VI CONFERENZA NAZIONALE CYBERSECURITY E PRIVACY

HealthBigData
The Italian Hub.

PROGETTI RILEVANTI PER LO SVILUPPO NAZIONALE E INTERNAZIONALE NELL'AMBITO DELLE APPLICAZIONI DI AI NEL SETTORE CLINICO-DIAGNOSTICO

22/04/2024

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ALLIANCE AGAINST CANCER

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fondazione CNAO AIMaC Fondazione Politecnico di Milano

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Health Big-data
Virtual Institutes of the Italian Network of IRCCS

→

- ✓ Prevent diseases
- ✓ Personalize care
- ✓ Improve the quality of life of patients

The Italian Ministry of Health is addressing this change in order to respond to the new needs of the country, where the population is ageing and has a growing need to be treated and assisted especially in the area of diseases that most affect the elderly: oncological, neurological and cardiovascular diseases.

The general objective of this program is to accelerate the transition to Precision and Personalized Medicine in the country, through the creation of an innovative national organization of IRCCS and the development of digital technologies for the construction of health and disease models (Human Avatar).
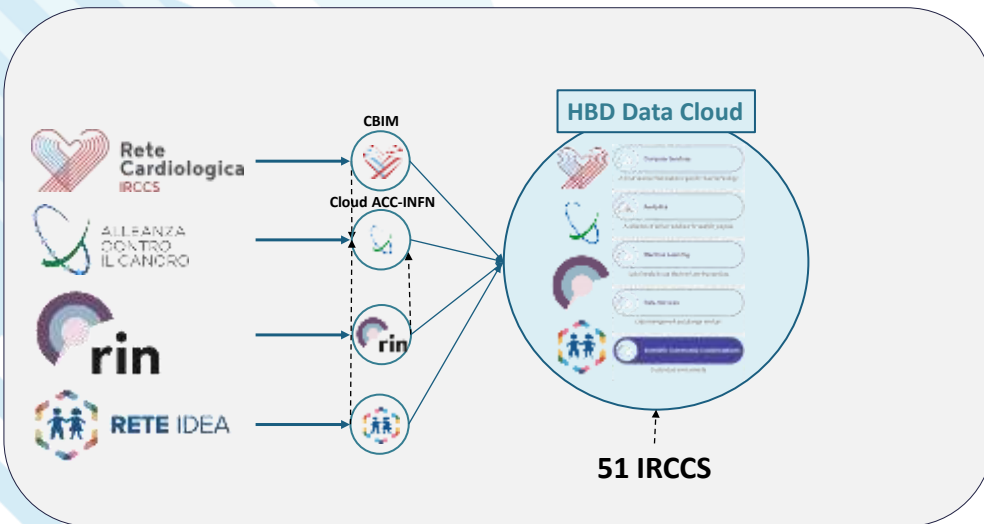
The specific objective of this project is the creation of a common platform for the various IRCCS for the collection, exchange and analysis of clinical and scientific data (**Health Big-data**). The clinical-scientific synergies and the creation of an economy of scale between the IRCCSs will lead to a concrete advancement of knowledge on prediction, prevention and personalized therapies in the reference areas of the three networks: **cancer**, **neurological diseases** and **cardiovascular diseases**.

IRCCS Cancer Network — ALLEANZA CONTRO IL CANCRO | IRCCS Neuroscience Network | IRCCS Cardiology Network | INFN CNAF | POLITECNICO MILANO 1863

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Il Progetto Health Big Data

SVILUPPO DI UNA *PIATTAFORMA INTEGRATA E FEDERATA* CHE CONSENTA LA RACCOLTA, CONDIVISIONE ED ANALISI DI DATI CLINICI E SCIENTIFICI DEI PAZIENTI DI CIASCUNO DEI 50 IRCCS PARTECIPANTI AL PROGETTO, E DI FORNIRE RISORSE ANALITICHE AVANZATE PER L'ANALISI DEI DATI.

CBIM

Cloud ACC-INFN

HBD Data Cloud

Rete Cardiologica IRCCS — ALLEANZA CONTRO IL CANCRO — rin — RETE IDEA

51 IRCCS

HealthBigData
The Italian Hub.

