



REPUBLIKA SLOVENIJA
MINISTRSTVO ZA ZDRAVJE

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

eHealth in Slovenia

October 2019

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National Institute of Public Health

Healthcare Informatics Centre

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eHealth in Slovenia

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



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

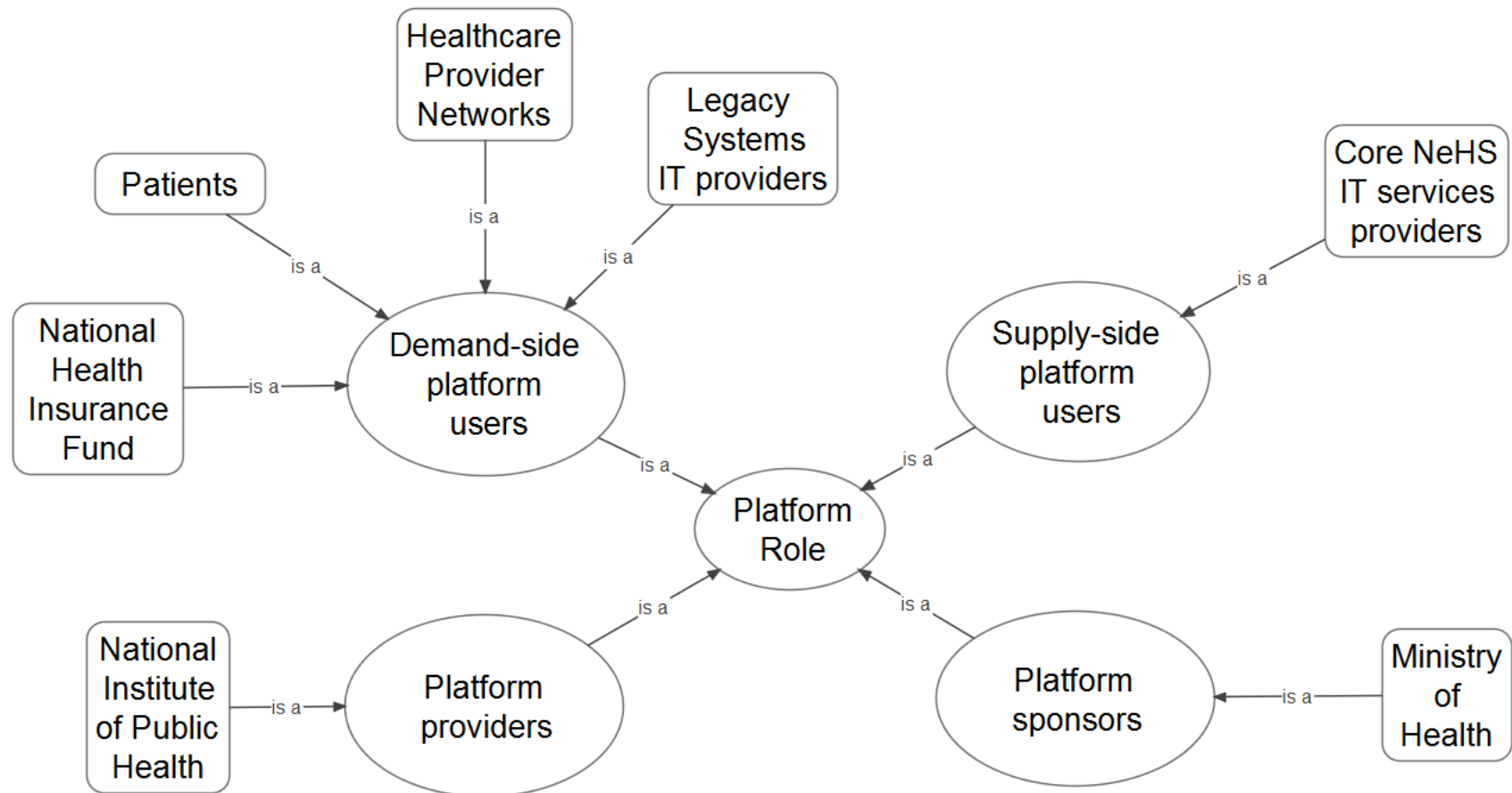


eHealth in Slovenia

- 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)

