InteropEHRate

EHR in people's hands across Europe

Enabling citizen-centric EHR data sharing

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InteropEHRate

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- **Type**: Research and Innovation action
- **Grant Agreement Number**: 826106
- **Start date**: 1st January 2019
- **End date**: 30th September 2022

16 Partners

- Engineering - Ingegneria Informatica S.p.A. (Italy)
- A7 Software (Belgium)
- EHTEL - European Health Telematics Association (Belgium)
- DTCA Hygeia – Diagnostic and Therapeutic Centre of Athens (Greece)
- University of Trento (Italy)
- University of Vienna (Austria)
- EFN - European Federation of Nurses Associations (Belgium)
- FTGM - Toscana Gabriele Monasterio per la Ricerca Medica e di Sanità Pubblica (Italy)
- CHU de Liège - Centre Hospitalier Universitaire de Liège (Belgium)
- UBITECH Limited (Cyprus)

- UPRC - University of Piraeus Research Center (Greece)
- SCUBA - «Bagdasar-Arseni» Clinical Emergency Hospital of Bucharest (Romania)
- SIMAVI - Software Imagination And VIsion (Romania)
- Fraunhofer ISST - Institute for Software and Systems Engineering (Germany)
- ISA - Iatrikos Syllogos Athinon (Greece)
- Byte Computer S.A. (Greece)

GOAL

To support the **cross-(any-)border exchange** of

personal health data

between **citizens** and **healthcare** or **research**
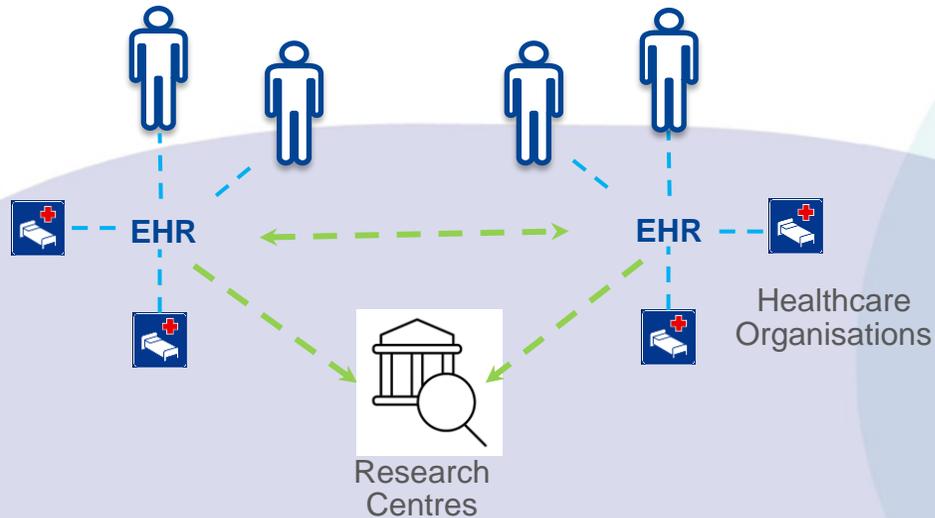
organisations.

VISION

## Citizens will be **peers** of healthcare and research organisations

Healthcare centred data exchange

- Health data **stored within EHR** of health organisations
- Citizens and healthcare connected to regional EHRs
- Exchange of health data mediated by EHRs

Citizen centred, **decentral** data exchange

- Health data also **stored on Citizens' device/systems**
- Citizens move with their health data
- Exchange of health data mediated by Citizens
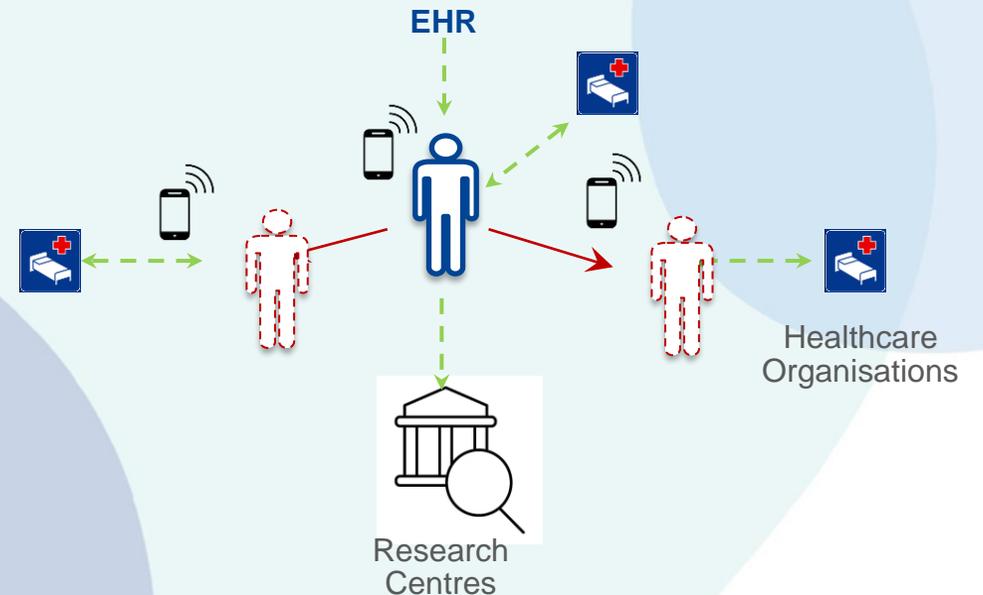
InteropEHRate defines OPEN protocols for various scenarios

