

# INSTALLATION AND TESTING OF TECHNICAL DEVICES AND APPLICATIONS

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Deliverable DT.3.5.4

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# Table of contents

1. Introduction .....	2
2. Testing of technology in cohousing context .....	2
3. Testing of technology in CSD context.....	4
4. Summary of testing results .....	6



## 1. Introduction

In the initial phase of the experimentation of the GPS tracking technology in the context of the pilot site of Treviso, some final tests related to the technology were carried out in parallel to the recruitment and training of the participants. The tests carried out differ from those described in Deliverable D.T2.3.4 "Testing and finalisation of the tracking tool", because they were carried out in real contexts, i.e. in the buildings that make up the housing complex "Borgo Mazzini Smart Cohousing" and at the Specialist Centre for Dementia - CSD (that is located inside the nursing home "Residenze per Anziani Città di Treviso" - R.A.C.T.).

It should be noted that the technology being tested does not require the installation of any technical device or hardware in the environments where it will be used. The bracelet is totally plug and play, it works autonomously and only needs to be charged periodically. No installation is required on the organisation's servers either. The monitoring platform is only available through cloud technology. Finally, with regard to the issue of security and privacy related to testing, it is recommended to read the Deliverable D.T3.5.2 "Engagement of test persons and consideration of legal aspects", where the results of the "DATA PROTECTION IMPACT ANALYSIS" (DPIA) are presented, which confirmed the compliance of the niCElife pilot in Treviso with the mandatory regulations.

## 2. Testing of technology in cohousing context

The testing of the technological solution in the context of Borgo Mazzini Smart Cohousing (BMSC) covered different functionalities and also involved the elderly residents. The test of the technology had also the aim, besides the verification of the effectiveness, to demonstrate to the elderly the potentialities of the gps tracking, verifying at the same time the usability of the system by the target groups of the project. Therefore, the test had also an educational value as it allowed the elderly to concretely experiment the technology following the theoretical training provided by the project team.

The main testing activities carried out at the Residence "Tito Garzoni", part of the "Borgo Mazzini Smart Cohousing" complex, concerned the following elements:

- Gps tracking. The ISRAA staff together with the seniors tried to identify the presence of the bracelet in the map on the monitoring platform. The identification of the position was instantaneous, but the experimentation indicated a certain degree of inaccuracy due to the fact that the bracelet was inside a well shielded building;
- Geofencing. This functionality was not tested in the context of cohousing as it is not particularly suitable and appreciated by elderly people living in this context who are not subject to severe forms of cognitive decline;



- Internal tracking. Also this functionality is not suitable for this kind of target group so it was tested in a different scenario;
- The sos button. The analysis of the effectiveness of the SOS button was performed by giving the technology directly to the elderly. In this case, the objectives of the test were two. The first one was to check the usability of the bracelet, i.e. the degree of ease with which the elderly were able to activate it. The response was positive as all participants were able to activate it. In addition, the sensitivity of the wristband was appreciated, which, thanks to its ergonomic features, avoids that the elderly person inadvertently triggers requests for support. The second element concerned the way in which the emergency is displayed on the monitoring platform app and the timing of caregivers' receipt of alerts. The visualisation appears clear and allows to easily identify the location of the person in difficulty. Finally, the notification arrives on the caregiver's smartphone within 2 to 3 minutes.
- Fall alarm. This feature was tested with a practical approach to make the elderly and carers understand the automatic way it works. A bracelet was dropped from a height of one meter. In 2, 3 minutes the emergency signal was automatically sent to the monitoring platform application. Elderly people and caregivers appreciated the fully autonomous operation of the fall functionality and were very positive about the potential of this feature to support them in their daily lives by providing a higher level of safety.
- Wellness-related functionalities: sleep monitoring, heart rate monitoring and physical activity monitoring. These functionalities work differently from those dedicated exclusively to security. Data related to these factors is sent to the platform every two hours and not in real time. This decision is based on the desire to guarantee a long battery life (around 20 days). Therefore, in the testing phase with elderly people, the usability of the platform and the information gathered by the platform were considered.



Finally, the digital application designed expressly for the elderly participants in the Project was tested. The functions that were tested and which the elderly person can access directly are as follows:

- SOS from Smartphone: in addition to the bracelet, it is possible to press the SOS button on the APP to alert family members of a situation of need.
- Reminders: the family member who is caring for the elderly person can schedule recurring and important activities such as taking a medicine and performing a certain activity. The



elderly person wearing the wristband will be able to check the list of reminders set by the family member and will receive audible notifications when the reminder expires.

- Video calls with family members: Simply click on a button to make a quick video call between the elderly user wearing the wristband and family members who are assisting them remotely.
- Alarms and Well-being: The user wearing the wristband can use all the standard functions of the App to display alarms and their physical well-being status: heart rate, sleep, physical activity.