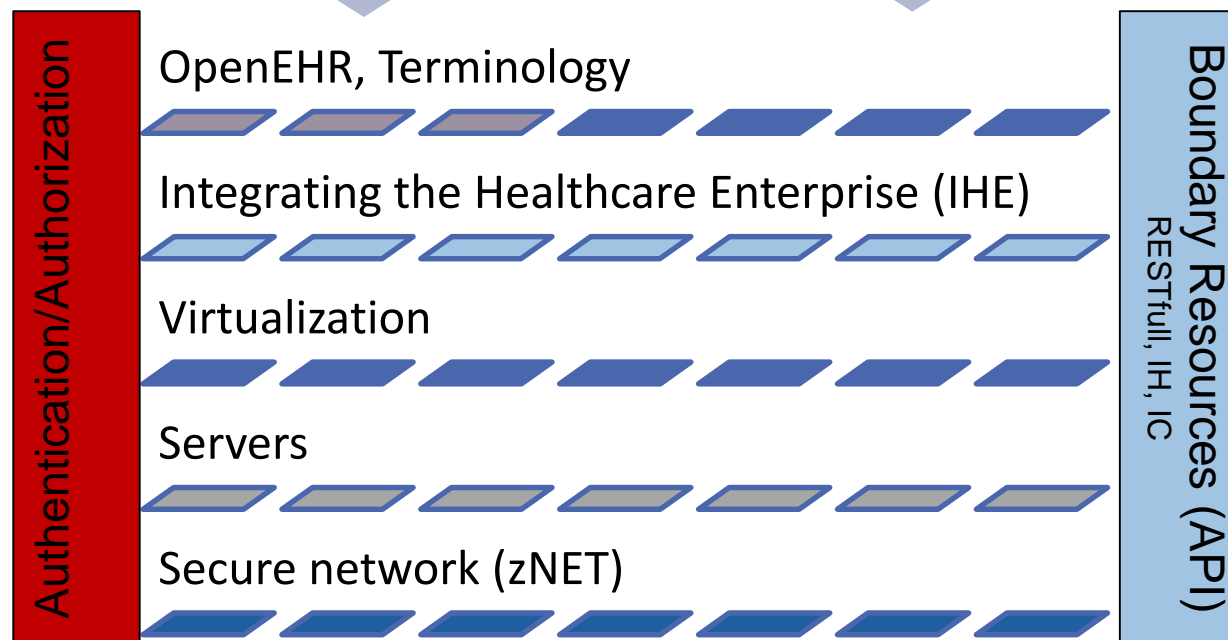
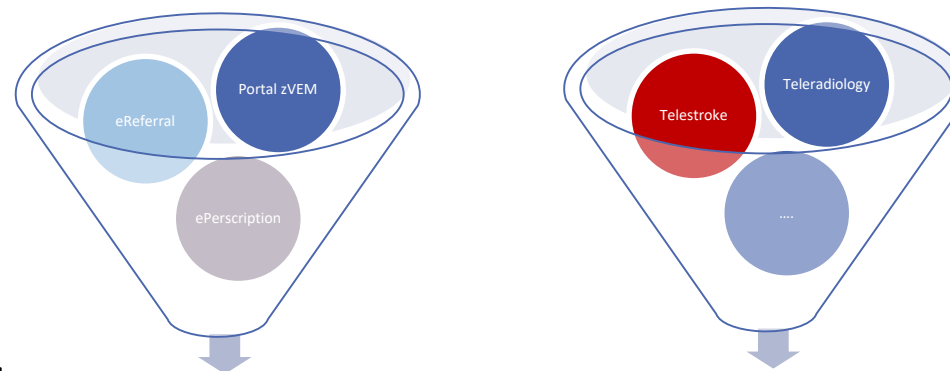


eHealth Platform roles





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
- **Central Registry of Patient Data (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** electronic **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



eHealth User Account Database

Authentication, Authorisation and
Management of eHealth users



eHealth User Accounts Database

- All registered healthcare organisations and professionals
 - automatically via connection to National Registry of Healthcare Providers and Professionals
 - Registered healthcare 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