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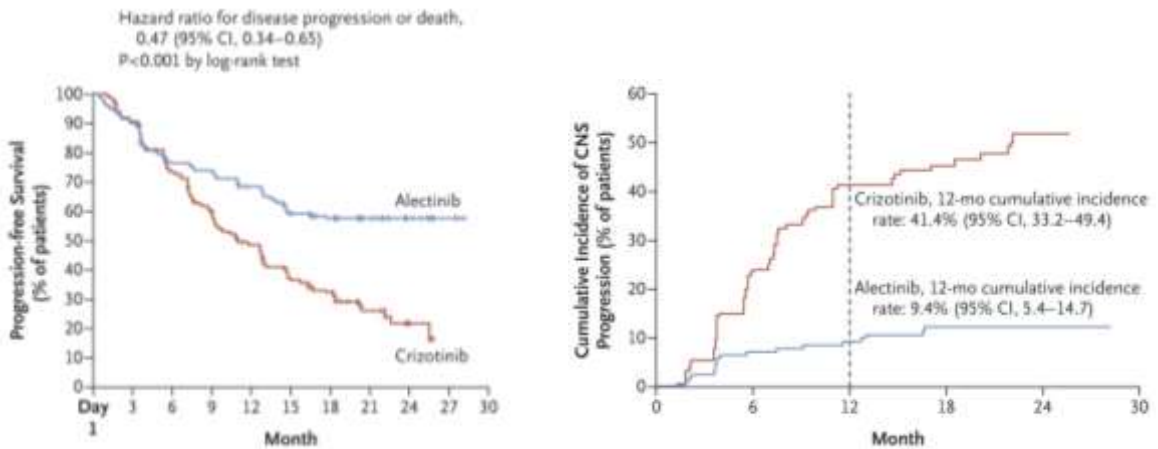The NEW ENGLAND JOURNAL of MEDICINE

SOUNDING BOARD

Real-World Evidence — What Is It and What Can It Tell Us?

Rachel E. Sherman, M.D., M.P.H., Steven A. Anderson, Ph.D., M.P.P.,
Gerald J. Dal Pan, M.D., M.H.S., Gerry W. Gray, Ph.D., Thomas Gross, M.D., M.P.H.,
Nina L. Hunter, Ph.D., Lisa LaVange, Ph.D., Danica Marinac-Dabic, M.D., Ph.D.,
Peter W. Marks, M.D., Ph.D., Melissa A. Robb, B.S.N., M.S., Jeffrey Shuren, M.D., J.D.,
Robert Temple, M.D., Janet Woodcock, M.D., Lilly Q. Yue, Ph.D., and Robert M. Califf, M.D.

N ENGL J MED 375;23 NEJM.ORG DECEMBER 8, 2016

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Alectinib versus Crizotinib in Untreated *ALK*-Positive Non–Small-Cell Lung Cancer

Hazard ratio for disease progression or death,
0.47 (95% CI, 0.34–0.65)
P<0.001 by log-rank test

Crizotinib, 12-mo cumulative incidence rate: 41.4% (95% CI, 33.2–49.4)

Alectinib, 12-mo cumulative incidence rate: 9.4% (95% CI, 5.4–14.7)

N Engl J Med 2017; 377:829-838

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Roche acquires Flatiron Health in $1.9 billion deal

https://www.zdnet.com/article/roche-acquires-flatiron-health-in-1-9-billion-deal/

It is hoped the deal will ramp up cancer research through healthcare data and analytics.

