A Personalised Integrated Care Platform

(Grant Agreement No. 689209)

# D8.10 Third Trials Installation and Annual Update

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# Index:

# 1 Executive Summary

This deliverable describes how UDUS and UTV performed the pilots from the perspective of the infrastructure allocated (rooms, infrastructure in the rooms, proposed calendar, etc.) and personnel involved (from the hospital, number of users expected in every round, project partners, etc.).

# 2 Introduction

The PICASO project built a service-oriented, information and communications technology (ICT) based integration platform that supports collaborative sharing of care plans across sectors based on dynamic and personalised orchestration of care services. It provides a method for sharing patient information across all relevant formal and informal care providers using a unique, trust federated solution to the problem of data privacy in cloud-based health systems.

Two proof of concept trials including patients were performed.

## 2.1 Purpose, context and scope of this deliverable

This deliverable describes how the Policlinic of Rheumatology and Hiller Research Unit Rheumatology, University Clinic Düsseldorf (UDUS) and The University Hospital of Tor Vergata in Rome (UTV) performed the pilots from the perspective of the infrastructure allocated (rooms, infrastructure in the rooms, proposed calendar, etc.) and personnel involved (from the hospital, number of users expected in every round, project partners, etc).

Trial 1 was carried out by PICASO partner UDUS and involved patients above the age of 18 with Rheumatoid Arthritis (RA) and Cardiovascular Disease or risk factors as co-morbidities.

Trial 2 was carried out by PICASO partner UTV and involved patients over the age of 65 with Parkinson Disease (PD) and Cardiovascular Disease as co-morbidity.

## 2.2 Content and structure of this deliverable

For the content and the structure of this deliverable see the summary table.

# 3 Trials at UDUS

A proof-of-concept clinical trial was carried out by the PICASO partner UDUS (Policlinic of Rheumatology and Hiller Research Unit Rheumatology) and involved patients above the age of 18 years with Rheumatoid Arthritis (RA) and any cardiovascular co-morbidity. RA treatment is optimally delivered by a multidisciplinary team and involves different competencies.

## 3.1 Patients involved at UDUS

Overall n=30 patients were enrolled from the outpatient clinic. During the PICASO trial, patients were followed by their usually caring rheumatologist at UDUS.

Patients needed to fulfil the following inclusion and exclusion criteria:

Inclusion criteria:

- Patients above 18 years of age
- Diagnosis of rheumatoid arthritis (ICD M05.* or M06.*)
    a) Any disease activity status (remission, low or active disease)
    b) Any functional status
    c) Any disease duration
- Have at least one known, documented cardiovascular co-morbidity or risk factor at study entry
    a) Patients suffering from following cardiovascular co-morbidities will be included:
        1. Arterial hypertension
        2. Arrhythmias
        3. Coronary heart disease
        4. Heart valve diseases and other heart structure failure, e.g. myocardial cause
        5. Heart failure, e.g., insufficient pump performance
        6. Former apoplexies
        7. Hypercholesterolemia
        8. Hyperlipidaemia
        9. Overweight
        10. Smoker
        11. Family history of cardiovascular disease
- Are willing to participate and sign data transfer agreements
- Are willing to interact with the PICASO platform over a period of six months
- Agree to setting up and de-install the equipment at home
- Internet connection (either existing or agreeing to be build up (using 4G provided with equipment))
- Have a sufficient understanding of the German language
- Patients are allowed to be pregnant
- Patients are allowed to be followed in registries / observational studies
- Signed informed consent
- Patients need to have health care insurance and are treated at outpatients clinic at UDUS

**Exclusion criteria:**

- Participation in clinical trials phase 1 to 3 or studies according to AMG (German acronym for 'Arzneimittelgesetz' (Medicinal Products Act))
- No other specific exclusion criteria.

Patients were and are pre-identified via our patient documentation system and asked randomly as they showed up in our outpatient clinics at UDUS.

## 3.2 Medical Personnel involved in UDUS trials

Professionals involved in the two UDUS trials and the belonging responsibilities are depicted in Table 1: Professionals involved at UDUS trials of this deliverable.

The list includes medical personal employed at UDUS and physicians in private practices collaborating with UDUS in PICASO.

