

DESIGN OF THE PILOT ACTION IN TREVISO

Deliverable D.T3.5.1

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1.1. GPS-based tracking tool

1.1.1. Objectives of experiment

The aim of testing is to verify the tool integrating GPS tool with an intelligent monitoring platform. The system automatically monitors the health conditions of persons suffering from dementia. It also analyses the received data about behaviour patterns of persons and will provides added insight to caregivers about their status according.

Moreover, thanks to the experimentation we could verify the integration of the technology in the overall care model. In fact, the solution will be evaluated from a holistic perspective, assessing both the impact of the solution on the level of safety of the elderly and their quality of life, but also the integration of technology into the model of care. This will allow us to evaluate the potential of the technological solution, so that it can become a service that can actually be delivered

1.1.2. Location and geographical information

Short description of the physical location where the pilot will be deployed.

The pilot site will be implemented in the city of Treviso where ISRAA is based. The activities of the pilot, as highlighted in other deliverables of the niCE-life Project, will cover different settings, such as nursing home, cohousing and home of elderly people.

1.1.3. Demographic information

Short description of the demographic characteristics that we can find in the pilot, with special emphasis on the aspects related to elderly population.

The niCE-life project will address the territorial area of the Treviso Municipality of the Veneto Region (80,000 inhabitants of which 22,355 are over 65 years old). The project idea tries to give answers to the need to address the increasing incidence of neurodegenerative diseases in the elderly population. Neurodegenerative diseases in the elderly population, a phenomenon that significantly increases the pressure on families and the social and health system. In the territory of Treviso there is a clear growth of the index of dependence of the elderly on their families: if in 2005 it stood at 26.4%, in 2019 it reached the figure of 33.7% (ISTAT data). Between 2014 and 2017, the prevalence of cases of neurodegenerative and Alzheimer's-type diseases in the territory of Treviso has resulted in a steady increase. This growth is in line with the general growth of the Region of the Veneto, in which the number of subjects with dementia, updated to 2017, stands at 66,147, with almost 8,000 more sick people than in 2014 (source Epidemiological Report on the main chronic diseases in the Veneto population - 2018, SER, Veneto).

1.1.4. Alignment with strategic and policy visions (national, regional, local level)

Identify and list the strategic and political initiatives, if exists, in the field of active and healthy ageing, that are being implemented at local, regional and national level, if relevant for the goals of NICELIFE and also if NICELIFE can impact on and support them.



The implementation of the gps tracking solution in the framework of the niCE-life Project demonstrates a high level of coherence with several policies and strategies, especially at the regional level, in particular:

- The Regional Law August 8, 2017, n. 23 "Promotion and enhancement of active aging", with which the Veneto Region has recognized and enhanced the role of adult or elderly people in the community, promoting their participation in social, civil, economic and cultural life;
- The Smart Specialisation Strategy of the Veneto Region, in particular with regard to the Sustainable Living axis;
- As far as the national level is concerned, it may be useful to highlight the "Multi-level participatory coordination of active ageing policies in Italy" (https://www.promisalute.it/servizi/notizie/notizie_fase02.aspx?ID=9459)

1.1.5. Needs of the target population

Using the outcomes already provided to WPT1 and WPT2, make a more descriptive summary of the detected needs of your target population (if relevant also include needs of the different stakeholders: informal carers, formal carers, service providers...)

The needs to which the experimentation seeks to respond are numerous and diversified for each target group identified by niCE.life. Specifically, the needs identified for each actor are:

- Elderly people suffering from cognitive disorders. The needs of this target group concern primarily the need to guarantee a higher level of safety. In addition, a second identified need concerns the low level of quality of life, which we hope will increase thanks to the support of technology. Finally, a need identified for this target group is related to autonomy support;
- Informal caregivers. Informal caregivers are mainly family members of older people. Informal caregivers are often characterised by high levels of stress and great difficulties in supporting their relatives who often live far away, also from a geographical point of view;
- formal caregivers (service providers). They need to increase their e-skills in order to support the increasing number of older people who need care.

