D5.13

HCP Web App – V1

ABSTRACT

This deliverable presents the features and relevant technical aspects of the prototype of HCP Web app (designed in the Task "*HCP web app and EHR functionalities*") – first version, corresponding to the first year of InteropEHRate project implementation. The HCP Web App prototype is a web app used by the healthcare professionals for creating and accessing health data of foreign patients. Healthcare professionals will use HCP Web App to securely exchange health data of their EMRs with any S-EHR (mobile or cloud) and to read health data stored in federated EHRs. This deliverable, drafted as demonstrator, is the first of the three iterations dedicated to development of HCP Web App prototype, corresponding to the *Task "Implementation and system testing of incremental EHRs integration"*. The preponderance of the depicted content is derived from the deliverables [D5.1] and [D5.4] and reflects, the current stage of HCP Web App implementation, comprising the most relevant features addressing the import / export data directly from/to the S-EHR on the smartphone.

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CONTRIBUTORS

	Name	Partner
Contributors	Andrei OANCA	SIVECO
Contributors	Simona BICA	SIVECO
Contributors	Simona ALEXANDRU	SIVECO
Contributors	Mihai SECELEANU	SIVECO
Reviewers	Adrian BRADU	SIVECO
Reviewers	Gábor Bella	UNITN

LOG TABLE

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0.1	16-12-19	Creation of the document's template (TOC).	Andrei OANCA	SIVECO
0.2	17-12-19	Contribution for Chapter 2 - Overview of the solution	Andrei OANCA	SIVECO
0.3	17-12-19	Contribution for Chapter 3 - Technical Approach, subchapters Installation Guide, Requirements Contribution for Chapter 1 – Introduction	Simona ALEXANDRU Mihai SECELEANU Simona BICA	SIVECO
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ACRONYMS

Acronym	Term and definition
HCP	Health Care Providers
JVM	Java Virtual Machine
EMR	Electronic Medical Records
GUI	Graphical User Interface
IPS	International Patient Summary
HCP	HealthCare Professional
HER	Electronic Health Record
S-EHR	Smart HER
D2D	Device to Device protocol
WP	Work Package

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1. INTRODUCTION

1.1. Scope of the document

The deliverable is the first demonstrator of *WP5 – Incremental EHRs integration*, covering the most relevant features and technical aspects of the prototype of HCP Web app (designed in Task "*HCP web app and EHR functionalities"*) – first version, corresponding to the first year of InteropEHRate project implementation. At this stage of project implementation, the deliverable aims to present the status of HCP Web App prototype development, addressing essentially the import/export data directly from/to the S-EHR App on the smartphone.

Moreover, the deliverable depicts the specific way that HCP Web App is compiled. There are two ways of which the application can be compiled. The first way to run the application is from the source on GitLab (link: http://iehrgitlab.ds.unipi.gr/interopehrate/reference-hcp-app/hcp-app.git). GitLab represents a DevOps platform ensuring the access based on accounts.

Second way to run the application is with hcp-web-app-1.0.0-SNAPSHOT.jar. For this specific method, the steps to follow are presented below in *Chapter3*

1.2. Intended audience

The document is intended to different categories of professionals, such as:
- Technical staff: developers, consultants, analysts, web designers, interested to have an overview about HCP Web App
- Healthcare professionals interested in how to use HCP Web App from the perspective of end-users.

Both categories might be interested in participating to co-design sessions during each development cycle (3 iterations), in order to improve and enrich the solution capabilities.

1.3. Structure of the document

The deliverable is structured in four chapters, as follows:
Section 1. Introduction: Presents a summary concerning the purpose and objectives of the deliverable, its structure and relation to other tasks and deliverables.
Section 2. SW Description: Presents the most relevant references of the software components that were implemented, addressing also the relation to other WPs and tasks.
Section 3. Overview: Presents the main technological approaches and decisions specific to HCP Web App implementation.