1. D2D (device to device) protocol – *applied to* **Medical visit abroad**

Exchange of data with healthcare organisations without internet connection

2. R2D *(Remote to Device)* protocols – **Remote Access & Emergency**

Internet access to EHRs for citizens (R2D Access) and to optional S-EHR Cloud, for backup (R2D Backup) and for healthcare in emergency (R2D Emergency).

3. RDS (Research Data Sharing) protocol – *applied to* **Research studies**

Sharing of health data with research centres, without cloud storage

Leverage:
- *Bluetooth*
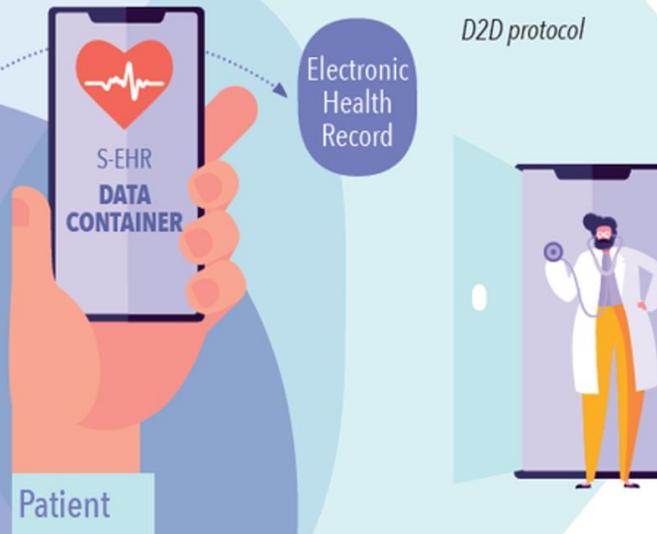- *HL7 **FHIR***
- *CEN/ISO **IPS***
- ***eIDAS** / CEF eID*

INTEROPEHRATE ARCHITECTURE

R2D Emergency: *download of patient's health data in emergency*

D2D: *secure sharing of personal health data during a medical visit*

R2D Access: *secure download of personal health data from an health care provider*

RDS Protocol: *secure and anonymized sharing of personal health data for research purposes*

