Finanziato dall'Unione europea NextGenerationEU

Ministero dell'Università e della Ricerca

Italiadomani
PIANO NAZIONALE DI RIPRESA E RESILIENZA

VITALITY

Ud'A Università degli Studi "G. d'Annunzio"

Università degli Studi "G. d'Annunzio"
Chieti-Pescara

Vitality Day

WP3

Telemedicine and environment health

Chieti 13 Maggio 2024

Università degli Studi «G. d'Annunzio» Chieti-Pescara
Missione 4 Componente 2 - M4C2 Investimento 1.5. Creazione e rafforzamento di "ecosistemi dell'innovazione", costruzione di "leader territoriali di R&S" ECS00000041 **VITALITY**

Scuola Superiore G. d'Annunzio

ONE HEALTH Telemedicine Environment

WP3: Telemedicine and environment health

Main objectives:

i) to develop a ***database structure*** for ***clinical*** and ***environmental*** data storage and use it to combine multimodal data of the same patient to improve early diagnosis and to efficiently monitor the progression of the disease;

ii) to improve the quality of life of patients with chronic diseases, integrating advanced ***portable imaging tools*** and ***extended reality techniques*** to improve remote clinical monitoring, diagnosis and consultation.

WP3 tasks:

1) T.3.1. Database construction and data protection

2) T.3.2. Telemedicine network and patient classification

3) T.3.3. Advanced techniques for extended reality

T.3.1 Database construction and data protection

Global computational resources (total cost ~ ***700000*** Euros) :

- 4 GPU - ***320 GB RAM dedicated***
- 5 CPU (Intel® Xeon® Gold 6338 2G, 32C/64T, 11.2GT/s, 48M Cache, Turbo, DDR4-3200), ***320 core*** total, ***2 TB RAM*** total
- Data storage about ***500 TB*** (expandable up to 2PB)
- 3 DELL 650xs (Clustering mode) for services application

Funded by: Vitality; UdA-TechLab; Dept of Neuroscience, Imaging and Clinical Sciences; PNRR-CN3 project (CN00000041)

