutch colleagues

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7 It is worth noting that Hungary seems to be particularly challenged in this area. As our Hungarian colleagues noted, there are none available state or regional-level financial grants or subsidies, which effectively put a stop to renovation of multi apartment buildings in Hungary. Substantial financial support from public institutions or private investors is necessary to restart them.
report, but heating the house now takes more time and the radiators do not get as hot as before the renovation.

Also, it is true that there are risks factors which can hardly be accounted for when planning building renovations. A prime example is the COVID-19 crisis. The pandemics had a negative effect on the renovation market. In relation to the pandemic, our Italian partners noted a delay in renovation due to difficulties to supply materials. On a related note, our Hungarian partners pointed out that prices in the construction industry market were soaring in the last couple of years, and that the pandemics only made the situation worse. They noted also that many people in Hungary lost their job, which means that many people are now more conservative about high financial expenses, such as complex building renovation projects.

Finally, an important angle related to the above considerations of discomfort and fear was reported in the Slovenian case, where relations between people involved in the project proved to be the central issue in the realization of renovation projects – both in positive and negative aspects. In their case, people generally found the experience of the renovation a lengthy, rather stressful, and frustrating experience first and foremost due to conflicts of interests between various stakeholders involved in the project. The main barrier there was a coalition of disinterested business premises owners that were not keen on investing money into the renovation, claiming that it is unfair to expect them to pay a proportionally equivalent amount of money for renovation while the value of their property is not going to be significantly changed and their energy saving will be minimal. In short, they had no financial or other incentive to engage in the renovation. The coalition tried to hinder the renovation process in a variety of ways – from obstructing the process of decision-making referring to administrative processes, to threatening with poorly based legal actions and lobbying among more undecided building owners and dwellers as well as with other agents with political power in the local environment. At the end they failed, and the housing community won. Building was renovated, but the bitterness of the process is still there; memories of frustration and stress – fear, if you will – that could well kill the project in its more than 6 years long preparation phase.

4.1.2 The grounds for decision: Awareness, motivation, willingness, and capacity
The above considerations bring us to aspects of awareness, motivations, willingness and capacity. The fact is that no matter how transparent and good-willing our intentions are, we cannot simply expect building owners, dwellers, or building users to always be willing to participate in a co-design planning for the renovation of their buildings, let alone to support it in the first place. This was specifically pointed out in the Greek case, where the occupants were students, and in the Spanish and Italian cases, which were dealing with the context of social housing. One could argue these cases were especially challenging in terms of planning and executing the renovation due to its relatively complex contexts of ownership and building use. Yet such aversion to cooperation was noted also in a relatively neutral housing contexts. Our Dutch partners stated that people in the Netherlands do not consider renovations due to lack of awareness, knowledge and motivation. In Slovenia, lack of collaboration and responsiveness by some members of the community of owners was also noted as “most problematic” among problems encountered during the project realisation.

All these examples indicate that each individual building renovation is a story of its own, requiring tailored solutions and case-specific considerations.
More importantly, among professionals working in the building renovation industry and adjacent disciplines (including experts, scientists and scholars working in projects such as TripleA-reno) there is a sense of conviction that each building can have a successful renovation story, and that there is always one or more protagonists living in a building who are motivated and willing to pursue the renovation if presented with a set of “rational” arguments, which are typically either economical or technical in nature. This brings us to another common thread of the TripleA-reno renovation stories, which is that this is not always the case. Our Dutch colleagues, for example, pointed out that it takes quite some time to motivate people to do renovations, and that it is easier, if home owners have previously done some energy efficiency measures. They concluded that more time is needed for interacting with possible clients and motivating them to do the renovation. In fact, TripleA-reno researchers concluded almost equivocally that in order to realize more building renovations, we have to work towards building awareness, motivation, willingness and capacity for renovation with a variety of approaches, including argumentation, persuasion, education, user-engagement activities etc.

