
Hospitals on HL7 FHIR
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HOSPITALS ON FHIR USER DAYS 2026
PISA, ITALY
Where Innovation Meets Healthcare
XiA CoP
Share
EHR Xchange Format
OneAquaHealth
Cities @Heart
PHOENIX
Patient Health Oncological Expertise Network for International eXchange
an HL7 Europe initiative
InterSystems
Creative data technology
HEALTH SAMURAi
HL7 Italia
19–21 OCTOBER 2026
PISA, ITALY
BUILDING THE EHDS TOGETHER
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HL7 FHIR for One Health

Connecting hospitals, environment and the city through shared terminologies

Hospitals on FHIR User Days 2026
Pisa, Italy | 20 October 2026 | Session 9

HL7® Europe

What will this session cover?

- One patient, one city, one environment - Cities@Heart perspective
  Eva Sabajova, HL7 Europe

- OneAquaHealth perspective
  Sónia Serra, University of Coimbra

- FHIR and terminology
  Stratos Kokolakis, HL7 Europe

- Hospitals on FHIR discussion

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One patient, one city, one environment

HL7 FHIR for One Health

Eva Sabajová
HL7 Europe

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Health information beyond the hospital

- **Many factors affecting health originate outside the hospital**
- Clinical care
- Public health
- Environmental monitoring
- City services and infrastructure
- Community and home

How can these domains exchange the information they need while preserving its meaning and respecting appropriate boundaries?

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Maria – one patient, one city, one environment but...
many sources of information



MARIA ROSSI

72 years old, lives near Pisa.
Cardiovascular disease, heart failure (NYHA II), pacemaker. Also anxiety and depression.
Multiple medications, regular monitoring.
Motivated to take care of her health, sometimes needs digital support from her daughter and nephew.

PATIENT (Maria)

What Maria & her family know

- How she feels
- Daily routine & behaviours
- Home environment
- Support network
- Personal concerns
- Ability to cope & preferences



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What the hospital knows

- Diagnoses & problems
- Medications
- Lab & clinical results
- Procedures
- Cardiac history
- Discharge & follow-up plan

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PUBLIC HEALTH

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- Population health indicators
- Vulnerable groups
- Disease patterns
- Service utilisation
- Prevention priorities

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CITY

What the city knows

- Urban infrastructure
- Land use & mobility
- Neighbourhood characteristics
- Socio-economic indicators
- Climate resilience

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ENVIRONMENT

What the environment knows

- Air quality
- Temperature & heat events
- Humidity, pollen, UV
- Water quality
- Noise, green & blue spaces
- Natural hazards

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Cities @Heart

Building healthy heart cities

From patient & hospital towards the city

Focus: cardiovascular health, inequalities and prevention

Information flow City → Public health → Hospital → Patient/Citizen

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What the environment knows

- Air quality
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CITY

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OneAquaHealth

From environment towards health

Healthy streams, healthy people, resilient cities

Focus: urban aquatic ecosystems, environmental conditions and human health

Information flow: Environment → City → Public Health → Health



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Maria — one patient, a lot of data

From environment and city to public health and hospital — how do we preserve meaning?