1.4. Updates with respect to previous version (if any)

The current deliverable aims to present the first relevant features and functionalities of the prototype of HCP Web App used by healthcare professionals for accessing and creating health data of foreign patients within the InteropEHRate project.

At this particular stage of project implementation, the deliverable presents the main functionalities of HCP Web App solution, addressing essentially the import/export data directly from/to the S-EHR on the smartphone.

This deliverable, drafted as first demonstrator, is dedicated to the implementation of HCP Web App and comprises the first relevant features and functionalities of the prototype of HCP Web App that will then be expanded incrementally in the next versions of this deliverable.

2. SW DESCRIPTION

SW TITLE	HCP APP
SW VERSION	1.0.0-SNAPSHOT
LICENCES AND PATENTS	Apache License
PROGRAMMING LANGUAGES	JDK 13
SUPPORTED PLATFORM(s)	Cross Platform (HCP App) but due to the dependency with the D2D library that is working only on Windows OS, the connection process is functional only on Windows OS
SOURCE CODE	http://iehrgitlab.ds.unipi.gr/interopehrate/reference-hcp-app/hcp-app
EXECUTABLE	https://drive.google.com/file/d/1vNa0god4A1r5uR4ku3iFHn3c22eTBikN/view?usp=sharing

3. OVERVIEW

In this chapter of this deliverable, an overview of the most relevant aspects of the solution implemented is going to be presented. Every decision and implementation structure regarding the solution has been done according to the defined user requirements (scenarios and user requirements presented in deliverable **[D2.1]** User Requirements for cross-border HR integration - V1) and from the deliverable **[D4.4]** Design of libraries for remote and D2D HR exchange - V1 which is concerned about the designing methods of the most important library used for data exchange.

To continue the preliminary consideration of the other two deliverables **[D5.1]**Software requirements specification of an integrated EHR web app for HCP - V1 and **[D5.4]** Design of an integrated EHR web app for HCP, the HCP Web App was designed to provide to the stakeholders, more precisely to the HCPs, an extensive and highly customisable platform that has emerged as a necessity for the stakeholder's needs.

The HCP app is the "prototype of secure web app, used by the HCPs to securely exchange health data of their EMRs with any S-EHR and to read health data stored in federated EHRs. Hospitals may use the HCP app or may choose to evolve the Graphical User Interfaces (GUIs) of their EMRs to add the same functionalities of the HCP app."
To summarize the above paragraph, the HCP Web App is an application for the secure exchange, retrieval, update and storage of the personal and health data from EMR, from S-EHR App or from S-EHR Cloud.

The graphical user interface (GUI) is of high importance for the testing of the exchange protocol. For this reason, a great amount of work has already been put into the main design of the HCP App and much more work will be done into future refinements. All the personal and health data that were mentioned above will be displayed using the standardized UI and UX described in Chapter 3.

In the deliverable **[D5.1]**, three main categories of relevant information / data were taken into account when the software requirements specifications were created:

- Information concerning the methodological approach relevant for HCP app design (input from deliverable **[D2.1]** User Requirements for cross-border HR integration - V1– Section 2. Approach for requirement analysis and Section 6.5. Users Focus Groups)
- Information concerning the functional approach relevant for HCP app design (input from deliverable **[D2.1]** – Section 5. Reference Scenarios and Section 6. User Requirements)
- Information concerning the end-user perspective relevant for HCP app design (input from deliverable **[D2.1]** – Section 4. S-EHR Content, Section 5. Reference Scenarios and Section 6.5. Users Focus Groups).

When the HCP App has been designed, the developers have decided to follow some simple principles to ensure the best development practices for the evolution of the solution. The main principles that are taken into account when any new feature is added:

- Extensibility: Easily extending the solution of HCP App for future modifications.
- Adaptability: Adapt to any request or changes that might occur during the process of Agile Development.

● Ease-of-Use: As the HCP APP is highly GUI driven, the created interface is intuitive, with a clean interface and easy to use menus.

