

A FAIR ontology as an interoperable hub for analysis, prediction, modeling, exchange, and visualization

INFRA: InfectionRadar –

A Swiss nationally funded demonstrator aligning regional and OHDSI/OMOP framework through dual modelling and OHDSI tooling

AIM:

A scalable blueprint for interoperable infection surveillance and decision support, with ongoing expansion toward federated research

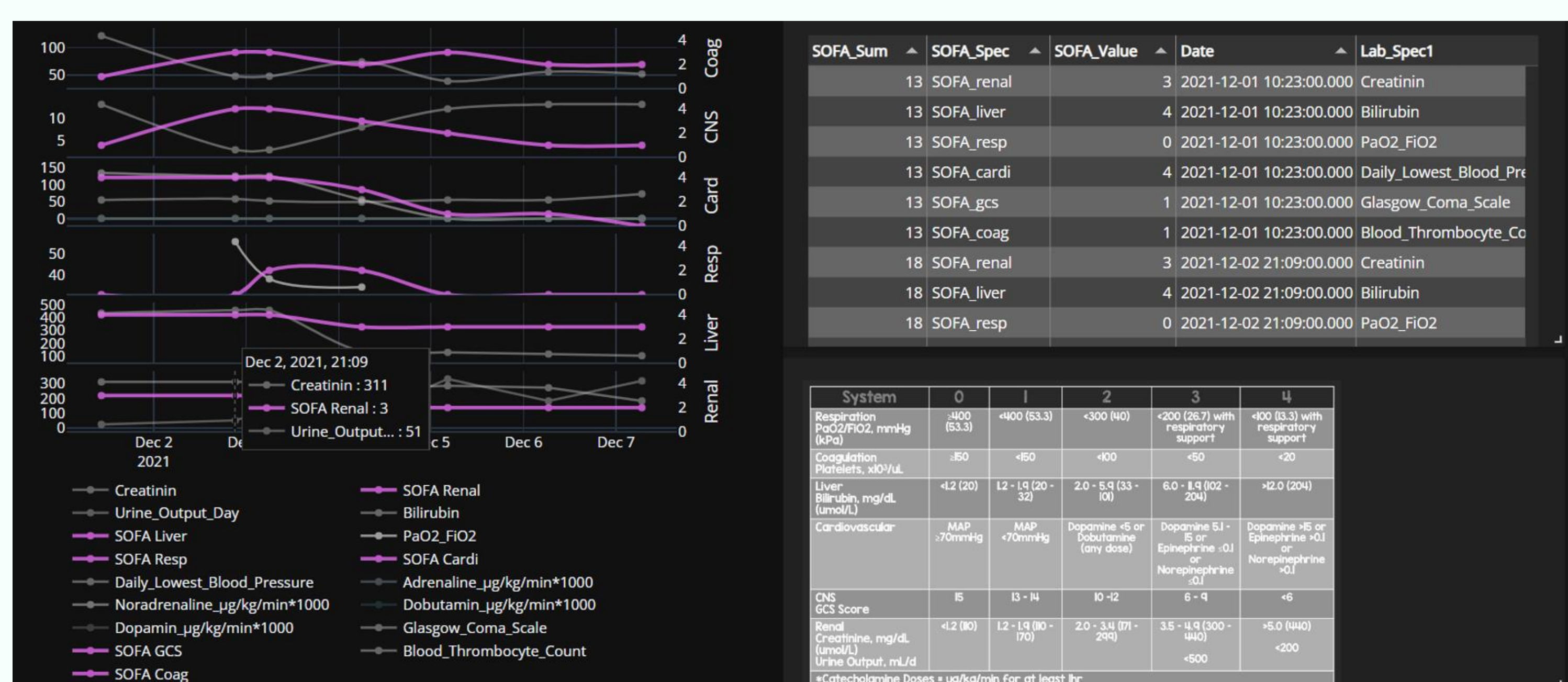
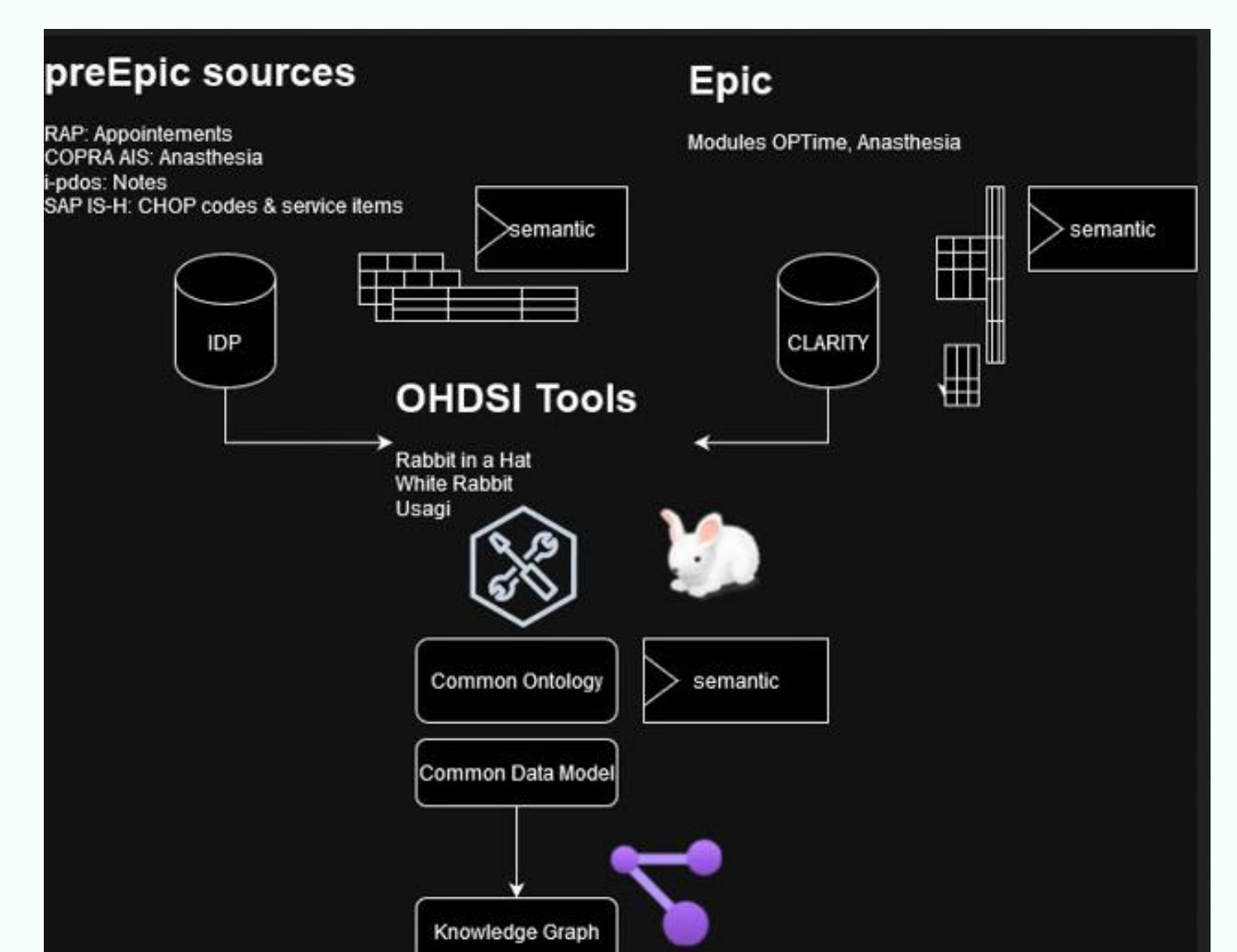
Background