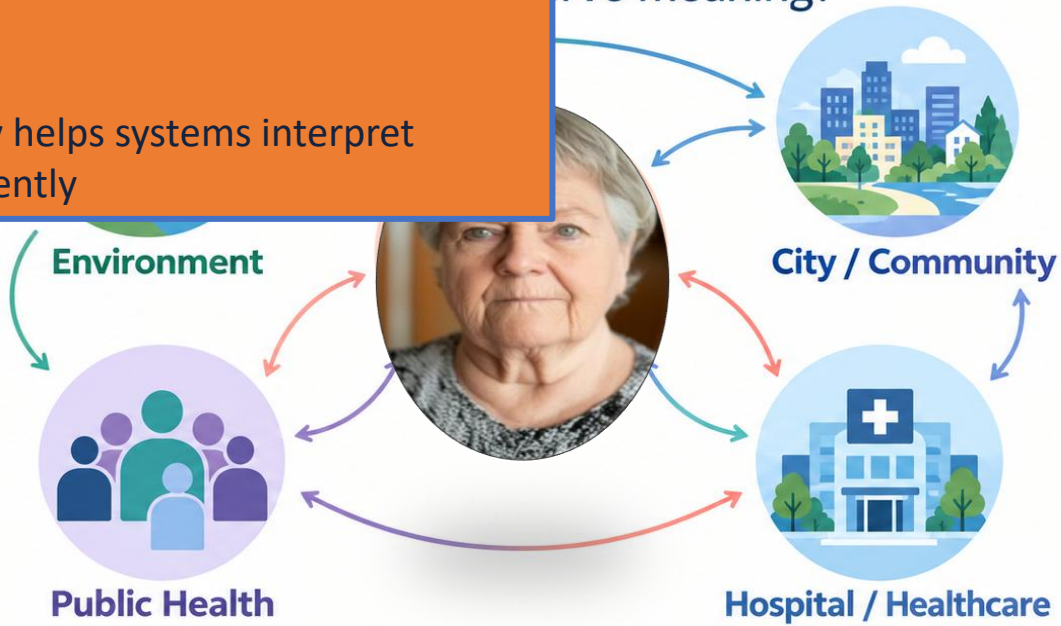
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Maria — one patient, a lot of data

From environment and city to public health and hospital — …erve meaning?

HL7 FHIR provides mechanisms for information exchange.

Shared **terminology** helps systems interpret information consistently



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Maria — one patient, a lot of data

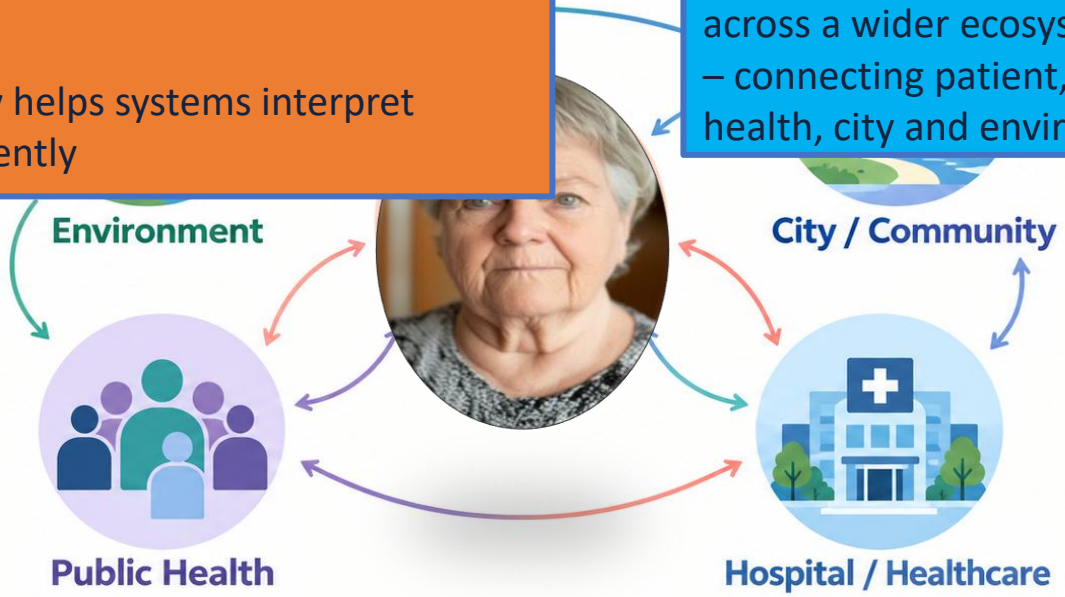
From environment and city to public

HL7 FHIR provides mechanisms for information exchange.