**Table 1: Professionals involved at UDUS trials**

| Role | Profession | Responsibilities |
|---|---|---|
| Physicians | Rheumatologists in clinic and private practises | Standard rheumatic care, trial parameters, use and evaluation of PICASO platform, filling evaluation forms |
| | GPs (e.g. from "Centre for Health and Society" (CHS)) | GP care, trial parameters, use and evaluation of PICASO platform, filling evaluation forms |
| | Cardiologists | Evaluation of PICASO platform during workshop |
| | Occupational physicians (e.g. from CHS) | Evaluation of PICASO platform during workshop |
| Documentation | Documentation officer/ study nurse / research assistant | Documentation of standard rheumatic care, trial parameters, trial support, evaluation forms, transfer into databases |
| Statistician | Statistician | Statistical analyses |
| IT | IT personnel | Technical support if not done by INJET/CNET or other applicable PICASO IT partners<br>Set-up and maintenance PICASO infrastructure in UDUS |
| Research assistants | Students, physicians | Setup the PICASO infrastructure for use at patients' homes<br>Set-up PICASO infrastructure for use in UDUS |
| Telephone hotline | Secretary/study nurse | Project support / management for health-related issues<br>Project support / management for technical issues |

## 3.3 Technical and physical infrastructure at UDUS

### Technical infrastructure at UDUS

UDUS hosted the UDUS PICASO server and the UDUS PICASO Database on two separate servers that mirror each other and thus guaranteed a fall-back solution in case that one of the systems should fail.

In addition, UDUS used its own hospital information system and patient documentation system as required. In case of e.g. power failure or hard disk crashes for these systems back-ups of the databases would have been are available as well.

At UDUS emergency power supply was available.

### Physical infrastructure at UDUS

*Patient recruitment*

Patient recruitment took place in the UDUS outpatient clinics.

Informed consent was obtained in outpatient treatment rooms and involved the caring physician (rheumatologist) and the PICASO study personnel (e.g. research assistants (medical students)) as appropriate. Our usually used medical equipment and software used in routine care was used for the interaction apart from the PICASO platform.

Training on the PICASO system, the home-monitoring devices and the hand over procedures of the preinstalled PICASO equipment were performed.

*Patient follow-up visits*

Follow-up visits and interaction with the caring physician were performed in standard outpatient treatment rooms and involved the caring physician and the PICASO study personnel. Our usually used medical equipment and software used in routine care was used for the interaction in addition to the PICASO platform.

Paper-based IT-Knowledge and evaluation questionnaires were handed out on clipboards with pencils. The patients had enough time to complete them. The filled questionnaires were returned to the study personnel and stored at a central place. The filled-out forms were archived according to legal requirements.

The collected paper-based data were digitized and stored in a Statistical Package for the Social Sciences (SPSS) databases for further analysis.

*Trial end*

UDUS clinical trial ended on the 18th June 2019 with the last patient visit for T6 at UDUS outpatient clinic.

# 4 Trials at UTV

The clinical trial was carried out by the PICASO partner UTV (University Tor Vergata, Department of Biomedicine and Prevention; Rome) in conjunction with the Department of Psychiatry of the Institute of Treatment and Research, Santa Lucia of Rome (SLUCIA). The trial is focused on patients suffering of Parkinson disease and related comorbidities and caregivers and is characterized by two main aspects: a) upload of medical data (including medical reports, blood tests examinations, imaging data) on a dedicated platform accessible by physicians; b) home monitoring of the main health parameters and medication adherence. In particular data derived from home monitoring will provide useful information about physical activity of patients (i.e. walking distance, heart rate), sleep (number of hours of sleep per night, sleep duration), weight (loss or gain), blood pressure. The professional roles involved in this trial are represented by neurologists, radiologists, nuclear medicine physicians, cardiologists and neuropsychologists. The main objective of this trial is to enhance the exchange of medical data among different physicians. Secondly, to investigate the impact of home monitoring devices on patients care and management.

## 4.1 Patients involved at UTV

The trial protocol required the recruitment of 30 Patients, over 65 years old. Case studies have divided into two arms: 1) standard arm (the patient were followed as in current clinical practice) and 2) the experimental arm (the patient management based on electronic information sharing and monitoring vital signs with electronic devices). Patients enrolled in the study showed a clinical condition of Parkinson's disease and an associated comorbidity, mostly cardiovascular or psychiatric. Cardiovascular comorbidity is seen both as chronic ischemic heart disease or heart failure either as an autonomic dysfunction due to noradrenergic system impairment due to Parkinson's disease. The patient enrolled in the study submitted also other types of psychiatric comorbidity (e.g. depressive syndrome) or other disease (i.e. oncological diseases). Some patients may have specific needs for support outside the hospital or clinic which may typically be provided by their informal carers, usually family members. Informal carers showed a crucial role in supporting the patient in managing and living with their condition(s) and in caring for the patient at home.

