

cityEHR in Ukraine

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cityEHR – Open Source Electronic Health Records

The screenshot displays the cityEHR web interface. At the top, patient information for WALLACE, Xana (ms) is shown, including birth date (28-Sep-1938), age (85 years), gender (female), patient ID (96274917), and NHS Number (1131313131). Below this, a sidebar lists various medical categories like Current Observations, Acid Base Disorders, Allergies and Warnings, Bone Chemistry, Hospital Anxiety and Depression Scale, Laboratory Test Results, Update Patient Demographics, Feature Demonstration, DAS 28, and DAS. The main content area shows a date (03-Jun-2024) and a medical condition (Fracture Record). A blue anatomical diagram of a human body is visible. To the right, a class hierarchy for owl:Thing is listed, including CityEHR:Class, CityEHR:DataType, CityEHR:Error, CityEHR:Patient, CityEHR:Property, CityEHR:Term, CityEHR:Unit, CityEHR:Warning, ISO-13606:Cluster, ISO-13606:Composition, CityEHR:Annotation, CityEHR:Booking, CityEHR:CodeSet, CityEHR:Form, CityEHR:Letter, CityEHR:Message, CityEHR:Notification, CityEHR:Order, CityEHR:Pathway, CityEHR:Prescription, CityEHR:View, ISO-13606:Data, ISO-13606:EHR_Extract, ISO-13606:Element, ISO-13606:Entry, ISO-13606:Folder, and ISO-13606:Section. On the far right, a mobile app interface is shown, displaying an 'Ocular History' form with various medical conditions and a 'NEXT' button.