3.1. Building Guide

In order to build the HCP App project, the basic process of packaging any Java Maven project is the simplest method which produces the executable Jar file. This Jar file is necessary for running the HCP App outside the developing environment.

1) Before the building process of the Jar file, the developers need to decide the coordinates necessary for the project model. Bellow is the current model of the HCP App:

```
<groupId>eu.interopehrate.hcpapp</groupId>
<artifactId>hcp-web-app</artifactId>
<version>1.0.0-SNAPSHOT</version>
<name>hcp-web-app</name>
<description>Reference HCP application</description>
```

2) The next process is to configure Maven to specify the main class and to create the jar executable:

```
<packaging>jar</packaging>
```

3) After the necessary configuration, the developers can run the package goal:

```
mvn package
```

One important information is that the steps 1 and 2 should not be repeated by anyone as they were necessary only the first time the developers package the project. Anyone that will download the source code of the project will already have this configuration inside the pom.xml file that comes when the cloning process of the project takes places.

3.2. Installation Guide

To run the application, you need to make sure you have Java installed (JDK version 13) and an internet browser (Ex. Google chrome).

How to use HCP Web App:

To start the application, please use the "hcp-web-app-1.0.0-SNAPSHOT.jar" file which can be downloaded from hcp-web-app-1.0.0-SNAPSHOT.jar. For the app to work, just open the .jar file like below:

● Open terminal/command prompt;
● Make sure you are in the directory where the .jar file is located (Ex. if the .jar file is located on Desktop, use a command like this "cd C:\Users\...\Desktop" - without the quotation marks);
● Use the following string of characters: "java -jar hcp-web-app-1.0.0-SNAPSHOT.jar" and press ENTER (the app will start in a few seconds);
● Then open this link http://localhost:8080/hcp-web-ui/;
● The app is up and running.

After a computer restart the last three steps have to be performed in order to rerun the HCP-App.

3.3. User Guide

The main intent of the HCP App is to use it in conjunction with its mobile counterpart, the S-EHR App. Being a web based application, the HCP app can easily be run on any device that has Java VM installed.

There is a strong relation in the functionalities of the HCP app regarding the S-EHR App. The main requirement that has been implemented regarding the connection between the S-EHR and HCP app is the basic connection and exchange of data from one direction, from S-EHR to HCP App. In future releases of the solution, more functional improvements will be added together with the evolution of both the D2D Protocol of data exchange and of the S-EHR App.

In the following paragraphs, a clear description of the usage process of the HCP app will be presented:

- HOME (connection):

The user (HCP) is using the Home screen to establish the connection with the mobile devices (phone with S-EHR application) of the patient via Bluetooth connection.
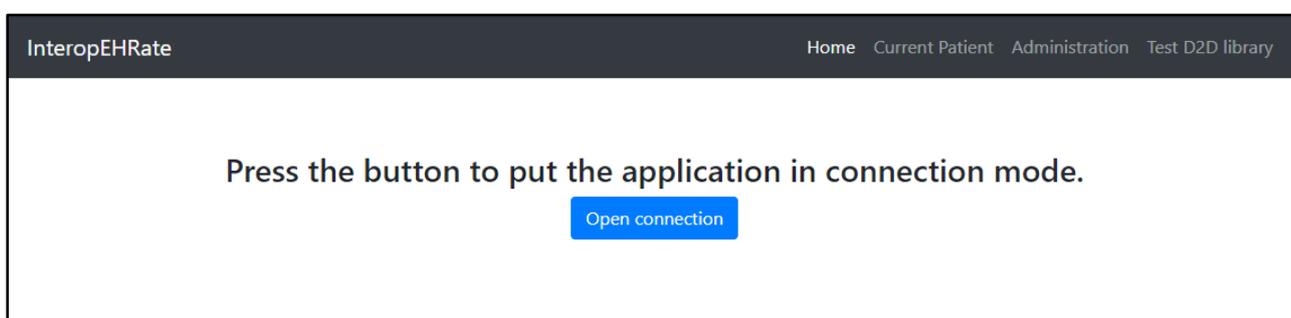
Figure 1 – Start page of the HCP-App

