MATSim in the Open Digital Twin Platform

Jascha Grübel
ETH Zürich

Carlos Vivar Rios
SDSC

Chenyu Zuo
ETH Zürich

Stefan Ivanovic
ETH Zürich

Milos Balac
ETH Zürich

Yanan Xin
ETH Zürich

Robin M. Franken
SDSC

Sabrina Ossey
SDSC

Martin Raubal
ETH Zürich

Kay W. Axhausen
ETH Zürich

Oksana Riba-Grognuz
SDSC

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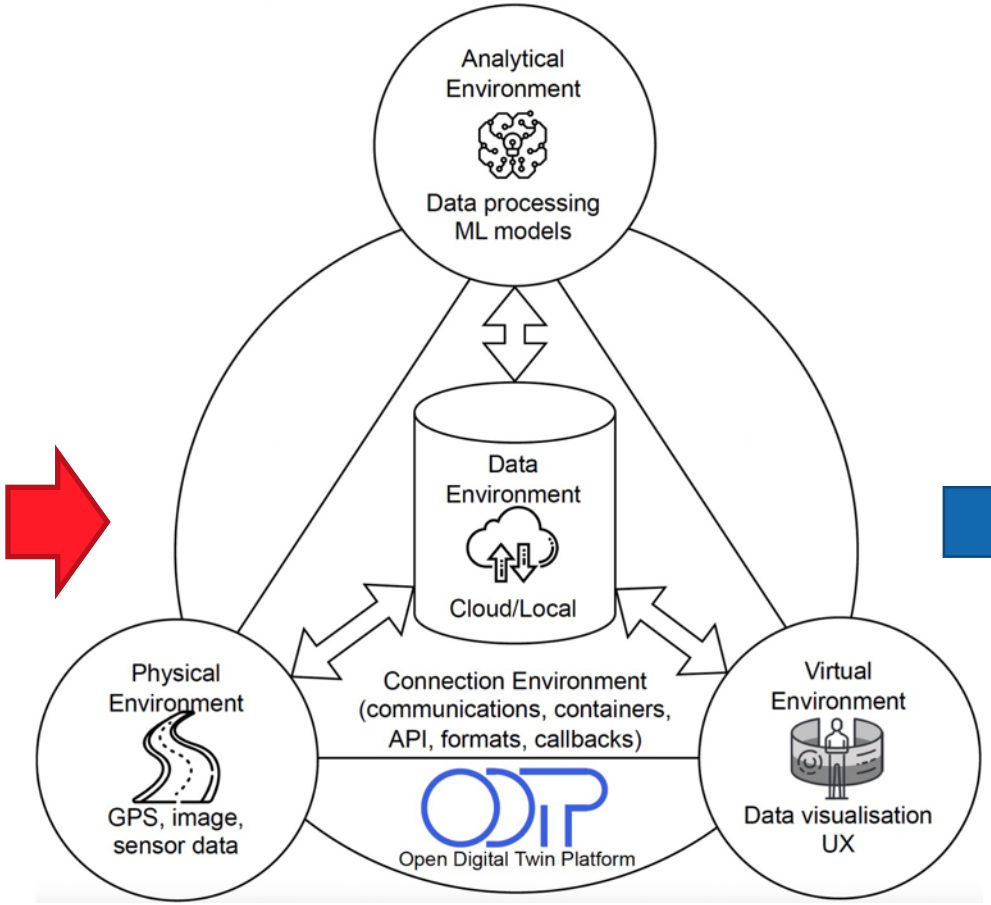
The Digital Twin of the Swiss Mobility System
“CH on the move”

1. “CH on the move”
2. Open Digital Twin Platform
3. Open Digital Twin Standard

Outline Digital Twin “CH on the move”