R2D Backup: *periodic backup of smartphone's health data*

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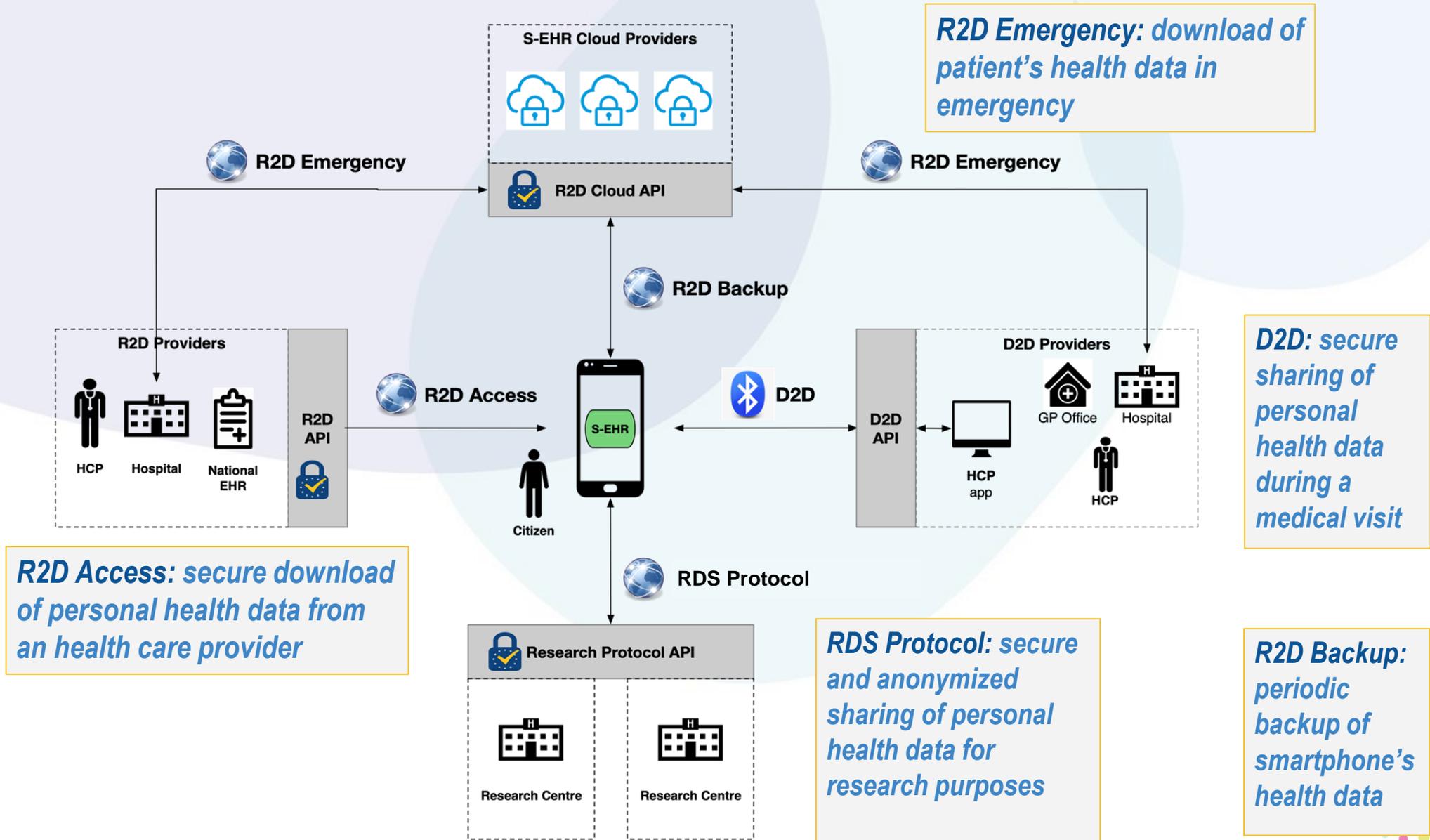
INTEROP**EHR**ATE OPEN SPECIFICATION

1. **FHIR profiles for EHR interoperability**

2. **S-EHR conformance levels**
   constraints that S-EHRs and S-EHR Clouds must fulfil;

3. **Device to Device (D2D) protocol**
   exchange of health data between Citizen and *Healthcare Organisation*, on Bluetooth;

4. **Remote to Device (R2D) protocols**
   R2D Access: download by Citizens of health data from *Healthcare organisations*;
   R2D Backup: storage by Citizens of encrypted health data on S-EHR Cloud;
   R2D Emergency: access by *Healthcare Organisations* to S-EHR Cloud in emergency;

5. **Research Data Sharing (RDS) Protocol**
   exchange by Citizen of health data with *Research Centres*.

Protocol: R2D Access

Patient

Healthcare Organisation

FHIR DM

Health
Data

FHIR API
Internet

R2D
Access

S-EHR

Any app under **Citizen's control** able to **store health data on smart devices,** supporting **InteropEHRate protocols** and compliant with the **InteropEHRate security constraints**

R2D Access Service

Any implementation of **R2D Access API**: allowing European citizens to download their health data from their healthcare providers using their **eIDAS digital identity** and their preferred S-EHR app

Protocol: D2D

Patient

HCP
within healthcare organisation

FHIR DM

Health Records

S-EHR

Any app under **Citizen's control**
able to **store health data**
on smart devices,
supporting **InteropEHRate**
protocols
and compliant with the
InteropEHRate security
constraints

HCP App

Any application used by HCPs,
in hospital, GP's or private office,
supporting the D2D protocol.
No other constraint imposed by
InteropEHRate.