After clicking on the "Open connection" button, the user should present the following screen to the patient who shall scan the barcode with the mobile phone application.
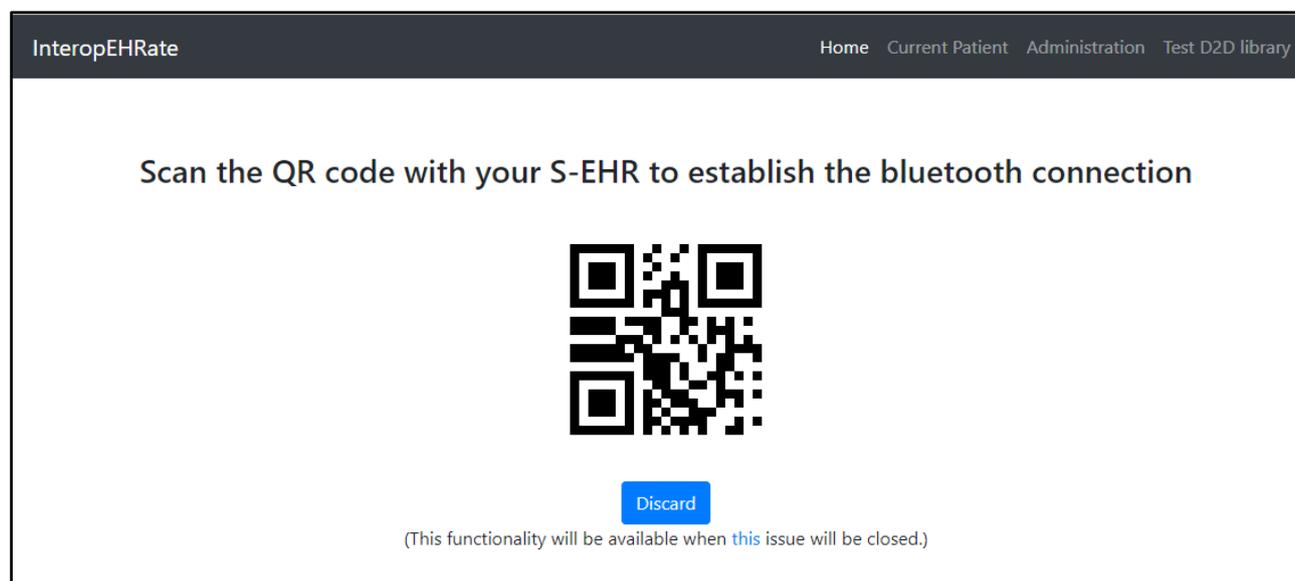
Figure 2 – Page displaying the QR code to be scanned by the S-EHR

The patient follows the process on his device and the following screen shows that the applications are connected using the D2D protocol :
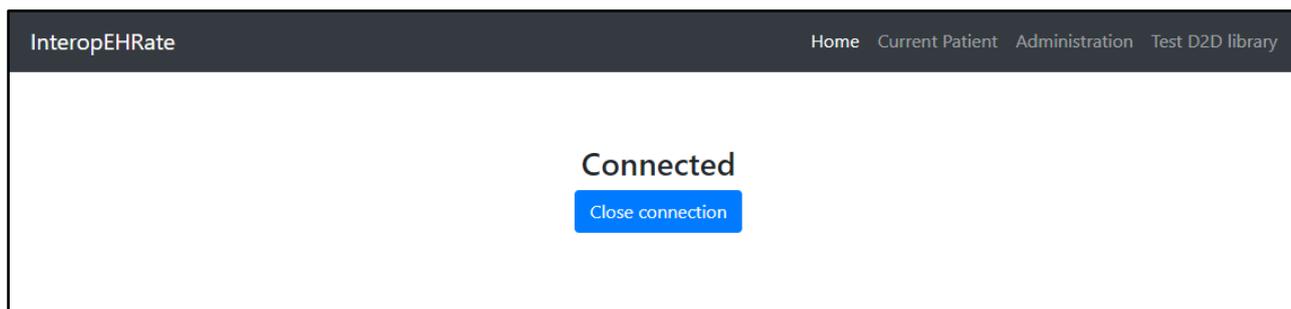
Figure 3 – Status of the connection between devices

