REPUBLIKA SLOVENIJA
MINISTRSTVO ZA ZDRAVJE

NIJZ Nacionalni inštitut za javno zdravje

zdravje

Naložba v vašo prihodnost
OPERACIJO DELNO FINANCIRA EVROPSKA UNIJA
Evropski socialni sklad

eHealth in Slovenia

October 2019

Mate Beštek

mate.bestek@nijz.si

National Institute of Public Health

Healthcare Informatics Centre

zdravje

NIJZ Nacionalni inštitut za javno zdravje

REPUBLIKA SLOVENIJA
MINISTRSTVO ZA ZDRAVJE

NIJZ Nacionalni inštitut za javno zdravje

zdravje

Naložba v vašo prihodnost
OPERACIJO DELNO FINANCIRA EVROPSKA UNIJA
Evropski socialni sklad

eHealth in Slovenia

- Introduction
- Overview of eHealth components and services
- **Key eHealth Services:**
  Central Registry of Patient Data (CPRD) , Patient Portal
- eHealth Deployment status

zdravje

Health System in Slovenia

- Population 2Mio; 2,5 doctors / 1000 patients
- **92 public institutional healthcare providers:**
  hospitals, community institutions for primary healthcare
- 27 hospitals, 64 community primary HC, NIPH
- 93 other public institutional care providers
  (e.g. nursing homes)
- Private healthcare providers providing public service by concession: cca 700 doctors, 1500 all
  (incl. nurses, pharmacists)

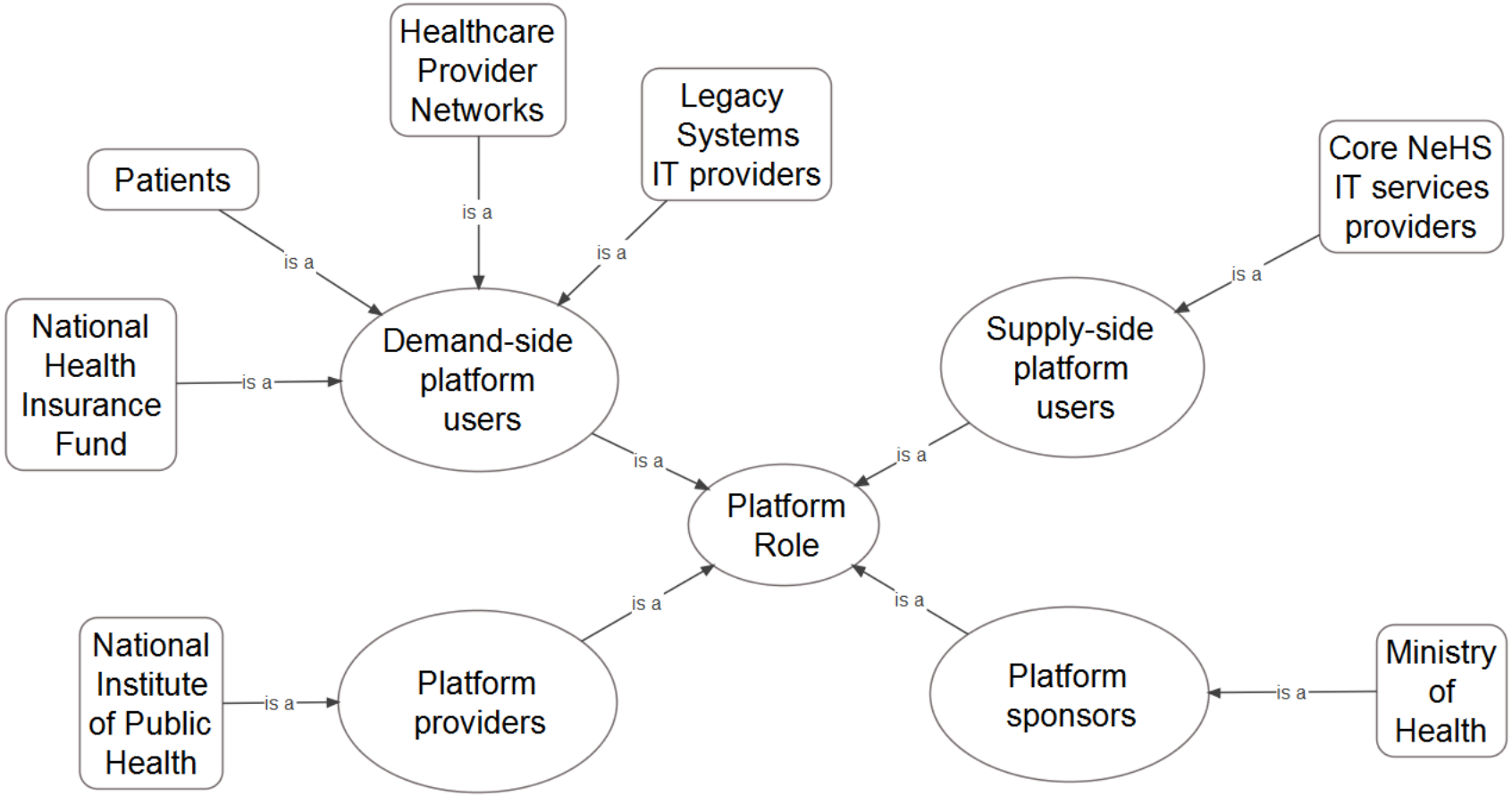
IT in Slovenian Health System

- National Health Insurance institution ZZZS http://www.zzzs.si/indexeng.html
- Issuing Health insurance cards; proceeding health service funding and payments. Not involved in eHealth services.
- > 20 SW vendors for local IT apps used by HC providers
- > 10 systems connected to key eHealth services
- NIPH controls central eHealth System
- HC providers are free to choose SW vendors for local systems