Physical Twin

Switzerland



Digital Twin

CH on the move

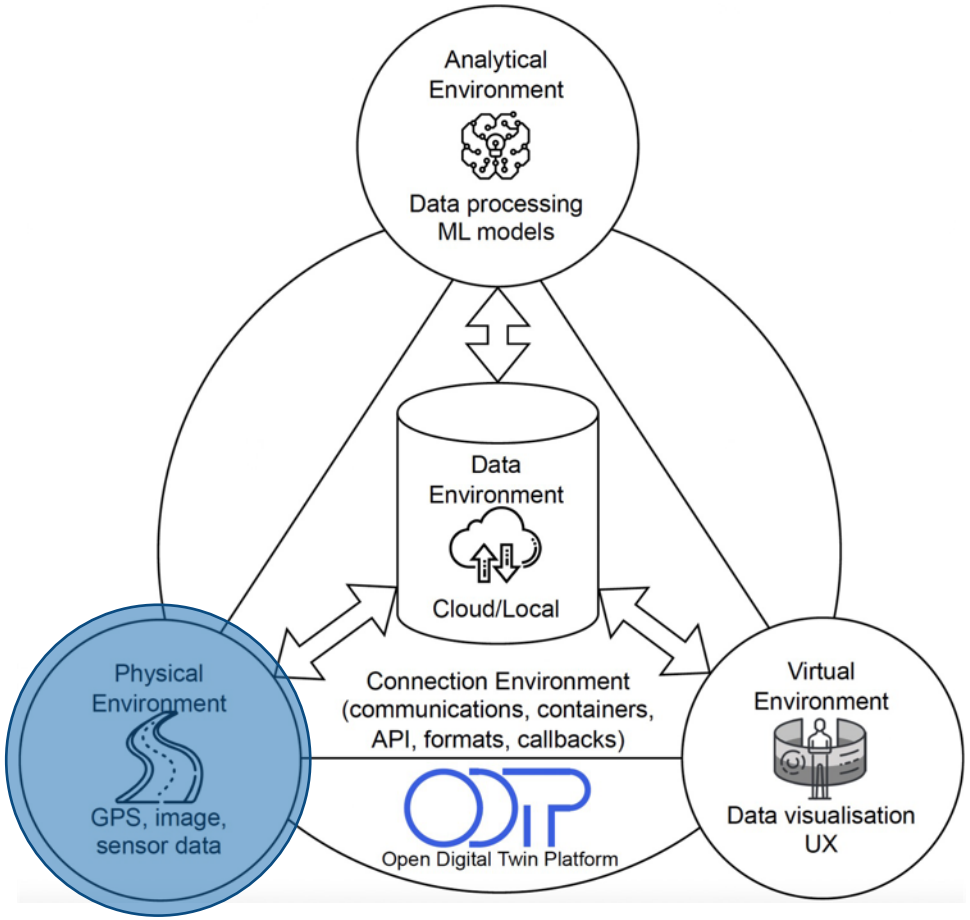
Digital Twins in Open Digital Twin Platform (ODTP)