Shared **terminology** helps systems interpret information consistently

One Health

challenges us to preserve that **meaning** across a wider ecosystem
– connecting patient, hospital, public health, city and environment.



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Cities@Heart Project Perspective

From city to health:

Maria lives near Pisa.

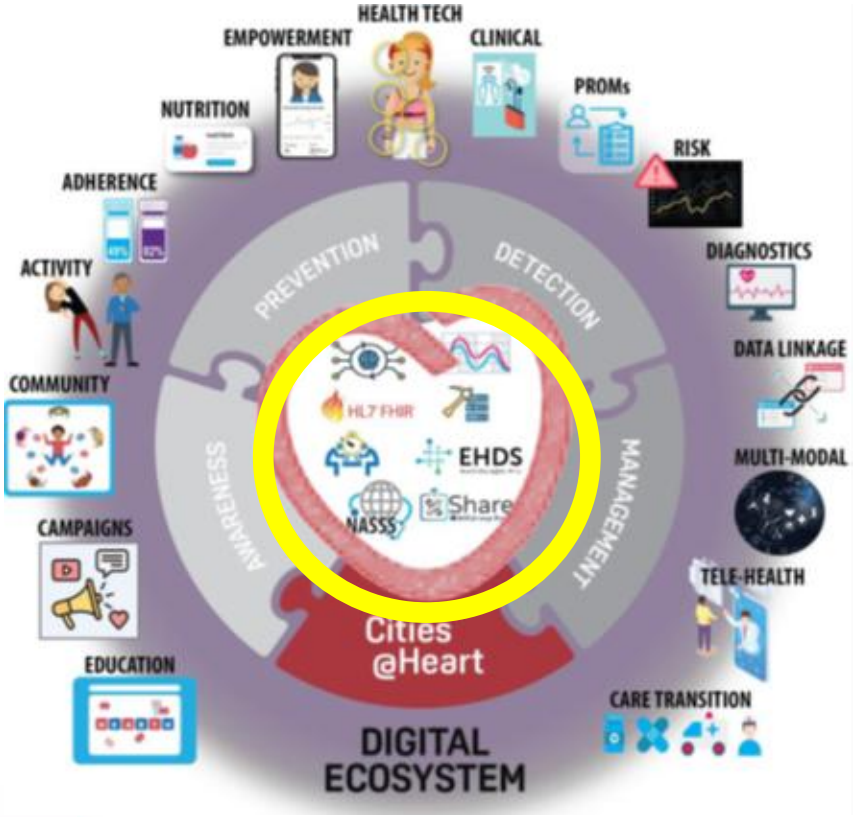
What information from Maria's city is relevant to her care?

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Cities@Heart Perspective

- Cities@Heart focuses on the prevention and management of cardiovascular disease in urban communities.
- Seven European cities will develop and validate city-based approaches.
- The project connects healthcare, public health, cities, communities and digital solutions.
- HL7 Europe supports interoperable information exchange through HL7 FHIR.



HL7 Europe

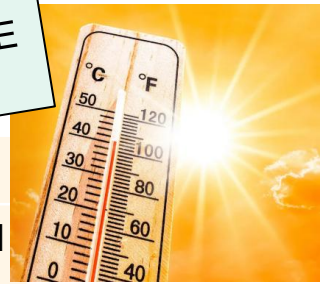
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Applying the Cities@Heart perspective to Maria

A **heatwave** is forecast in Maria's neighbourhood.

What information is needed, by whom, and for which decision?

ILLUSTRATIVE SCENARIO





Intended outcome	Possible exchange
Maria receives relevant advice	Trusted, understandable information adapted to her health risk
Her care team understands the external risk	Relevant heat-event information connected to her clinical context
Public health identifies vulnerable groups	Population-level information without unnecessary disclosure of clinical data
The city supports an appropriate response	Information about affected areas, services and available interventions
The ecosystem learns from implementation	Agreed indicators and feedback from care, public health and city actors

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Hospitals HL7 FHIR User Days

OneAquaHealth Perspective

From environment to health: Maria lives by a stream. What does her care team may not see?