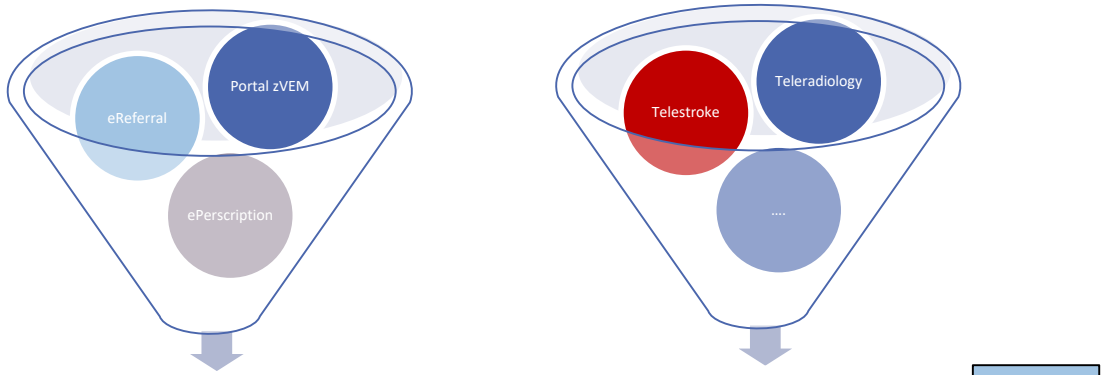
eHealth in Slovenia

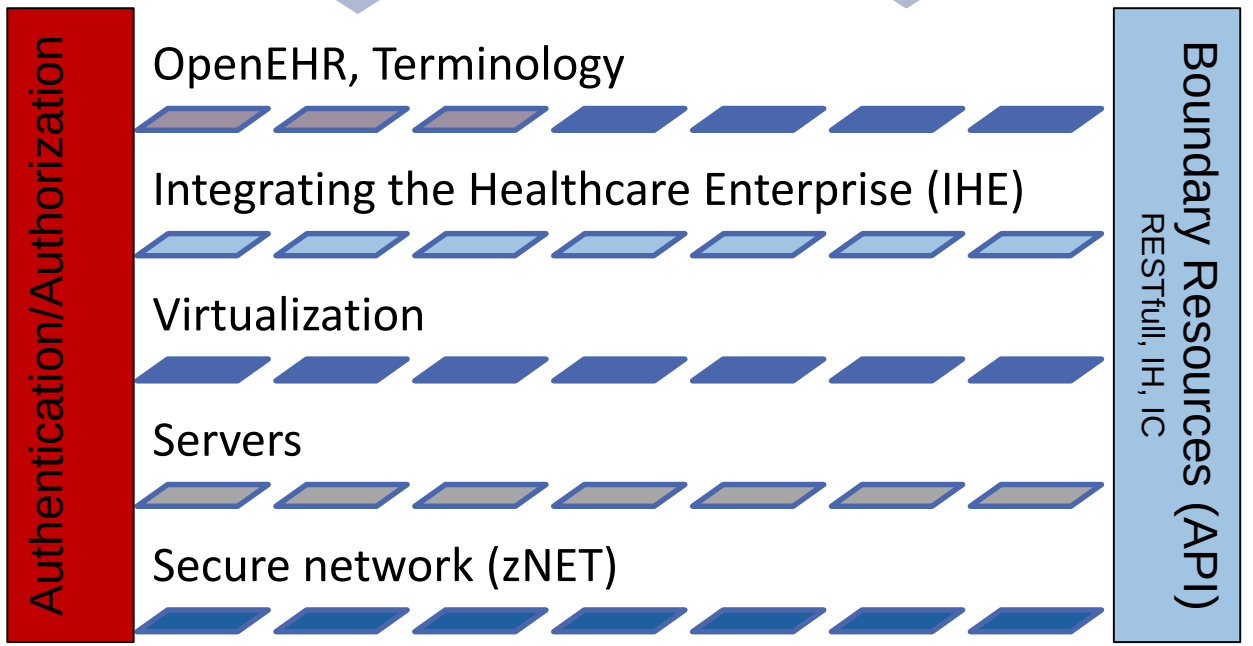
- eHealth project started in 2008
- eHealth sector at Ministry of Health in 2011
- 22M EUR initial development (85% EU funding , 15% Slovenia)
- eHealth managed by NIPH since 2015; eHealth team 9 members
- 4,5 M EUR maintenance and development per year (100% Slovenia MoH)
- eHealth services available to all healthcare providers (primary, secondary and tertiary)

eHealth Platform roles



Component-based services





eHealth Components services

- Identity Management
- Central Registry of Patient Data
- Knowledge sources - terminologies, information models (OpenEHR archetypes and templates), workflows (with very limited scope), and also some decision support for the drugs related scenarios like contraindications, interactions etc.
- Boundary resources – interfaces that enable access to central components
- IT infrastructure (also secure network)

eHealth Services in Slovenia

- **eHealth ICT infrastructure** including secure network **hNET**
- **eHealth users database;** Authentication & Authorization
- **ePrescription**
- **eAppointment** & eReferral
- **C**entral **R**egistry of **P**atient **D**ata (**CPRD**)
- **Patient Portal** zVEM (Health – one website for all health info)
- **eHealth Call Centre** (Help Desk): 080 2445, podpora@ezdrav.si

eHealth Services in Slovenia

- **TeleStroke**: teleconference system for emergency treatments in case of stroke (national medical expert network)
- **eRDP e**lectronic **R**egistry of **V**accinated **P**ersons
- **Reference primary healthcare** - encounter data recording; preventive care, chronic diseases management by family nurse practitioners
- **TeleRadiology**: store& exchange of radiology images (PACS)
- **eCommunication**: reporting injuries (healthcare – police)

ICT infrastructure

Platform for eHealth Services

hHET (zNET) Secure network for healthcare providers

ICT infrastructure & Network

- Servers, virtualization
  - platforms for national eHealth solutions
- hNET (zNET) secure network
  - all public institutions connected: community health centres, hospitals, tertiary institutions
  - Only few (> 10%) private doctors connected

hHET (zNET) network

SAFE HEALTH NETWORK

Communication infrastructure via **certified endpoints**

More than **130** health care providers connected

Links:

MPLS

VPN

Availability

99.95% from 06:00 to 20:00 (and 97% 20:00 to 06:00) 24/7/365

SERVICES

Provides IT services of national importance

Available for secure communication

mandatory use for eHealth/CPRD; recommended for other services

SAFETY

Safe and reliable connections

MINIMAL SECURITY REQUIREMENTS

REPUBLIKA SLOVENIJA
MINISTRSTVO ZA ZDRAVJE

zdravje

Naložba v vašo prihodnost
OPERACIJO DELNO FINANCIRA EVROPSKA UNIJA
Evropski socialni sklad

eHealth User Account Database

Authentication, Authorisation and Management of eHealth users

zdravje

eHealth User Accounts Database

- All registered healtcare organisations and professionals
  - automatically via connection to National Registry of Healthcare Providers and Professionals
  - Registered healtcare worker > eHealth user when obtaining DC
  - All nationally qualified Digital Certificates (DCs) valid
- Patients via Patient Portal registration procedure
- eID store for eHealth users (professionals and patients)
- „Central entity of trust “ for eHealth applications

eHealth User Roles

- Authorisations based on professional qualifications as per National Registry of Healthcare Providers and Professionals
  - organisation, professional qualifications, medical area / specialization
- Distinct user roles based on eHealth application (ePrescription, eReferral, CRPD…)
- Administrative management possible to a limited extent
  - administrators appointed by Healthcare institutions (employee data)
  - Example: hospital administrative staff roles for eAppointments

REPUBLIKA SLOVENIJA
MINISTRSTVO ZA ZDRAVJE

NIJZ Nacionalni inštitut za javno zdravje

zdravje

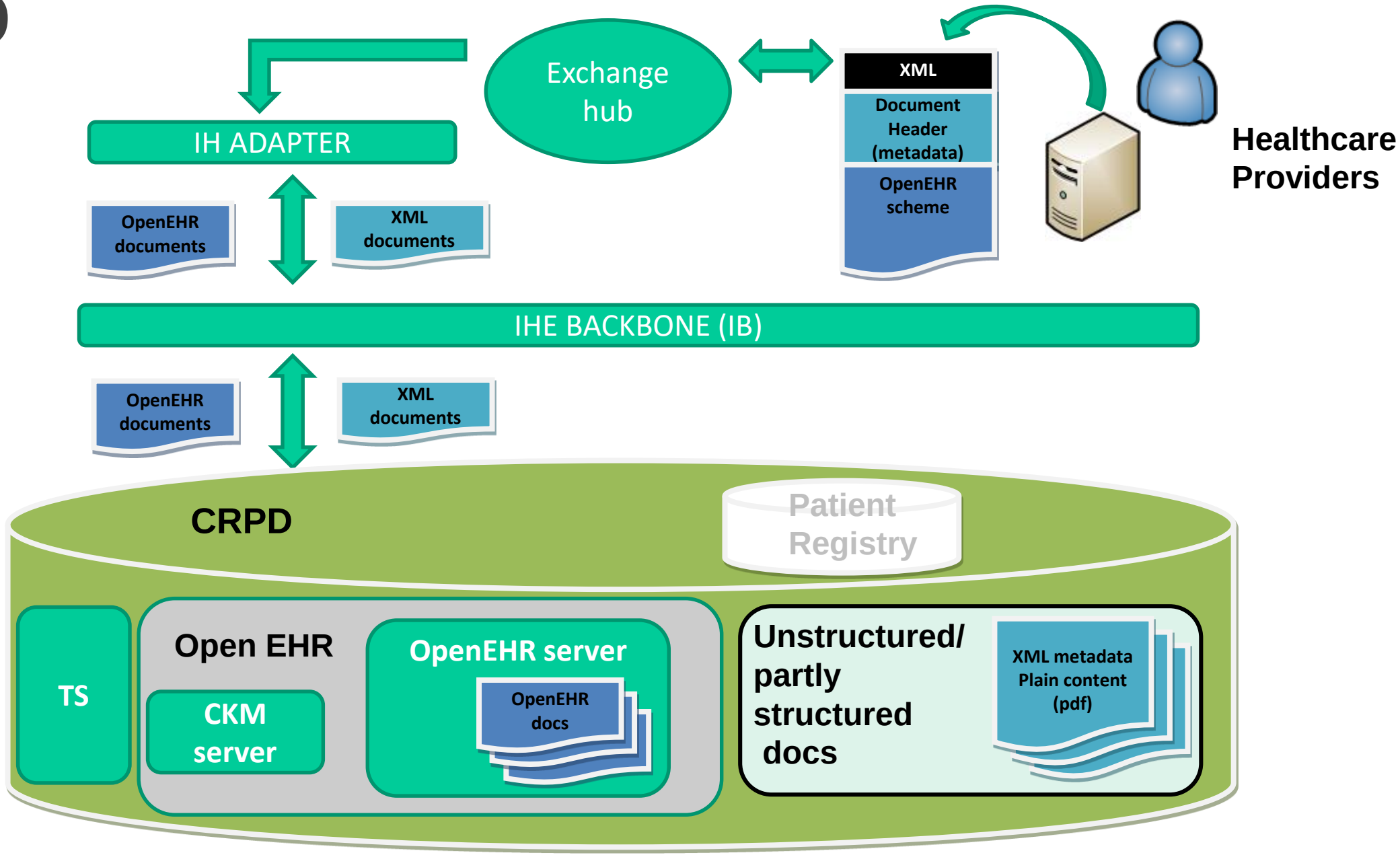
Naložba v vašo prihodnost
OPERACIJO DELNO FINANCIRA EVROPSKA UNIJA
Evropski socialni sklad