DIGITAL TWINS

Physical Environment

Focus on Data Acquisition

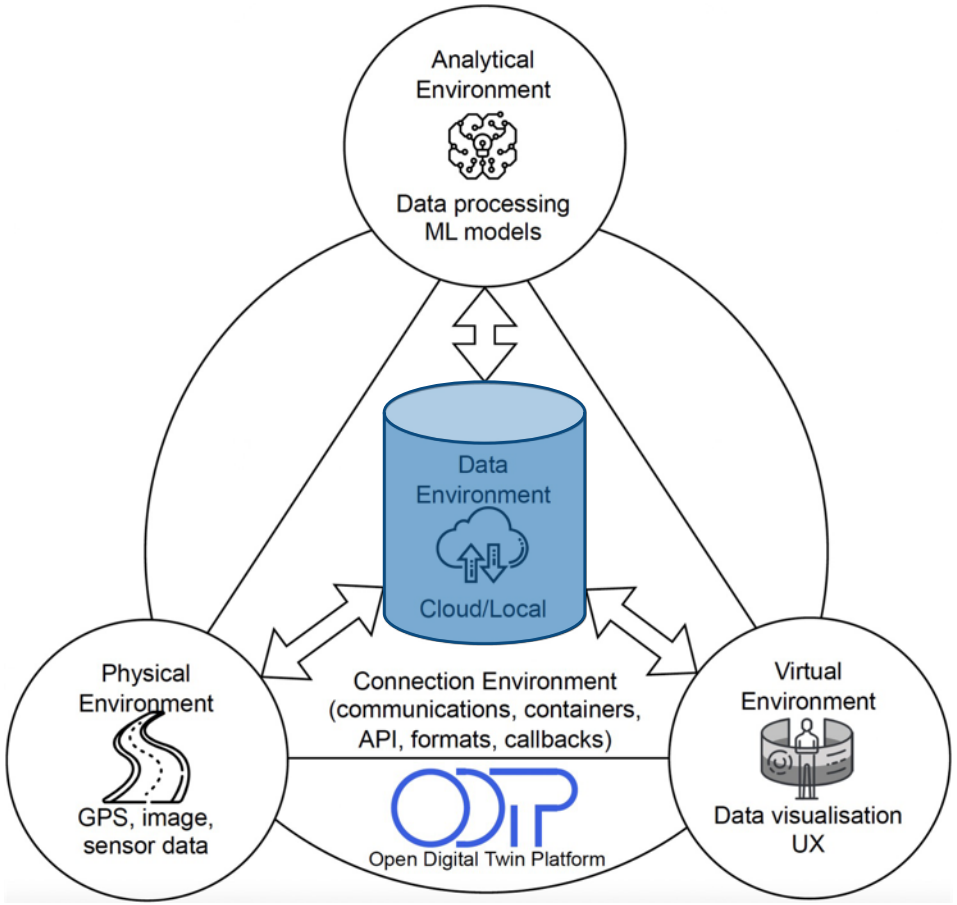
- Find data sources
- Catalogue data sources
- Version data sources
- Access data sources
- Protect data sources



Data Environment

Focus on Data Semantics

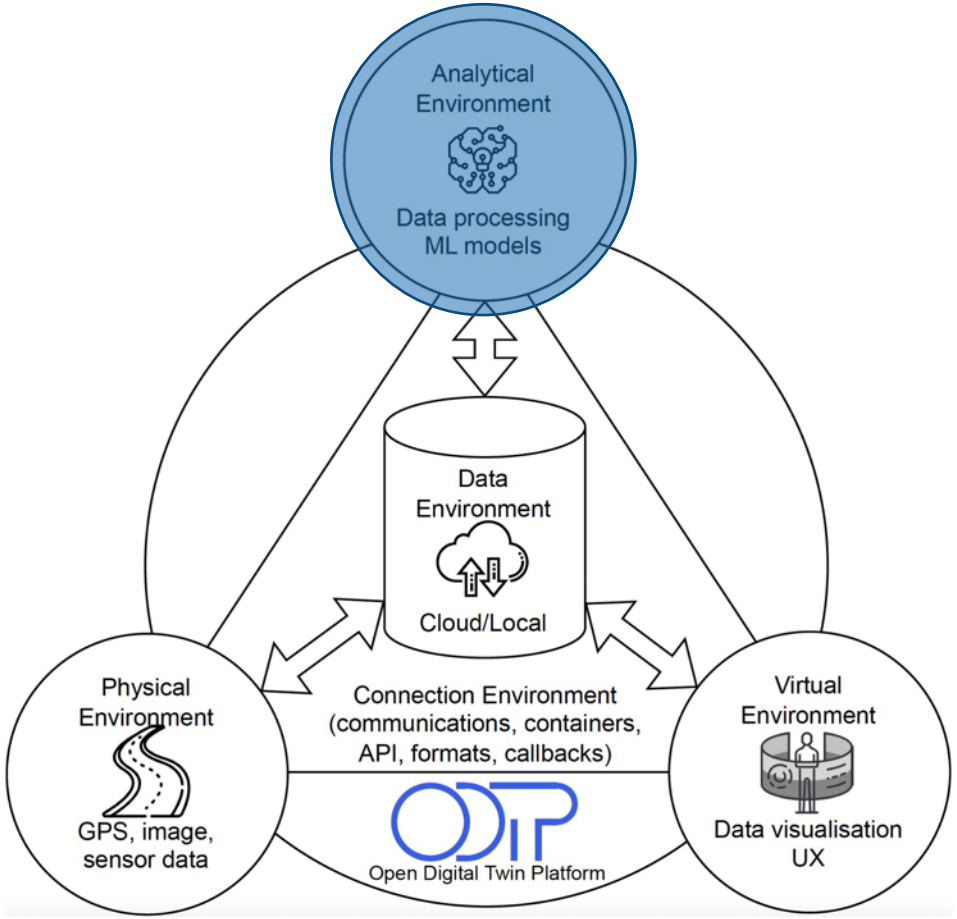
- Classify data
- Relate data
- Equate data