Sónia Serra
University of Coimbra, Portugal

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From environment to health

What should hospitals know about the environment their patients live in?

OneAquaHealth



Healthy urban streams, healthier people, more resilient cities

One Health. Connected lives.

Investing in healthy urban streams is also investing in healthier people.

Source: AI generated

PEOPLE ANIMALS ENVIRONMENT ONE HEALTH

HL7 Europe

One stream, everyone around Maria

The same stream, two futures: for Maria and for everyone who shares her place.



MARIA ROSSI

72, lives near Pisa
Heart failure, pacemaker, anxiety and depression
Many medicines

	Healthy, intact stream	Degraded stream
Maria the patient	Cooler, greener places to walk: more activity, better mood, more social contact.	Heat, flooding and contact with polluted water: fewer reasons to go out.
Her family daughter and nephew	Somewhere to go out together, and a healthier shared surrounding.	The same exposures, plus the extra care load when Maria's health worsens.
Her care team GP, nurses, cardiology	Fewer heat- and pollution-related episodes to manage.	They see the consequence in the clinic, but not the cause in the record.
Her companion animal the walks that keep her moving	Safe walks and clean water to drink.	Shares the same water and vectors, and can be an early warning.
The stream itself habitat, biodiversity, upstream/ downstream	Habitat, natural cooling and a flood buffer. Upstream influences stream reach integrity.	Species loss, piped channels, pollutants carried downstream.

Associations and hypotheses, not findings. Serra & Feio 2024; Rodrigues et al. 2025; Walsh et al. 2005 (urban stream syndrome).

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What the stream can tell Maria's care team

Four things OneAquaHealth measures in urban streams, and why each one matters to Maria.



Macroinvertebrates & diatoms (EU WFD)

Together they give the ecological status of the place where Maria walks: restorative, or degraded.



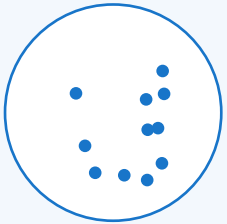
Diptera

Adult mosquitoes and sand flies sampled by the stream: possible disease vectors, for her and her companion animal.



Pharmaceuticals

Antihypertensives and antidepressants, like Maria's own medicines, were found in OAH urban streams.



Coliforms

Faecal contamination of the water: a contact risk for Maria, and for her companion animal, on their walks.

Each one is already an indicator in the OneAquaHealth FHIR guide

These are the values behind Maria's environment record

Sources: OAH indicator factsheets & field sampling protocols (D2.2); Rodrigues et al. 2025 (J Hazard Mater); OAH FHIR Implementation Guide (D3.8).

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Two records, one place, one time: what must match

WHERE space

Health record

Home address, postcode or health region

River record

Stream reach, water body, catchment

Must match

The neighbourhood matched to its nearest stream, without exposing where a patient lives

WHEN time

Health record

Dated visits and prescriptions; statistics reported yearly

River record

Samples by season or year; ecological status every few years

Must match

The same season and time window (for example, before and after a restoration)

WHAT meaning

Health record

“Healthy” = no disease. A dose in mg. A blood sample

River record

“Healthy” = good ecological status. A concentration in ng/L. A water sample

Must match

Same word, same meaning, same unit: a blood-pressure medicine is in both records

Without this match, the two records cannot talk to each other

OneAquaHealth tested one way to do it in FHIR, a health-data standard

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Shared words: a short glossary

Six words you will hear today, from the stream side and from the FHIR side.