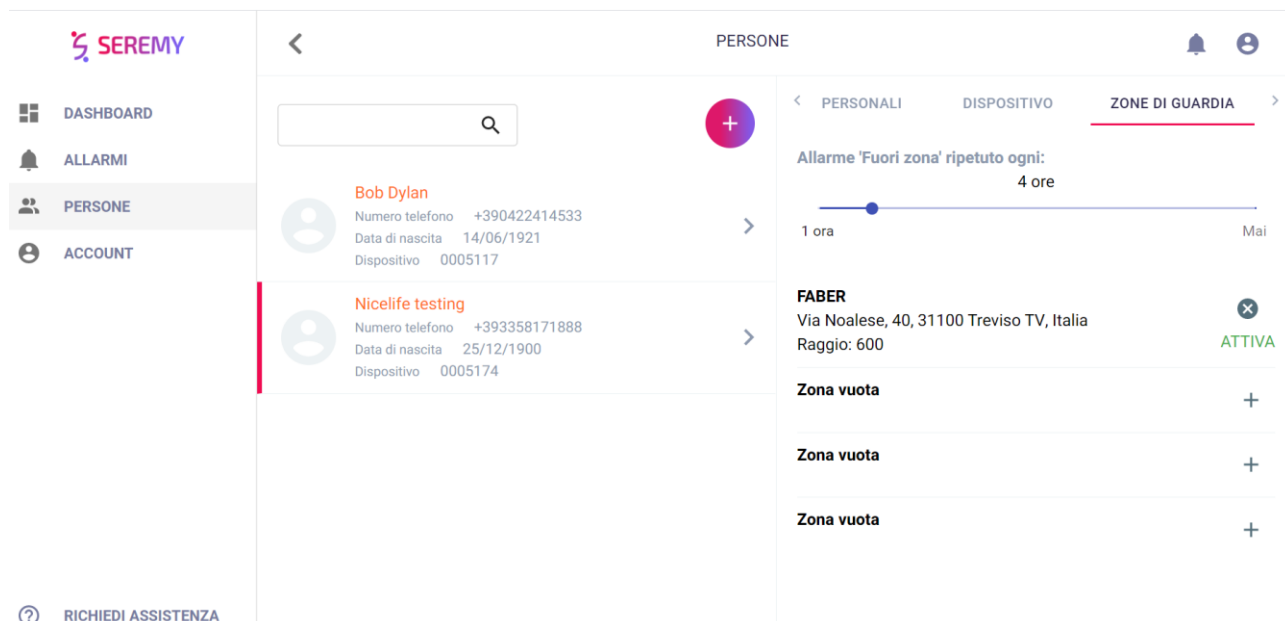
### 3. Testing of technology in CSD context

A further test of the technological solution was also carried out in the context of the Specialist Centre for Dementia (CSD). The objective in this scenario was different from the one implemented previously in the context of cohousing. In fact, the test only involved ISRAA's staff, while the older people were not involved. There are two reasons for this approach:

- Through this test, we tried to understand the level of usability of the care solution for formal caregivers, who are often characterised by a low level of computer skills;
- Deepening the level of accuracy and effectiveness of the functions offered by the wristband with a specific focus on safety-related elements. This depends on the fact that elderly people who will be involved through the Specialist Centre for Dementia are generally characterised by a higher level of cognitive decline. For this target group, functionalities such as geofencing and fall detection play a more prominent role than for seniors living in the cohousing context.

Shifting the focus to single functionalities, those validated in the course of the experimentation in the Specialist Centre for Dementia are the following:

- Gps tracking. The accuracy of the ecosystem in indicating the position of the bracelet on the map of the monitoring platform was evaluated. The results were similar to those obtained in the cohousing contest;
- Geofencing. This functionality is of particular interest to caregivers of people with cognitive decline as it can prevent dangerous situations, while at the same time providing ample freedom to the person wearing the bracelet. The phase of setting the guard zones was tested with the identification of the perimeter beyond which the system automatically generates an alarm that is sent to formal and informal caregivers.



- Internal tracking. This functionality has also shown great potential for the target population of the Specialist Centre for Dementia. Internal guarding also has potential for use in care homes for the elderly and in homes where people with more advanced forms of dementia live. The added value of this technology must be traced back to the higher precision it offers compared to tracking solutions based solely on satellites. As can be seen in the picture, the use of this functionality was possible with the addition of another hardware component, namely a Long-Range Beacon, powered by USB, placed at the entrance of a room and able to evaluate the incoming and outgoing movements of the person wearing the bracelet. The testing of the solution proved to be effective, but it is however necessary to underline that the experimentation of this functionality has a marginal role in the context of the testing of the GPS tracking solution in the pilot site of Treviso.



- Fall detection. This functionality was tested in a similar way to the cohousing implementation context. The social and health care staff participating in the test underlined that this functionality has a great added value for the target group of elderly people suffering from cognitive decline as falling is a situation they often have to face.

Finally, with regard to the functionalities related to well-being, the test with the social care staff focused on the screens of the application through which information is displayed in order to assess its usability and effectiveness.



## 4. Summary of testing results

Below is a table summarising the results of the testing activity:

N.	Functionality	Test location		Test results	
		BMSC	CSD	BMSC	CSD
1	GPS tracking			positive outcome, reduced sensitivity inside buildings	positive outcome, reduced sensitivity inside buildings
2	Geofencing			not tested in cohousing	positive outcome, useful for older people with more severe forms of cognitive decline
3	Internal tracking			not tested in cohousing	positive outcome, useful for older people with more severe forms of cognitive decline
4	The sos button			positive outcome, strong interest from seniors	positive outcome, strong interest from formal carers
5	Fall alarm			positive outcome, strong interest from seniors	positive outcome, strong interest from formal carers
6	Heart rate			positive outcome, ease of use, automatic data collection	not tested in the CSD
7	sleep monitoring			positive outcome, ease of use, automatic data collection	not tested in the CSD
8	physical activity			positive outcome, ease of use, automatic data collection	not tested in the CSD