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*“Policies for Enhancing Access to Health Services in Deprived Areas”*

**The Healthy Municipality**

MIS Code: 5011021

**Deliverable 4.6.2**

**Digital data base in each area with patient cards and digital alert system**

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## DIGITAL DATA BASE - PATIENT CARD

In WP4, activity 4.2, of the “Healthy Municipality” Project, a digital data base with patient cards and digital alert system is foreseen in each area. The respective database for the involved Greek municipalities was developed by the Aristotle University of Thessaloniki.

**Important Note: The aforementioned database is integrated in the platform included in the Deliverable 4.1.3.Digital municipal health platform in each area.**

Therefore, the database is hosted in the following link:

<https://patients.healthymunicipality.com>

### Specifications

#### 1. Digital Data Base

Opensource MySQL was applied, which does not have a limit on the number of records, but has only a limit of 64 TB per table. The number of records depends on the size of each table row and the size of the hard disc.

Applying the SQL data base, the best practices of design and interaction with the data base should be followed:

- The design of the data base scheme should be with maximum level of normalization, in case it would not harm the productivity;
- Indices by set table rows should be created in order to optimize the most common used applications;
- The creation of indices should be motivated and supported by measures;
- The links between tables should be defined through foreign key.

The storage of administrators’ passwords of registered and external users and access accounts are not permitted. All passwords /PIC/ are protected by suitable ensured algorithms (ex. BCrypt, PBKDF2, scrypt (RFC 7914)) for password protection.

All tables in the data base include the following attributes:

- o unique number;
- o exact time of the creation of the record;
- o exact time of the last update of the record;
- o identification of the user, registered the event.

Access of GPs etc. to Patient Cards (PCs) is limited in terms of time. Once the GP receives access e.g. via a code (PIN) delivered by the patient, this access is then automatically expired, so as to respect privacy of the patient’s personal data.

The long lists of results are divided into numbered pages with appropriate navigation elements to move to the previous, next, first and last page, to a specific page. The navigation elements are logically separated and associated with the corresponding list.

For the large hierarchic categorizations, it is possible to navigate by levels or by lazy load.

Analysis option- queries to the database by different criteria. Indicative queries for the system:

- Number of visits to a specific/or and the total of the health structures in a specific time period (from ... to...).
- Number of patients examined in a time period.
- Area of origin of patients examined within a period. Age, Gender, Profession (?) of examined population.
- Findings of them in dependence on age, gender, area of origin, profession.
- Occurrence of diseases.
- Treatment prescribed: further examination, medicine, laboratory analysis etc.

ICD codes- symptoms, diseases and treatment have been uploaded with reference to the specific codification, whereas GPs have very easy access to the code, so as for them to easily find and save the respective codes on the PC.

The system keeps records of the patients' data. E.g. weight on March 15 2017, weight on February 25 2019 etc.

## **2. Web platform requirements:**

All web pages (internal and public accessible in Internet) are solely accessible through protocol HTTPS. Encryption is based on a safe certificate with verified identity, ensuring the application of TLS 1.2, issued by a verification body, readable by most commonly used browsers (Microsoft Internet Explorer, Google Chrome, Mozilla Firefox).

REST is a software architectural style which allows presenting data to external systems (ex. The Ministry of Health).

The server, on which the web platform operates, supports the relevant data base and program platform, performed by the Contractor.

- Description of basic functions and access right

The system is web- based platform with frontend and backend. The municipalities have common data base, which ease the access to information both by patients and doctors. The common data base restricts the opportunity to duplicate patients and medical professionals.

The system users are divided into roles:

- Superadmin- has access to all the available information
- Admin- a staff member from each municipality having access to information, concerning only the particular region
- Doctors- medical professionals having access to all or partial information of the patients /depends on the access rights given by the patient to the relevant doctor/. If access is given, the physician can fill in medical data in the patient's profile in relation to his/her visit or attach medical results /ex. medical examinations, laboratory results, etc./
- Patient- registered users. Either registered by an administrator or by himself/herself, the patient receives an automatically generated Personal Identification Code (PIC), for

filling/ editing the information in the e- health card, as well as another PIC, to present and give access to the doctor(s).

The system allows the registration of the patients, while the doctors are only registered by an administrator.

- Frontend- web address, through which the patients authorize themselves to access their personal information (patient card)
- Backend- web address, which is accessible for Admin, Doctors, Superadmin.

