



# **Heliant Health Information System: EuroRec Experience**

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# About Heliant

- Based on a concept of integration of healthcare institution around patient-centric electronic medical record.
- Supports all kinds of interactions among patients and healthcare professionals within the institution.
- Interfaces to key holders in Serbian healthcare system, such as Republic Health Insurance Fund and Institute of Public Health.
- Applicable in primary care healthcare centres, general and special hospitals.

# Heliant history

- Early development for **University Children's Hospital** in Belgrade
- **Serbian Health Project (SHP)**, 2006-8, funded by the **World Bank** – implemented by the **Ministry of Health (MoH)**: HIS for general hospitals in Kraljevo, Valjevo and Vranje, code owned by MoH
- **PHC software customization**, 2007-9 – development of PHC specific use cases, several primary healthcare centres and Children's Hospital in Novi Sad
- **Delivery of Improved Local Services (DILS)**, 2009-12, World Bank, MoH: ~60 PHCs (including earlier ones)
  - DILS supported **MoH PHC certification** of 8 SW in Serbia
- **MoH IT rulebook certification**, 5.11.2010
- **EuroRec**, 9.12.2010 - **EuroRec Seal Level 2** for both HIS and PHC
- **SHPAF**, 2010-11, World Bank, MoH – 10 new hospitals  **heliant**

# Heliant in numbers – October 2011

- Implemented or in process of implementation in
  - 72 primary healthcare centres
  - 15 hospitals
  - 1 gerontological centre
- Used by 12.000 healthcare professionals in their everyday practice
- +2.000.000 examinations
- +1.000.000 printed prescriptions
- +5.000.000 HIF services

# Heliant technical details

- NO ADDITIONAL LICENCES! Based on free and open source software
- Multitiered architecture with centralized database
- Interoperability with other clinical, laboratory and PACS systems based on HL7 and DICOM standards
- Used technologies:
  - Java Enterprise Edition
  - JBoss application server
  - MySQL
  - EJB 3.0 / JPA
  - JReports
  - dcm4che

# Security and data integrity

- The user account can be granted only necessary roles.
- Explicit access permissions can be set on individual data items.
- Supported login with certificates and smart cards.
- The data is deleted only on the logical level - after deletion, the medical data is not accessible to users, but it will permanently remain in the database.
- Old values of changed data are recorded. For every change, a record is being made about the user who entered or modified data, and the time when this action was performed.