	What it means	In the OneAquaHealth FHIR guide
Urban stream	Running water in or alongside a city: a real watercourse, not a park feature.	Coded as River (environment), SNOMED CT 420531007
Catchment	The land that drains into the stream: what happens there arrives in the city.	Not coded yet
Stream reach	A stretch of stream with similar conditions: the unit we sample.	What the Location resource points to
Ecological status	Water Framework Directive rating of a water body's health, in 5 classes from Bad to High.	No single code yet: built from its biological indicators
Indicator	A measured value that tells us the stream's condition, e.g. macroinvertebrates, pharmaceuticals.	Each indicator is a code in the OAH code system (temporary, for now)
Biological indicators of health risk	Organisms by the stream that signal a risk to people or animals, e.g. Diptera as possible disease vectors.	The guide's own group name

Terminology is where the meaning survives

Sources: OAH indicator factsheets & field sampling protocols (D2.2); OAH FHIR Implementation Guide (D3.8); Water Framework Directive 2000/60/EC.

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FHIR and terminology: building the bridge

Existing standards, semantic gaps and opportunities for further work

Stratos Kokolakis
HL7 Europe

HL7 Europe
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Two Health Systems, no Shared Language

Environmental monitoring

- Field sensors and lab sampling
- Biological and water-quality indicators
- Reported to the EU Water Framework Directive

≠

Health Systems

- Hospitals and primary care
- Electronic health records
- Public-health disease records

OneAquaHealth starts from a One Health premise: the health of freshwater ecosystems and the health of people in cities are tightly linked - improving one tends to improve the other.

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The OneAquaHealth FHIR Implementation Guide

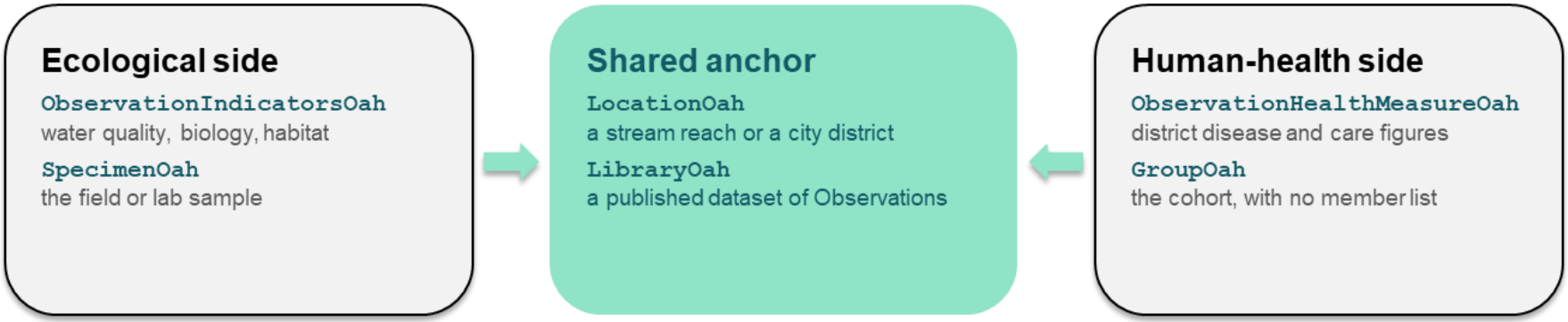
An EU-funded specification that lets environmental sensors, laboratories, and health-data systems describe the river-health indicators the same way.

Horizon Europe project
Grant Agreement 101086521

Open REST APIs
Connect sensors, labs, health systems

EU water law
Aligned with the Water Framework Directive and EQS Directives

WHAT THE GUIDE PROFILES



Both sides use the same FHIR resource, Observation. The next slides follow each side into FHIR, then compare them

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Ecological Indicators, Health Measures

ECOLOGICAL INDICATORS · value set OahIndicatorsNoHealthOahVs

Biological Quality
Macroinvertebrates, diatoms, fish, macrophytes, riparian vegetation, microbiomes

Hydromorphological Quality
Channel morphology, hydrology, land use along the margins

Water Quality
Nutrients, pH, dissolved oxygen, temperature, conductivity, pharmaceuticals

Health-Risk Indicators
Disease vectors, invasive species, and sentinel birds and amphibians

Direct link to human health

Human-health measures · value set HealthIndicatorsOahVs

Per-district cohort figures: cardiovascular and metabolic disease, mental health, and gastrointestinal and zoonotic infections such as Campylobacter and Borrelia.