TripleA-reno involved some of these strategies in its process of working towards the pivotal point of decision-making. In Hungary, for example, the TripleA-reno monitoring campaigns showed building occupants a new aspect on energy efficiency of the case-study building. They also provided ground for case-specific recommendation measures. Concretely, the monitoring campaign helped proving that winter overheating is a problem in the Hungarian demo building. The occupants participating in TripleA-reno research were given recommendations by our researchers on how to use the thermostatic radiator valves to prevent overheating. Recommendations were not only easy to understand, but also convincing, since they were based on concrete measurements. This intervention effectively reduced heating energy consumption and increases thermal comfort in the heating season. Moreover, our Hungarian partners report that the TripleA-reno combined labelling helped building users understand the energy performance of their building, the IAQ, and well-being aspects of the analysed dwellings. It also provided useful recommendations on how to continue to improve energy efficiency and comfort.

Another report that relates to TripleA-reno interventions comes from Slovenia. In this case, the air quality sensor played the key role in changing in everyday living practices of participating occupants, and related improvement of the indoor air quality were also noted. Concretely, participants stated that they opened the window when the sensor indicated poor air quality (the light turned orange or red). At the end of the project’s campaign, one of the research participants even asked if they can keep the sensor since they have gotten so used to opening and closing windows based on the indication. All these examples implicitly indicate that preparation phase for building renovation should be considered a gradual, step-by-step approach, involving a variety of monitoring and communication activities.
4.1.3 The vehicle and purpose of renovation: The people

TripleA-reno project was undoubtedly a good example of a gradual approach that we refer to above. The interventions done in the preparation phase were certainly impactful and positively described. That external intervention can have a positive influence on the progress of the renovation was mentioned in the Greek, Hungarian, Italian, Slovenian, and Spanish cases. This, of course, was related to the experiences and feedbacks related to observation and engagements of the TripleA-reno researchers. In the Slovenian case, the interventions by TripleA-reno researchers was said to have contributed to the acceleration of the renovation process. Spanish partners noted that both sensor installations and ethnographic interviews were welcome and appreciated. Our Hungarian partners particularly stressed the focus group interview – as part of the ethnography research – as very useful. It was on opportunity for occupants, the building manager, and the potential contractor to share their views on building renovation project. This helped to answer several open questions and started a structured discussion on the preparation, the implementation and the finish of a renovation project. Similarly, our Italian partners noted that the relationship they managed to establish with key stakeholders in the preparation phase of the project is still fruitful, and that the TripleA-reno’s approach, combining monitoring and research interventions, will continue to be adopted in the future.

These accounts indicate the importance of good project management. This was noted explicitly in the Greek case, where guidance on how to perform a successful interview was noted as very important for the project managers in Athens. The TripleA-reno’s research process, which included interviews with students, contributed towards consolidating trust between the involved stakeholders. In pursuit of understanding needs and habits of the students, researchers shared their knowledge with them, which helped them to better understand how the renovation process works, made them feel part of the process, and helped build relationships. Another aspect implicit in these examples is the need for an external “knowledge ambassador”, as referred to in Slovenian and Dutch cases. As our researchers pointed out in the Greek case, dwellers often lack the necessary knowledge needed to make well informed decisions on energy renovations. In such cases, trustworthy external experts can play a pivotal role when it comes to nudging people towards deciding for/supporting building renovation. “Supervisor”, even if only as an observer or a researcher, can have a positive effect on the renovation process, noted our Italian partners, even more so if imagined in a form of a facilitator – an independent expert on building. The key here is not so much their knowledge as is their trustworthiness – their ability to evoke trust in key decision makers, and to guide them towards insights they need to understand building renovation and to decide to support it.

Finally, a relevant outcome shared by virtually all of our researchers was the importance of involving and empowering people involved in the renovation process. Making building residents feel they were part of the renovation planning process has been explicitly highlighted as relevant in the Greece, Italy, Slovenia and Spain. Our Italian partners pointed out that by including building users in the process, they were more optimistic about the renovation of their apartments and had regained (or consolidated) trust in other key stakeholders involved in the project, such as their building management company and other relevant institutions that enable the realisation of the project.
Our Spanish partners report that data collected through TripleA-reno interventions were used to close one of the programmed refurbishing projects in an increasing friendly atmosphere created by both the first campaign and the interviews sessions. What is more, they note these as a turning point of the project. As tenants in social dwellings the occupants usually don’t take part in refurbishing projects. This project was different, and some tenants were excited and decided to collaborate actively. This would not be possible without help by professional social workers who know most of the flat tenants. The process required a lot of effort, including door-to-door visits, in order to engage a handful of households to take part in the monitoring campaign. The effort, however, paid off. With help of TripleA-reno interventions, the tenants learned about renovation and, most importantly, for once felt protagonists in the process of improving the buildings they live in, even though they do not actually own them.