# Heliant Modules

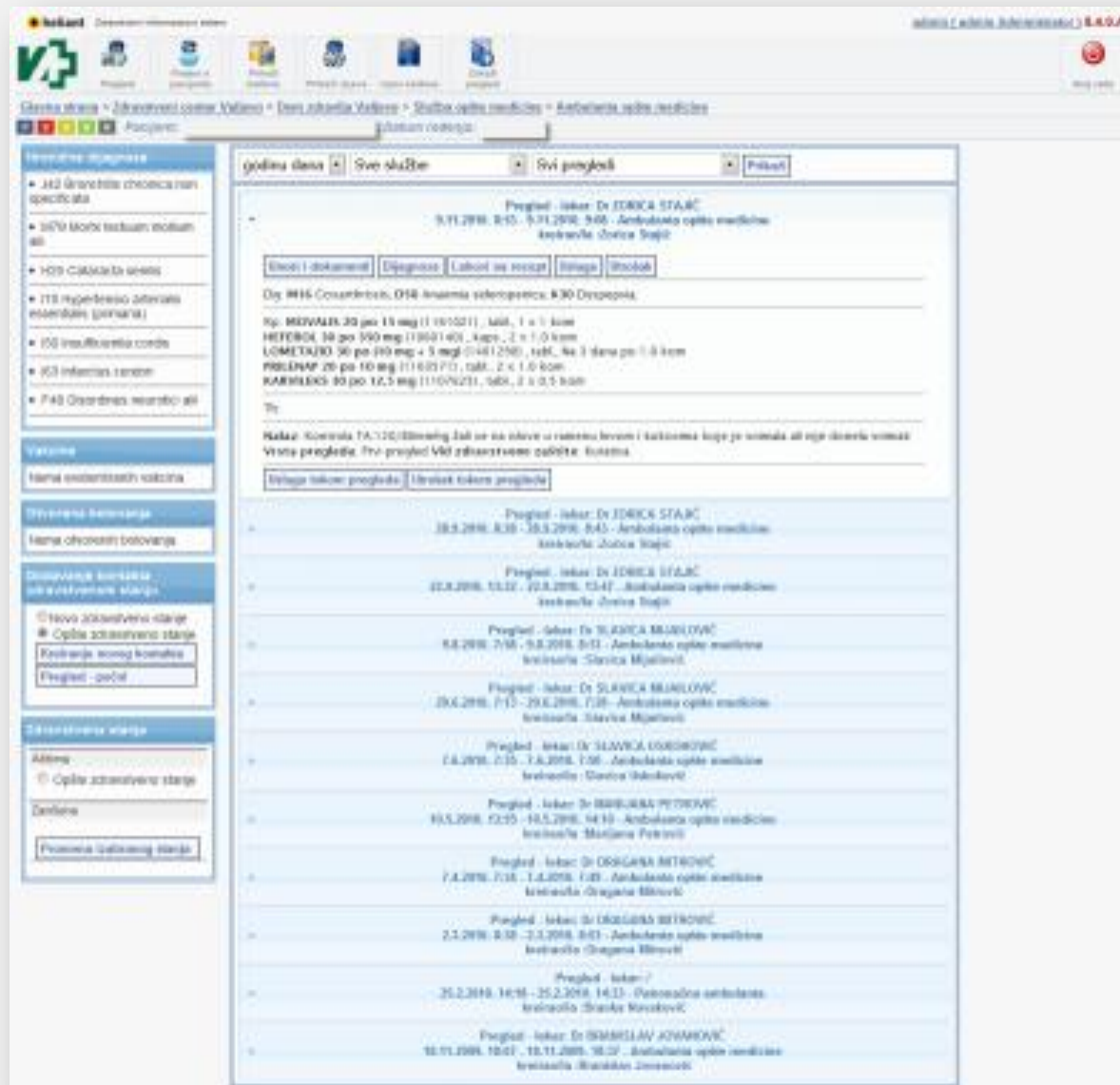


# Electronic patient record (EPR)

- Data: patient, examinations, hospitalizations, diagnoses, findings, case history, internal and external referrals, results of laboratory and histopathological analyses, medical procedures, operations, prescribed and administered medications, applied therapies and provided services.
- Items in electronic patient record are configurable and are designed for complex hierarchical structures in order to support outcomes of any healthcare activity.
- The coherent platform for outpatient and inpatient records: greatly improved efficiency, eliminated potential and duplicates and data mapping errors.



# Electronic patient record (EPR)



# Outpatient procedures

- Admission of patients and appointments management
- Recording of outpatient examinations
- Recording of the diagnoses and prescribed therapies
- Recording of the therapy administrations
- Recording of the provided services and expenditure of drugs and materials

The screenshot displays a complex medical information system interface. It features multiple panels for patient data entry, including fields for name, date of birth, and address. There are also sections for appointment management, with buttons for 'Novi' (New), 'Izmeni' (Edit), and 'Prikaži' (Show). The interface is designed for efficient data management and patient care coordination.

This screenshot shows a detailed view of a patient's medical history within the system. It includes a list of dates and corresponding medical events, such as '1. PET', '2. SSB', '3. SSB', '4. POK', '5. SSB', '6. SSB', '7. PET', '8. PET', '9. SSB', '10. SSB', '11. SSB', '12. SSB', '13. SSB', '14. SSB', '15. SSB', '16. SSB', '17. SSB', '18. SSB', '19. SSB', '20. SSB', '21. SSB', '22. SSB', '23. SSB', '24. SSB', '25. SSB', '26. SSB', '27. SSB', '28. SSB', '29. SSB', '30. SSB'. The interface allows for a comprehensive review of a patient's medical journey.

This screenshot displays a table of medical services and their associated costs. The table is organized into columns for service type, date, and cost. It provides a clear overview of the financial aspects of patient care, including various medical procedures and their respective charges.