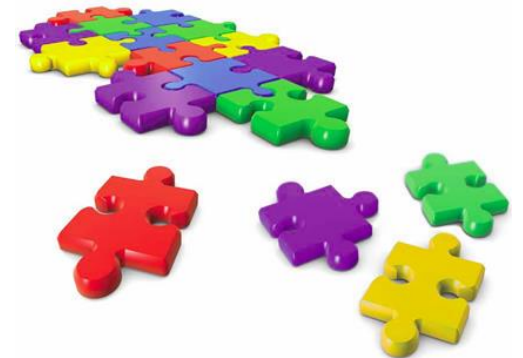
eHealth User Roles

- 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

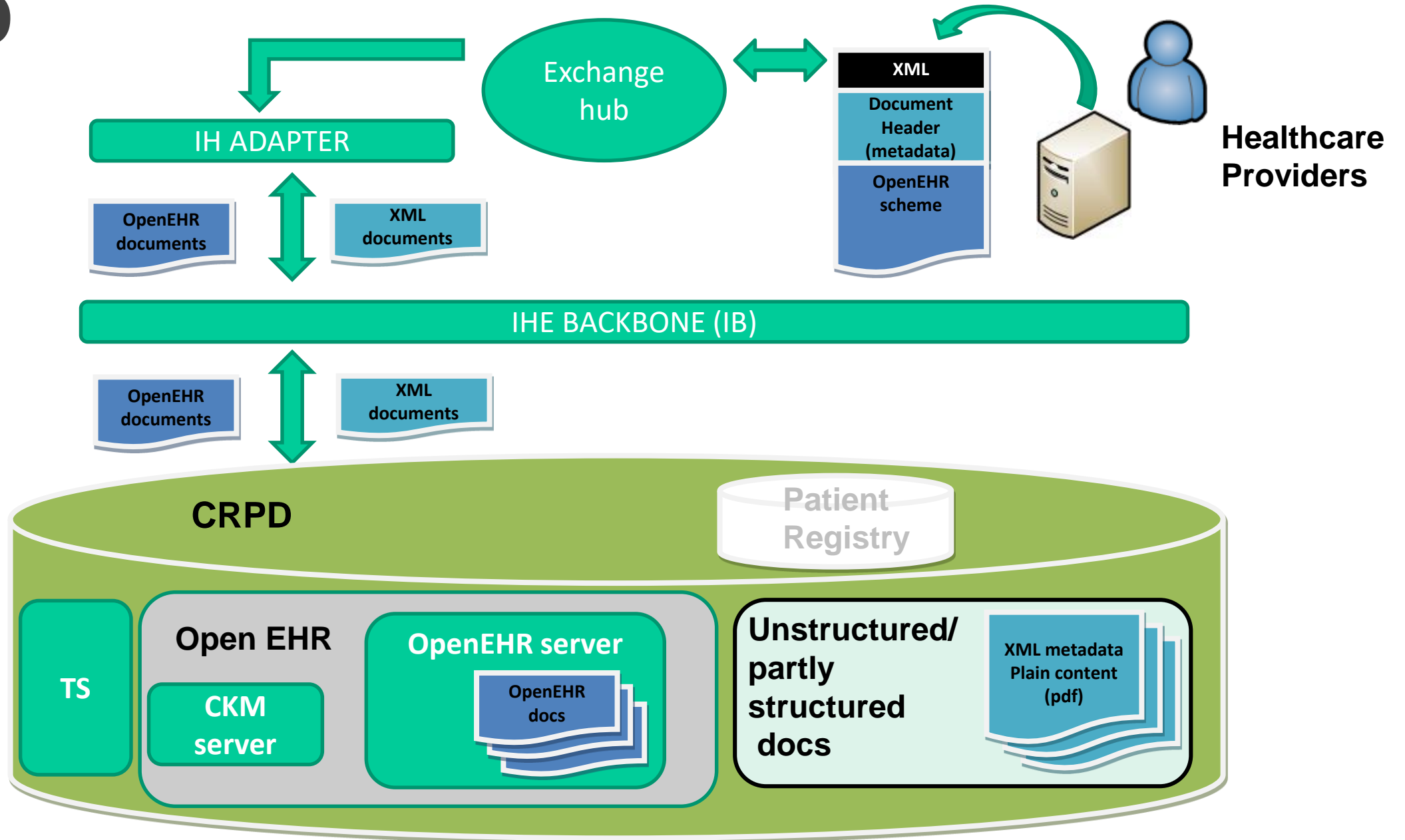


Central Registry of Patient (Data CPRD)