Swiss Personalized Health Network (SPHN) -funded demonstrator project (-> 2023), applicants Bern and Geneva University Hospitals, collaboration with Lausanne University Hospital

- Interoperable analytics compromised: hospital data originate from heterogeneous sources, lack metadata, local code sets not mapped to international standards
- SPHN: semantic specifications for FAIR secondary use <-> Observational Medical Outcomes Partnership Common Data Model (OMOP CDM, OHDSI) for federated research
- Sepsis: definitions evolve over time, scores for sepsis diagnosis require granular representations of evidence and mappings

Method

- Clinical Data Warehouse (>10 years of legacy data) two use cases: (i) sepsis detection and (ii) postoperative infection risk prediction
- Dual modeling strategy: (i) SPHN-aligned concepts for RDF export (ii) OMOP CDM representations to support OHDSI tooling
- Standard terminologies and Swiss classifications - Mapping and ETL documentation combined OHDSI tools (White Rabbit, Rabbit in a Hat, Usagi) with governed reference tables.
- LLM-assisted translation and mapping workflow, use of Usagi for mapping
- Neo4j/Bloom: visual validation of mappings, provenance, and cross-terminology relationships



Results

Integrated semantic-to-analytics pipeline:

- Sepsis / postoperative infection datamart exporting SPHN - and OMOP - conform concepts
- Near-real-time SOFA score computation and derived organ-complication phenotypes,
- Clinician-facing SSRS reports and Apache Superset dashboards for operational monitoring

Achievements

- INFRA shows that dual modeling to SPHN and OMOP CDM, anchored in standard terminologies and governed mappings, can support near-real-time sepsis / postoperative infection analytics and explainable risk prediction across heterogeneous hospital systems.
- The resulting blueprint—combining OHDSI tooling, LLM-assisted mapping, and graph-based validation—supports interoperability during the transition of legacy to newly introduced hospital information system (legacy → Epic) and positions Swiss sites for EHDEN-compatible federated research.

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