cityEHR
Open Health Informatics for Electronic Health Records



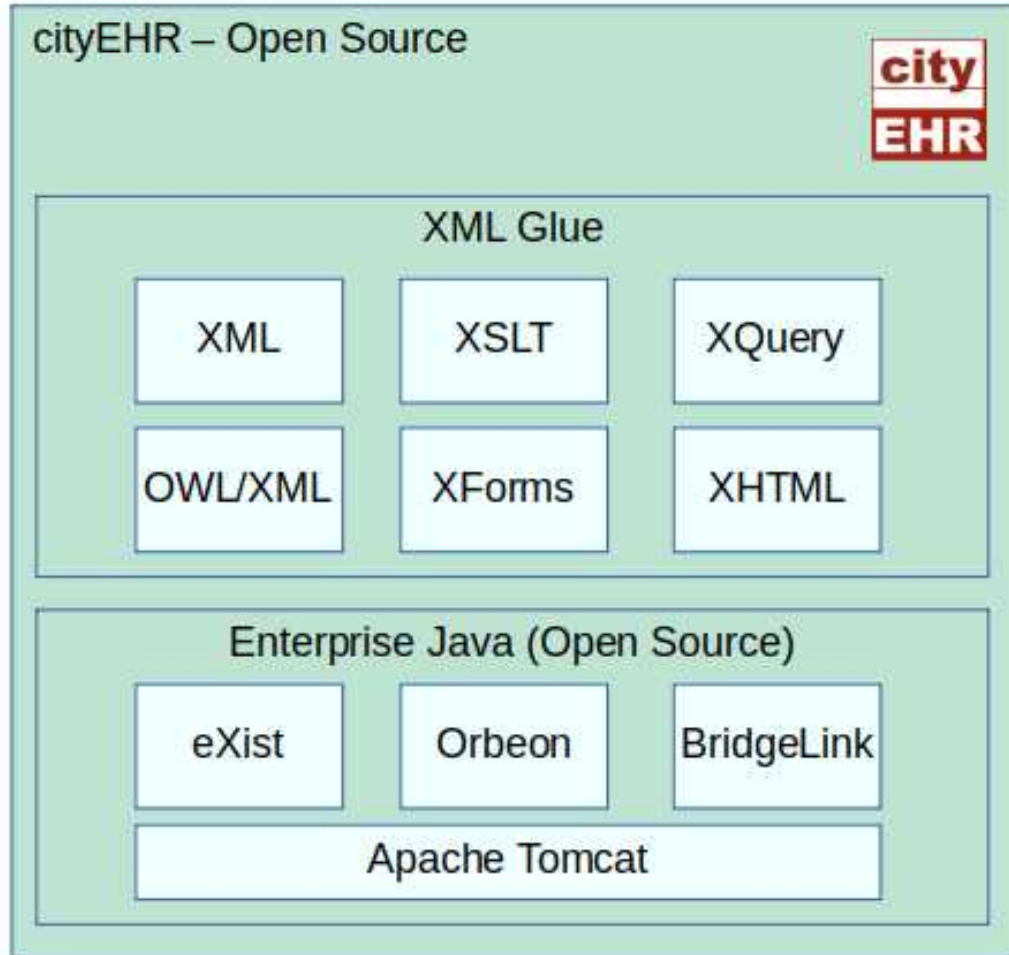
Open Health Informatics

<https://openhealthinformatics.com/>