The Heart of Slovenian eHealth System



CRPD





CRPD building blocks

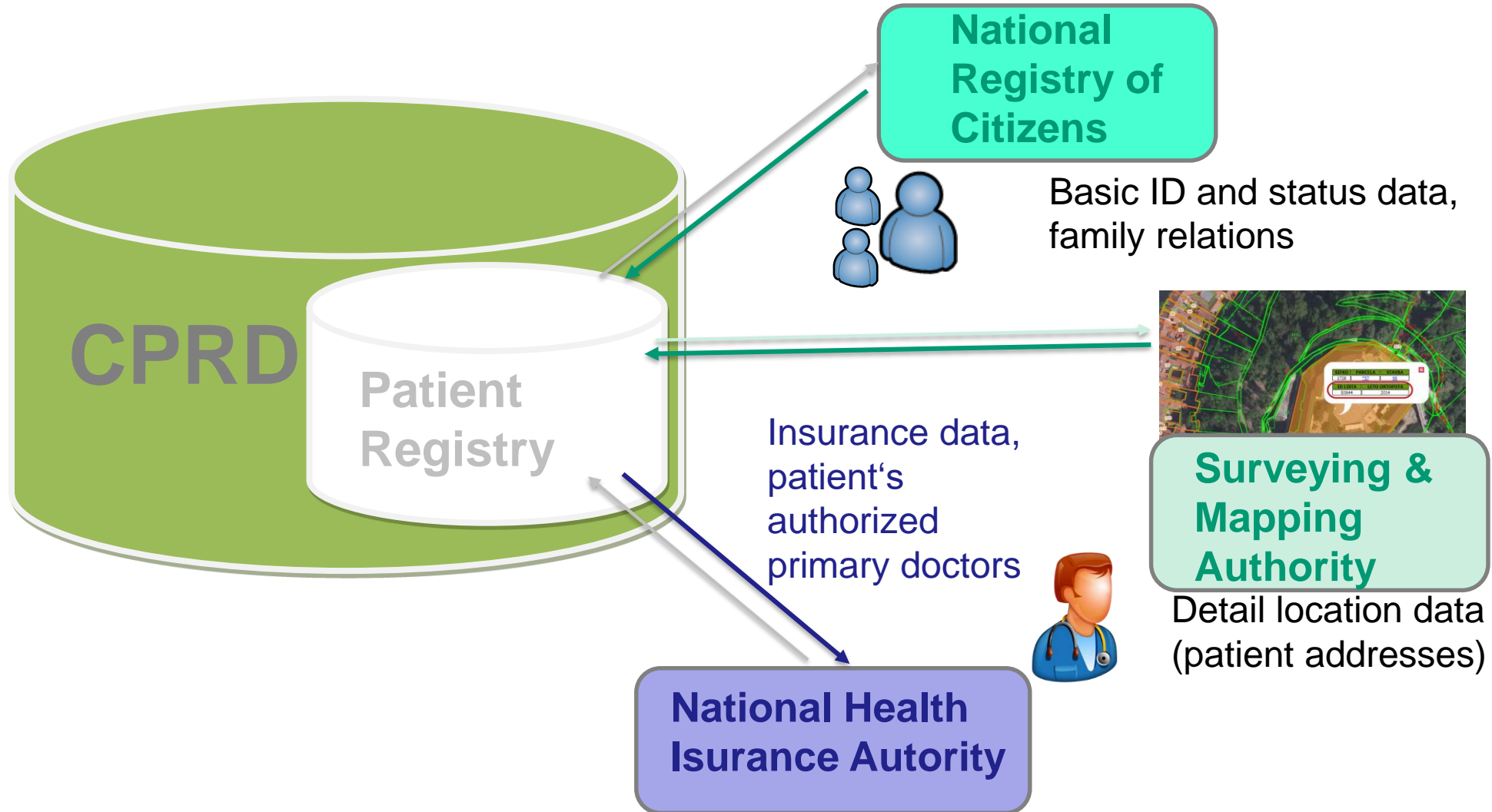
- **IB:** Interoperable **b**ackbone:
integration IHE profiles for health data exchange
 - <https://www.tiani-spirit.com/ihe>
- IH adapter: interface customized according national specifics
- Think!EHR: management of structured data according to OpenEHR standard
 - <http://www.marand.com/thinkehr/>



CRPD building blocks

- Terminology server HealthTerm :coding standards and terminologies
 - <http://www.carecom.com/>
- Clinical Knowledge Manager: OpenEHR standardized 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 between healthcare providers
- Data and documents to be available to patient
- Short – term storage for exchange purpose
- Data and documents submitted by patient
 - patients 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 Recommendations