Analytical Environment

Focus on Data Analysis

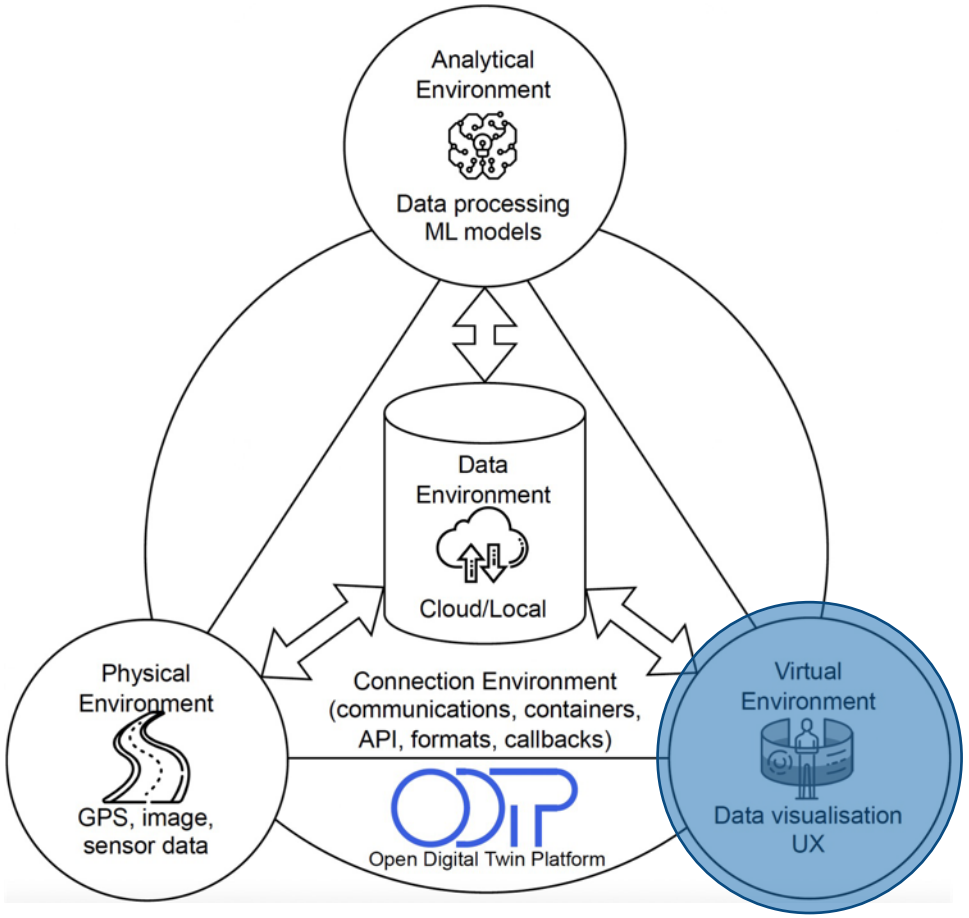
- Wrangling
- Simulations
- Models
- ML/AI