Ime i prezime	JMBG	Osnovno osiguranje
Brj. zdravstvene knjižice	LBO	Participacija
Osnovno osiguranje	Brj. knjižice	Nosilac osiguranja
Brj. knjižice	1210	LBO nosilac
Diagnostički testovi	1210	LBO nosilac
Trudnoća	1210	LBO nosilac
Brj. dodatnih zdravstvenih usluga	1200047	
Atributi usluga:		
Izvršeni pregledi specifični za organizaciju		
Prvi pregled odraslih i do 18 godina	14.05.2009	Kalendar
Ponovni pregled odraslih i do 18 godina	14.05.2009	Kalendar
Kratka poseta lekara	14.05.2009	Kalendar
Pružanje zdravstvenih usluga licima sa invaliditetom	14.05.2009	Kalendar
Povratni pregled odraslih i do 18 godina	14.05.2009	Kalendar
Neurološki pregled	14.05.2009	Kalendar
Test funkcije kardiovaskularnog sistema	14.05.2009	Kalendar
Elektrookardio skeniranje vezano za kardiovaskularni sistem - EKG	14.05.2009	Kalendar
Lekarski pregled na terenu	14.05.2009	Kalendar
Pružanje zdravstvenih usluga na terenu	14.05.2009	Kalendar
Sankcionisani prevoz za medicinskom pratnju	14.05.2009	Kalendar
Organizovani sanitarni prevoz jednog ili više bolesnika (bez medicinske pratnje)	14.05.2009	Kalendar
Sistematski pregled odraslih	14.05.2009	Kalendar
Plaćeni pregled na rano otkrivanje raka debelog creva	14.05.2009	Kalendar
Individualni zdravstveni - vaspitni rad	14.05.2009	Kalendar
Grupni zdravstveno-vaspitni rad	14.05.2009	Kalendar
Sprovedbene imunizacije vakcinacije	14.05.2009	Kalendar
Upravljanje materijalima za analizu i ispitivanje	14.05.2009	Kalendar
Ekscizija odstranjivanje tkiva destrukcije čišćenje rane/kauterizacija - optice	14.05.2009	Kalendar
Zavoji kompresivni zavoji kompresija tamponada	14.05.2009	Kalendar
Incizija drenazija ispiranje aspiriranje odstranjivanje tečnih produkata upalnih procesa	14.05.2009	Kalendar
preliva uva, nosa i ždrelca	14.05.2009	Kalendar
Mechanizacija i njezina aplikacija	14.05.2009	Kalendar
vađenje stranog tela u ušle i probavni trakt	14.05.2009	Kalendar
Složene terapijske procedure/ manje hirurške intervencije	14.05.2009	Kalendar
Namještanje fleksija - optice	14.05.2009	Kalendar
Zatvaranje rana bolesnika u stacionaru	14.05.2009	Kalendar
Incizija drenazija ispiranje odstranjivanje tečnih produkata upalnih procesa - optice	14.05.2009	Kalendar
Brj. uputa za klinički centar po mišljenju izabranog lekara	14.05.2009	Kalendar
Brj. uputa za klinički centar po mišljenju lekara specijaliste	14.05.2009	Kalendar
Brj. uputa za KVB po mišljenju izabranog lekara	14.05.2009	Kalendar
Brj. uputa za KVB po mišljenju lekara specijaliste	14.05.2009	Kalendar
Brj. uputa za institut za plućne bolesti po mišljenju lekara specijaliste	14.05.2009	Kalendar
Brj. uputa za institut za plućne bolesti po mišljenju izabranog lekara	14.05.2009	Kalendar
Brj. uputa za institut za onkologiju po mišljenju izabranog lekara	14.05.2009	Kalendar
Brj. uputa za institut za onkologiju po mišljenju lekara specijaliste	14.05.2009	Kalendar
Brj. uputa za Specijalnu bolnicu za reumatske bolesti po mišljenju izabranog lekara	14.05.2009	Kalendar
Brj. uputa za Specijalnu bolnicu za reumatske bolesti po mišljenju lekara specijaliste	14.05.2009	Kalendar
Brj. uputa za institut za javno zdravlje po mišljenju izabranog lekara	14.05.2009	Kalendar
Brj. uputa za institut za javno zdravlje po mišljenju lekara specijaliste	14.05.2009	Kalendar
Brj. uputa za Zavod za transfuziologiju po mišljenju izabranog lekara	14.05.2009	Kalendar
Brj. uputa za Zavod za transfuziologiju po mišljenju lekara specijaliste	14.05.2009	Kalendar

# Inpatient procedures

- Admission and collocation of the admitted patients
- Recording of diagnoses and prescribed therapies
- Recording of therapy administrations
- Recording of the provided services and expenditure of drugs and materials
- Updating the regime of care during the hospitalization
- Vital signs and temperature/therapeutic/dietary list (TTDL) management
- Recording of required and performed consultations
- Keeping records of surgical procedures
- Discharge

# Extras

- Internal pharmacies and management of medical supplies
- Laboratory
- PACS integration
- Referrals to other institutions

The screenshot displays a web-based medical laboratory interface. At the top, there are tabs for 'REZULTATI', 'USLUGE', and 'NAPLATA'. The 'REZULTATI' tab is active, showing a list of icons on the left: 'Povesti verifikaciju', 'Snimi', 'Uput', and 'Rezultati'. The main area displays a blood test result for 'Krvna slika'. The results are listed in a table with columns for the test name, value, unit, and reference range. Values are color-coded: red for abnormal (e.g., 12.00, 6.20, 25.00, 8.00, 6.40, 42.00) and blue for normal (e.g., 5.00, 1.20, 0.09, 1.80, 25.00, 45.00, 115, 0.40, 81, 370, 170, 1.70, 6.40, 42.00). Below the table, there are fields for 'Datum analiza:' (17.11.2011.), 'Napomena:', and 'Dodavanje baterija' (Izaberi, Dodaj bateriju). At the bottom, there is a section for 'Dodavanje datoteke sa rezultatima analiza' with a 'Browse...' button and a 'Snimi' button.