1.1.6. Partners involved and role in pilot

Institute for elderly care and shelter, ISRAA - lead partner

Brno University of technology - partner involved

1.1.7. Technologies and technical solution

The main functionalities that will characterise the platform are the following:

1) GPS tracking. This functionality constitutes the central element of the experimentation, consistently with what is defined in the application form. GPS technology allows both formal caregivers and relatives to know the position of the elderly person wearing the bracelet. Probably, the frequency will be measured at most every five minutes.

Formal and informal caregivers will be able to know the position of the person wearing the bracelet through the monitoring platform. It will be accessible through two channels. The first one is the web console, which allows following all participants in the project activities at the



same time. It is mainly designed for formal caregivers and allows quick access not only to the position of the person but also to health data.

The second channel that allows login to the monitoring platform is a mobile application accessible via smartphone and tablet. It is designed primarily for informal caregivers who can easily access their loved one's location via the application. The choice of the application is due to the need to facilitate access to the platform for informal caregivers, who often have low digital skills. Nevertheless, access to the platform via an app can also be a useful tool for care managers if they need to move away from their workplace.

Finally, it is necessary to underline that information about the position of the elderly person will be transmitted through a specific device connected to the platform. It will have some functional features that will guarantee a high level of usability by the target group of the project.

2) Geofencing, a virtual perimeter associated to a real world geographical area, is another essential functionality, closely linked to GPS technology and able to support the monitoring activity through the platform. Within the niCE-life project, geofencing will allow formal and informal caregivers to receive an alarm if the person wearing the bracelet leaves a predetermined area. This can ensure a good level of security for those people who are developing early forms of dementia who will then be able to move more freely, knowing that this technology is there to support them.

3) Indoor tracking. This functionality is largely underestimated, as it can play a decisive role in protecting the health of the elderly person. In fact, safety must be guaranteed not only outside the home but also inside, where classic GPS tracking technology addresses numerous problems.

In addition, indoor tracking can also be particularly interesting for care providers who can monitor the position of their caregivers within their own facilities, whether they are in old people's homes or cohousing or alternative forms of residential care. Specifically, indoor tracking allows the identification of the person's presence in internal areas, be they rooms, gardens or any other area.

From a technical point of view monitoring will be possible thanks to the use of BLE proximity TAGs. The 100% wireless BLE (Bluetooth Low Energy) sensors are easy to install thanks to the standardised, non-proprietary protocol. The intelligent battery management is essential, as the BLE tags consume twice less energy than classic Bluetooth, reducing power consumption while providing a wide range of coverage. In addition, these sensors are now accessible at a low cost, thus allowing a wider range of coverage. Finally, thanks to BLE technology, the sensors can be interfaced with any device with Bluetooth connectivity, making it easy for the platform to acquire data.

4) The sos button is one of the other features that integrate with the platform with the aim of maximising the level of security of the elderly person. This functionality will be extremely easy to use by the person wearing the bracelet, in fact, it will be sufficient to press the button to



trigger a previously configured chain of alarms. From the side of the platform, the alarm will come via a notification that will trigger a loud siren-like sound so that the emergency situation is suddenly taken over. The notification of the emergency situation will reach both the dedicated application and the web console. This will also allow informal caregivers to be the first to come to the rescue of their relative in need. In any case, the alarm chain will be configured specifically for each participant in the project.

5) Fall alarm. Falls are among the traumatic events that can have the greatest impact on the health and quality of life of the elderly person. The problem of falls in the elderly is particularly relevant not only in terms of the frequency and severity of the results in the case of fractures, but also in terms of the consequences on the psychophysical well-being of the person, because even the insecurity linked to the fear of falling can considerably limit the performance of everyday activities. The data on falls are explanatory of the severity of the problem. Therefore, our project seeks to offer a solution that guarantees a higher degree of safety for older people at risk of falling through a wearable band. From the point of view of the monitoring platform, the fall will be automatically signalled through the generation of automatic alarms. The chain for taking charge of the fallen person will be customisable and therefore defined from time to time, together with informal caregivers. Finally, the benefit of using this technology must also be linked to a better-perceived level of security, directly linked to the stress levels of the participants.