cityEHR in Ukraine

An XRX Application (XForms, REST and XQuery)

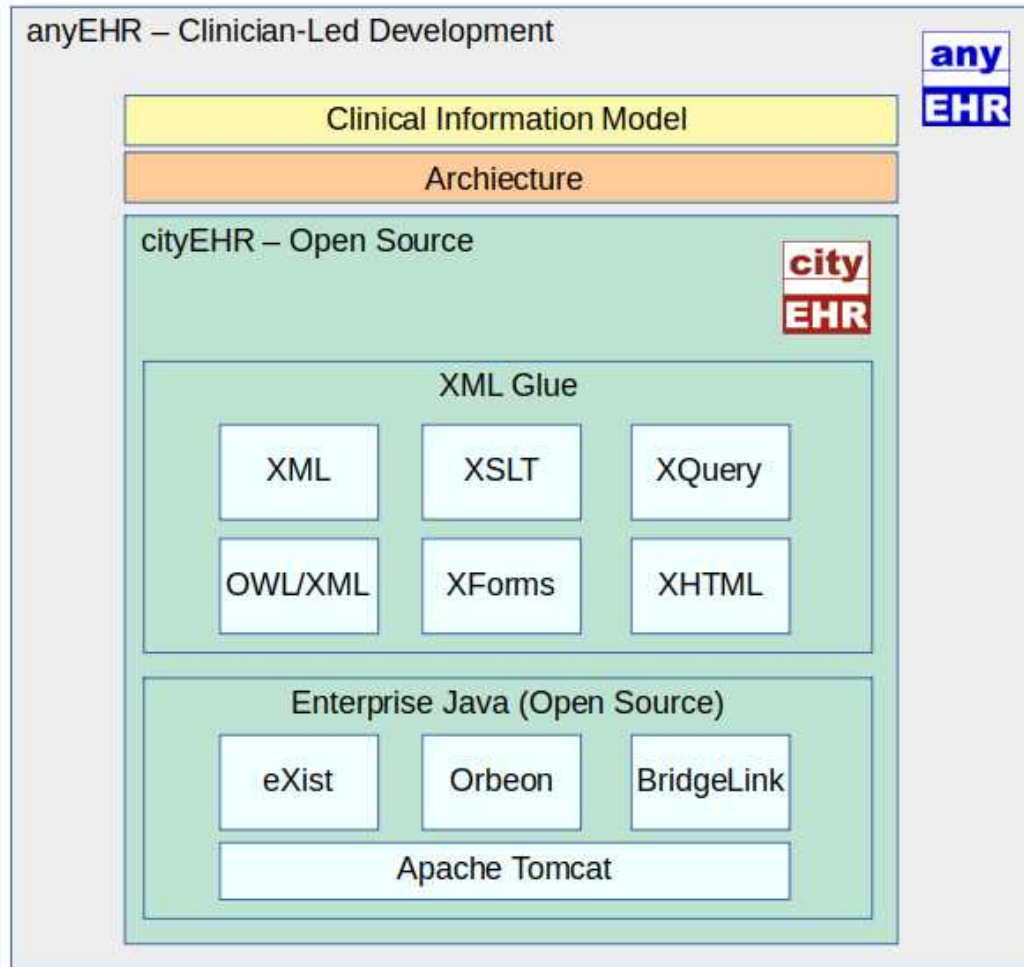


cityEHR is built on the Orbeon XForms platform.