The "Discard" button is used to generate a new QR Code.

The "Close connection" button is used to close the connection between the mobile application and the HCP App.

- ADMINISTRATION:

Prior to the usage of the application, some parameters are initiated by the HCP or the organization of the HCP using the administration module:
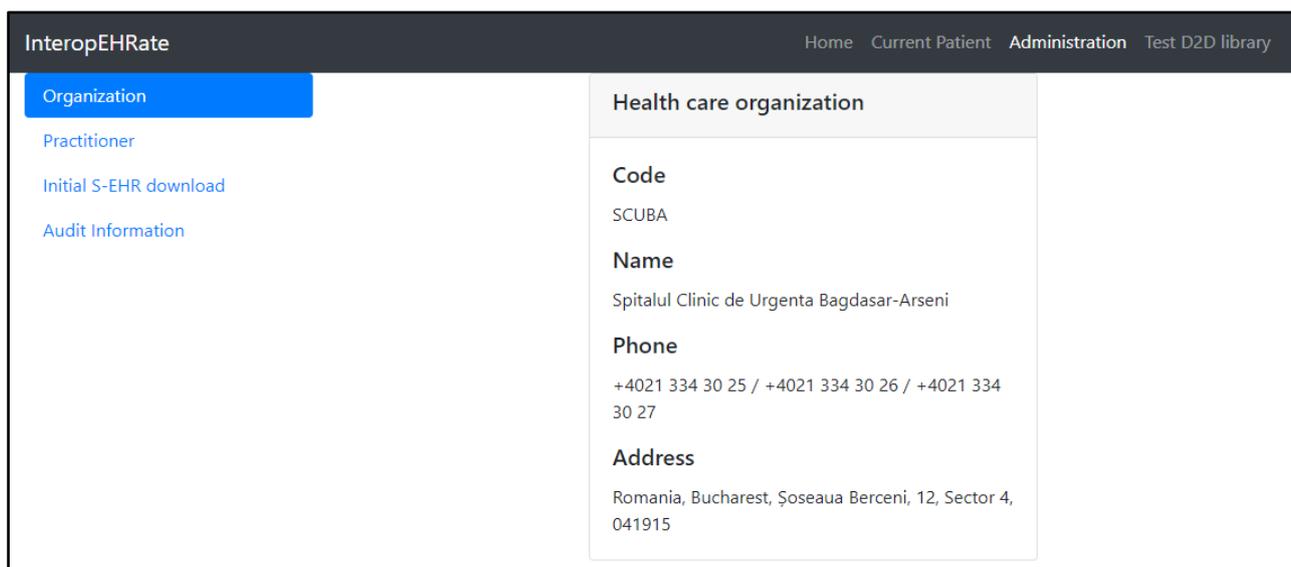
Figure 4 – Displaying the information of the HCP organization
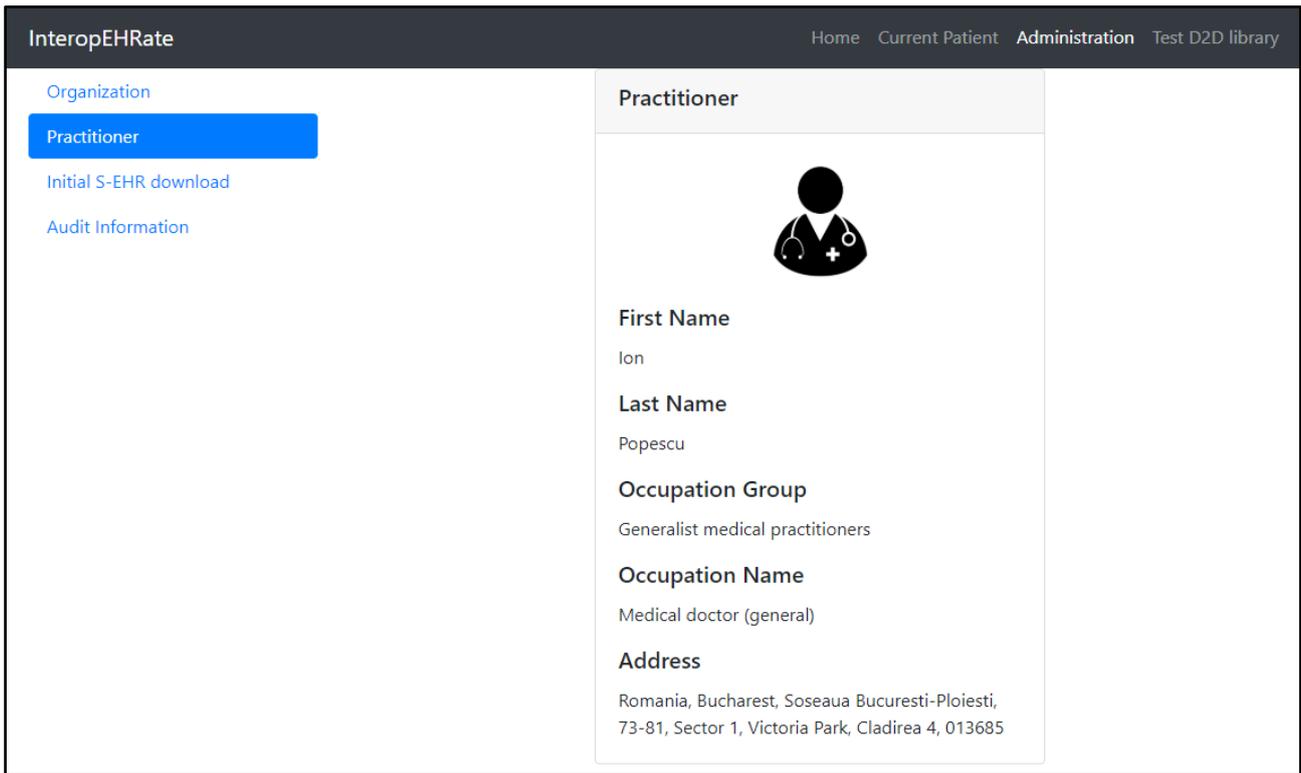
Figure 5 – Displaying practitioner information
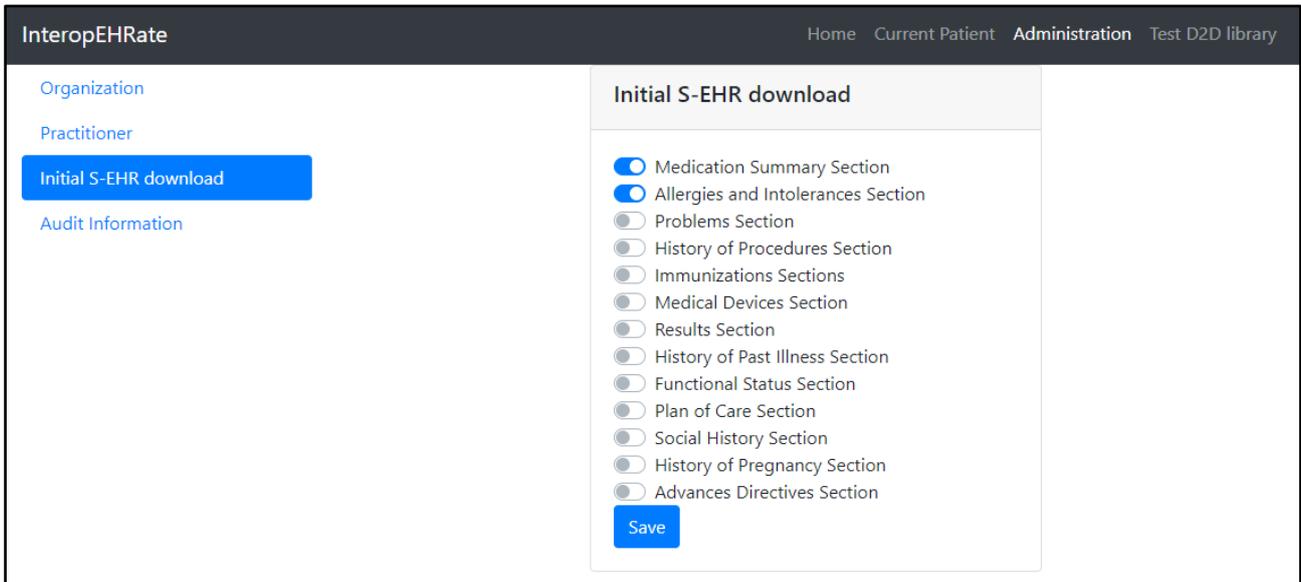
Figure 6 – Configuration of the initial download request from the S-EHR