Both value sets draw on the IG's temporary OAH code system; the ecological set is defined as "all OAH indicators minus the health ones".

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Ecological Side: Stream Sample to FHIR

One water-temperature reading from the Giofyros stream in Heraklion, as it appears in the IG.

SOURCE RECORD
Field observation
Giofyros reach A, 21 Nov 2024: water temperature 18.6 °C

→

MAPPING
ConceptMap
IndicatorsOah2FHIR maps each OAH indicator to an Observation

→

FHIR RESOURCE
Observation
Profile: observation-indicators-oah

```
Instance:    Obs-WaterTemp-Giofyros-2024-11-21
InstanceOf:  ObservationIndicatorsOah
* code              = TemporaryOahSystem#waterTemperature
* subject           = Reference(Loc-Giofyros)    // River      ← the anchor: a Location
* effectiveDateTime = "2024-11-21"
* device            = Reference(Dev-HI98130)
* valueQuantity     = 18.6 'Cel' "Celsius"
```

FSH source: hl7-eu/oah, examples/water_tmp.fsh. Loc-Giofyros is typed SNOMED CT 420531007 |River|.

The observation is about a place, not a person. Now the people who live there. →

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Health Side: District Record to FHIR

One public-health figure for a district of Oslo, mapped through the same pattern.




```
Instance:    Obs-OS-long-term-disease-Male
InstanceOf: ObservationHealthMeasureOah
* code            = TemporaryOahSystem#long-term-disease
* subject         = Reference(Loc-Nordre-Aker)    // City environment      ← the anchor: a Location
* focus           = Reference(Group-OS-Male)      // cohort, member 0..0
* effectivePeriod = 2024-01-01 .. 2024-12-31
* valueQuantity   = 40 '%'
```

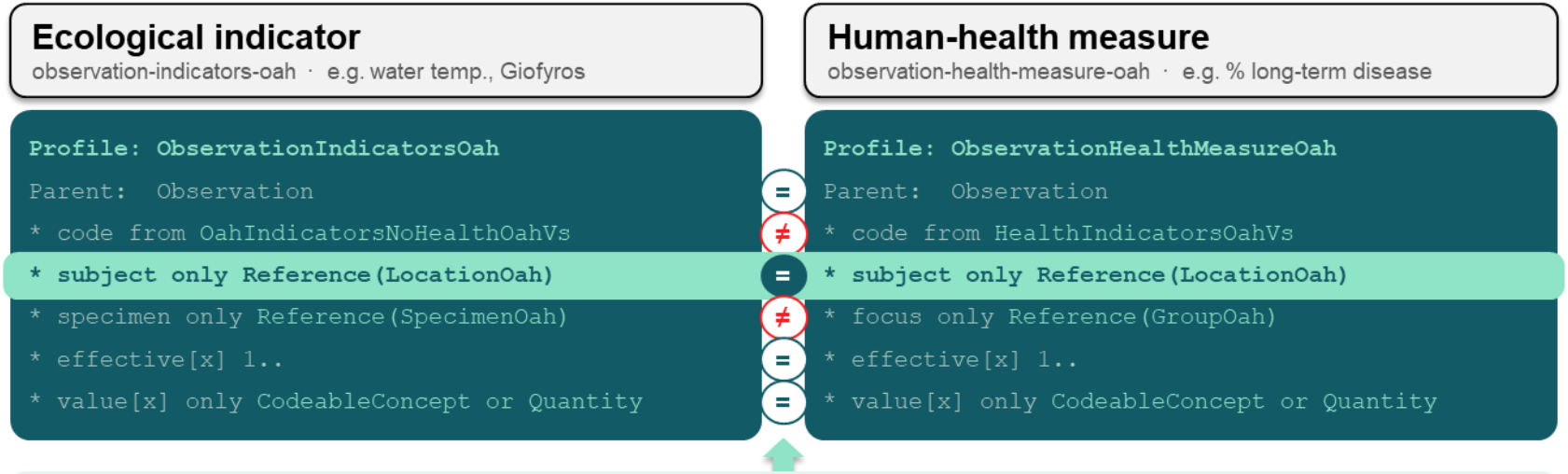
FSH source: hl7-eu/oah, examples/os_disease_prevalence_observations.fsh. Loc-Nordre-Aker is typed SNOMED CT 288520005 |City environment|.