Central Registry of Patient (Data CPRD)

The Heart of Slovenian eHealth System

zdravje

CRPD


Exchange hub
XML
Document Header (metadata)
OpenEHR scheme
Healthcare Providers
IH ADAPTER
OpenEHR documents
XML documents
IHE BACKBONE (IB)
OpenEHR documents
XML documents
CRPD
Patient Registry
TS
Open EHR
CKM server
OpenEHR server
OpenEHR docs
Unstructured/ partly structured docs
XML metadata Plain content (pdf)

CRPD building blocks

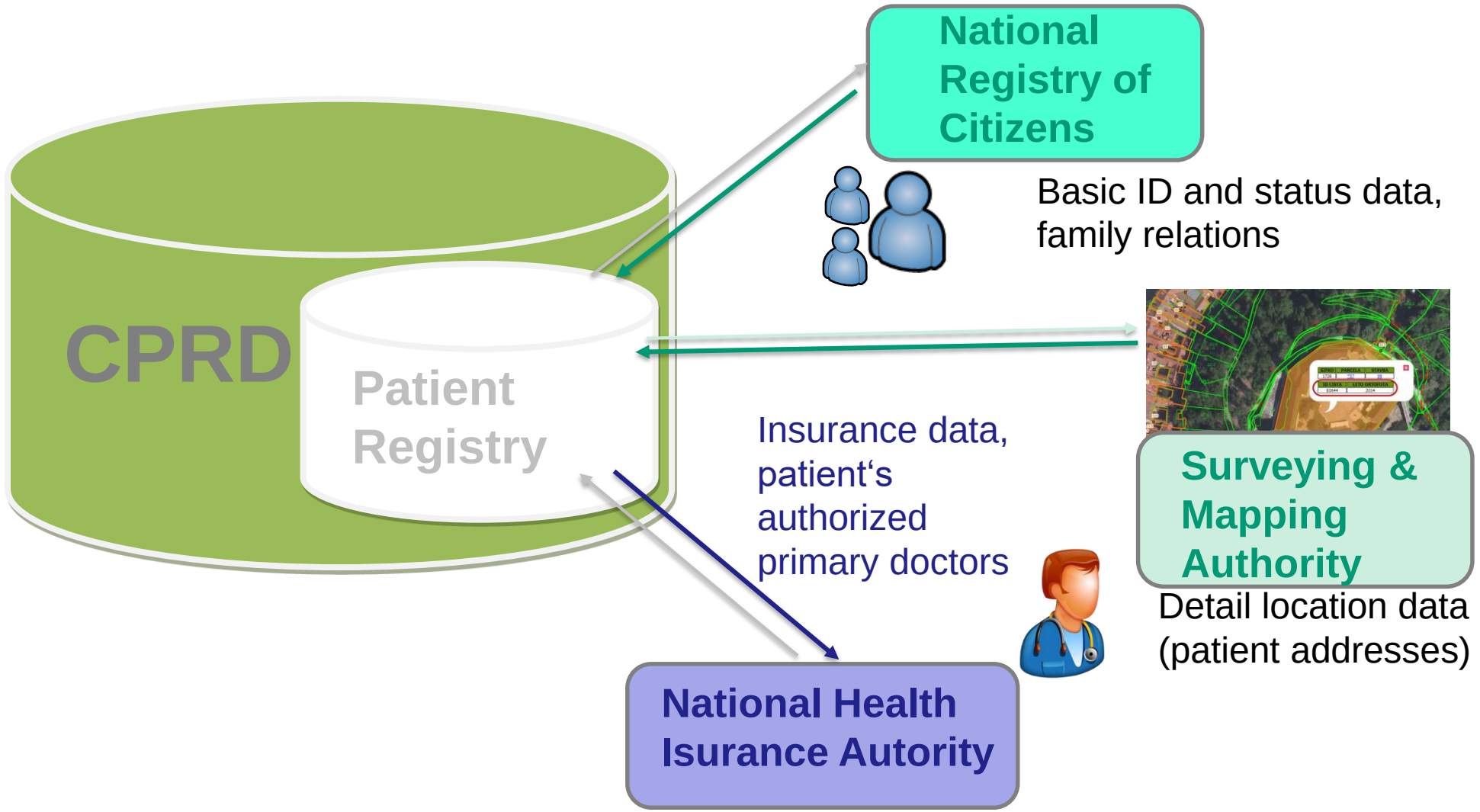
- **IB: I**nteroperable **b**ackbone:
  integration IHE profiles for health data exchange
  - https://www.tiani-spirit.com/ihe
- IH adapter: interface customized according national specifics
- Think!EHR: management of structured data according to OpenEHR standard
  - http://www.marand.com/thinkehr/

CRPD building blocks

- Terminology server HealthTerm :coding standards and terminologies
  - http://www.carecom.com/

- Clinical Knowledge Manager: OpenEHR standarized model
  - http://www.openehr.org/ckm/
  - http://ukz.ezdrav.si/ckm/OKM_sl.html

CRPD Patient Registry – external sources



CRPD scope

- Data and documents to be exchanged or shared beween healthcare providers
- Data and documents to be available to patient
- Short – term storage for exchange purpose

- Data and documents submitted by pacient
  - patiens consent documents; access to personal data

CRPD contents

- Patient Registry: personal data, detailed address, family relations, authorised (chosen) personal doctors
- Pdf documents; discharge letters issued by hospitals, medical specialists
- Patient consent statements and access policies
  - Patient Summary access restriction; patient consent to read docs
- Open EHR structured Patient Summary Records
- eReferrals (via eAppointment System)

CRPD

Discharge letters (hospitals, medical specialists)

Patient summary records (allergies, vaccinations, diseases etc.)