Figure 7 – Audit Information of the exchanges between devices

Clicking on the "Audit information" tab will display to the user the data that was audited by the HCP App.

- CONSENT:

Since the HCP App needs to show information about the patient from his/her mobile device, the patient has to give it his consent:

Figure 8 – Info to S-EHR not sent

By clicking the "Send info to SEHR" button, the app request the patient's consent.

Figure 9 – Info to S-EHR sent

After the patient accepts the request, the HCP App starts to show information about him.

InteropEHRate

Home Current Patient Administration **Test D2D library**

Send info to SEHR

{ "resourceType": "Patient", "id": "89a40a55-16c1-4410-9678-243f3f251a82", "name": [{ "family": "Soare", "given": ["Mircea"] }], "gender": "unknown", "birthDate": "1992-02-20", "address": [{ "use": "home", "city": "Bucharest", "state": "RO" }] }
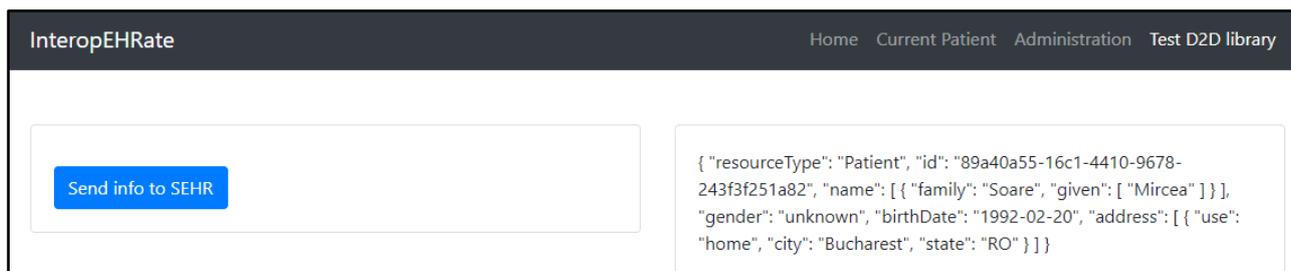
Figure 10 – Information retrieved from the S-EHR

By accessing HOME tab the GENERAL DATA of the patient are displayed:

InteropEHRate

Home Current Patient Administration Test D2D library

Connected
First Name: Mircea
Family Name: Soare
Patient/89a40a55-16c1-4410-9678-243f3f251a82