The other aspect of empowerment is with the most invested individuals. Specifically in multiple-occupancy buildings, it is best to have a **small team of engaged individuals** who run the project. Other owners and members of the residential community, who do not want to engage, should support the core team in their efforts by periodically following up with the project developments and trusting the core team to represent in the ongoing business. This was especially clear in the case of Slovenia. There a small group of engaged owners, lead by a single highly motivated and driven individual, took the project as a personal challenge. They played a key role in the realisation of the project. These are the individuals who might give you the following suggestion:

> “Do not simply trust ‘the experts’. Be curious and engaged! Do not let individuals force their quasi knowledge-authority on you, but always give yourselves time to investigate all possibilities.”

Not everyone will both decide to challenge ready-made ideas about building renovation with their own engagement. The ones who are, are likely to be among the most valuable resources for those who wish to promote and execute building renovations. Our researchers from Slovenia even report, that the renovation was successful only because of skills, experiences, and perhaps most of all, the determination of their **local heroes**, who were the engine of the housing community’s efforts for the project’s success.
4.2 The recommendations derived

All of the above leads us to explicitly state what has already been communicated implicitly – when thinking about and planning for building renovation and retrofitting, it is people who should be in the centre of attention, not buildings as such. Below we include an entire list of recommendations for improving renovation projects based on this conclusion. They relate to key project notions of Affordability, Acceptability and Attractiveness and the project’s goals on building renovations solutions, tools and interventions.

The order of recommendation is arbitrary and the relevance of individual aspects depends on each case individually. Nonetheless, projects do tend to depend on one or more individuals who from the start to the end take on the role of the project manager and, in some cases, the community manager, mobilizing their knowledge, skills and resources to realize their project. This role tends to be less demanding for smaller projects, involving small number of involved stakeholders (e.g. single family houses), and more demanding for larger project, involving large amount of stakeholders (e.g. blocks of flats), yet always requiring a significant amount of skill and dedication.

In summary, this list provides an abundance of insights for initiatives related to TripleA-reno, which want to understand better the people-related impressions on the deep renovation opportunities. This knowledge can be leveraged in pursuit of positive change in the existing socio-technical systems within and beyond the TripleA-reno.
4.2.1 Engage community managers

Renovation is a complex process that demands for wide variety of different skills, knowledge, established network and tools. It is more likely that people will find a project acceptable if it is managed by, in their opinion, a trustworthy person to whom they naturally or purposefully give the mandate to lead and manage the project.

Identified issues:

1. Weak project management, lack of knowledge, skills, lack of appropriate tools.
2. Lack of competent energy experts / the overwhelming number of offers. Individuals do not know where and how to find reliable and competent experts and professionals and ask for advice and assistance. Wrong perception, feelings and interpretation of the available information.
3. Lack of knowledge about regulatory framework.
4. Lack of confidence in construction professionals / Choosing the right contractor is of key importance
5. Incompetent supervision. “Conflicts of theory and practice” at the building site.
(6) Bureaucracy and paperwork.
(7) Lack of transparency in the market.
(8) Lack of knowledge about issues and technologies and available solutions — together with benefits (also possibility of customization).
(9) Complex decision-making rules in multi-apartment buildings and difficulties to reach and take collective decisions to renovate. Cases where individuals would complicate on certain matters but would not be willing to actively engage in the project with their “better” suggestions. Only through somewhat tedious conversations and negotiations, after they ran out of more or less reasonable arguments, they would agree with the widely supported solutions.

TripleA-reno ethnographic research suggests that introducing a community manager might be the best approach to address the issues listed above. There is a need for a competent project facilitator that would oversee and manage the complex process of deep renovation, and lead or facilitate the communication between stakeholders involved. This person (also a group, or an organization) could represent one of the main end-users of the TripleA-Reno platform, using it as a toolbox for catalyzing building renovation processes.

The Community Manager should be the translator and integrator that has access to different information on the market (e.g. available technologies, funding instruments, experts and certified building professionals) and in the community (e.g. good and bad practices) and is able to critically examine and make the selection. The Community or renovation manager should also be able to understand the complexity of building renovation and has both the necessary knowledge on how to use the tools integrated in the platform, as well as the capacity to translate knowledge on the specific renovations to other stakeholders in an appropriate and understandable way.