With code written using

XML
OWL/XML
XSLT
XQuery
XForms
XHTML

A Platform for Model-Driven EHR



cityEHR is a platform for model-driven development of **any** Electronic Health Record.

Clinicians build an Information Model that describes their own clinical domain and the information they need for both routine clinical care and for research studies.

The Information Model defines the **information structure** and **data properties** for the clinical domain as well as the **behaviour** of the information – how clinicians and patients will interact with it.

Interaction can also be configured with
custom CSS for 'look and feel'
interactive SVG graphics
mapping to office documents – word processor
(spreadsheet, presentation)

From Architecture to EHR System

The base Information Architecture defines the building blocks of an Electronic Health Record using the international standard ISO 13606.

An ontology ,represented in OWL/XML.

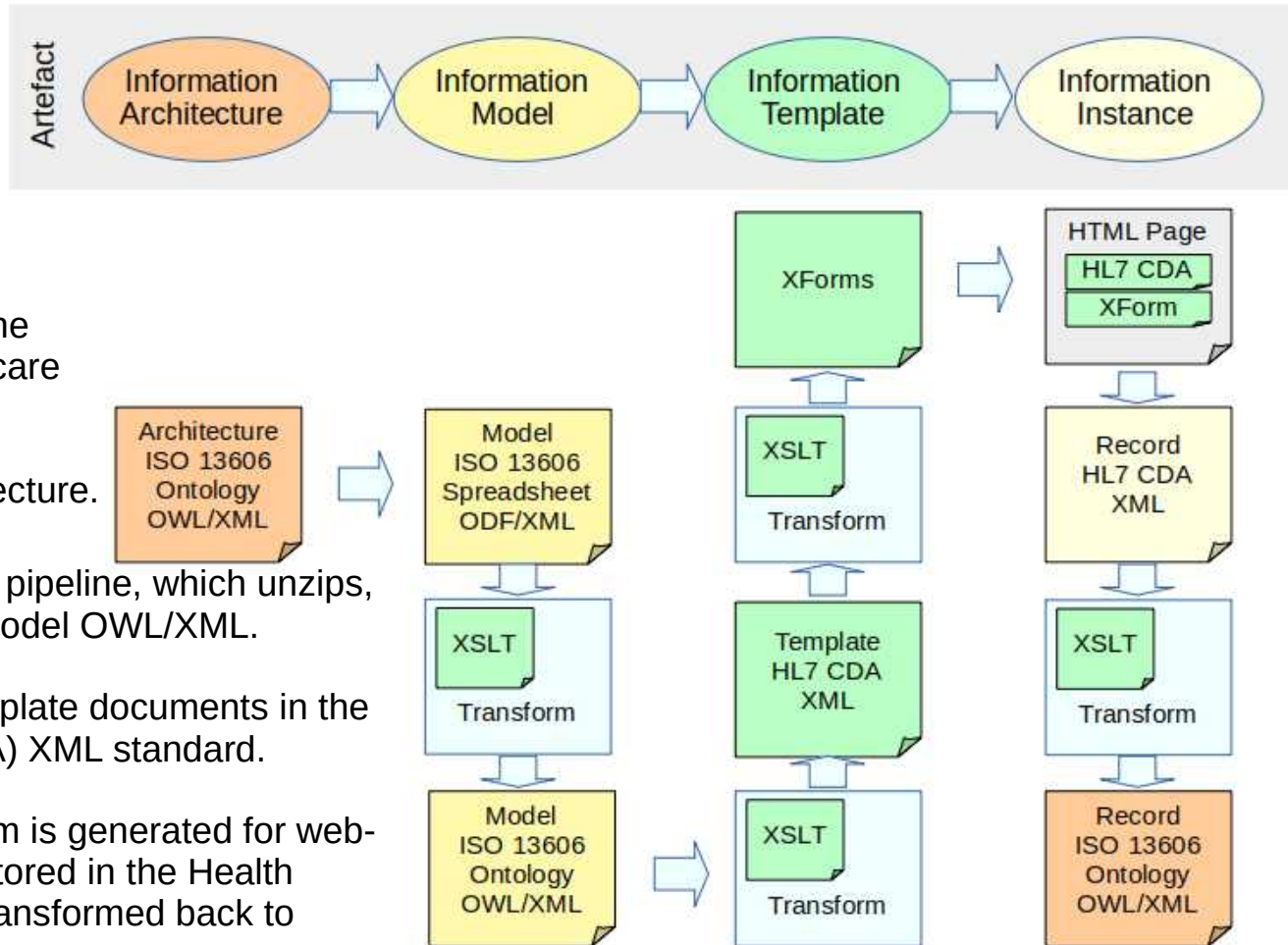
Clinicians build an Information Model that describes their own clinical domain and the information they need for routine clinical care and research studies.