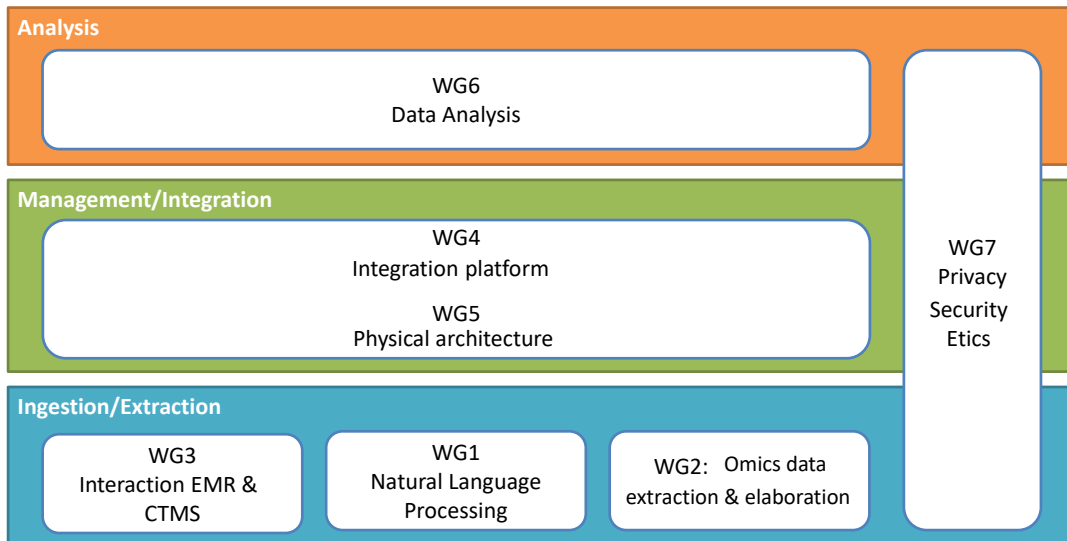By Charlie Osborne for Between the Lines | February 16, 2018 — 11:43 GMT (03:43 PST) | Topic: Innovation

Flatiron's data helped Roche expand access to Alectinib, which was approved by FDA in November 2017, as first-line treatment for ALK-positive NSCLC.

The Flatiron database was able to support the access of Alectinib in different countries because it allows to compare USA real-world data to the way that Alectinib performed in clinical trials.
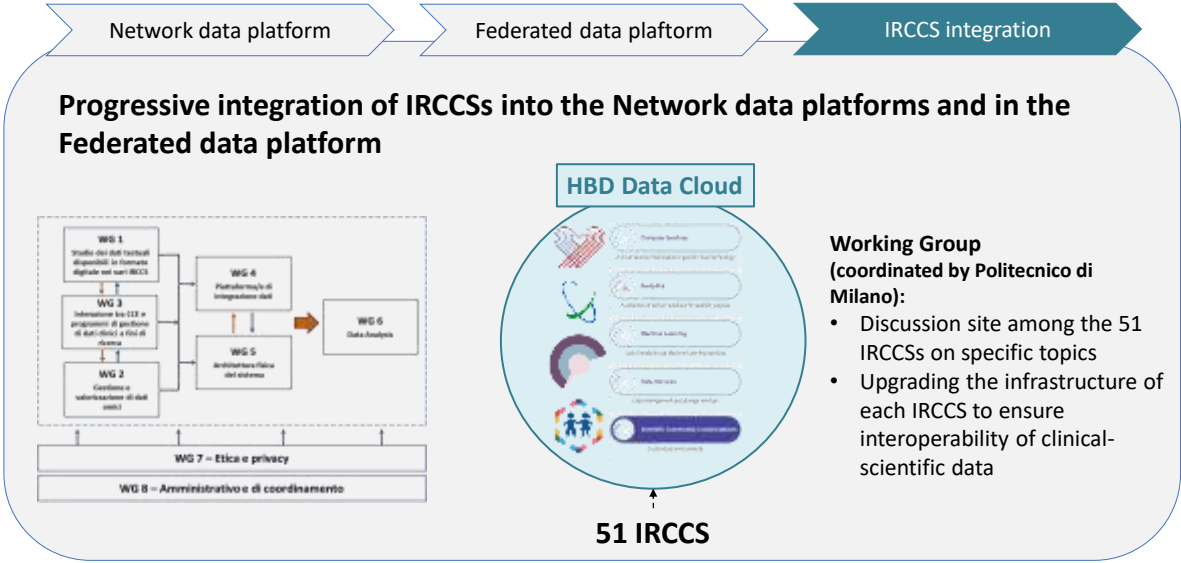
Cancer is smart. Together, we can be smarter.