6) Heartbeat. This element is one of the platform indicators that focus more on the well-being of the elderly than on safety. The importance of monitoring this data is also indicated in the scientific literature which considers heartbeat monitoring to be a useful tool to prevent possible problems related to arrhythmias and heart attacks, often widespread among the elderly population. As far as the monitoring activity through the platform is concerned, it will be possible to define specific thresholds for each participant in the project which, if exceeded, will generate a specific alarm. Moreover, the monitoring series of this parameter will constitute one of the types of data that will feed the forecasting capacity of artificial intelligence.

7) Sleep monitoring. This indicator is an extremely useful tool especially for the target group of the Treviso pilot, i.e. people at risk or suffering from cognitive impairment. In fact, sleep plays an important role in maintaining brain health and lowers the risk of age-related cognitive decline. Findings indicate that poor sleep is a risk factor for cognitive decline and the development of Alzheimer's disease. So, constant monitoring will certainly be a valuable resource. In fact, the platform will be able to analyse the quality of sleep of the participant. This will make it easier to change behaviour in order to improve this indicator and consequently, the health status of the elderly person.

1.1.8. Use Cases and target users

The three main users of the service will be:

1. care providers (formal caregivers)



2. the elderly person

3. relatives (informal caregivers in general)

Each of these actors will have clearly defined responsibilities and the possibility to act on the platform as defined below:

1. The care provider will have the overall management of the platform. Through a specific monitoring portal it will be able, through the specific work of a care manager, to carry out different types of activities. First of all, the organisation will be able to receive alerts from the devices worn by the elderly person. The alerts will be triggered following events defined ex ante, such as the use of the SOS button or the exceeding of health thresholds defined specifically for the user. Through remote monitoring the care provider will be able to verify the position of the subject and this will be particularly useful in cases where specific parameters are defined and an alert is automatically triggered within the platform. The care provider will also have the task of extracting data from the platform so that they can be used by partners to develop predictive models of health status through the analysis of data patterns.

2. The elderly people who will participate in the project will be the most important actor and the target identified by the project proposal. Participants will be selected on the basis of their compliance with the parameters defined by ISRAA and the state of need, for which the technology could have a significant impact. The target includes older people aged 65 or more, with MCI living in cohousing alone or with an informal caregiver and older people that live in nursing home with formal caregivers assistance. Mild cognitive impairment (MCI) is defined as cognitive decline greater than expected for an individual's age and education level, which does not interfere affect basic activities of daily living. The activities required of the elderly person will therefore be minimal, precisely because of the need to minimise the complexity and skills that the elderly person must have in order to use the proposed solution. Therefore, the elderly person will have to wear the smartwatch all day long and periodically recharge the battery of the device through probably a magnetic base. The elderly person will be able to use the sos button to ask for support from family members or the care provider. In addition, if the participant still has sufficient cognitive skills, he or she will be able to access the dedicated app and assess his or her health over time, orienting his or her behaviour towards improving his or her condition. Finally, the elderly will participate in a short training before the start of the training. Through little and clear information, they will be able to make the best use of the proposed technology.

3. Finally, a valuable role in terms of guaranteeing and sustainability of the intervention will be ensured by the participation of family members, who are often the main caregivers in our society for people who are ageing. The specific actions that family members will be able to carry out with regard to the platform are many. First of all, they will be able to access a dedicated app which will provide the position of their relative, as well as parameters indicating the evolution of their state of health. The informal caregiver will also be included in the alarm chain that will be triggered if the elderly person presses the SOS button or if thresholds established through the technology platform are exceeded. Therefore, through the implementation of these technologies it will be possible to alleviate the caregiver's anxiety level, who will be able to live his or her daily life better with a tool capable of reducing the potential dangerous situations that the elderly person might encounter.