**Tasks and roles:**

- To use the platform as a tool to interact with relevant stakeholders: Level 1 (home owners in the design phase), Level 2 (contractors and installations), Level 3 (home occupants during the operational phases);
- To understand the renovation process from the technical point of view;
- To conduct ethnographic inquiry in order to dig into stakeholders’ roles, habits, values and hidden principles;
- To provide easily understandable information from the start of renovation process. This skill includes the selection and translation of complex information from experts to the occupants (during the design, installation and operational phases) of complex information;
- To facilitate complex decision-making process and consensus;
- To supervise contractors during construction phase;
- To keep the end user informed and engaged – collect their feedback (before, in the middle and after renovation);
- To identify potential crisis during the main phases of the renovation (Level 1, 2, 3) and filtrate what is important and what is not (in majority people will complain);
- To take care of operational management in the part of ensured improved IEQ;
• To create transparent network of interested individuals and experts (power analysis – supporting and obstructing the renovation process).

4.2.2 Raise awareness
People (occupants) often do not understand the overall renovation process or tend to see it as a “black box” (e.g. technical design, economic/financial requirements, impact on environment etc.). However, it is more likely that people will find renovation projects acceptable if they are well informed about the key project aspects – technical, financial and practical. People are more likely to support the renovation if the solutions are widely recognised and established as efficient. In addition, people are also more likely to support and get actively involved with the project if there is some sort of a reliable guarantee that the renovation is not going to cross certain limitations – deadlines, budgets etc.

Identified issues:

(10) Users and owners are often mistrustful and sceptical about new technologies (consumer acceptance). Lack of knowledge about issues and technologies and available solutions (also possibility of customization). Fear and worry about potential risk and inconvenience that people may have regarding new technologies that have not yet become mainstream.

(11) Interests of clients (occupants, end-users) are often superficial, focusing exclusively on one individual segment of a renovation, such as the insulation, and ignoring important elements of different types of housing systems and installation (ventilation, heating etc.).

(12) People have their own opinions which are not based on knowledge of the facts or carefully considered principles. They do not rely on evidence. People develop those opinions based on different factors, such as limited personal experience, media etc. These opinions furthermore influence their habits and practices.

(13) Speculations about long-term savings coming from the renovation can be misleading. For optimal balance of quality and affordability, individuals interested in the renovation should also be presented with possible risks, such as dangers of bad quality work done by the contractor or low-quality materials.

(14) A phenomenon that people resist to change even when all positive aspects and benefits are clearly presented to them. Explanation could be found in behavioural economics theory which considers individuals to be bounded rational and to make choices relying on mental shortcuts and habits, especially when they face cognitive overload. This exposes their decision-making process to cognitive biases that the context of the moment of decision makes salient. Individuals are prone to the status quo bias, that is they are prone to resist change and stick to the status quo. This is particularly true when they have to choose new electricity suppliers or devices, even when they are educated about the product benefits and features.

(15) Context is the surroundings in which people decide how to act and one of the main determinants of energy behaviours and social change. An actor learns which behaviours are culturally and socially recognized in the context and the constant repetition creates the social practice (theory of social practice – people are actors who grow up, act and make decisions in specific material and cultural context with common rules and meanings.). For instance, the social housing conditions of scarcity (like income and energy) affect peoples’ available cognitive resources and, in turn, their behaviour. When
there are several pressing needs to satisfy, attention is depleted, and future needs are neglected. As a result, a context characterized by scarcity conditions shapes peoples’ preference towards immediate rewards, exacerbating the human myopic tendency to value future benefits, such as those associated to energy behaviours.

In order to raise awareness, we suggest to enhance acceptance of new technologies, solutions, and models by educating everyone involved in the project on relevant topics and procedures (e.g. What is deep renovation, what are possibilities, what are positive and negative consequences, the required behavioral change after renovation is completed).

- Answers on specific question should be provided, such as what renovation means in practice; very concretely, what does it mean to change windows, to renovate the balcony, to drill holes etc. (noise, duration, dust etc.).
- Demonstrate positive and negative sides – also what could go wrong and how people should be prepared if something goes wrong.
- Information provided should be realistic and fair – without trying to manipulate the people.
- Provide information focusing on benefits in terms of energy efficiency, housing quality, indoor conditions but should also specifically address concerns relating to individual owners.
- Put equal (or more) emphasis on the prospective health and safety benefits of renovation rather than on long term financial returns. In addition, environmental impact of CO2 reduction, might play a role for some as well.