Same resource, same kind of subject. Let's put the two profiles side by side. →

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Ecological vs Human-Health Profiles

Two Observation profiles from the OneAquaHealth IG, side by side: different content, the same anchor.



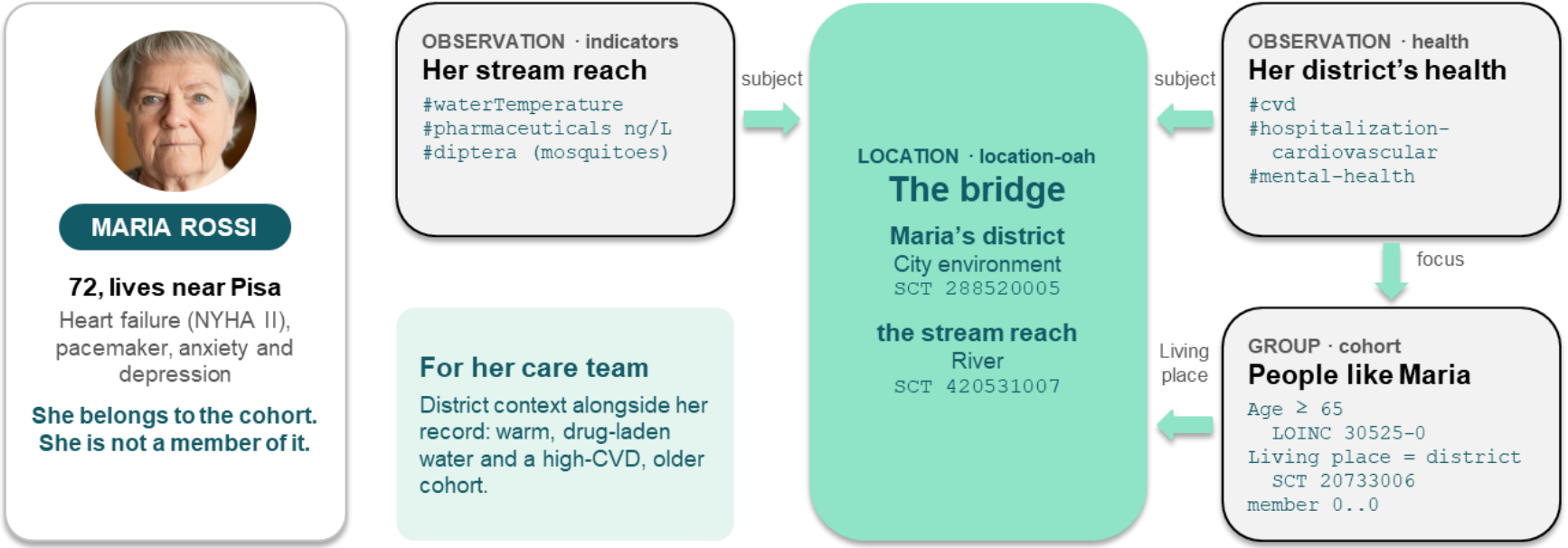
The bridge is LocationOah. A river reach (SNOMED CT 420531007 |River|) and a city district (288520005 |City environment|) are both Locations, and the health cohort's *Living place* (20733006) points to that same Location. Place links the two kinds of data, with no patient record involved.