### 3. Description of the patient card registers

For the application of the patient card, **the Data privacy, the Patient Consent and the Patient Access** have been respected.

**The data needed for the patient card** (and consequently for the digital data base where the patient cards are maintained) include 7 sections: 1. General Personal Data, 2. Visits, 3. Personal History, 4. Family History, 5. Gynecological History, 6. Vaccines, 7. Messages/Alerts.

The detailed data for each section are described below:

## 1. General Personal data

- Social Security Number
- Last name
- Name
- Father's name
- Date of Birth
- Sex
- Contact info
- Insurance Data (Yes/No)
- Date of creation (Automatically generated)
- Date / time of last update (Automatically generated)
- Profession
- Blood group and RH
- Willingness to organ donation (Yes/No)
- General practitioner (chosen from a list of National Unique Code of the health professionals)
- Smoking (smoker, non-smoker)
- Alcohol drinking (yes, no, chronic)
- Usual daily drinking
- Year of stop drinking alcohol

## 2. Visits

### Patient status

- No of visit (Automatically generated)

- Date of visit
- Specialty of doctor (chosen from a list of National Unique Code of the health professionals)
- Reason for visit (comment field, free text entered including symptoms) (the ICPC2 is not applicable in Bulgaria)
- Diagnosis of the episode of care (according to ICD 10)
- Option to add attachments with short description (lab test, prescription, etc.)

#### **Somatometric data**

- Weight (Kg)
- Height (m)
- Body Mass Index (BMI)
- Systolic blood pressure (mmHg)
- Diastolic blood pressure (mmHg)
- Beats (number / min)
- Diabetes mg / dL
- Temperature (degrees Celsius)
- electrocardiogram ECG
- ECG Findings

#### **Laboratory and Clinical Examinations** (*numerous repetition*)

- Name
- Result
- Comments

#### **Therapeutic / Pharmaceutical Instructions** (*numerous repetition*)

- Name
- Dosage form (e.g. tablets, etc)
- Duration
- Date
- Medication comments

#### **Visit remarks**

- Prevention – comment/ free text field
- Diet / exercise- comment/ free text field
- Vaccination comment/ free text field field
- Short-term care - comment/ free text field
- Small surgery or catheterization- comment/ free text field
- Physiotherapy - comment/ free text field
- Hospitalization- comment/ free text field

## **3. Personal History**

### **3.1 Chronic diseases**

- ICD-10 code

- Age of appearance
- Comments

### **3.2 Hospitalizations**

- ICD10 code
- Hospital
- Year
- Comments

### **3.3 Implantable devices**

- Yes/ No
- Comments

### **3.4 Allergies**

- Medicines vs. which there is an allergy (Free text field)
- Active substances vs. which there is an allergy (Free text field)
- Allergens (Yes / No / Do not know)
- Medicines (Yes / No / Do not know)
- Foods (Yes / No / Do not know)
- Other (Yes / No / Do not know)
- Comments

## **4. Family history**

- Comments (free text)

## **5. Gynecological History (for women)**

- Age of first period
- Age of the last period
- Cycle duration (days)
- Blood duration (days)
- Type of menstrual cycle
- Symptoms
- Contraception
- Number of abortions
- Childbirth
- Birth date
- Comments

## **6. Vaccines**

**Vaccination against:**

- Influenza
- Tetanus, Diphtheria, Acellular pertussis (Td, Tdap)
- Measles, Mumps, Redness (MMR)
- Chickenpox (VAR)
- Herpes Zoster
- Human Papilloma Virus (HPV)
- Pneumococcal conjugate (PCV13)
- Pneumococcal polysaccharide (PPSV23)
- Meningococcal conjugate (MCV4)
- Hepatitis A (HepA)
- Hepatitis B (HepB)
- Haemophilus influenza b-type (Hib)
- Hepatitis B (HepB)
- Tetanus, Diphtheria, Acellular pertussis (DTap <7 years, Tdap> = 7 years)
- Haemophilus influenza b-type (Hib)
- Inactivated polio (IPV)
- Pneumococcal conjugate (PCV13)
- Pneumococcal polysaccharide (PPSV23)
- Meningococcal conjugate (MCC, MCV4)
- Measles, Mumps, Redness (MMR)
- Chickenpox (VAR)
- Hepatitis A (HepA)
- Human Papilloma Virus (HPV)
- Tuberculosis (BCG)
- Influenza
- Other vaccinations: /free text field/