A spreadsheet, constrained by the Architecture.

The spreadsheet is processed in an XML pipeline, which unzips, extracts the XML and transforms it to a model OWL/XML.

That model is transformed to a set of template documents in the HL7 Clinical Document Architecture (CDA) XML standard.

From each HL7 CDA document, an XForm is generated for web-based instantiation of the CDA which is stored in the Health Record. The stored record can then be transformed back to OWL/XML.

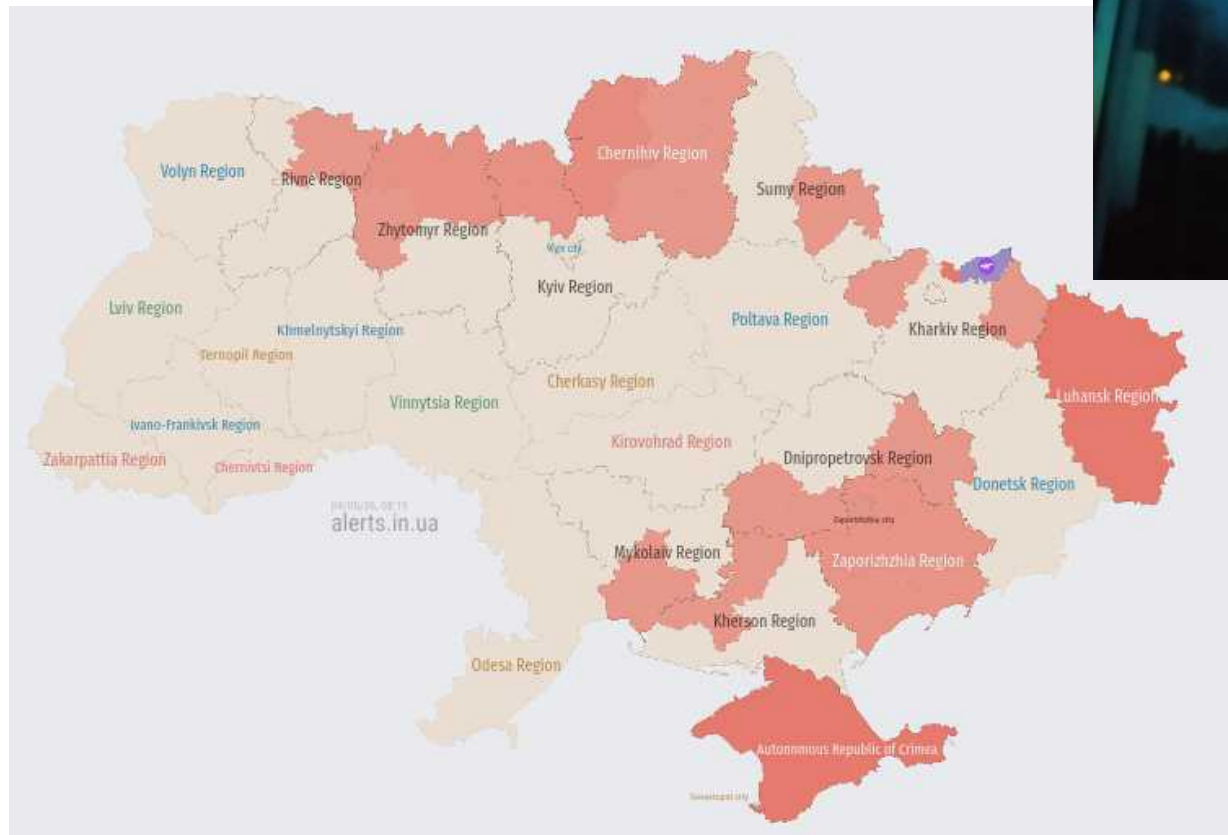


Ukraine

Kyiv early morning June 2nd



Air raid alert map, June 4th, 8am



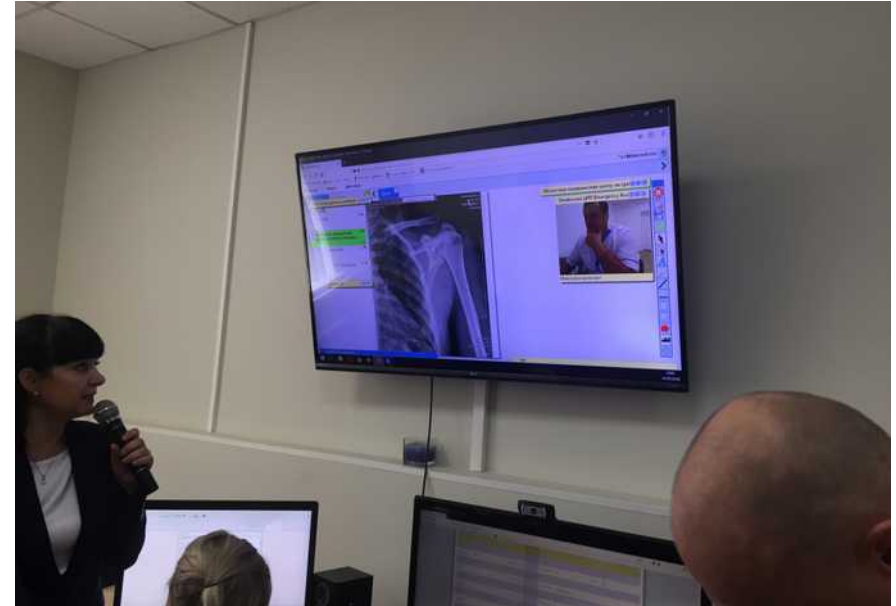
Kyiv metro, evening of June 1st

Telemedicine in Ukraine

The Point of Care (village Feldsher Station)



Remote Clinical Expertise (Regional Hospital)



Telemedicine = the practice of medicine where the patient (the point of care) is remote from the clinical expertise, connected using telecommunications.