Source: HL7 Europe OneAquaHealth FHIR IG (FSH, hl7-eu/oah), profiles observation-indicators-oah and observation-health-measure-oah; ci-build 0.1.0.

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Maria’s Neighborhood, Encoded

The same IG applied to Maria: the stream near her home and her district’s heart-health figures meet at one Location, and Maria herself never enters the data.



Codes from the IG’s temporary OAH code system. Pisa resources are illustrative; IG examples cover Giofyros (Crete), Benevento and Nordre Aker (Oslo).

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Conclusion: Place Is the Bridge

What Maria's case shows about connecting ecological and human-health data in FHIR.

1

One resource, two profiles

Stream indicators and district health measures are both FHIR Observations, so the same servers, APIs and tooling handle both.

2

Place and time do the joining

LocationOah as subject and a mandatory effective time link a stream reach to a district, season by season, without naming a single patient.

3

Terminology is the open work

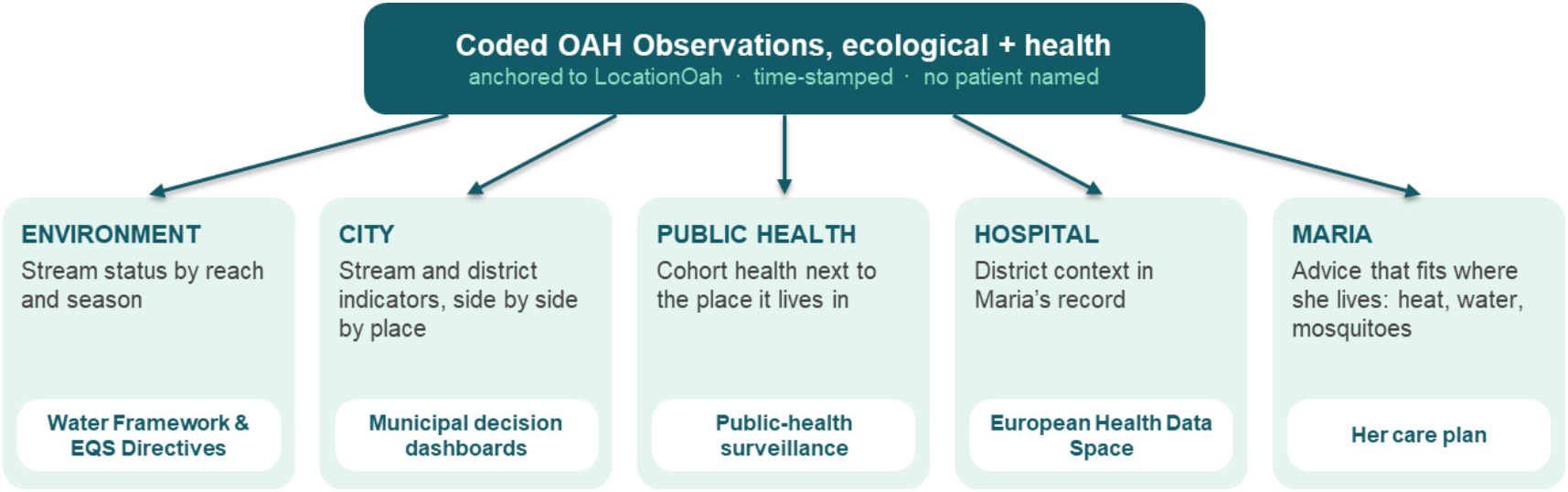
Standard codes, an explicit exposure link and a route into the EHR turn linked data into shared meaning for Maria's care team.

From one district to Europe's river basins: the same coded Observations can serve EU policy. →

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One Data Layer, Every Layer of Maria's World

The domains from the start of the session, joined by one place-anchored data layer.



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Hospitals on FHIR discussion

- **Which existing FHIR resources and terminologies can we reuse?**
- **Where are the main gaps: terminology, mappings, implementation guidance or organizational arrangements?**
- **Which challenges should we prioritize?**

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