Virtual Environment

Focus on Data Visualisation

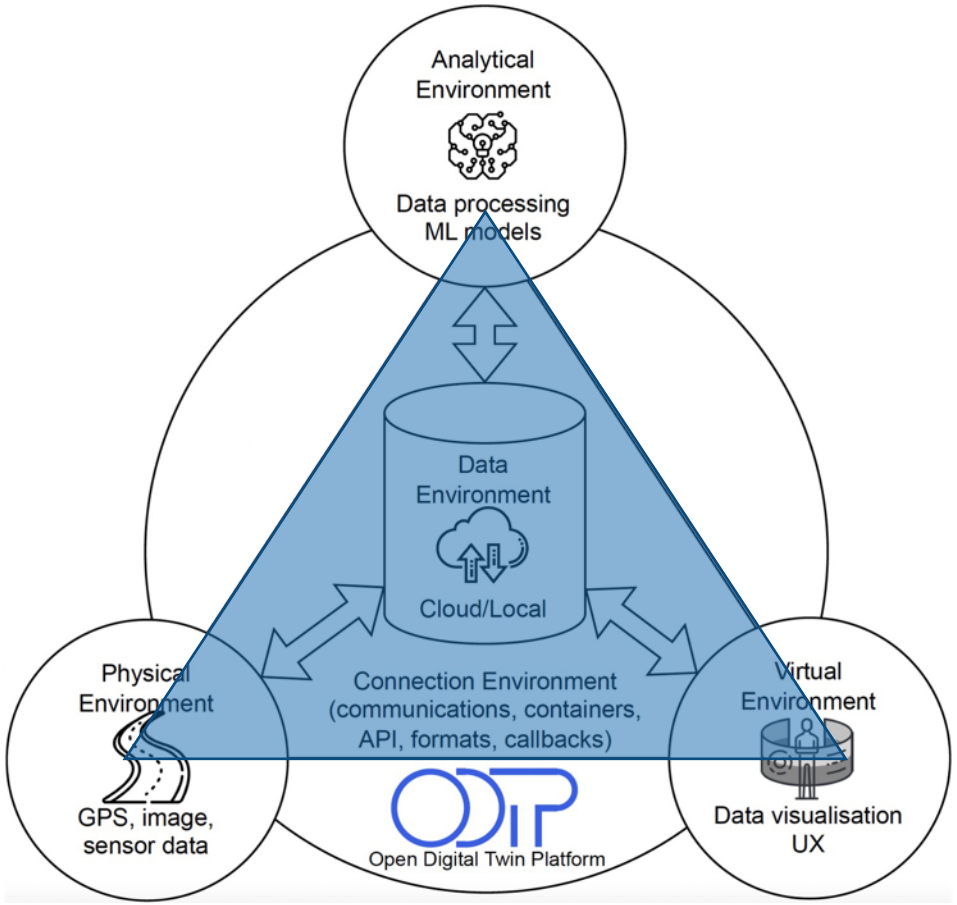
- Raw data types
  - Trace, Surface, Volume
- Descriptive statistics
- Model differences
- Parametrization & Feedback



Connection Environment

Focus on Data Management

- Provisioning
- Deployment
- APIs
- Data Traces
- Meta-analysis



A closer look at Open Digital Twin Platform (ODTP)