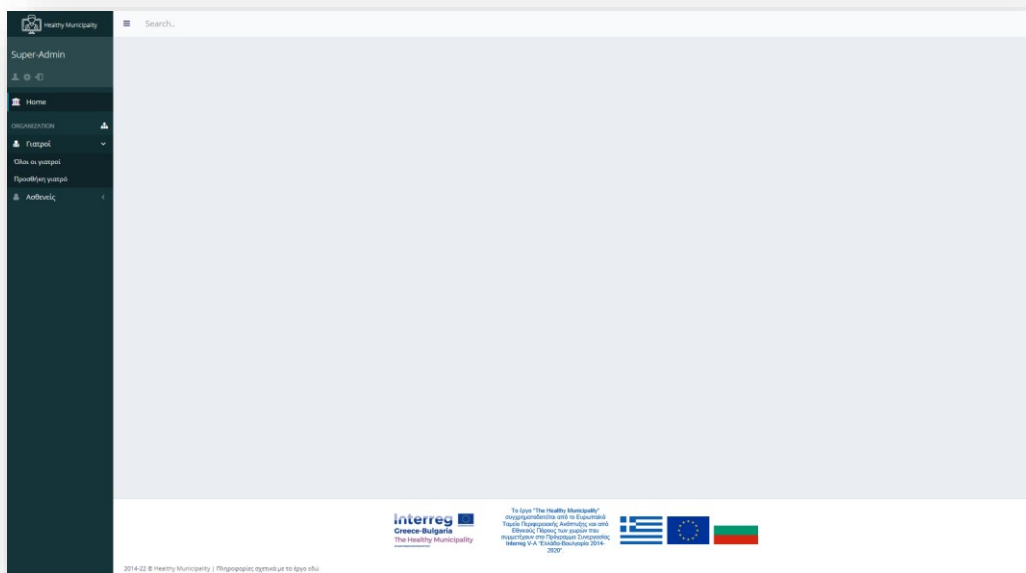
## 7. Messages / Alerts

Allergies, vaccines, tests as well as other important notices have been designed.

Within this section, the registered doctors can get alerts and send notifications to their registered in the data base patients. A message is also sent to an assigned municipal officer.

## ANNEX I- Database Screenshots

Fig. 1 Functions per type of user (patient, doctor, etc)



The screenshot displays a database table of doctors. The table has columns for ID, Όνομα (Name), Email, Τηλέφωνο (Phone), Ειδικότητα Γιατρού (Specialty), and Ενέργεια (Action). The data is as follows:

ID	Όνομα	Email	Τηλέφωνο	Ειδικότητα Γιατρού	Ενέργεια
1	Καπαλός Νικόλαος	n_kafalis@hotmail.com	2531025797	Εκτασυντακτικός	<input type="checkbox"/> <input type="checkbox"/>
2	Καμνιέρης Στέφανος	skamnieris@gmail.com	2531089940	Παιδιατρικός	<input type="checkbox"/> <input type="checkbox"/>
3	Ασβεργής Δημήτρης	dimitrios_asbe@gmail.com	2551029700	Ευρωπαϊκός	<input type="checkbox"/> <input type="checkbox"/>
4	Σαμάλιουστίν	test@gmail.com	2531102330	Οδοντολόγος	<input type="checkbox"/> <input type="checkbox"/>
5	Κωνσταντίνης Αχιλλείος	test2@gmail.com	2531025211	Καρδιολόγος	<input type="checkbox"/> <input type="checkbox"/>
6	Βαούζης Νεκτάριος	test3@gmail.com	2534022277	Παιδίατρος	<input type="checkbox"/> <input type="checkbox"/>
7	Εμίν Μουχάμντ	test4@gmail.com	2531029900	Χυμολογός	<input type="checkbox"/> <input type="checkbox"/>

At the bottom of the table, it shows '1-7 of 7' and navigation buttons for 'First', '1', and 'Last'.