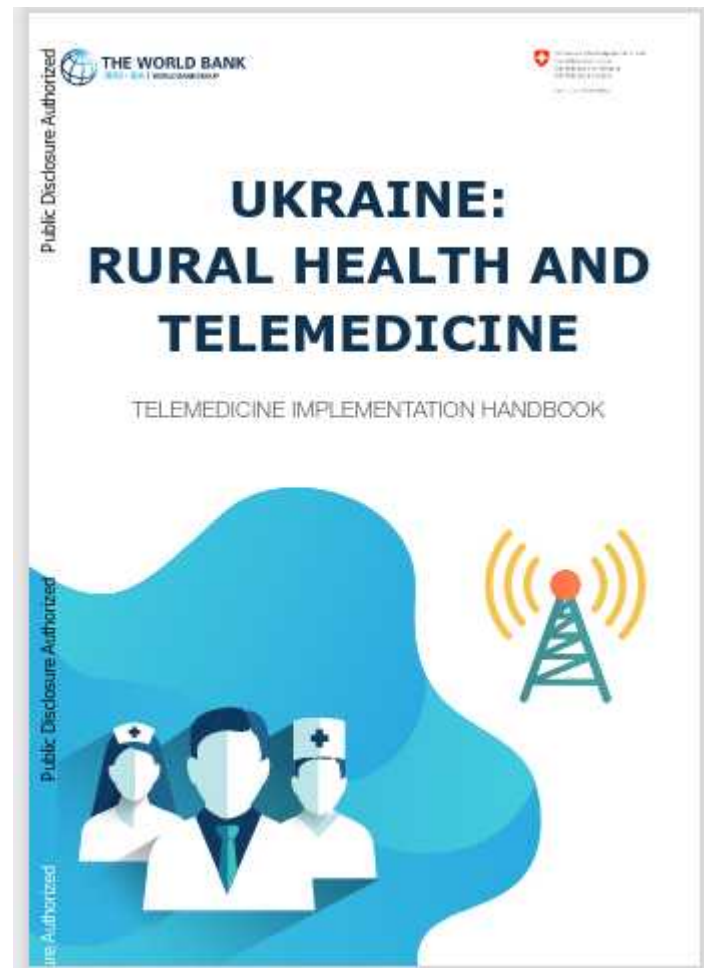
Pictures from the Odesa Oblast, 2018

Handbook for Rural Telemedicine

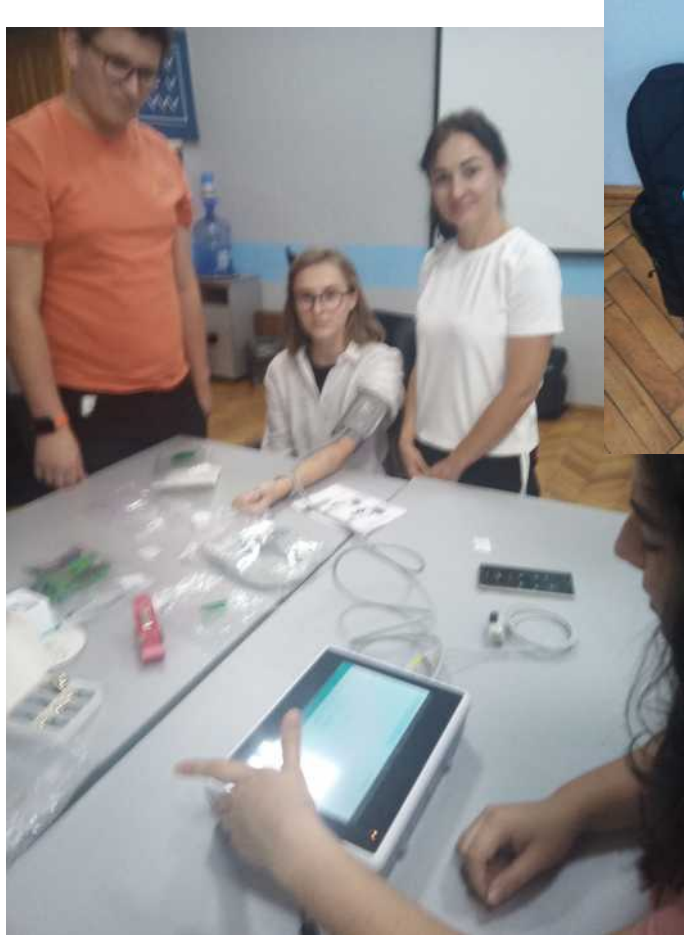
Published by the World Bank in January 2020, based on development and prototypes in Rivne, Odesa and Poltava oblasts.