• 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 Appendicitis

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

Medical Specialisation of Querying User		SubSpec Code	Legal base for access	SubSpec Code	Medical Specialisation of Document Origin
Abdominalna kirurgija	101;201	napotna listina, privolitev pacienta	101;201	Abdominalna kirurgija	
Anesteziologija, reanimatologija in perioperativna intenzivna medicina	102;202	napotna listina, privolitev pacienta	102;202	Anesteziologija, reanimatologija in perioperativna intenzivna medicina	
Čeljustna in zobna ortopedija	401	napotna listina, privolitev pacienta	150	Babištvo	
Dermatovenerologija	103;203	napotna listina, privolitev pacienta	401	Čeljustna in zobna ortopedija	
Družinska medicina	302	izjava o izbiri zdravnika, privolitev pacienta	506	Delovna terapija	
Fizikalna in rehabilitacijska medicina	104;204	napotna listina, privolitev pacienta	103;203	Dermatovenerologija	
			302	Družinska medicina	
			104;204	Fizikalna in rehabilitacijska medicina	
			507	Fizioterapija	
			105;205	Gastroenterologija	
			106;206;306	Ginekologija in porodništvo	



Access Denied



Access by warning



Access Granted



Electronic Registry of Vaccinated Persons eRVP

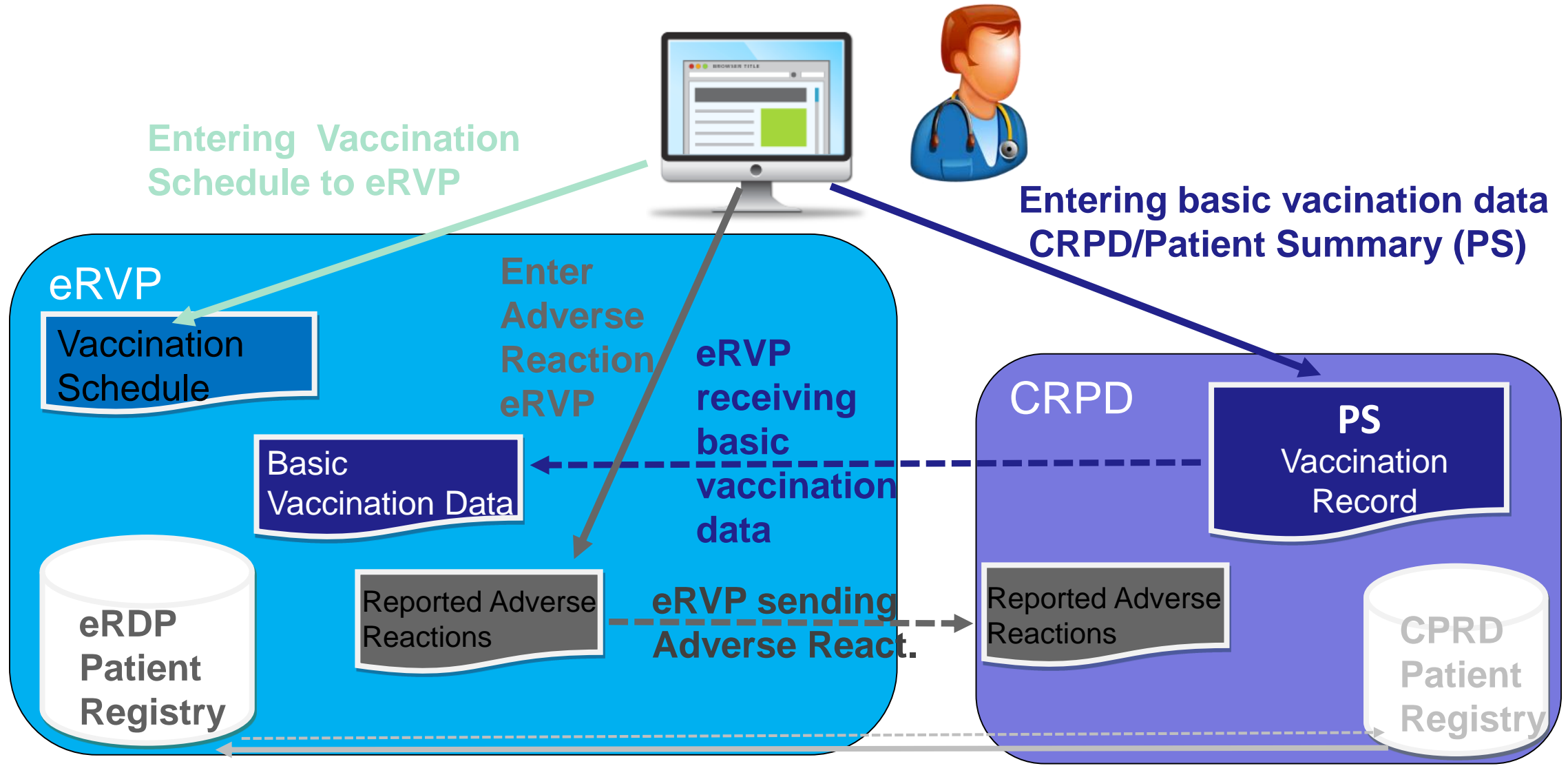
Surveillance and Monitoring of
Vaccinations and Adverse Reactions