T.3.1 Database construction and data protection

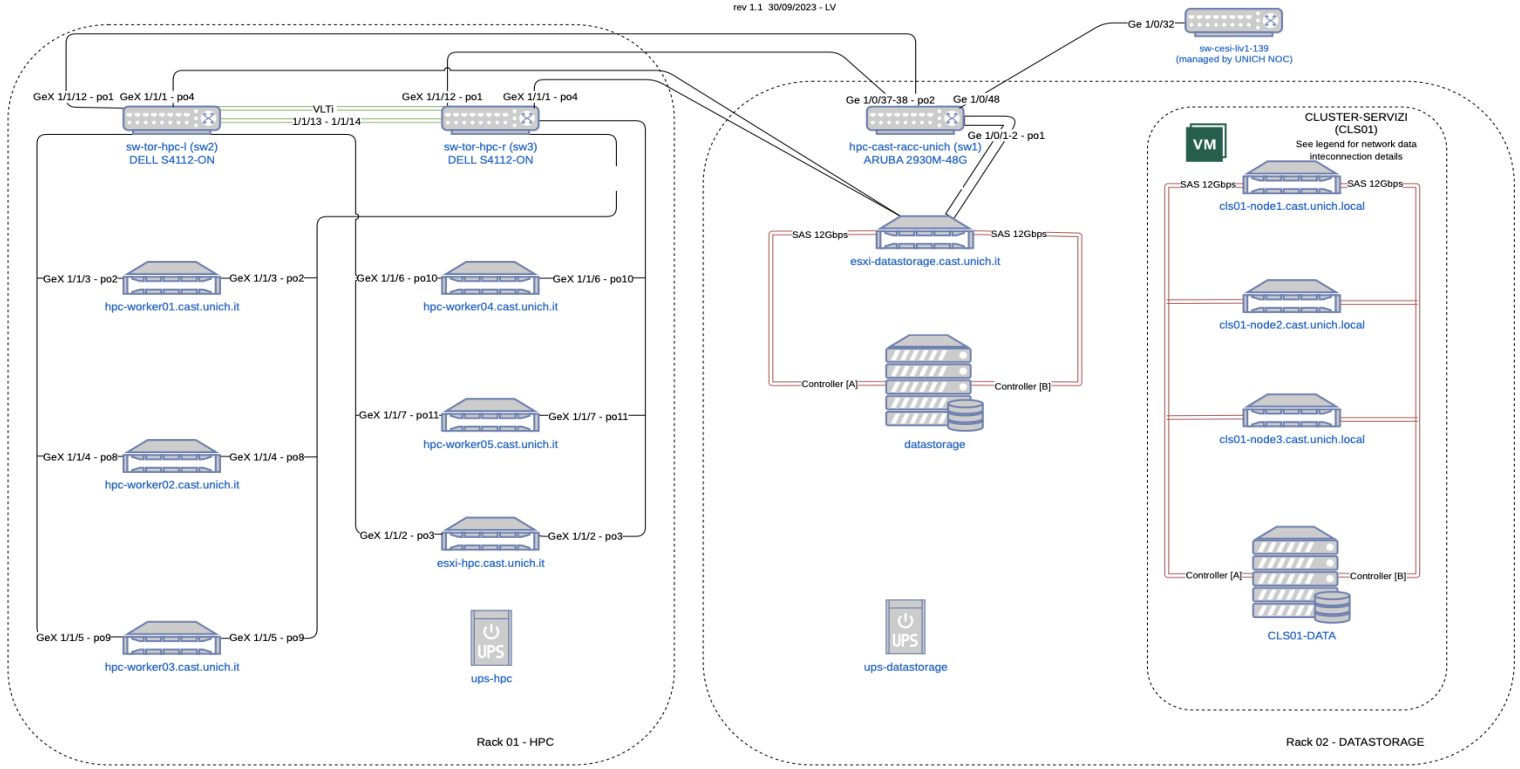
Suitable for the following security certificates:

UNI CEI EN ISO/IEC 27001:2017
UNI CEI EN ISO/IEC 27017:2021
UNI CEI EN ISO/IEC 27018:2020
UNI EN ISO 22301:2019
UNI CEI ISO/IEC 20000-1:2020

Tier 3 compliant

DATACENTER HPC - Center for Advanced Studies and Technology (CAST@UNICH)
PHYSICAL INTERCONNECTION DIAGRAM

rev 1.1 30/09/2023 - LV



Legend:

= Ethernet Protocol
= VLTi Protocol
= SAS Protocol (MultiPath)
GeX = TenGigabit Ethernet interface
Ge = Gigabit Ethernet interface
po = PortChannel Interface (see device configuration for further details)

Network legend for CLS01:

cls01-node01.cast.unich.local interconnected:
- via sw-tor-hpc-l (sw2) on port GeX 1/1/7 on Po5
- via sw-tor-hpc-r (sw3) on port GeX 1/1/7 on Po5

cls01-node02.cast.unich.local interconnected:
- via sw-tor-hpc-l (sw2) on port GeX 1/1/8 on Po6
- via sw-tor-hpc-r (sw3) on port GeX 1/1/8 on Po6