Includes

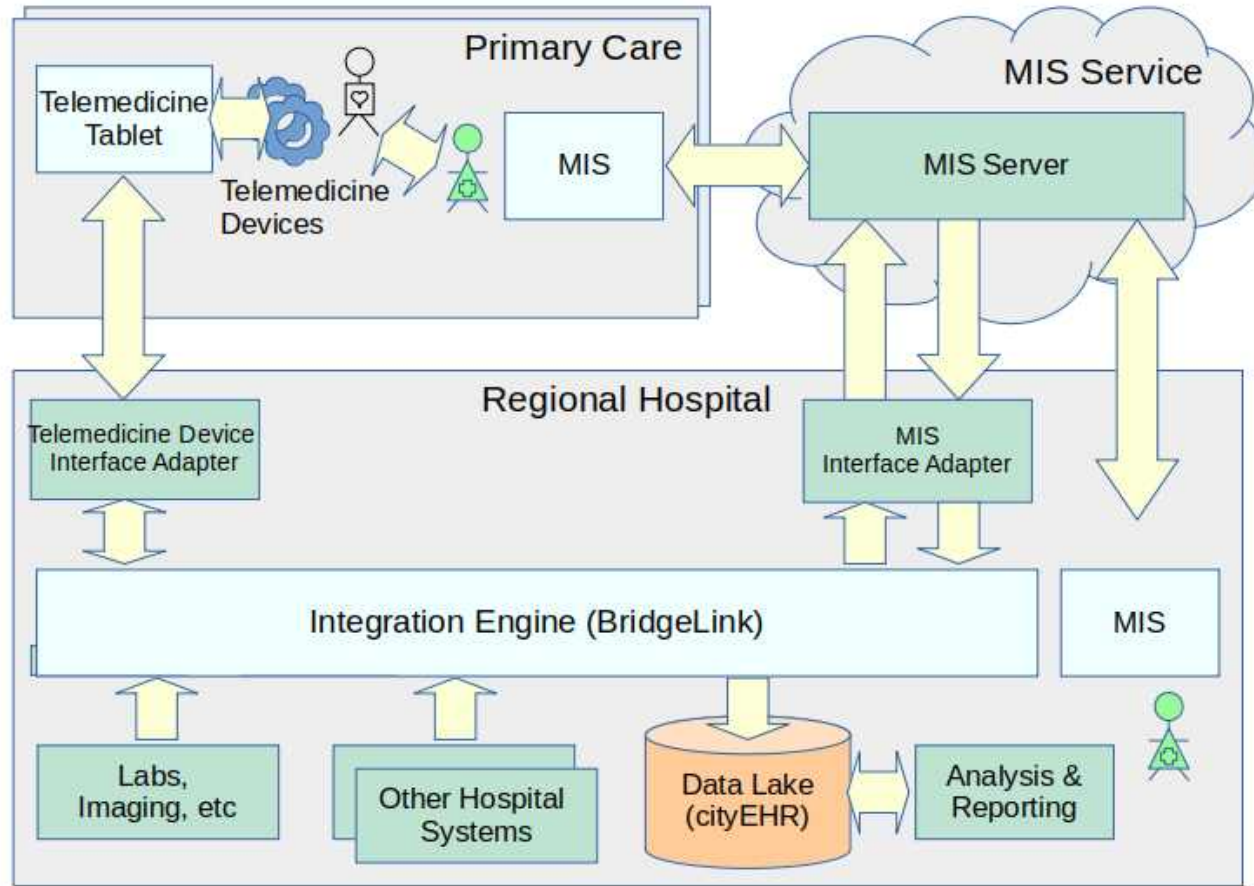
- A reference technical architecture
- Description of different modes and types of telemedicine
- Relevant international standards
- How to build a server room
- Telecommunications requirements
- A product catalogue
- Project management and governance
- Evaluation methods



2024, National University of Water and Environmental Engineering in Rivne



Telemedicine Data Integration in Rivne



MIS = Medical Information System
= EHR

Data from telemedicine devices are transferred to a local (Android) tablet.

Sent to the Telemedicine Device Interface Adaptor, then to the Integration Engine which writes to the Data Lake.

Data are also routed through the MIS Interface Adaptor to the cloud-based MIS.

Clinician at the point of care accesses the data through the MIS user interface.

Open Source Software

The complete Telemedicine Data Integration solution will be packaged up for use in other oblasts, the first of which will be Odesa in Q4 2026.



Integration Engine



Data Lake (EHR Repository)

Telemedicine Device
Interface Adapter

Developed as open source software in Rivne, Ukraine

Medical Information System (MIS)
Interface Adapter

Owned by 100% Life, the NGO which funded the project

Teaching Telemedicine Data Integration

In Rivne the workshops are being delivered over five weekends, in parallel with the ongoing Telemedicine Data Integration development and deployment project.

