

D³ 4 HEALTH DIGITAL DRIVEN DIAGNOSTICS, PROGNOSTICS AND THERAPEUTICS FOR SUSTAINABLE HEALTH CARE

SCHEDA INIZIATIVA



Dati di sintesi Iniziativa

Denominazione dell'Iniziativa: D³ 4 Health - Digital Driven Diagnostics, prognostics and therapeutics for sustainable Health care

Main Topic: Data Mining

Data avvio Iniziativa: 01/12/2022

Durata Iniziativa (espressa in mesi): 48

Costo totale (€): 130.914.200,00

Agevolazione MUR (€): 126.500.000,00

Abstract

Public health systems worldwide rely on limited resources and suffer the high costs of cure. This is especially true for Italy, where the universalistic system represents a precious asset for citizenship. The adoption of value-based healthcare (VBH) may mitigate these critical issues. In this scenario, the Digital Driven Diagnostics, prognostics, and therapeutics for sustainable Health care (D³ 4 HEALTH) initiative aims at developing digital and biological twins to improve, through a data mining approach, reference diseases care. D³ 4 HEALTH initiative will deliver, adopting VBH, novel, non/minimally invasive predictive, diagnostic and therapeutic pathways for reference diseases: metastatic colon cancer, liver and bile duct cancer, central nervous system cancer, diabetes type I and multiple sclerosis. The project will be structured in four interlinked core Spokes, highly interrelated either at technical or translational level.

The deployment of the D³ 4 HEALTH technologies will represent a tool for the achievement of National and European policy objectives combining the skills of referral with non-referral centres in Italy, for the development of cutting-edge service delivery systems. Specific objectives span from high-performance computing, such as AI solutions on a comprehensive interoperability data platform, development of innovative technologies and methods (wearable devices, biosensors and biomarkers) to obtain a cluster of digital information prototypical of the Digital and Biological Twin. The collection of digital data will be accomplished retrospectively at the beginning for a fast data accessibility from all referral centres. Then, the advanced devices and

biomarkers will be further implemented in simulation tests and prospective longitudinal studies. Simulation strategies on Digital Twins, exploiting clusters of patient's digital data, based on the query of AI and mathematical models, may generate predictive, prognostic and therapeutic response solutions. The simulated predictive algorithms may be validated by in-vitro developing biological simulation platforms, the Biological Twins, and by monitoring of the patient's health condition, through advanced wearable technologies.

Sustainability of this approach will rely on the creation of research infrastructures (RI) equipped with state-of-the-art instrumentation for design, realization, and characterization of in-vitro biological twin of diseases and the development and testing of wearable sensors, biosensors and biomarkers for the digital twin. The RIs will be constituted by a headquarter and a few local nodes, open for research and technology services to the internal community of the D³ 4 HEALTH initiative and to all interested stakeholders of the developed technologies.

From D³ 4 HEALTH we envision successful technological solutions, the Digital and Biological twins, supported by a research infrastructure for reference diseases care. The scientific and technical feasibility of the project relies on the high-level skills and international experiences of project partners and their ability to participate in multidisciplinary research involving enterprises. The duration of the project and the strong interaction with industries will ensure a successful implementation and sustainability of the project in the long-term. Communication, dissemination, and education will be promoted for public engagement and stakeholder involvement.

The deployment of the proposed solutions will have direct and indirect effect on the three axes around which the NRRP was built: promote digitalization and innovation, improve the Italian ecologic transition and advance social inclusion, especially concerning the North-South gap and ensuring equality in accessibility to the best care to all citizens.

An increase in public and private investment in R&D is expected given an effective collaboration between the public scientific base and the industrial world and the development of researchers' skills, particularly in

digital technologies, environmental transition and management models provided in D³ 4 HEALTH.

The digital and biological twins proposed in the D³ 4 HEALTH initiative will lead to better patient management and care, both in the short and long-term. D³ 4 HEALTH will achieve the goals of the national health system through the development of a research and clinical care digitized infrastructure, merging highly specialized technological

centers and human expertise, based on an innovative model of integration of health data, for the development of state-of-the-art service delivery systems.

Finally, D³ 4 HEALTH will strengthen the position of Italy in the landscape of European technological advancement for the diagnostic and therapeutic reference diseases pathways and will impact the centrality of the person, the protection of the right to health, the collaboration between different levels of government, the optimization of resources and the return of health to the population.

Partner

Soggetto Proponente

Sapienza Università di Roma

Soggetto attuatore (Hub)

Fondazione Digital Driven Diagnostics, prognostics and therapeutics for sustainable health care

Spoke

Spoke 1 - Clinical use cases and new models of care supported by AI/E-Health based solutions

Leader

Università degli Studi di Milano

Affiliati

Azienda Ospedaliera Universitaria Federico II di Napoli

Azienda Ospedaliera Universitaria Senese

IRCCS Sacro Cuore Don Calabria

IRCSS CROB

Istituti Fisioterapici Ospitalieri - Istituto Nazionale Tumori Regina Elena

Neuromed - Istituto Neurologico Mediterraneo

Ospedale Pediatrico Bambino Gesù

Sapienza Università di Roma

Università degli Studi del Molise

Università degli Studi Magna Graecia di Catanzaro

Università di Torino

Spoke 2 - Multilayer platform to support the generation of the Patients' Digital Twin

Leader

Università degli Studi di Salerno

Affiliati

AizoOn

CINECA - Consorzio Interuniversitario per il Calcolo Automatico dell'Italia del Nord Orientale

Fondazione Bruno Kessler

IRCCS Galeazzi - Sant'Ambrogio

Istituto Euro-Mediterraneo di Scienza e Tecnologia

Istituto Europeo di Oncologia
Politecnico di Bari
Porini SRL
Telethon Institute of Genetics and Medicine (TIGEM)
Università Vita-Salute San Raffaele

Spoke 3 - Wearable technologies, sensors and biomarkers for care through Digital Twin approaches

Leader

Sapienza Università di Roma

Affiliati

ASL Nuoro
Azienda Ospedaliera Universitaria Senese
Consiglio Nazionale delle Ricerche
IRCSS CROB
Istituto Superiore di Sanità
Neuromed - Istituto Neurologico Mediterraneo
Politecnico di Bari
Politecnico di Torino
Università degli Studi del Molise
Università degli Studi di Milano
Università degli Studi di Salerno
Università degli Studi Magna Graecia di Catanzaro

Spoke 4 - Biological and bioengineered in vitro models for care through Digital Twin approaches

Leader

Politecnico di Torino

Affiliati

AizoOn
Azienda Ospedaliera Universitaria Federico II di Napoli
CINECA - Consorzio Interuniversitario per il Calcolo Automatico dell'Italia del Nord Orientale
Consiglio Nazionale delle Ricerche
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