OVERVIEW

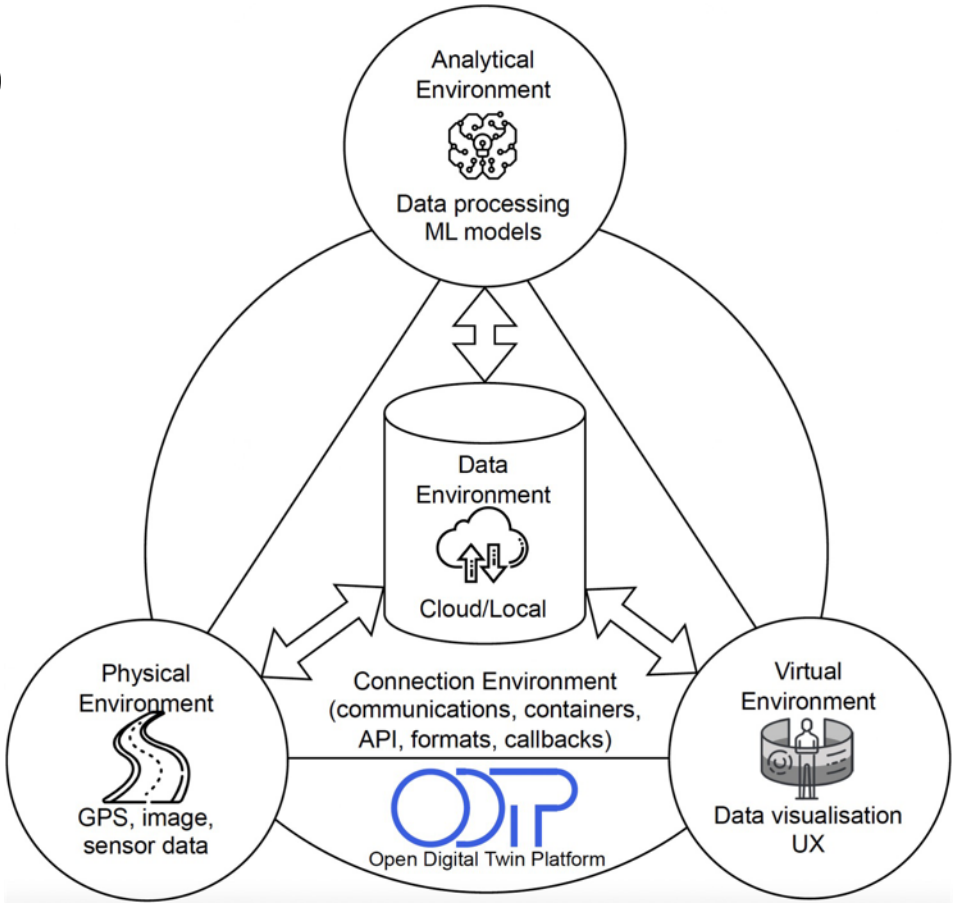
A closer look at Open Digital Twin Platform (ODTP)

Creating a new digital twin with ODTP

Open Digital Twin Platform

Digital Twin Zoo (Swiss ORD Grant, 2023)

1. Containerise each component
2. Provide well-defined API
3. Web-service hosts zoo of components
4. Able to pick and choose



A closer look at Open Digital Twin Platform (ODTP)