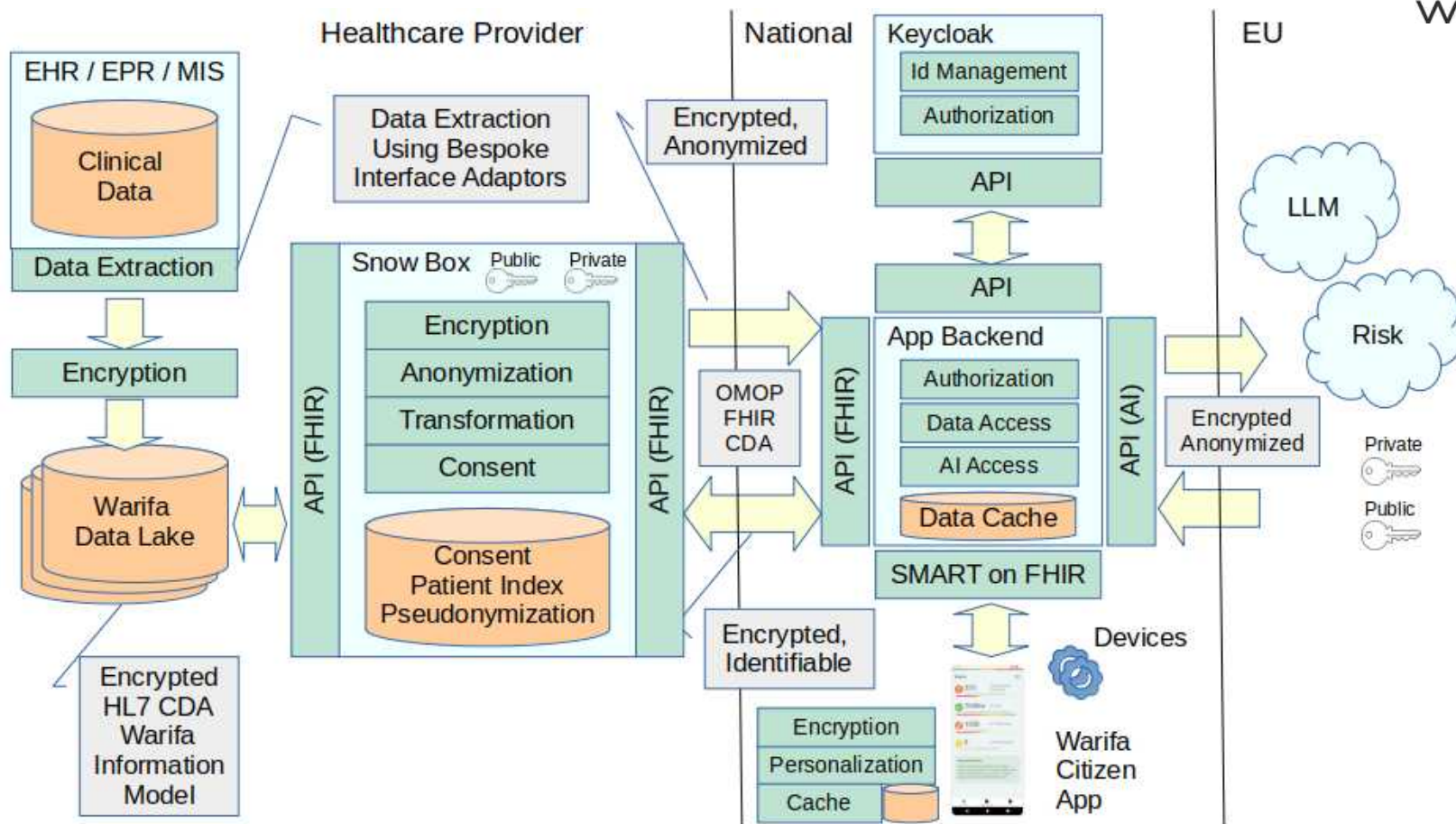
The workshops are attended by students from the IT College and NUWEE in Rivne and by students from the Kyiv Aviation Institute who travel to Rivne for the weekend.

The workshops in Rivne use refurbished equipment donated in the UK and delivered by truck to the IT College.

Once that development project is finished the equipment and the server room that has been provisioned will remain with the IT College for their own use in teaching.



Data Lake for EU Research Projects



Some Additional Challenges

Encryption of data at rest in the XML database (either in eXist or we will switch to a different database that supports it).

cityEHR is stuck on an old version of Orbeon and needs to be ported to the latest release so that it can run in any browser and legacy security issues are resolved.



Some peaceful images from the Ukrainian resort of Yaremche in the Carpathian mountains.