**Myopic tendency to prioritize inefficient, but more short-term rewarding behaviours.** Individuals are prone to perceive things as more valuable when they are closer in time, even when they might provide higher benefits when delayed in the future. This “myopic” behaviour results in comparing the short-term costs and long-term benefits of energy behaviour, such as energy consumption and energy efficient investments. A strategy aimed at correcting behaviour would seek to remove the context-specific cognitive biases that pose barriers for people to perform optimal decisions (such as sending reminders mentioning a particular future action). Another strategy would be informing or showing people on aggregate future benefits from e.g. ventilating efficiently, or about what others do.

Changing a social practice requires a deepen process. A new practice is created when new images, forms of knowledge, and technologies are combined. Changing a practice requires that individuals and groups negotiate new actions with old ones through social learning. In particular, social practice change requires the understanding of the reasons behind the change (e.g. environmental footprint associated to the old practice) and the participation to a new practice through individual and collective experience and training. Social practice change has to be systemic. Community-based initiatives might move from cognitive to systemic change. Energy consumption is not a practice: it is the outcome of many different practices shared collectively and performed by individuals (such as showering, bathing, cooking, washing clothes and dishes, heating, entertainment, ventilation etc.).
4.2.3 Provide a timeline
Disruption of life is a major barrier to acceptance and attractiveness of building renovation. Troubles for the occupant associated to refurbishment work can impact the decision-making process significantly. Renovations are considered a disorder of everyday life. Tenants might need to relocate and landlords might lose income from rent. Any major work on the flat, be it renovation of an individual space within the unit or the unit as a whole, disturbs the everyday life of the inhabitants (also noise & dirt during the construction phase). For this reason, it is common that individuals are keen on investing into renovation of their flats before they move in the flat for the first time. Similarly, symptomatic is the step-by-step renovation, where flats are renovated by segments over an extended period (usually several years). In addition, reasons for such an approach include lack of funds, and intentions to study the investment thoroughly (what materials and technologies to use, the design of space etc.).

In order to address this issue, we suggest to provide a reliable project timeline: Detailed plan and timeline (Gantt chart) presented to everyone – how much time will it take (in general and individually). Break-down of the renovation process into smaller segments (missions), which are specific, measurable, achievable, relevant and time bound/limited. The project should be clearly split into phases, so that people can easily observe the progress from phase to phase (and receive feedback). Occupants have to be familiar with the timeline and effort that is requested from them (needs to be very clear and transparent!). Potential disruptions and delays should be addressed in a suitable way (mitigation, communication to stakeholders). We also suggest developing strategies for minimizing impact on the occupant’s daily routine.

4.2.4 Enhance transparency
Lack of transparency has repeatedly been reported as a barrier for building renovation. Relevant stakeholders involved in the renovation process can be directly visible and known (e.g. building contractors, the housing company, housing corporation etc.). However, some of them could be also indirectly involved but having an important role (positive/enhancing the process or negative/obstructing the process) – e.g. the local heroes, the antagonists, regulators etc.

The challenge and importance of transparency best seen in the case of illegitimate business practices (corruption). People find it unacceptable if they feel someone involved in the project has illegitimate benefits from it. Cases of corruption and possible frauds are a major source of frustration especially for the housing community. On the other side, a contractor that participated in the study pointed out, that if you do not play by the unwritten rules of whomever it is that holds the position of power in an area (e.g. a municipality), you can have serious problems doing business there.

To mitigate these challenges, we suggest to build trustworthy networks of stakeholders (task of the community manager). Provide transparency, traceability and recognition of all actors/stakeholders involved in the process. Their concrete roles, attitudes, values should be clear and transparent. Basic ethnographic research should be carried out to identify and map the stakeholders and their ability to influence outcomes (e.g. power map). Basic power analysis should be carried out (e.g. power to support or obstruct the
renovation process). Protocols should be developed that define what is illegal/illegitimate, how to eliminate potential risks proactively, and how to react if risks are identified or violations of the protocol confirmed.