Test	Value	Unit	Reference Range
WBC	5.00	G/L	[4.0 - 10.0]
Lym#	1.20	G/L	[0.8 - 4.5]
Mid#	0.09	G/L	[0.08 - 1.0]
Gm#	1.80	G/L	[1.6 - 7.5]
Lym%	25.00	%	[20.0 - 45.0]
Mid%	12.00	%	[2.0 - 10.0]
Gm%	45.00	%	[40.0 - 75.0]
RBC	6.20	T/L	[3.8 - 5.8]
HGB	115	g/L	[110 - 160]
HCT	0.40	L/L	[0.35 - 0.54]
MCV	81	fL	[80 - 100]
MCH	25.00	pg	[27.0 - 34.0]
MCHC	370	g/L	[310 - 380]
RDW	8.00	%	[10.0 - 14.0]
PLT	170	G/L	[150 - 440]
PCT	1.70	mL/L	[1.5 - 3.2]
MPV	6.40	fL	[6.3 - 10.1]
PDW	42.00	%	[40.0 - 60.0]

Datum analiza: 17.11.2011.

Napomena:

Dodavanje baterija

Dodavanje datoteke sa rezultatima analiza  
Datoteka sa rezultatima analiza:

# Laboratory and PACS

- Scheduling during examinations and hospitalizations, automated referrals and modality worklists.
- HL7 LIS integration, also
  - Direct support for common laboratory devices
  - Manual entry
- DICOM PACS integration
  - Opening and viewing of image studies and series
- Laboratory results become part of the EPR immediately after verification.
- Automatic recording of provided services and spent material for invoicing after the results are verified.

# New! Dental patient record (DPR)

8

7

6

5

4

3

2

1

1

2

3

4

5

6

7

8

info

gore levo 8: (Kr)

gore levo 7:

gore levo 6: (L)

gore levo 5:

gore levo 4:

gore levo 3:

gore levo 2: (Z) (proteza) (Kp)

gore levo 1:

gore desno 1:

gore desno 2:

gore desno 3: (N) (R) (Lt) (E)

gore desno 4: (Z) (N) (proteza) (Kx) (R)

gore desno 5:

gore desno 6:

gore desno 7: (Z) (N) (Kg) (Kx) (Fr)

gore desno 8:

dole levo 8: (Lt)

dole levo 7:

dole levo 6: (N) (Kg) (R) (Ks)

dole levo 5:

dole levo 4: (Z) (Kr) (Kg) (Kx)

dole levo 3:

dole levo 2:

dole levo 1:

dole desno 1:

dole desno 2:

dole desno 3: (Kx) (R)

dole desno 4:

dole desno 5: (Z) (Kg)

dole desno 6: (L)

dole desno 7: (Kr)

dole desno 8:

z32

zdrav, prisutan zub (Z): ☐

zub u nicanju (N): ☐

karijes prvog stepena (KI): ☐

karijes drugog stepena (KII): ☐

plomba (P): ☐

krunica zuba (KR): ☐

proteza: ☐

pulpitis zuba (Kp): ☐

gangrena pulpe (Kg): ☐

periodontitis (Kx): ☐

koren zuba (R): ☐

frakturiran zub (Fr): ☐

sekundarni karijes (Ks): ☐

izlečen zub (L): ☐

zub u lečenju (Lt): ☐

izvadjen zub (E): ☐

izmeni i zatvori

izmeni





# New! Integration with financial software Moneo





## EHR Quality Seal Level 2

- Issued by EUROREC Institute, supported by national ProRec centres.
  - Initiated harmonisation between EHR systems.
  - Facilitates Europe cross-border interoperability.
  - Complement to the existing (national) certification initiatives.
  - *Mechanism to avoid re-certification of EHR systems in EU member states.*
- Can be done in increments for specific modules and markets.





# 50 complex criteria

- Regulatory and coding compliance
- Specific scenarios
- Data completeness and ownership
- Temporal perspective and data versioning
- Information presentation and grouping for use cases
- Security, privacy and concurrency
- Documentation



# Heliant certification experience

Separate certification of HIS and PHC software

- Checking all 50 criteria
- For about half, the products had to be adjusted
- Implementation of necessary features
- Providing responses and corroborating evidence
- Certification rehearsal/trial with assistance by ProRec Serbia and EuroRec
- Additional software improvement
- Refining/completion of responses
- Actual certification
  - Presentations of responses
  - Thorough interactive software examination



# Conclusions: EuroRec certification

- EuroRec Seal greatly helped to improve SW products.
- Developers got clear guidelines about key features that are often neglected by end users.
- Customers got additional assurance of software quality.
- Increased odds at foreign markets!

# Conclusions: Heliant products

- Relieve medical staff from excess administration.
- Integrate data from various sources.
- Help healthcare institutions in providing a better service and accommodation of particular patient needs.
- Help in performance and expenses control via detailed record of the performed services.

# Thank you for your attention.

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