Public health care providers at primary, secondary and tertiary levels connected to secure health network (hNET)

Future development > new types of documents, increasing number of users to the widest range of healthcare stakeholders

PPoP – structured data, pdf view

Patient Summary Sections:

- Allergies and Adverse Reactions
- Vaccinations
- Medication Summary
- Diseases and Conditions (ICD–10 AM coding)
- Health interventions (ACHI coding)
- Pregnancy
- Disability
- Implants
- Physical Findings
- Diagnostic Tests
- Social History
- Treatment Recomendations

- **Alergije in ostale preobčutljivosti**

59037007 | Preobčutljivost za zdravilo

Datum	Manifestacija	Ime alergena
01.01.2000	angioedem	Hiconcil 250 mg/5 ml prašek za peroralno suspenzijo

- **Bolezni in stanja**

E10 | Insulin-dependent diabetes mellitus

Datum	BPI	Zavod
20.01.2017	10321	ZD Kamnik
20.01.2017	10321	ZD Kamnik

K35 | Akute Appendizitis

Datum	BPI	Zavod
04.03.2015	10321	ZD Kamnik

CPRD Privacy policy

Basis

- Sharing health records is defined in a **unified manner ,** pre-established procedures
- **Contractual data protection obligations** for Software vendors and healthcare workers
- Legal base: Access to personal data solely for **the purpose of treating** an individual.
- **Preventing unauthorized access :** access rights (users database), cryptographic resources

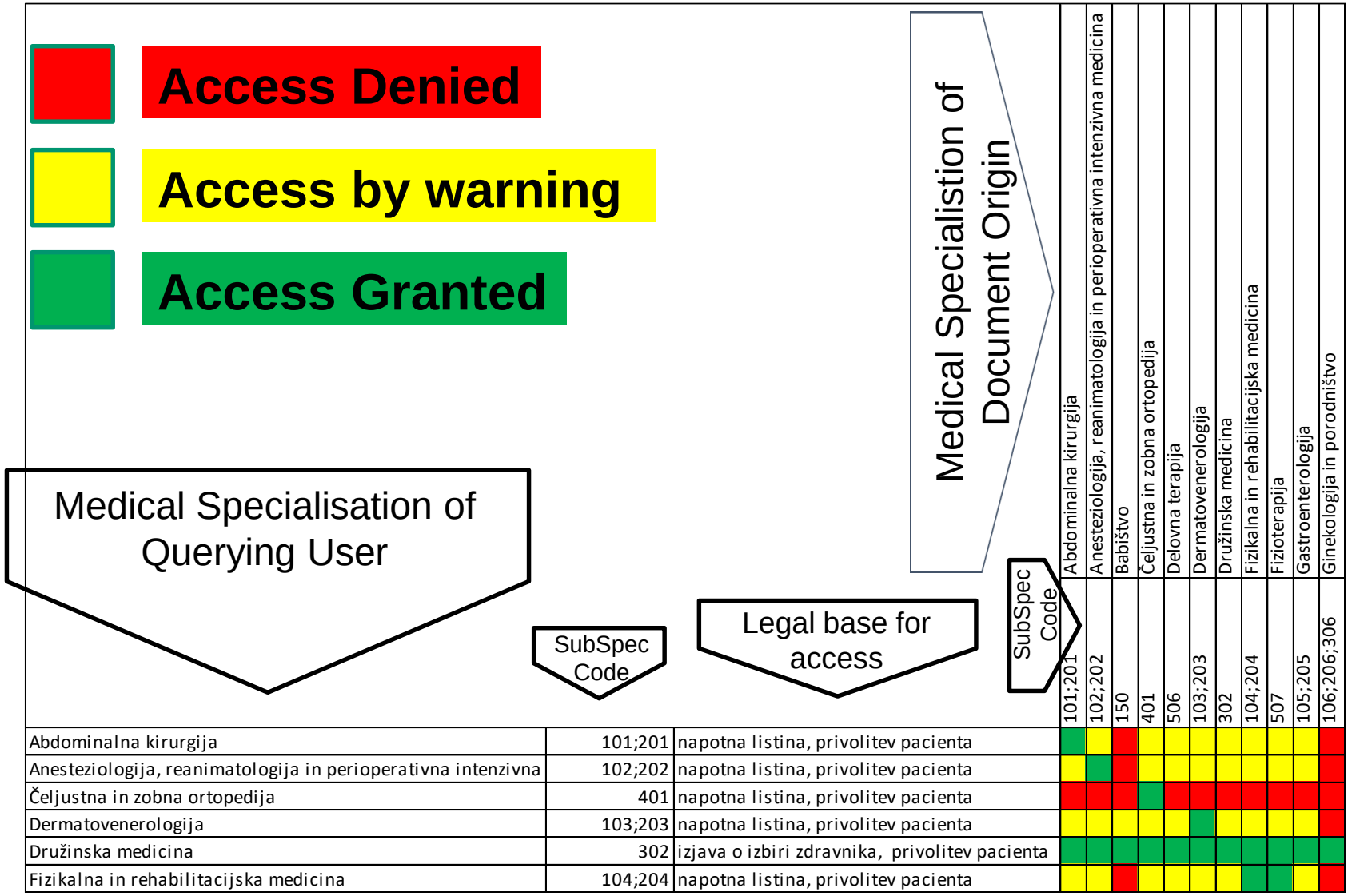
Method of implementation

- Providing **full traceability** of all processes of personal data
- **Implemented active access policies** based on application and user authorization (**access matrix**) –default restrictions
- **Personal doctors** have **full access**
- **eReferral or patient consent required** for other doctors
- User rights granted by **medical specialisation**

Patient's decisions

- **Legal base for default sharing of health records** to the **full extent**
- **Patient Opt-out** possible for Patient Summary
- **Patient consent** needed to override default restrictions for documents other than Patient Summary

CRPD Read Access Matrix



Abdominalna kirurgija	101;201	napotna listina, privolitev pacienta											
Anesteziologija, reanimatologija in perioperativna intenzivna	102;202	napotna listina, privolitev pacienta											
Čeljustna in zobna ortopedija	401	napotna listina, privolitev pacienta											
Dermatovenerologija	103;203	napotna listina, privolitev pacienta											
Družinska medicina	302	izjava o izbiri zdravnika, privolitev pacienta											
Fizikalna in rehabilitacijska medicina	104;204	napotna listina, privolitev pacienta											

REPUBLIKA SLOVENIJA
MINISTRSTVO ZA ZDRAVJE

NIJZ Nacionalni inštitut za javno zdravje

zdravje

Naložba v vašo prihodnost
OPERACIJO DELNO FINANCIRA EVROPSKA UNIJA
Evropski socialni sklad