1.1.9. Definition of local indicators

Describe your evaluation goals and how this is mapped to your strategy and local indicators, as well as any already identified tool you plan to use to collect the indicators.

The tools we will use to assess the change our project will bring to the pilot site are the following:

- EQ-5D-3L. is a standardized instrument for measuring generic health status. It has been widely used in population health surveys, clinical studies, economic evaluation and in routine outcome measurement in the delivery of operational healthcare. (<https://euroqol.org/eq-5d-instruments/eq-5d-3l-about/>).
- Zarit Burden interview. Caregiving experiences in dementia may have adverse effects on the caregiver's own physical and mental health. The Zarit Burden Interview (ZBI) is the most widely used instrument for assessing family carer burden (<https://www.apa.org/pi/about/publications/caregivers/practice-settings/assessment/tools/zarit>);

1.1.10. Procedures

Describe the procedures that are relevant for your pilot, for instance, if you don't need procurement, just put a NA text or a short sentence saying that it is not relevant for your pilot. All procedures should follow the same structure

- *Purpose of the procedure*
- *Description of the documents resulting from executing the procedure*
- *Responsible of executing the procedure, input procedures and output procedures*
- *Description of the steps defining the procedure*
- *Workflow diagram summarizing the procedure*

1.1.10.1. Legal and ethical assessment

Regarding the pilot activities to be implemented in Treviso, no validation by an ethical committee is envisaged. Given the non-medical nature of the experimentation, the internal evaluation of ISRAA's legal experts was considered sufficient. The type of experimentation envisaged by the Project does not therefore fall within the cases identified by the reference legislation and in particular by Directive 2001/20/EC of the European Parliament and of the Council of 4 April 2001 on the approximation of the laws, regulations and administrative provisions of the Member States relating to the implementation of good clinical practice in the conduct of trials on medicinal products for human use.

1.1.10.2. User recruitment and consent procedures

The recruitment activities will be carried out through the channels through which ISRAA provides services to senior citizens. In particular, the recruitment will be carried out through the following services that daily involve the target citizens of the project:

- The Specialist Centre for Dementia. an innovative service through which ISRAA carries out, in addition to study, research and promotion projects on dementia in general and Alzheimer's

disease in particular, also territorial activities in collaboration with or on behalf of Azienda ULSS 2, primarily the management of the "Alzheimer Network" project;

- The four residences for elderly people that ISRAA manages on the territory of Treviso Municipality (Casa Albergo Salce; RESIDENZE ANZIANI CITTÀ DI TREVISO -RACT; RESIDENZA G. MENEGAZZI; RESIDENZA R. ZALIVANI).

- The Home Assistance Service (SAD) and "Centro Specialistico per le Demenze". ISRAA is developing an increasing presence on the territory, in favour of taking care of the elderly population at home and in the community. It manages the Home Assistance Service (SAD) of the Municipality of Treviso, the Municipality of Casier, the Municipality of Silea, the Municipality of Carbonera, and the Municipalities of Quinto di Treviso and Morgano.

- Brogo Mazzini Smart Cohousing. BMSC is the new cohousing project of ISRAA. This new neighbourhood based on solidarity is the result of a participative urban regeneration process: a place where people of all ages can fulfil their life plans. BMSC is also located close to the nursing home "Casa Albergo Salce" (<https://www.israa.it/home-bmsc>).

All participants in the project will sign the specific documentation prepared by the ISRAA legal team.

1.1.10.3. Procurement

The procurement procedures for the purchase of equipment for the implementation of the pilot site were completed in December 2020. The process implemented by ISRAA was successfully concluded in compliance with both programme-specific and Italian procurement regulations. All tender documents are available at www.israa.it.

1.1.10.4. Installation procedures

Due to the nature of the technology used, no installation is planned.

1.1.10.5. User training and support

The technology used in the pilot site is characterised by a high level of usability. Nevertheless, training activities will be necessary and will have the characteristics briefly described below.