At the time of writing of this document, the trial has finished. All the patients that have been recruited into the experimental arm provided their feedback.

Data are now under evaluation from a physician specialized in the research on neurodegenerative disorders for correlation analysis of health parameters.

The PICASO system has been used to date for the publication of two peer reviewed manuscript. The preliminary impressions of the PICASO project in Italy have been published on PLATINUM Journal, Issue luly 2018. Medical Personal involved at UTV

Prof. Orazio Schillaci, Full Professor, MD, Phd, Nuclear Medicine physician, Radiologist

Dr. Agostino Chiaravalloti, Reasearcher, MD, PhD. Nuclear medicine physician.

Prof. Gianfranco Spalletta, Associate Professor, MD, Phd. Psychiatrist.

Dr. Clelia Pellicano, MD, PhD. Neurologist

Dr. Gaia Pellicano, Neuropsychologist

Dr.Cinzia Savini, Neuropsychologist

Dr. Andrea Cimini, MD, Specialist in training

## 4.2 Technical and physical infrastructure at UTV

The clinical evaluation of subjects affected by Parkinson disease and related comorbidities was carried out in the Neuropsychiatry Laboratory of SLUCIA. This laboratory is located at the 1st floor of the IRCCS Santa Lucia, via Ardeatina 354, 00179 Rome, B1 building, rooms 31, 135, 147, 148, 152. The Laboratory investigates the clinical phenomenology and the biological bases of neuropsychiatric disorders. The scope ranges from psychopathology to neuropsychology, from molecular and cellular biology to neuroimaging. The approach adopted is multidimensional, it uses different survey methodologies and different evaluation tools. Data collection and analysis are entrusted to a multidisciplinary team of psychologists, biologists and physicians. In this highly specialized environment, researchers and physicians study the biological and

genetic markers useful in early diagnosis of neurodegenerative diseases (dementia and motion disorders), cerebrovascular (stroke) and psychiatric disorders (schizophrenia, bipolar disorder, depressive disorder, obsessive compulsive disorder). These markers are also used for predicting the clinical course of the disease. The further study of the cognitive function of the individual is accomplished using standardized neuropsychological tests, while neuropsychiatric symptoms are analyzed through psychodiagnostic and psychometric scales. The results achieved allow characterizing the cognitive and psychopathological profiles of subjects with neurological and psychiatric illnesses. The profiles are then correlated with structural, functional and metabolic alterations in the brain, which can be detected by qualitative and quantitative techniques of neuroimaging (see below). These techniques, widely used by the Laboratory, allow to draw inferences about brain alterations that are the basis of neurological and psychiatric illnesses and their symptomatic manifestations.

Neuroimaging studies are performed in the Department of Biomedicine and Prevention, University Tor Vergata of Rome and in the Tor Vergata Policlinic of Rome, Nuclear medicine and Radiology Unit. Both Units are located in the Policlinic, floor -1 and floor -2 (see figure 1 and figure 2), Viale Oxford 81, 00133 Rome.