Electonic Registry of Vaccinated Persons eRVP

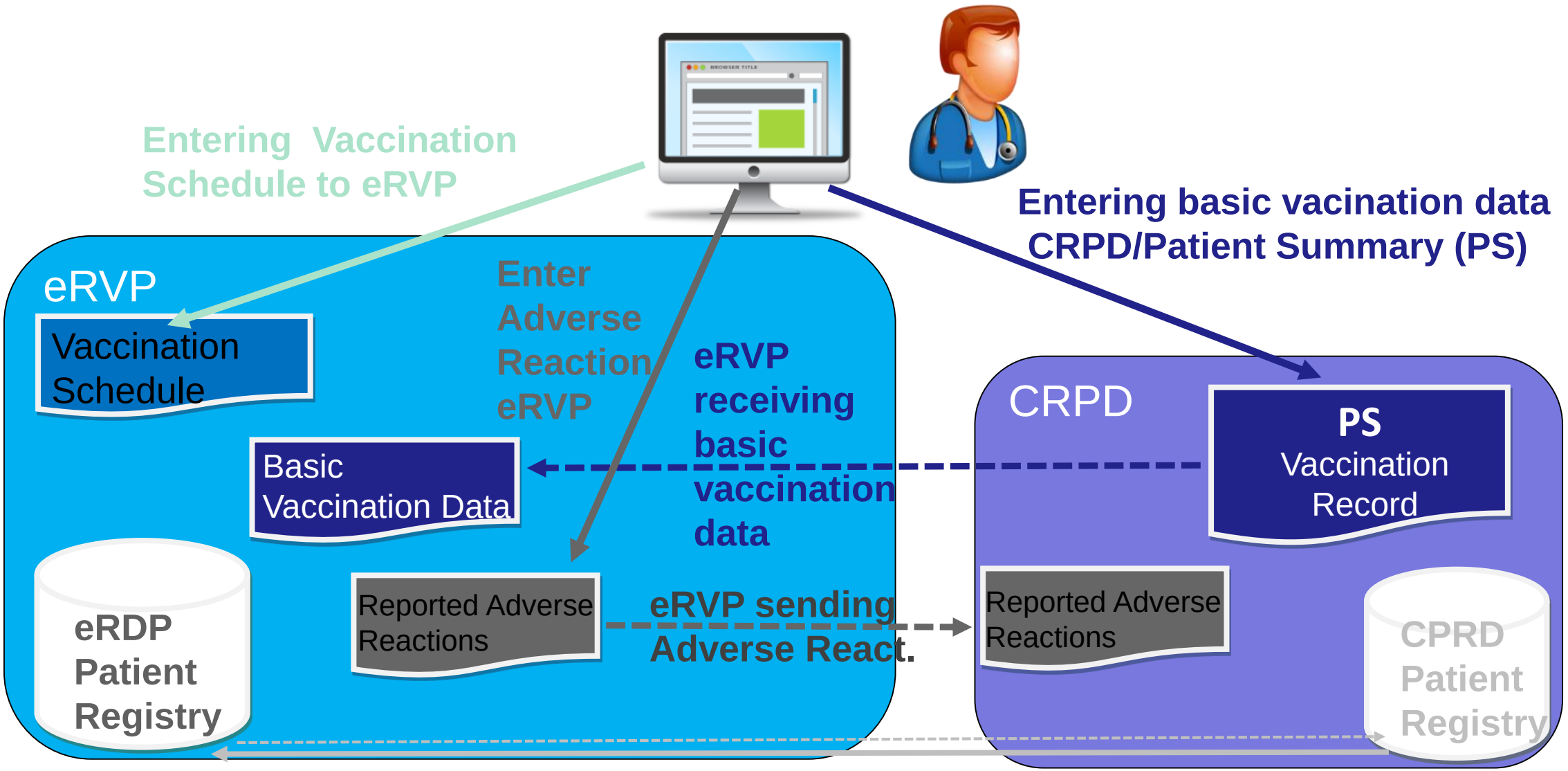
Surveillance and Monitoring od Vaccinations and Adverse Reactions

zdravje

eRVP scope

- All vaccinations administred in Slovenia recorded
- Patient‘s vaccinations and adverse reactions history
- Managing vaccination programs (pediatricians)
- Population vaccination data by disease, age group, geographic areas etc.
- Surveillance, monitoring, policy, planning
- Efficient control of infectious diseases

eRVP and CRPD integration



eRVP receivng basic data (newborns, patient‘s chosen pediatrician …)

REPUBLIKA SLOVENIJA
MINISTRSTVO ZA ZDRAVJE

NIJZ Nacionalni inštitut za javno zdravje

zdravje

Naložba v vašo prihodnost
OPERACIJO DELNO FINANCIRA EVROPSKA UNIJA
Evropski socialni sklad