Sharing an ODTP digital twin

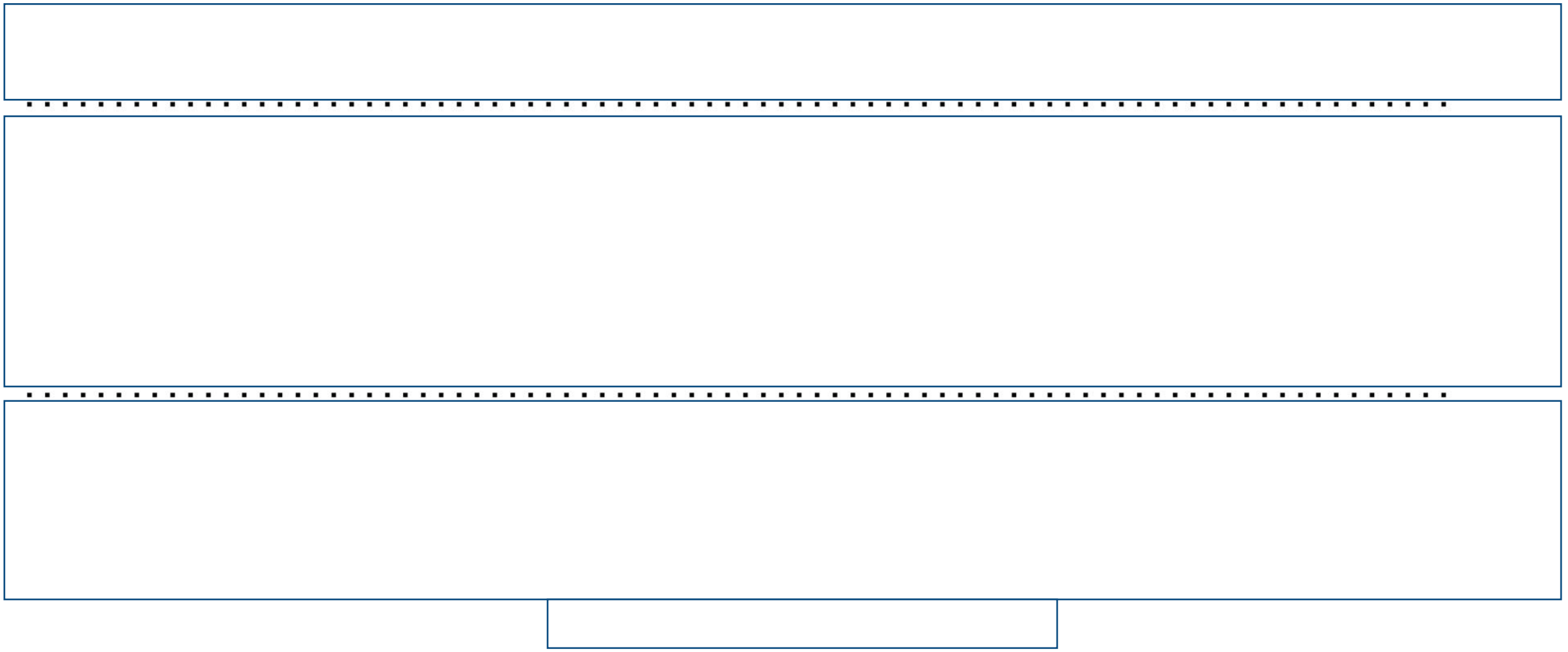
A closer look at Open Digital Twin Platform (ODTP)

Commercial use of an ODTP digital twin

A closer look at Open Digital Twin Platform (ODTP)