Close connection
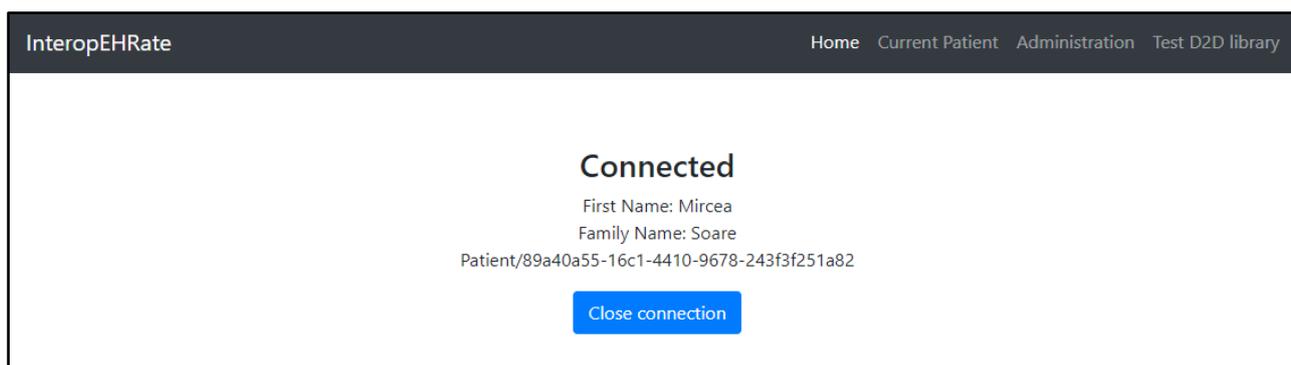
Figure 11 – General Data of the EHR record available

- IPS - Medication:

Clicking on "Current Patient" will display to the user a complete list of the IPS categories that will be populated with the information from the mobile application. Three IPS categories are implemented and tested: "Medication Summary", "Allergies and Intolerances" and "Diagnostic Results". By clicking on the Add button, a new window will appear where the user can add a new entry to each IPS category.

Figure 12 – Medication Summary

Figure 13 – Allergies & Intolerances

Figure 14 – Diagnostic Results – Add Page

The translation button should be used if a translated version of the current page is desired by the user.

Notes about the current release:

As of December 2019, the status of the HCP App is the following: 5 of the user requirements were successfully implemented, while the rest are still in progress, with a plan to be fully implemented and integrated in the solution as soon as possible. The user requirements which were fully implemented and tested are the following ones:

- Consultation of auditing for healthcare organization;
- Auditing for healthcare organization;
- D2D Request of consent from HCP for download and storage of data from S-EHR and upload new data to S-EHR;
- Setup on HCP App of initial health data to download by D2D;
- D2D Access consent to healthcare organization by Citizen.

and the user requirements that are in the final stage of implementation are :

- Auditing of admission data by HCP App
- Auditing on HCP app of consent by Citizen for temporary S-EHR access
- D2D Request of consent from HCP for download and storage of data from S-EHR and upload new data to S-HER
- Patient Summary consultation on HCP App (Demo for translation services)

REFERENCES

[1] **[D2.1]** InteropEHRate Consortium, User Requirements for cross-border HR integration - V1, 2019. https://www.interopehrate.eu/resources/#dels

[2] **[D2.7]** InteropEHRate Consortium, FHIR Profile for EHR interoperability - V1, 2019. https://www.interopehrate.eu/resources/#dels

[3] **[D4.4]** InteropEHRate Consortium, Design of libraries for remote D2D HR exchange - V1, 2019. https://www.interopehrate.eu/resources/#dels

[4] **[D5.1]** InteropEHRate Consortium, Software Requirements specification of an integrated EHR web app for HCP - V1, 2019. https://www.interopehrate.eu/resources/#dels

[5] **[D5.4]** InteropEHRate Consortium, Design of an integrated EHR web app for HCP - V1, 2019. https://www.interopehrate.eu/resources/#delsf