eRVP scope

- All vaccinations administered 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 receiving basic data (newborns, patient's chosen pediatrician ...)



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Patient Portal zVEM

One Website for All Health Information





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

The screenshot displays the Patient Portal zVEM interface. At the top right, there are navigation buttons for 'NOVICE' (News) and 'ISKANJE' (Search). Below the navigation bar, there is a section for 'Aktualne novice' (Actual news) with an RSS feed link. The main content area features four news articles:

- Preskrba s cepivom proti gripi** (11. jan 2018): An article about flu vaccination, mentioning that the supply is low and that patients who ordered the vaccine by January 10, 2018, will receive it in the following days.
- Sezonska gripa in cepljenje** (11. jan 2018): An article about seasonal flu and vaccination, noting that the flu season is expected to peak in late January or early February.
- Telefonska številka za izpostavljene ošpicam na Pediatrični kliniki v Ljubljani** (9. jan 2018): An article from NIJZ (National Institute for Public Health) regarding a telephone number for measles cases at the Pediatric Clinic in Ljubljana.
- Poteka epidemiološka preiskava za omejitve širjenja ošpic** (8. jan 2018): An article about an epidemiological investigation for measles at the University Medical Center in Ljubljana.

Each article includes a 'Preberite več' (Read more) button. The website also features a dark blue header with navigation options and a green sidebar on the left.



Patient Portal - ePrescription

The screenshot displays the 'e-RECEPT' section of the Patient Portal. The main navigation bar includes 'E-NAROČANJE', 'E-RECEPT', 'DOKUMENTI', 'ZZS', and 'PREGLED (NASTAVITVE)'. The 'e-RECEPT' section is active, showing a list of prescriptions under the 'Recepti' tab. The list includes columns for 'Ime zdravila', 'Status', 'Preostale izdaje', 'Veljavnost', 'Predpisano/izdano', and 'Akcija'. A detailed view for 'Ciprinol 500 mg film.obl.tbl. 10x' is shown on the right, listing various details such as 'Šifra zdravila', 'Navodila za uporabo', 'Predpisano', 'Veljavnost', 'Status', 'Predpisana količina', 'Tip terapije', 'Tip recepta', 'Vrsta listine', and 'Razlog obravnave'.

Ime zdravila	Status	Preostale izdaje	Veljavnost	Predpisano/izdano	Akcija
Ciprinol 500 mg film.obl.tbl. 10x	Porabljen	0		12.01.2018	Podrobno
Efloran 400 mg tbl. 10x	Porabljen	0		12.01.2018	Podrobno
Primotren 80 mg/400 mg tbl. 20x	Porabljen	0		12.09.2017	
ZOMIG 2,5 mg film.obl.tbl. 6x	Porabljen	0		26.01.2017	

Podrobnosti predpisa zdravila

Ime zdravila: Ciprinol 500 mg film.obl.tbl. 10x
Šifra zdravila: 040398
Navodila za uporabo: 0 1; 1 tabl. na 12 ur
Predpisano: 12.01.2018
Veljavnost:
Status: Porabljen
Predpisana količina: 2.0
Tip terapije: Akutna
Tip recepta: Neobnovljiv
Vrsta listine: ZeleniRecept
Razlog obravnave: BolezenPreventiva



Patient Portal - eAppointment

The screenshot displays the 'eAppointment' section of the Patient Portal. The interface is divided into several panels:

- Top Navigation:** Includes the 'vem' logo, navigation icons for 'DOMAČA STRAN', 'MOJE E-ZDRAVJE', 'KOLEDAR', 'OBJAVE', 'UPRAVLJANJE', and a user profile for 'MR ŽLENDER'.
- Search Panel (ISKANJE):** Features a search bar with '25. 09. 2015' entered, a 'Prikaži izkoriščene napotnice' checkbox, and a 'FILTRIRAJ' section with a 'Vse' filter.
- Search Results Table:** A table with columns for 'Datum napotnice' and 'Podrobno'. It lists several appointments from 2015 and 2016. A green arrow points from the 'Podrobno' link of the 18.01.2016 appointment to the details panel.
- Appointment Details Panel:** A modal window showing details for the selected appointment, organized into sections:
 - 1 - IZVAJALEC:** ŠTEVILKA IZVAJALCA (50007), ŠIFRA ZDR. DEJAVNOSTI (101), NAZIV IZVAJALCA (Req org name).
 - 2 - ZDRAVNIK:** VLOGA ZDRAVNIKA (Osebni), ŠTEVILKA ZDRAVNIKA (99986), IME ZDRAVNIKA (TEST), PRIIMEK ZDRAVNIKA (MARAND).
 - 3 - ZAVAROVANA OSEBA:** ŠTEVILKA ZAVAROVANE OSEBE (900001345), EMŠO (2310982678133), VRSTA ZAVAROVANJA (ZZS stevilka), DATUM ROJSTVA (23.10.1982), PRIMEK (Podc), IME (Pavla), SPOL (Zenski).
 - 4 - ENAPOTNICA:** ŠTEVILKA ENAPOTNICE (2016011800004), ŠTEVILKA PREJŠNJE ENAPOTNICE (Številka prejšnje eNapotnice), VRSTA ENAPOTNICE (Izdana elektronska napotnica), STATUS ENAPOTNICE (Izdana).
 - 5 - VELJAVNOST:** VELJAVNOST (Za obdobje), MESECEV (6).
 - 6 - OBSEG POOBLASTILA:** VLOGA (Pacient sam).
- Bottom Panel:** Includes 'Uporabniška navodila' and 'Ostale vsebine'.



Patient Portal - CPRD

TESTNA POSTAVITEV - MZ

zvem

DOMAČA STRAN MOJE E-ZDRAVJE KOLEDAR OBJAVE

Dobrodošli **BONI**
903001782, Ajda Boni

E-NAROČANJE E-RECEPT DOKUMENTI ZZS PREGLED (NASTAVITVE)

Ogled dokumentov **Prepoved vpogleda v PPOp**

FILTRIRAJ PO

Išči

Tip dokumenta
karkoli

Ime dokumenta	Tip dokumenta	Datum in čas	Akcija
	Povzetek podatkov o pacientu (Patient Summary)	27.03.2017 14:54:31	Predogled Prenesi
	Izjava o zasebnosti	17.03.2017 11:51:25	Predogled Prenesi



Patient Portal – Patient Summary

The screenshot displays the Patient Portal interface. At the top, there is a navigation bar with tabs: E-NAROČANJE, E-RECEPT, DOKUMENTI (highlighted in green), ZZS, and PREGLED (NASTAVITVE). Below the navigation bar, there are two buttons: 'Ogled dokumentov' and 'Prepoved vpogleda v PPOp'. On the left side, there is a 'FILTRIRAJ PO' section with a search input field containing 'išči', a dropdown menu for 'Tip dokumenta' set to 'karkoli', and a 'Ponastavi' button. The main content area shows a table of documents:

Ime dokumenta	Tip dokumenta	Datum in čas	Akcija
	Povzetek podatkov o pacientu (Patient Summary)	23.01.2018 15:42:21	Predogled Prenesi
	Prepoved vpogleda		

At the bottom right of the document list, there are buttons for 'Tiskaj' and 'Prenesi'. Below the document list, there is a section titled '• Cepljenja' (Vaccinations) with three entries:

- 350327004 | Davica - Tetanus**

Datum	Preparat	Serija	Odmerek	Zavod in cepitelj
15.05.2017	Td-pur susp.za inj.brizga 0,5 ml 10x	071231C	2	04450 OZG OE ZD KRANJ
- 333699008 | Klopni meningoencefalitis**

Datum	Preparat	Serija	Odmerek	Zavod in cepitelj
09.11.2017	FSME IMMUN 0,5 ml suspenzija za injiciranje v napolnjeni injekcijski brizgi-za odstranjevanje	VNR1R07EAC	7	50505 NIJZ - Nacionalni inštitut za javno zdravje
- 46233009 | Gripa**

Datum	Preparat	Serija	Odmerek	Zavod in cepitelj
09.11.2017	Vaxigrip Tetra suspenzija za injiciranje v napolnjeni injekcijski brizgi	P3F261V	2	50505 NIJZ - Nacionalni inštitut za javno zdravje

At the bottom of the page, it says 'Stran 1' and 'Izpisano dne 23.01.2018'. The @zdravje logo is visible in the bottom left corner.