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ALLEANZA
CONTRO
IL CANCRO

The Health Big Data project

POLITECNICO
MILANO 1863

Analysis

> WG6
> Data Analysis

Management/Integration

> WG4
> Integration platform
>
> WG5
> Physical architecture

WG7
Privacy
Security
Etics

Ingestion/Extraction

> WG3
> Interaction EMR & CTMS

> WG1
> Natural Language Processing

> WG2: Omics data extraction & elaboration

EMR: Electronic Medical Record; CTMS: Clinical Trial Management System

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The federation process: IRCSS integration

| Network data platform | Federated data plaftorm | IRCCS integration |

Progressive integration of IRCCSs into the Network data platforms and in the Federated data platform

HBD Data Cloud

Working Group
(coordinated by Politecnico di Milano):
- Discussion site among the 51 IRCCSs on specific topics
- Upgrading the infrastructure of each IRCCS to ensure interoperability of clinical-scientific data

51 IRCCS

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Come HBD abilita l'uso della IA nel settore clinico-diagnostico

PILASTRI ARCHITETTURALI

1. Infrastruttura **cloud** e **micro-servizi** basata su software open-source e standard
2. Possibilita' di (sia commerciali che nazionali) **federare i sistemi cloud gia' esistenti**
3. Orchestrazione dinamica delle risorse per comporre applicazioni complesse partendo da potenti **risorse computazionali** (GPU e Storage ad alte prestazioni) e **algoritmi evoluti di IA**
4. Sistema di autenticazione e autorizzazione basato su standard OpenID Connect/OAuth2 **integrabile con i sistemi di gestione identita' nazionali** (SPID/CIE) e con le federazioni gia' esistenti (IDEM/EDUGAIN)

NO VENDOR LOCK-IN
Open-source, vendor-neutral architecture

FEDERATION
of existing Cloud infrastructures for both compute and data

DYNAMIC ORCHESTRATION
of resources via the INDIGO PaaS Orchestrator

CONSISTENT AUTHN/AUTHZ
at all cloud levels via OpenID-Connect/OAuth2

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Sicurezza, Privacy e Potenza di calcolo

I FATTORI ABILITANTI

Sicurezza e privacy
Misure tecniche e organizzative a garanzia della sicurezza dei dati, definite all'interno di un Sistema di Gestione della Sicurezza delle Informazioni certificato ISO 27001 27017 27018

- Autenticazione a due fattori
- Sistemi di backup e disaster recovery geografici
- Infrastruttura **tecnico-legale** per la gestione degli obblighi derivanti dal GDPR (consenso informato, DPIA, garanzia dei diritti degli interessati al trattamento)
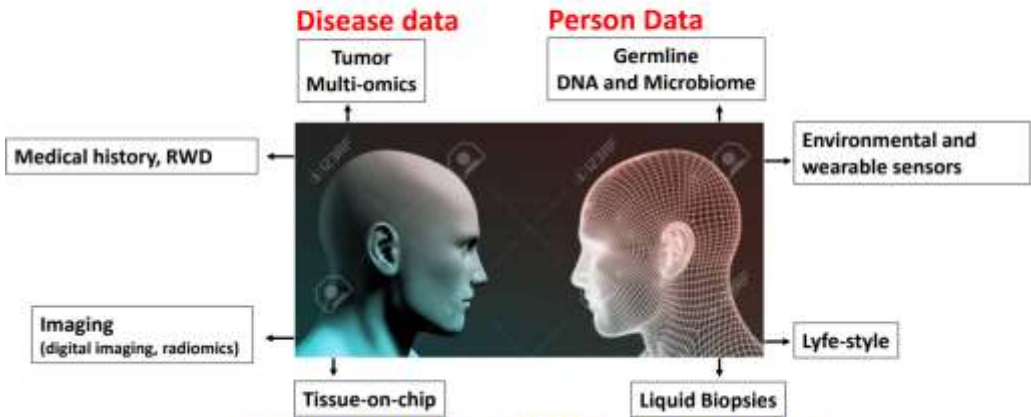- **Analisi dei rischi** alla base di tutte le scelte tecnologiche

Potenza di Calcolo
Sinergia con il Centro Nazionale di Ricerca in HPC, Big Data e Quantum Computing

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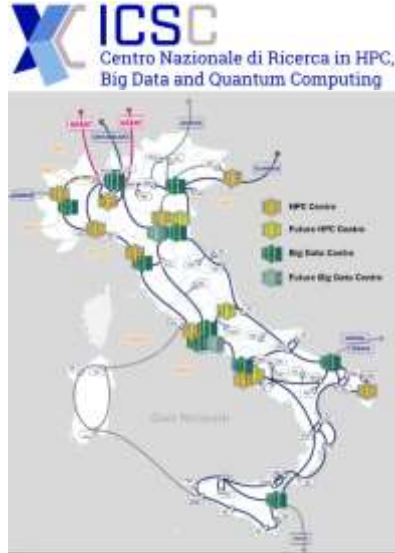
Health Big Data Project