Protocol: R2D Backup

Patient

FHIR DM

Encrypted Health Data

R2D B. API
Internet

S-EHR Cloud Provider

S-EHR Cloud

S-EHR

Any app, under **Citizen's control** able to **store health data on smart devices,** adopting **InteropEHRate protocols** and compliant with the **InteropEHRate security constraints**
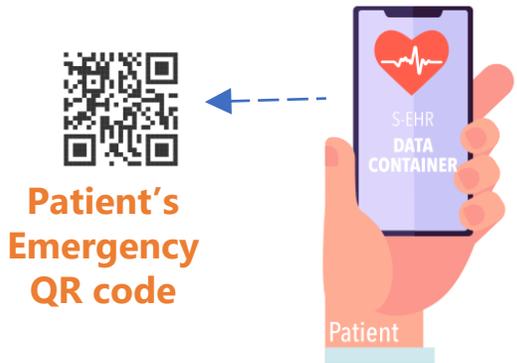
S-EHR Cloud

Any cloud storage service, under **Citizen's control** able to store encrypted blob of data, adopting the **InteropEHRate protocols** and compliant with the **InteropEHRate security constraints**
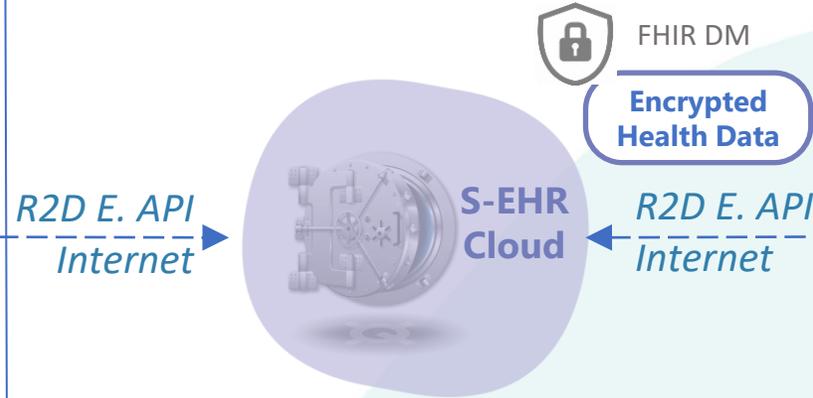
Emergency - Actors

Patient

S-EHR Cloud Provider

HCP
within Healthcare Organisation

FHIR DM

Encrypted Health Data

R2D E. API
Internet

S-EHR Cloud

R2D E. API
Internet

Patient's Emergency QR code

Patient's Emergency QR code

S-EHR

Any app, under **Citizen's control** able to **store health data on smart devices,** adopting InteropEHRate protocols and compliant with the **InteropEHRate security constraints**
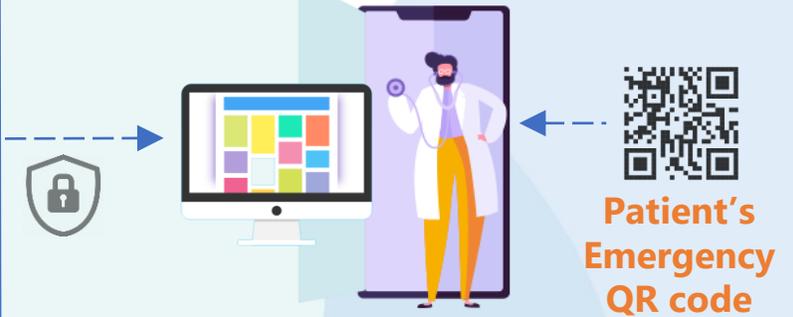
S-EHR Cloud

Any cloud storage service, under **Citizen's control** able to store encrypted blob of data, adopting the **InteropEHRate protocols** and compliant with the **InteropEHRate security constraints**

HCP App

Any application used by HCPs, in hospital, GP's or private office, **supporting the D2D protocol.** No other constraint imposed by InteropEHRate.

RESEARCH STUDY - ACTORS

Publisher

Patients

Research Centres

FHIR DM
Research Study

FHIR DM
Anonymised Health data

RDS API
Internet

RDS API
Internet

S-EHR
DATA CONTAINER

Patient

Central Node

A central repository where the **Research Definition documents (RDDs)** are published by the Research Centres and are read by the S-EHRs using the **RDS protocol**.

S-EHR

Any app, under **Citizen's control** able to **store health data on smart devices,** supporting **InteropEHRate protocols** and compliant with the **InteropEHRate security constraints**

IRS

Any service exposed by a Research Centre able to **receive the health data** sent by the Patients by means of the InteropEHRate **RDS protocol**.

INTEROP**EHR**ATE FRAMEWORK

1. Prototype of HCP App.

2. Reference implementation of S-EHR.

3. Reference implementation of R2D Access service.

4. Reference implementation of S-EHR Cloud.

5. Reference implementation of IRS & Central node.

6. Client-side and server-side libraries implementing the InteropEHRate protocols.

7. InteropEHRate Health Services (IHS): components for converting structured health data extracted from local EHRs to the FHIR data format expected by the InteropEHRate protocols.

8. InteropEHRate Health Tools (IHT): tools for managing healthcare knowledge. They allow to define mapping rules for conversion of health records exploited by the IHS for data conversion.