Patient Portal – Document Submission

Patient's right
to forbide access
to Patient
Summary Records

Prekliči

Podpiši in oddaj

Prepoved vpogleda v povzetek podatkov o pacientu

Podatki o pacientu

Priimek in ime: Ajda Boni

EMŠO ali ZZS številka zavarovane osebe: 903001782

Podatki o osebi iz drugega ali tretjega odstavka 2. člena Pravilnika o prepovedi vpogleda v povzetek podatkov o pacientu v Centralnem registru podatkov o pacientih

Priimek in ime:

Razmerje do pacienta (pravna podlaga):

Naslov stalnega in začasnega prebivališča:

EMŠO ali ZZS številka zavarovane osebe:

Podatki o prepovedi

Prepoved za izvajalca:

Naziv izvajalca: 24260 ZDRAVNIŠKA ZADRUGA VRHNIKA BREZ ODGOVORNOSTI - V LIKVIDACIJI

Naslov: CESTA 6. MAJA 11 - 1360 VRHNIKA



Slovenian eHealth in Figures

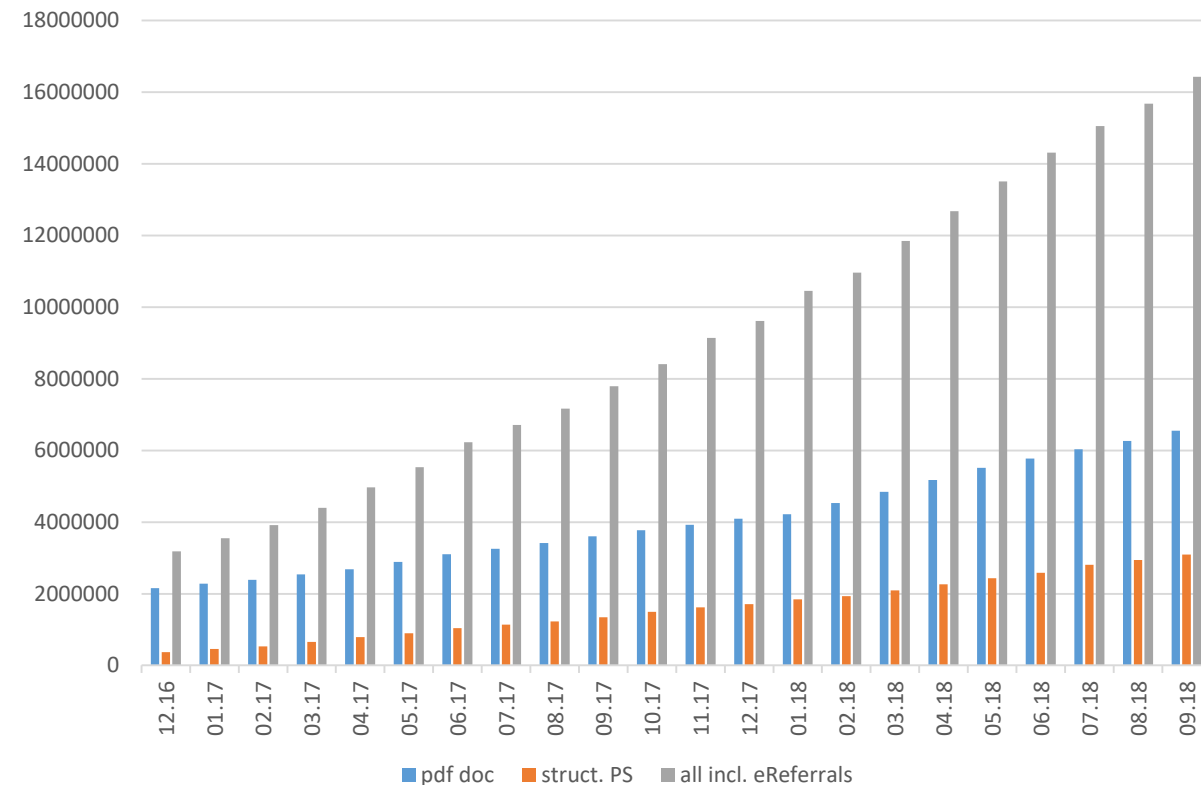
Current Deployment of eHealth Services



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

#docs CRPD





Thank you!

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