4.2.5 Demonstrate value and build support

Gaining people’s trust is key for success of a renovation project. Renovations are acceptable if all parties involved are reassured that it will be worth their time, effort, and financial investment.

The notion of affordability does not necessarily translate into financial terms (e.g. return on investment). People often tend to prioritise the prospective results, such as visual (aesthetic) appearance of the building, the better IEQ and comfort of the flat, and the feeling that they have participated in a project that is in the interest of the wider community.

Identified issues:

1. People are more likely to support the project if they are convinced that their investments will have positive returns in at least one of the two key aspects – financial savings or improved quality of life. The later, among others, includes improved IEQ, aesthetic aspects and social acceptance.

2. Examples of good and bad practices as well as comparative information on energy use, renovations, financial plans etc. (from similar buildings, from similar towns or regions) can prompt people into changing their opinions and ways of living.

3. Positive feedback turned out to be key in promotion of renovations. What seems to be the key tipping point in getting people to support renovations were the first positive examples and feedback from the occupants of those buildings (e.g. in the neighbourhood). Once the first projects were successfully realized, support and demand for such projects increased dramatically.

4. Visual appearance and aesthetics: Individuals sometimes find outer appearance of their building more important than any other reason. This could also be interpreted as a function of public appearance and conformation with the social standards. However, since aesthetics is largely a subjective category some individuals deny support of the renovation exactly because they feel the new appearance of the building will be worse than the old one.

5. Prospects of better IEQ: One of the general primary considerations for support of renovation is improved aspects of IEQ – thermal comfort, sound, air quality and light. This is especially true with individuals that face serious issues with IEQ in their flats. If user does not have serious problem (mould, noise, overheating…) he or she is at that moment unlikely to consider improved IEQ as a driver.

6. Narrow minded thinking that prioritizes private interests over a sense of shared responsibility for common good (tragedy of the commons). However, a sense of comradery is also apparent. Those individuals, who have less reasons to support the renovation because they are content with their current situation find their reason in solidarity with other occupants who depend on their support to realize the renovation.
In order to address the issues above, we suggest to provide location-based services (also good and bad practices from local/regional environment). Examples of same/similar successful projects with the real impact – ideally in their community or close (testimonial). Provide testimonials from others that have successfully carried out renovation projects. Involve experts from local environment. Live and verified measurements from real cases (IEQ + energy reductions). Disseminate examples of good practices, how challenges can be solved, and how difficult projects can be realized.

To address potential aversion due to the aesthetic (visual) appearance of retrofitted building, a good quality design is needed, ideally together with a comprehensive visual demonstration of the building “before and after” the renovation.

Peer pressure can also be used as a strategy. In this regard, a fundamental concept that suggests that behaviour is affected by contextual features is the absence or the presence of interpersonal trust. In the domain of energy related behaviours this translates in improving energy behaviour when information comes from a trusted source. This links to the evidence that peoples’ behaviour is also influenced by the behaviour of those who surround them; they draw from peoples’ behaviour to understand which is the socially appropriate behaviour they have to conform to.

Finally, ambassadors of successful projects from other communities (early adopters) can also be a strong reference of value. These are people (individuals) who are able to motivate others to use the novelty or enhance a process in a community based on their personal experience. Identification of existing formal and informal groups of people and their leaders (e.g. building communities, NGOs, informal communities of neighbours) is therefore a recommended strategy for demonstrating value and building support.

4.2.6 Identify and engage Local Heroes

It is more likely that people will find a renovation project acceptable if they trust the key stakeholders involved in project. Community (or project) managers, who manage the renovation process, or different knowledge ambassadors (building experts, such as architects, engineers, etc.) who support and enable the project development, can find building trustworthy relationships a significant challenge.

Local heroes as trusted representatives of households (in case of smaller projects, such as single-family houses) or members of the community of owners and residents (in case of apartment buildings) can play a major role facilitating the project development and execution. Ideally, these are competent individuals invested in the process of the renovation who are also willing to collaborate with the project managers on concrete tasks to work towards a smoother realization of the project. These tasks can include supporting communication with the community or individuals within it, gathering of signatures, gathering information needed for quality development of the renovation project (e.g. defining details and best solutions together with architects and project designers), etc. Having such individuals as an ally in the project is also a key asset when it comes to detection of potential risks and conflict mitigation.