Fig.2 Doctors registration

A/A	Όνομα	Email	Τηλέφωνο	ΑΜΚΑ	Πατρώνυμο	Ημερομηνία Γέννησης	Φύλο	Επάγγελμα	Ουκίδα αιματός και ΒΗ	Δείκτης Οργάνων	Κίνηση	Ενέργειες
1	ΑΓΑΝΑΣΙΟΣ		69			26	Αρσεν			Οχι	Ναι	
2			69			03	Αρσεν			Οχι	Οχι	
3		demo@email.gr				10	Αρσεν			Οχι	Οχι	
4	ΕΛΕΥΘΕΡΙΟΣ						Αρσεν			Οχι	Ναι	
5						00	Αρσεν			Οχι	Ναι	
6			69		ΑΓΑΝΑΣΙΟΣ		Αρσεν			Οχι	Οχι	
7						06	Αρσεν			Οχι	Ναι	
8					ΔΗΜΗΤΡΙΟΣ		Αρσεν			Οχι	Οχι	
9	ΑΓΑΝΑΣΙΟΣ	demo@email.gr					Αρσεν			Οχι	Οχι	
10	ΙΩΑΝΝΗΣ					11	Αρσεν			Οχι	Ναι	
11		demo@email.gr					Αρσεν			Οχι	Οχι	
12		demo@email.gr	69		ΙΩΑΝΝΗΣ		Αρσεν			Οχι	Οχι	
13	ΓΕΩΡΓΙΟΣ	demo@email.gr	69				Αρσεν			Οχι	Οχι	
14						07	Αρσεν			Οχι	Οχι	
15		demo@email.gr	69			17	Γυναίκα			Οχι	Ναι	
16					ΓΕΩΡΓΙΟΣ		Αρσεν			Οχι	Οχι	

Fig. 3 Patients' registration and management

Εμβολιασμοί

Γρίπης	<input type="radio"/> Ναι <input type="radio"/> Όχι
Τετάνου, διφθερίτιδας, ακυτταρικού κοκκύτη (< 7 ετών)	<input type="radio"/> Ναι <input type="radio"/> Όχι
Τετάνου, διφθερίτιδας, ακυτταρικού κοκκύτη (>= 7 ετών)	<input type="radio"/> Ναι <input type="radio"/> Όχι
Ιλαράς, παρωτίτιδας, ερυθράς	<input type="radio"/> Ναι <input type="radio"/> Όχι
Ανεμοβλογιάς	<input type="radio"/> Ναι <input type="radio"/> Όχι
Έρπητα Ζωστήρα	<input type="radio"/> Ναι <input type="radio"/> Όχι
Θηλωμάτων	<input type="radio"/> Ναι <input type="radio"/> Όχι
Πνευμονοκοκκικό συζυγές	<input type="radio"/> Ναι <input type="radio"/> Όχι
Πνευμονοκοκκικό πολυσακχαρίτη	<input type="radio"/> Ναι <input type="radio"/> Όχι
Μηνιγγιτιδοκοκκικό συζυγές	<input type="radio"/> Ναι <input type="radio"/> Όχι
Ηπατίτιδα Α	<input type="radio"/> Ναι <input type="radio"/> Όχι
Ηπατίτιδα Β	<input type="radio"/> Ναι <input type="radio"/> Όχι
Αιμόφιλος ινφλουένζα τύπου Β	<input type="radio"/> Ναι <input type="radio"/> Όχι
Πολυομελίτιδας	<input type="radio"/> Ναι <input type="radio"/> Όχι
Φυματίωση	<input type="radio"/> Ναι <input type="radio"/> Όχι
Σχόλια	<input type="text"/>

Fig. 4. Patient's medical information

Κατάσταση Ασθενούς

A/A Επίσκεψης	Ημ/νια επίσκεψης	Αιτία επίσκεψης	Διάγνωση	Γιατρός	Ειδικότητα Ιατρού
1	17-03-2022	ΕΛΕΓΧΟΣ		Βούζης Νεκτάριος	Παθολόγος

Σωματομετρικά Δεδομένα

Βάρος (κιλά)	60
Ύψος (cm)	152
Δείκτης μάζας σώματος (BMI)	26
Συστολική αρτηριακή πίεση (mmHg)	150
Διαστολική αρτηριακή πίεση (mmHg)	80
Σφυγμοί (αρ./λεπτό)	59
Διαβήτης (mg / dL)	
Θερμοκρασία (°C)	36.7
Ηλεκτροκαρδιογράφημα (ΗΚΓ)	
Ευρήματα Ηλεκτροκαρδιογραφήματος (ΗΚΓ)	

Παρατηρήσεις Επίσκεψης

Πρόληψη	1
Διατροφή	ΑΝΑΛΟΣ
Εμβολιασμός	COVID
Βραχυπρόθεσμη Περίθαλψη	
Μικρή χειρουργική επέμβαση - Καθετηριασμός	
Νοσηλεία	
Φυσιοθεραπεία	

Fig. 5 Doctor's final report