- a) The project team will train all professionals involved in the activities of engaging, supporting and assisting older people. The main contents of this training will be: - bracelet functionality; - monitoring platform functionality with specific focus on alarm management, location tracking, parameter control, geofencing area setting, user insertion;

- b) A second, specific training session with each user will then take place. On this occasion, the ISRAA team member will train the end users and caregivers about the operation of the bracelet and the platform. Furthermore, the functioning of the application available to the users and integrated with the monitoring platform will be explained in detail.

Concerning user support, contact information will be shared for users to receive support quickly.

1.1.10.6. Operation procedure

After the training phase the operational part of the pilot will begin. As already highlighted in the section "2.3.8. Use Cases and target users", the elderly participants will basically wear the bracelet and through the monitoring platform the formal and informal caregivers will be activated in case of need.

1.1.10.7. Termination procedure

At the end of the pilot site the bracelets will be collected by the institution. At this point, depending on the results of the pilot, ISRAA can take two paths. First of all, if the piloting proves to be successful, the institution could invest further resources, making the gps-tracking an additional service that ISRAA can offer to the elderly living in the Treviso contest. If, on the contrary, the piloting does not prove fruitful, the problems encountered will be addressed in order to develop different strategies to support the seniors target of the project.

1.1.10.8. Evaluation procedures

The indicators set out in this document will be used to assess the impact of the pilot site:

- EQ-5D-3L.

- Zarit Burden interview.

In addition, short interview with seniors will be implemented.

1.1.10.9. Data management procedure

The procedure for the proper management of data collected through project activities will consist of the following elements:

- DPIA, a risk impact assessment inherent to the processing operations we are going to carry out. On the basis of what emerges (i.e. whether the level of risk is low, medium or high) we will assess whether to implement security measures for the protection of health and geolocalisation data;

- Appointments of ISRAA professionals who will handle such data will be prepared and training on confidentiality and proper use of the devices will be implemented;

- Consent will be collected from the subjects together with the privacy policy;

- The supplier GURPPO SELYON has already been appointed as external data controller and has committed to ensure the integrity, availability and confidentiality of the data through encryption and, where possible, pseudonymisation techniques. It is also committed to adapting its systems as soon as solutions proposed by the European Commission regarding the transfer of data to non-EU countries are available.

1.1.11. Planning

Here provides a timetable with the different actions to be realised from January 2020 until the end of WPT3 according to the use case definition and identified procedures.

Start	End	Description of the actions	Deliverables
December 2020	January 2021	preparing a draft of the pilot actions, discussing the details with the project leader, authors of the tools, partners responsible for each testing	
January 2021		Comprehensive design of the pilot in Treviso	D.T3.5.1
January 2021	November 2021	Coordination of the pilot activities by the LP, regular meetings about progress, regular exchange of information	D.T3.1.2
January 2021	May 2021	Engagement of 20 residents of co-housing/nursing house upon initial meeting, explanations of principles and benefits of pilot action, contact with home care givers/family members, obtaining written consent	D.T3.5.2

		from residents/ custodians	
March 2021	May 2021	- initial briefing of staff about scope, objectives and timeframe of the pilot action, - targeted trainings of test persons, care givers about tool to be tested (incl. presentation of their functionality and explanation of testing processes).	
May 2021		Report from briefing and training of test persons, home care givers and nurses	D.T3.5.3
March 2021	May 2021	Installation of technical devices and applications in ISRAA facilities in Treviso (flats of test persons and administration facilities), testing their functionality and security aspects	D.T3.5.4
May 2021	November 2021	regular collection and analysis of feedback from the test persons and from the staff-regular contacts with social home care givers and other staff	
November 2021		Collection and analysis of	D.T3.5.5



		feedback from test and support persons	
October 2021	December 2021	- preparing a report from pilot action summarising results from tests	
December 2021		Summary report from the pilot action in Treviso, - submit a report to PP5	D.T3.7.6