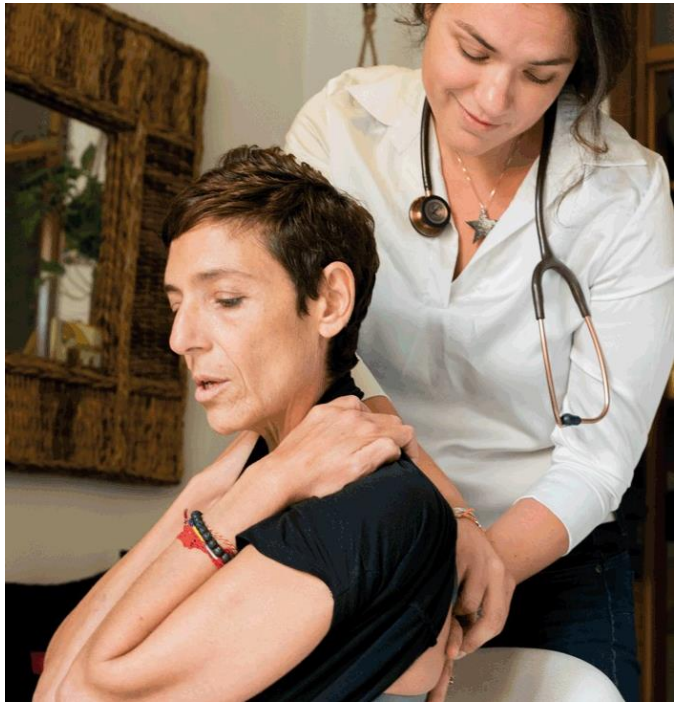
cls01-node02.cast.unich.local interconnected:
- via sw-tor-hpc-l (sw2) on port GeX 1/1/9 on Po7
- via sw-tor-hpc-r (sw3) on port GeX 1/1/9 on Po7

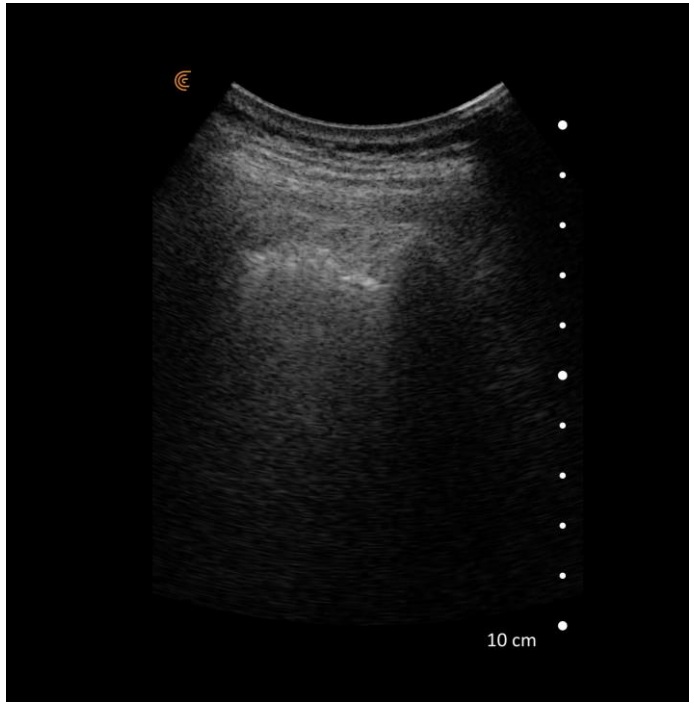
T.3.2 Telemedicine network and patient classification

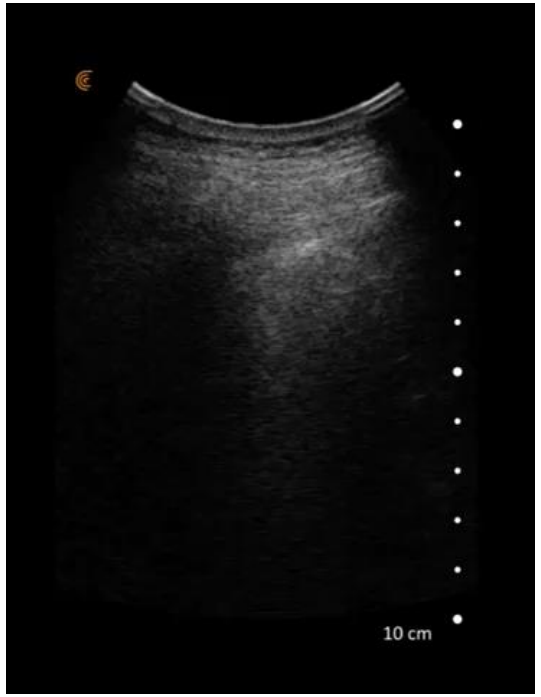
Chronic patients are evaluated to individuate eligible patients for telemedicine and focus on active clinical problems that could be monitored in remote modalities.