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8 There is a difference between a local hero and a community manager. The local hero is the representative of the occupants. Ideally, they live in the building that is planned for renovation and will therefore be directly affected by the renovation. The community manager is...
One or more enthusiastic individuals often naturally take on the role of Local heroes and propagate the project within their community until its realization. To give a strong boost to the renovation project, we suggest identifying and proactively engaging such individuals. This can be an easy and efficient way to constructive solutions defined with and for the community that will benefit (and be impacted) most by the building renovation. The alternative, which is trying to talk to everyone in the community or avoiding such interaction in the first place, can be much more challenging and time consuming.

4.2.7 Accommodate local specifics

There are no universal recipes for optimization of renovation processes. There are no universal answers to all different kinds of issues that emerge throughout the renovation. Each project has to be tailored to the needs of the specific building, occupants and the relevant contexts.

Each project to take into account:

- Building and urban typology (e.g. crowded street, busy city, shrinking village, sub-urban, etc.)
- Household structures and personal situations
- Socio-economic situation
- Existing infrastructure
- Geography and climate zones
- Market (e.g. market for renovation supplies, construction chain, real estate market, rental market etc.)
- Technical / availability of technical solutions (what is available on the local market)
- Culture
- Entrepreneurial environment
- Comfort level and IEQ
- Local policies
- Access to subsidies

4.2.8 Present a feasible financial plan

The financial plan is where wishful thinking about building renovation and retrofitting either stop or transform into concrete planning of actions and investments.

most likely an external expert (e.g. an architect or project facilitator with a significant amount of necessary technical and/or project management background) that oversees and manages the complex process of deep renovation as well as facilitates the communication between all stakeholders involved. In some cases, particularly in the case of single-family homes, the roles of the local hero and project management will overlap. Nonetheless, making a distinction between the two roles is beneficial for understanding and later managing complex relations between different stakeholders involved in the project, particularly those who can have significant positive or negative influence on the development of the project.

The concept of a local hero, as we refer to, is derived from Joseph Campbell’s theory of the “hero’s journey”, where a hero sets of on a journey to an unknown territory (e.g. a building renovation project) knowing they will face one or more challenges (e.g. various tasks inherent to the planning and execution process of the project) before coming back to their everyday life (e.g. after the renovation). After the return he or she is wiser (has a new experience) and is recognized as a hero within it’s community. On the other hand, he/she also takes a lot of responsibility on his/her shoulders (e.g. collaborating with key project stakeholders and representing the entire community, sometimes also through concrete decision making). The community or project manager, in this respect, is the helper who supports the local hero on it’s journey. In case of building renovation, the load of responsibility that should be taken on by local heroes depends on several factors, such as size and nature of the project, also the knowledge background and skills of the heroes. Nonetheless, the analogy is useful to understand how project managers or even projects, such as TripleA-reno, should think about engagement with visible representatives of communities they want to work with in business of building renovation and retrofitting.
Some identified issues:

- Initial investments and upfront costs are relatively high
- Payback periods are relatively long
- In many cases, there is lack of funding opportunities (including both subsidies and loans) or lack of knowledge (and capacity) to exploit them successfully
- Lack of comprehensive information about associated benefits and the post-renovation value of the property
- Differences in making sense of investments toward building renovations (based on demographic factors, background knowledge, locally/country specific socio-cultural patterns, locally/country specific markets etc.) → Younger generations tend to see their financial participation in the project as an investment into their assets, the older generations often tend to see it as an investment for the younger generations of their family
- In case of apartment buildings, uneven distribution of benefits and costs of an energy retrofit among the owners, particularly in cases of buildings with mixed purpose of use, is a barrier to consensus building.
- For some households, especially those with low household incomes, the initial costs of renovation outweigh the prospects of long-term savings.
- Fear of possible poor realization of a renovation (e.i. investment) and its consequences is a significant demotivating factor for decision makers.
- Projecting finances as an issue is sometimes used as a diversion strategy to obstruct the project and obscure personal interests or to pursue a variety of personal interests of individual stakeholders (related, for example, with political affiliations, personal resentments, financial interests etc.).

If people do not find the renovation affordable, they will most probably not find it acceptable, and the project will stop before it actually started. Financial plans have to be at the same time detailed and easy to understand. In more complex projects, the financial burden has to be spread between the stakeholders in a way that everyone, or at least the absolute majority, find it acceptable.