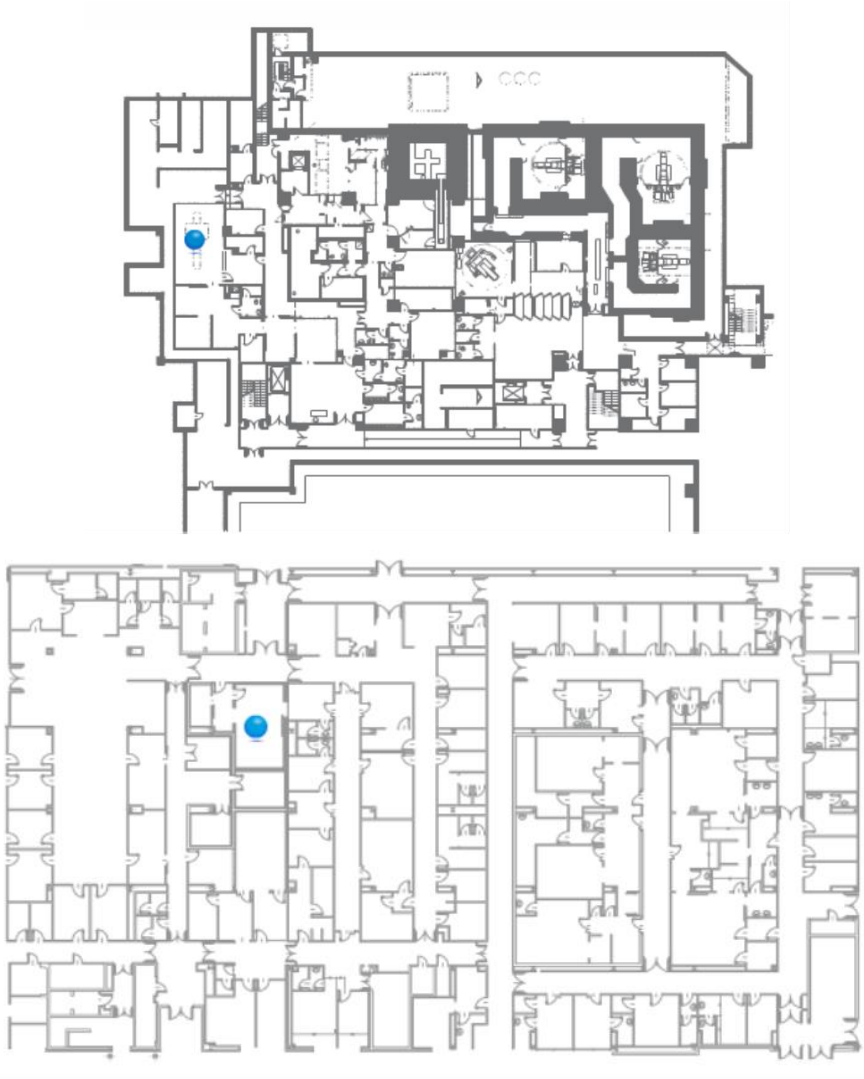

Figure 1:. Plan of floor-1 (a) and floor-2 (b), Nuclear medicine Unit, Tor Vergata Policlinic. The blue dot shows the exact location of PET/CT VCT scanner in (a) and of GE Iq scanner in (b).

For Positron emission tomography/ Computed tomography (PET/CT) examinations, two scanners are available in the Nuclear Medicine Unit. The PET/CT system Discovery VCT (GE Medical Systems, Tennessee, USA) is used to assess brain distribution of selected Radiolabelled compounds in all patients by means of a 3D-mode standard technique in a 256 × 256 matrix. Reconstruction for brain is performed using

the 3-dimensional reconstruction method of ordered-subsets expectation maximization (OSEM) with 20 subsets and with 4 iterations. The system combines a high-speed ultra 16-detector-row (912 detectors per row) CT unit and a PET scanner with 13440 bismuth germanate crystals in 24 rings (axial full width at half-maximum 1-cm radius, 5.2 mm in 3D mode, axial field of view 157 mm). A low-ampere CT scan of the head for attenuation correction (40 mA; 120 Kv) is usually performed before PET image acquisition. As for GE Iq PET/CT scanner, this system is characterized by highest NEMA sensitivity in the industry at up to 22 cps/kBq, Highest NECR for clinical 18F in the industry, High NECR for both low-count and high-count rate radioisotopes such as 68Ga, 11C, 82Rb and more, optimized for oncology practices administering 18F, which accounts for nearly 94 percent of all PET procedures,up to 75 kcps at 2.4 kBq/mL,largest axial field-of-view coverage in the industry at up to 26 cm, thorax respiratory Motion Free study can be achieved in as fast as four minutes, full organ imaging in the fewest possible bed positions with one-third scan time, 50-slice equivalent CT speed with IQE 1.75 pitch booster, 20 mm CT coverage for fast exams and short breath holds, platform compatible with advanced digital solutions designed to connect machines, people and data through a portfolio of healthcare analytics applications.

Figure 2: PET/CT VCT scanner at UTV.

As for Magnetic Resonance Imaging (MRI), Philips Achieva 3.0T TX is available at floor -1 Radiology Unit, Tor Vergata Policlinic. The system is characterized by multiTransmit technology, that overcomes dielectric shading by using simultaneous (parallel) transmissions from multiple Radio Frequency (RF) sources. It automatically optimizes the power, amplitude, phase, and waveform for optimal RFuniformity. The system's exclusive Quasar and Quasar Dual gradient systems offer gradient amplitudes up to 80 mT/m to provide superb performance with excellent linearity.

List of abbreviations:

**PET/CT** : Positron emission tomography/Computed Tomography
**OSEM**: ordered-subsets expectation maximization
**GE**: General Electric
**NEMA**: National Electrical Manufacturers Association
**68Ga**: Gallium 68 isotope
**11C**: Carbonium 11 isotope
**82Rb**: Rubidium 82 isotope
**Kcps**: kilocounts per second
**kBq**: kiloBequerel
**mL**: milliliter
**RF**: Radiofrequency

# 5 List of Figures and Tables

## 5.1 Figures



## 5.2 Tables