Imaging equipment for telemedicine applications has been acquired, including a portable ecographic scanner (Clarius HD3 Portable Ultrasound Machine) and digital stethoscopes.

In particular we will monitor chronic patients with diabetes and heart failure to detect preclinical ultrasonographic signs that precede an acute phase to avoid hospitalization.
These are US images acquired through a portable ultrasonographic scanner (Clarius HD3 Portable Ultrasound Machine) directly at patients home or in ambulatory care area.







No symptoms
Traditional thorax examination: normal
US: Normal lung sliding representation
(no signs of pulmonary congestion
in a patient with chronic heart failure)

No symptoms
Traditional thorax examination: normal
US: Pathologic lung representation
(first signs of pulmonary congestion
in a patient with chronic heart failure)

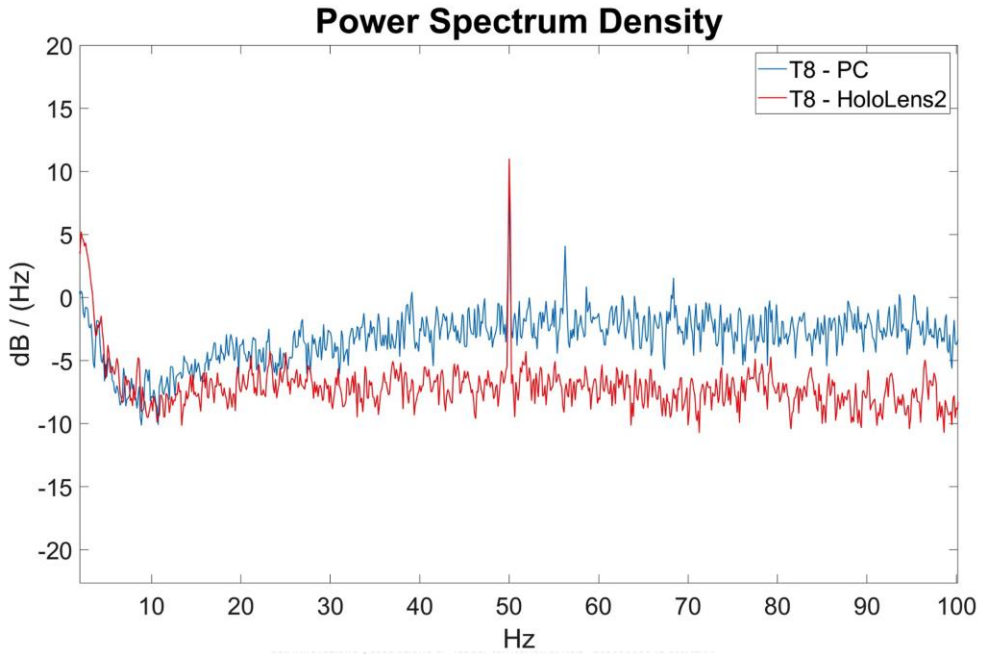
T.3.3 Advanced techniques of extended reality

We are currently working on the integration of an head-mounted display for extended reality applications (Microsoft HoloLens 2 - development edition) with a wireless EEG system with 32 channels (Enobio 32 5G).

T.3.3 Advanced techniques of extended reality

Tests for potential artifacts on the EEG signals due to the HoloLens electronic activity have been carried out, showing no significant additional noise from the device.

The EEG system and the HoloLens will be integrated to implement new ecological protocols for clinical monitoring of neurological impairment.



T.3.3 Advanced techniques of extended reality

In particular, a visuo-spatial working memory task with colored cubes has been implemented. This task is commonly used in neuropsychology to measure encoding and retrieval short-term working memory.

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Grazie per l'attenzione

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