The perception of acceptability should also be managed. There is a higher chance of engagement and support to building renovation on the side of the building occupants if costs of living are considered disproportionally high in comparison with similar/comparable buildings that have already been renovated. Contextualization, such as comparing retrofit and energy costs in a broader context with other household costs, such as costs for telecommunication or running costs of vehicles, could also be utilized to pose a question:

*Is investment into energy efficiency, comfort, health and safety of the home really so expensive compared to other services?*

In short, financial value has to be demonstrated in a simple and comprehensive manner. Provide simple answers on questions such as:

- How much does my building consume?
- How much will it consume after renovation?
How much money would I / we save after the renovation and how long would it take?

Presented with the right arguments, some people will find investments into renovation project attractive for prospects of long-term savings. In addition, they could see it as an investment that increases the financial value of their property. To streamline renovation planning, typified scenarios or business plans could be set up on a local level that would fit a variety of user profiles by making the renovation affordable or even financially attractive for the end-user depending on their financial capacity, needs, and interest. Different financial instruments, such as loans from the housing company, subsides for energy poverty, etc., should also be considered in the plans. As a prospect for ICT solution development, modelling could be set up that would forecast Key Performance Indicators based on different financing and renovation scenarios, projecting expected returns on investments (accounting for expected savings on energy and building life-cycle costs, impact on the property value, etc.) together with indicators of expected quality of housing, health and safety benefits, etc.

4.2.9 Involve and empower occupants

As stressed several times already, when thinking about buildings, we should first be thinking about the people that use them and live in them. For most of us, investments into real-estate and property are likely the largest and arguably most important investment we will have to undertake in our lifetime. At the same time, they are not only walls, windows, and doors, but our homes and offices, places where we do meaningful things. This indicates the magnitude of importance we ascribe to them, be it consciously or not. This realization can help us understand both the challenges of trying to promote building renovation, as well as the opportunities for their management.

Identified issues:

1. In apartment buildings and other types of multiple-occupant buildings, there is often an evident lack of a sense of community and/or shared responsibilities regarding maintenance of the building and its immediate surroundings. There seem to be no considerable activities that would indicate a sense of community or interest in collective action.

2. People tend to make decisions based on trust. In the context of building renovation projects, people often do not know where and how to find reliable and competent experts and professionals to ask for advice and assistance, or decide to trust advice shared by individuals who do not necessarily have the right knowledge or pursue their personal interests.

3. There is a lack of feedback after finished renovation projects. After renovations are finished, there is no control of the quality or what kind of impact the renovation has on the IEQ. That would be both beneficial for ensuring standards and general promotion of renovations, supported with concrete data.

To mobilize the power of communities, we suggest to simply invite people to participate and facilitate the process of planning and executing the renovation. Ask them about their problems and address them proactively, especially if they are relatively simple and relatively inexpensive (e.g. a broken door in the lobby). Secondly, create opportunities, channels, and spaces where everybody can participate and share their opinion or problems. Enable interested individuals with an option to monitor the progress and status of the
renovation project. People should feel empowered by having a transparent insight into the project development as well as a chance to influence it. Involve people through participative activities – ask occupants (and other stakeholders) to take photos of renovation and share them. Provide them with a platform (such as was planned in TripleA-reno; or simply an email, a social-network channel, or a monthly gathering for interested individuals) where they can share the issues they identify, problems they experience etc. Provide them access to relevant, simple, and trustworthy information tailored to their level of knowledge and interest (for example by links to popular and scientific articles). It should not be in form of data, which is difficult to understand (e.g. complex charts), but concrete examples and stories, possibly accompanied with visual representations. Transfer and visualize complex information in an understandable and engaging (possibly gamified) way. Many of these activities require engagement and facilitation by the community manager.

4.2.10 Pursue long-term behavioural change
The post-renovation period is very important but often forgotten aspect of renovations. This is especially true when new interfaces and systems are introduced, such as heat pumps, ventilation units, new heating systems etc. The disturbance and “chaos”, which is the period of physical ground works during building renovation, presents a natural ideal moment to create new “order”, and foster new practices of energy use as well as building management and maintenance (behavioral change). People perceive the renovation as a new start, which has significance when trying to influence people’s habits and consolidate new patterns of doing, new practices of living. The change could happen on individual, family or on building level or even beyond.