Patient Portal zVEM

One Website for All Health Information

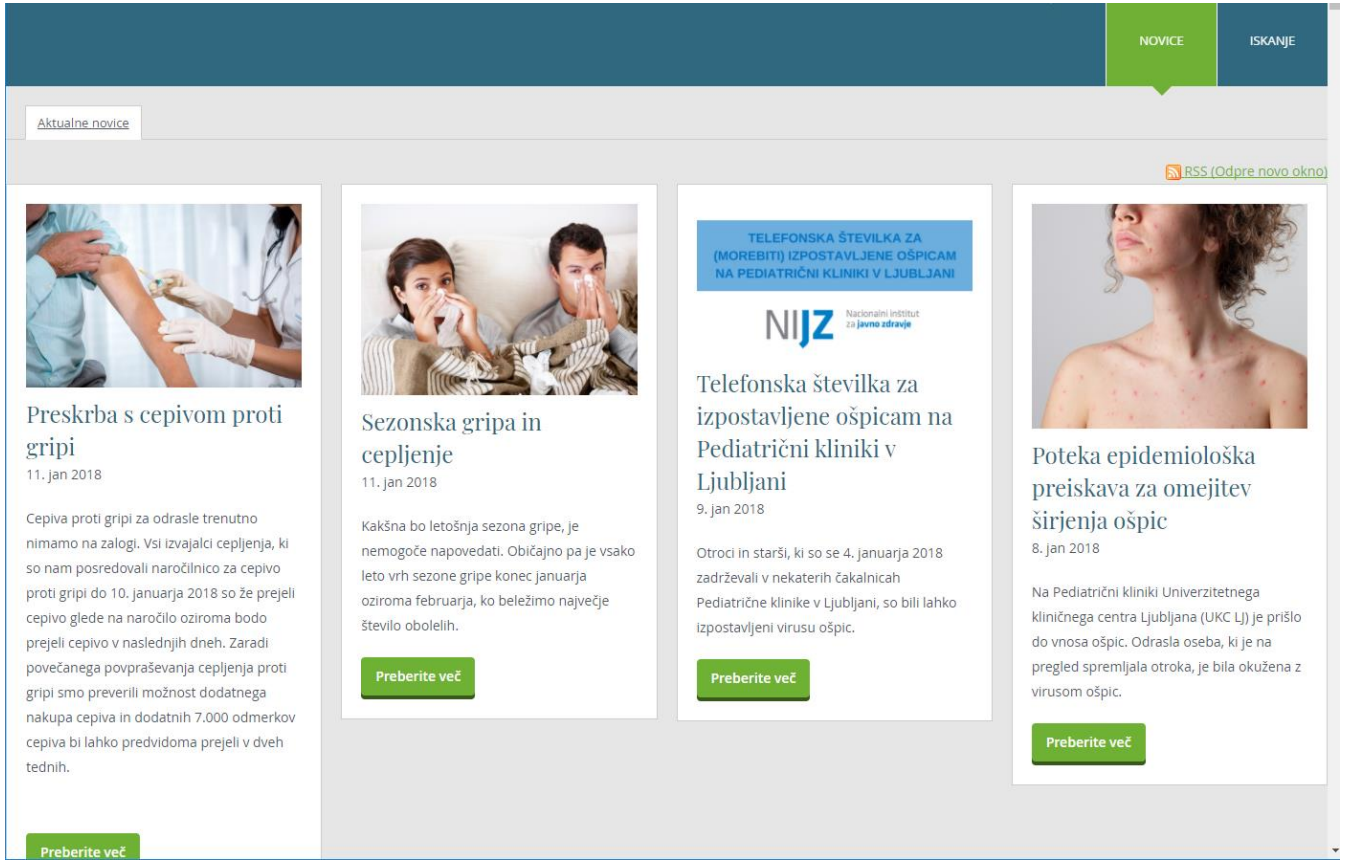
zdravje

Patient Portal zVEM

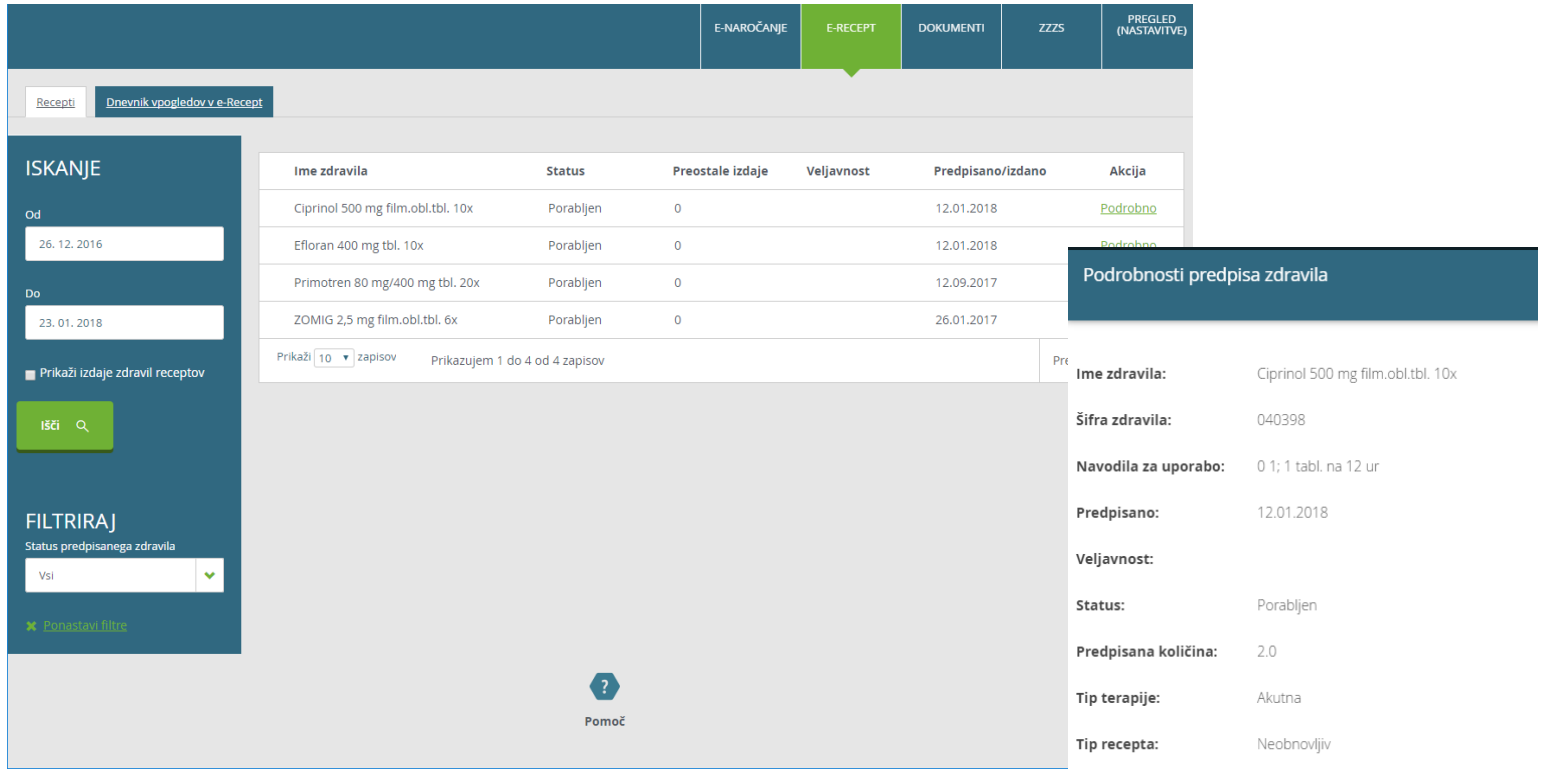
- https://zvem.ezdrav.si
  - Digital certificate needed to access personal data
- Patient access to eAppointment
  - eReferrals, eAppointments, health services and healthcare providers
- Patient access to ePrescription
  - ePrescriptions, dispensed meds
- Patient access to CRPD
  - Discharge letters, Patient Summary Records, Patient Consents