The challenge: Systematic collection of high-resolution multi-dimensional data

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Health Big Data Project

ALLEANZA CONTRO I CANCRO

Generation of a Universal Knowledge Resource to manage health and care

Systematic collection of high-resolution data across millions of patients

Real-time knowledge generation (artificial intelligence systems)

Disease re-classification (not based on human-defined disease classes)

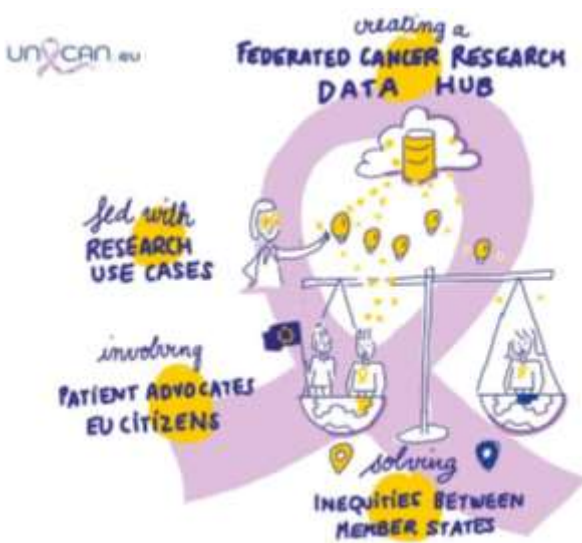High-definition Prevention and Treatment

Single-patient treatment decisions (intelligent-decision support)

Real-time data generation and sharing

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4.UNCAN.eu
a European initiative to UNderstand CANcer

ALLIANCE AGAINST CANCER — UNCAN.eu — Funded by the European Union

The creation of a **federated digital platform** where **researchers from all over the world share and have access to high-quality cancer research data**
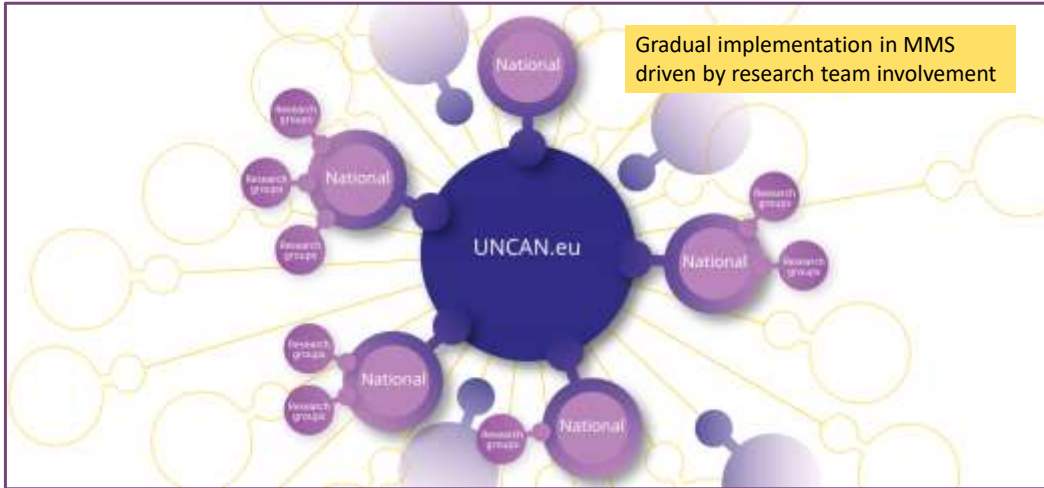
Generate new breakthroughs on cancer that enhance cancer prevention, early diagnosis, and treatment strategies

A **Coordination and Support Action (CSA)** under the Mission on Cancer will deliver a **blueprint** for the establishment of a fully-fledged, sustainable platform managed by Member States, associated countries & stakeholders.

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UN CAN.eu
Funded by
the European Union

UNCAN.eu network, a flexible federation of federations

Gradual implementation in MMS driven by research team involvement

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ALLIANCE
AGAINST
CANCER

www.alleanzacontroilcancro.it   www.allianceagainstcancer.org

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