Patient Portal zVEM

- eLearning rooms
- Survey Tool
- Forum
- Data collection
- Useful info, news

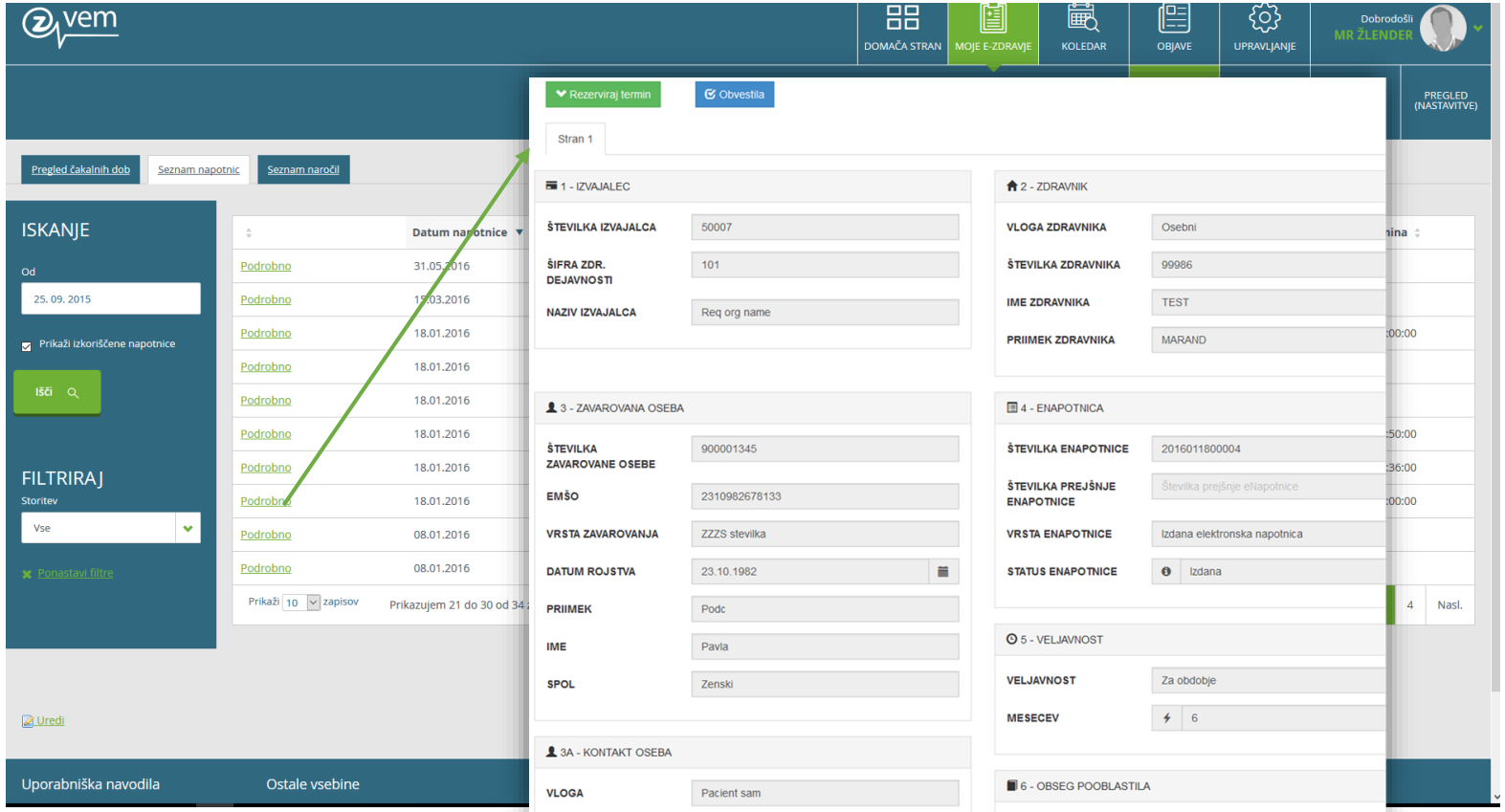


Patient Portal - ePrescription



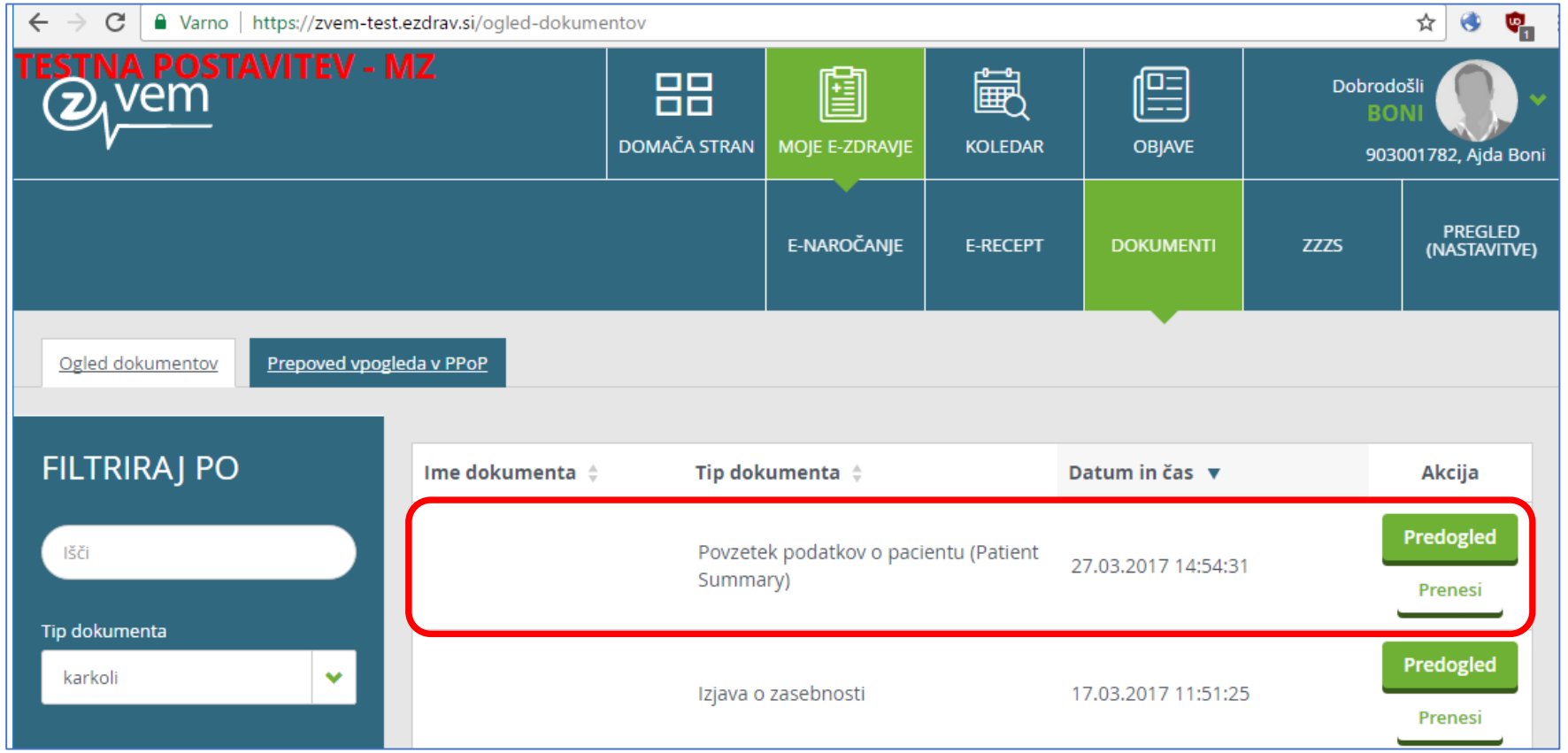
zdravje

Patient Portal - eAppointment

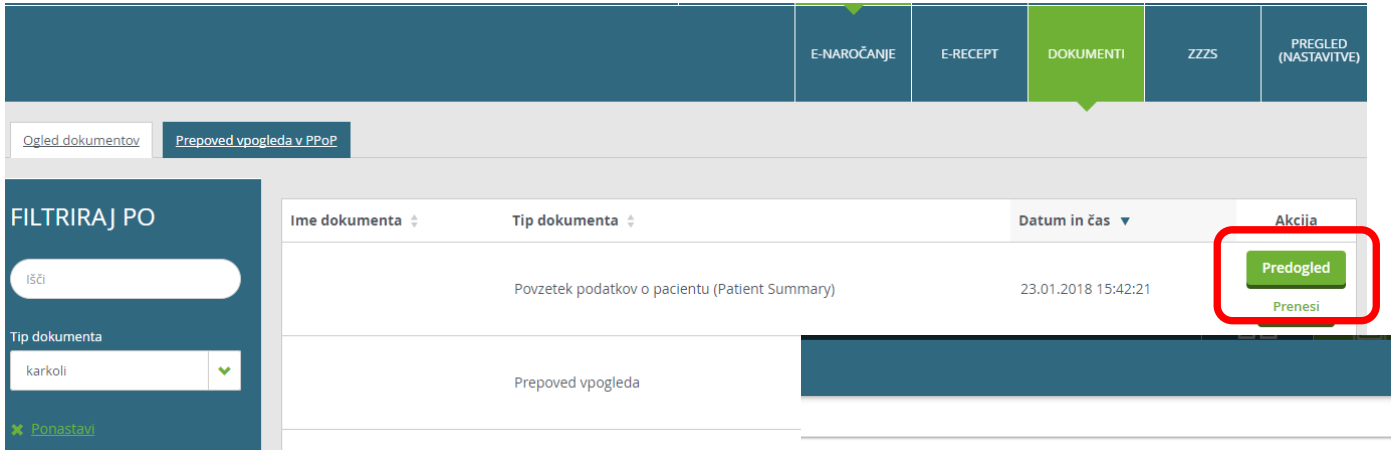


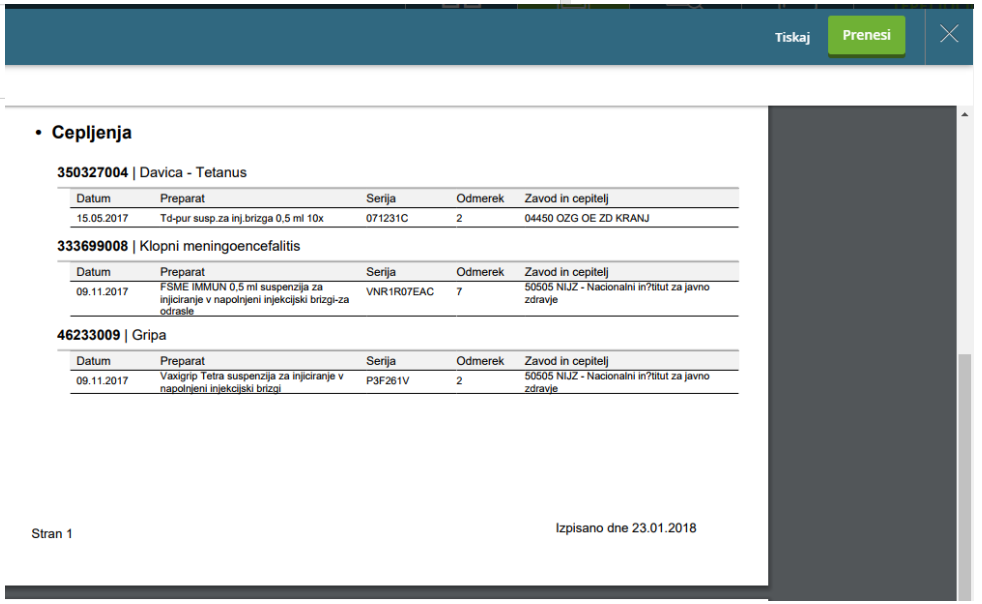
zdravje

Patient Portal - CPRD



Patient Portal – Patient Summary

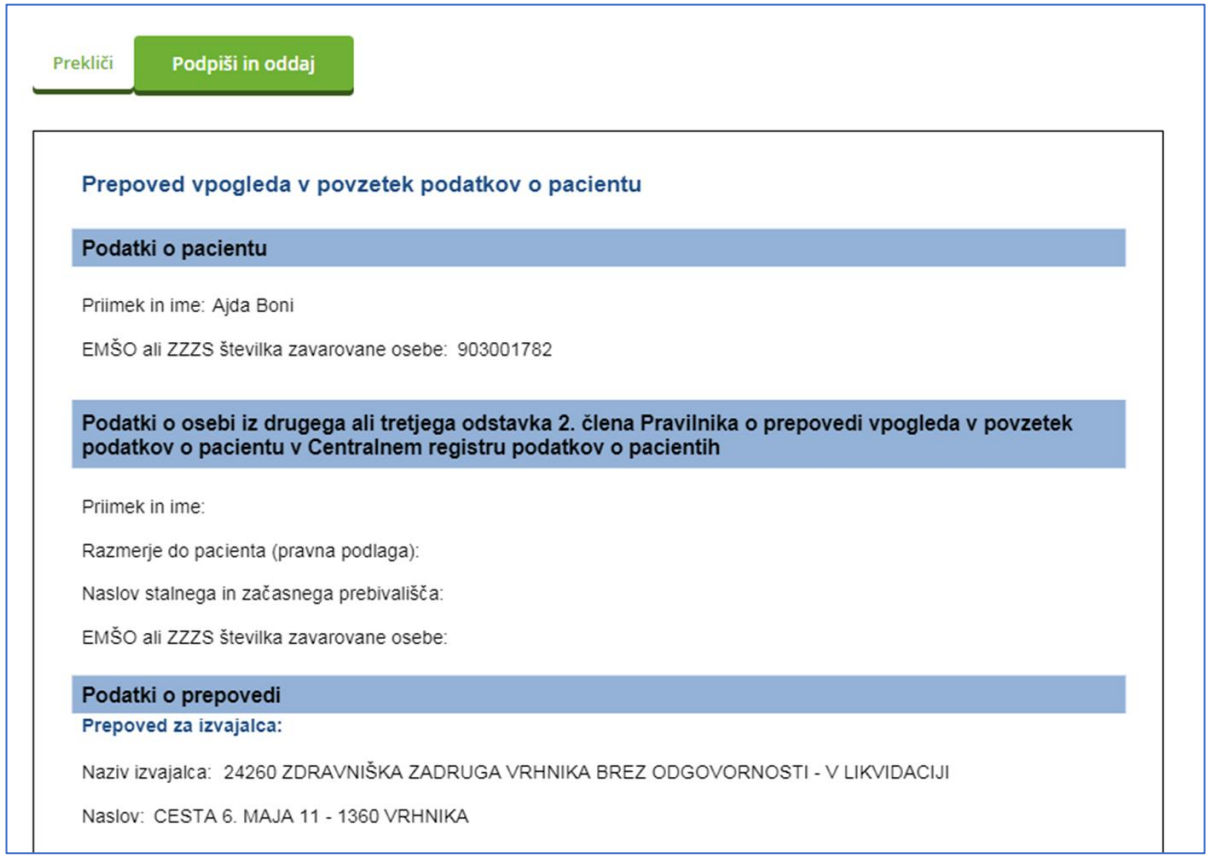




zdravje

Patient Portal – Document Submission

Patient‘s right
to forbide access
to Patient
Summary Records



REPUBLIKA SLOVENIJA
MINISTRSTVO ZA ZDRAVJE

zdravje

Naložba v vašo prihodnost
OPERACIJO DELNO FINANCIRA EVROPSKA UNIJA
Evropski socialni sklad

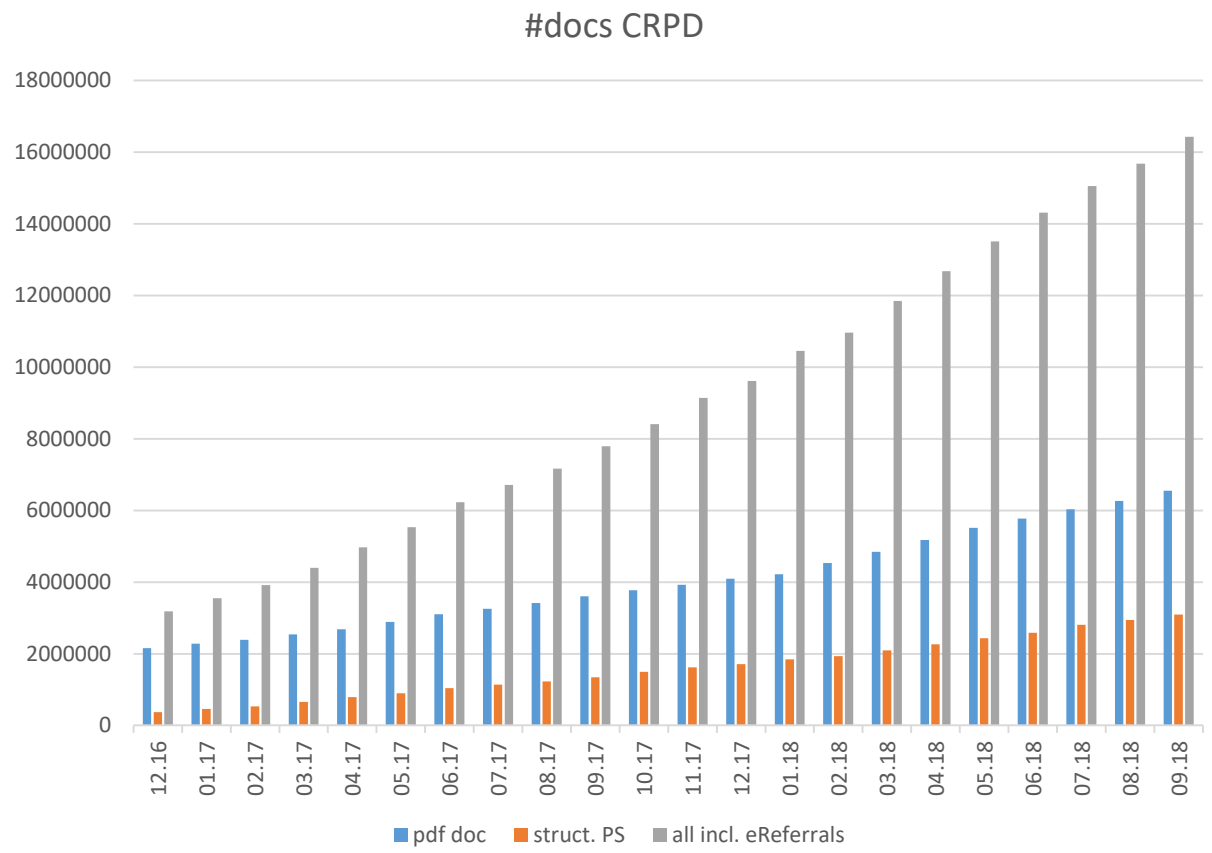
Slovenian eHealth in Figures

Current Deployment of eHealth Services

zdravje

CRPD deployment

- Launched in 2013, limited extent
- in 2016 full, incl. Patient Summary
- 04.2019:
  - > 1,4 Mio Patients (> 70% population) have Discharge Letter or Medical Examination Report
  - > 1,2 MIO Patients have Patient Summary Record
  - > 8 Mio HC documents – 7 MIO Medical Examination Reports, 1 MIO Discharge letters
  - > 4 Mio Patient Summary Records



Thank you!

mate.bestek@nijz.si

mbes@itu.dk

@matebestek