TECHNOLOGY

Open Digital Twin Platform

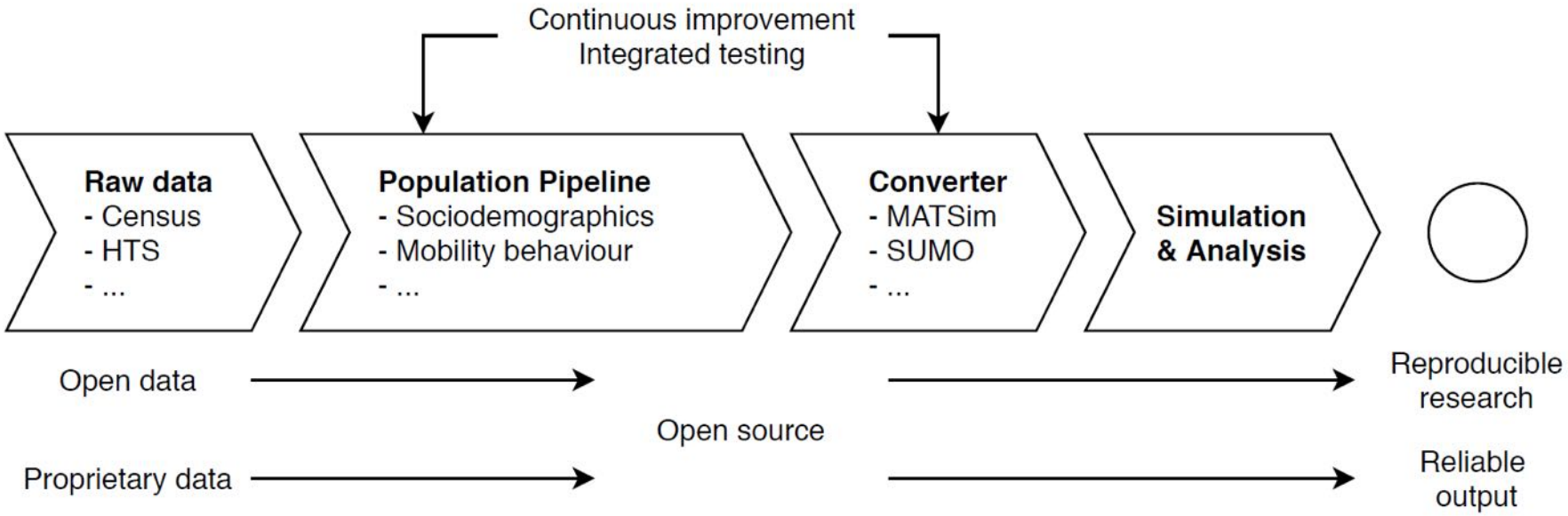


”CH on the Move” in the Open Digital Twin Platform (ODTP)

MATSim + eqasim prototype

Eqasim

An integrated Python-based pipeline from raw data to agent-based simulation based on straightforward statistical methods



Eqasim

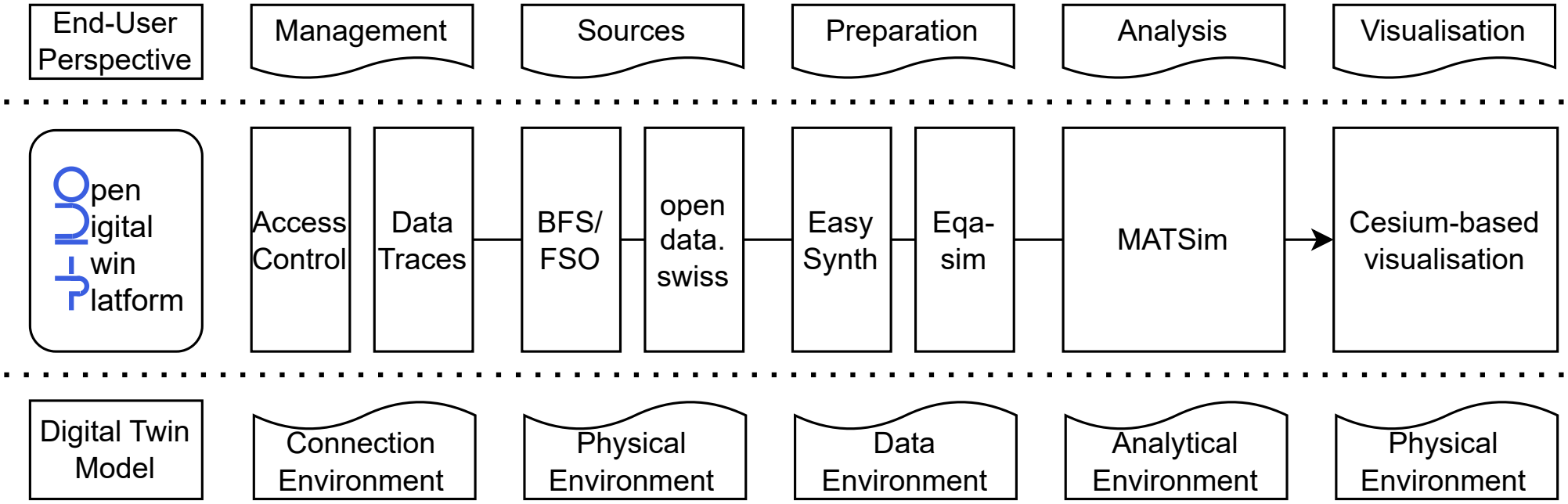
An integrated Phython-based pipeline from raw data to agent-based simulation based on straightforward statistical methods

Ile-de-France, Sao Paulo, San Francisco, Los Angeles, Jakarta, **Switzerland**, **Germany**, **Cairo** and others

Available at https://github.com/eqasim-org

”CH on the Move” in the Open Digital Twin Platform (ODTP)

MATSim + eqasim prototype



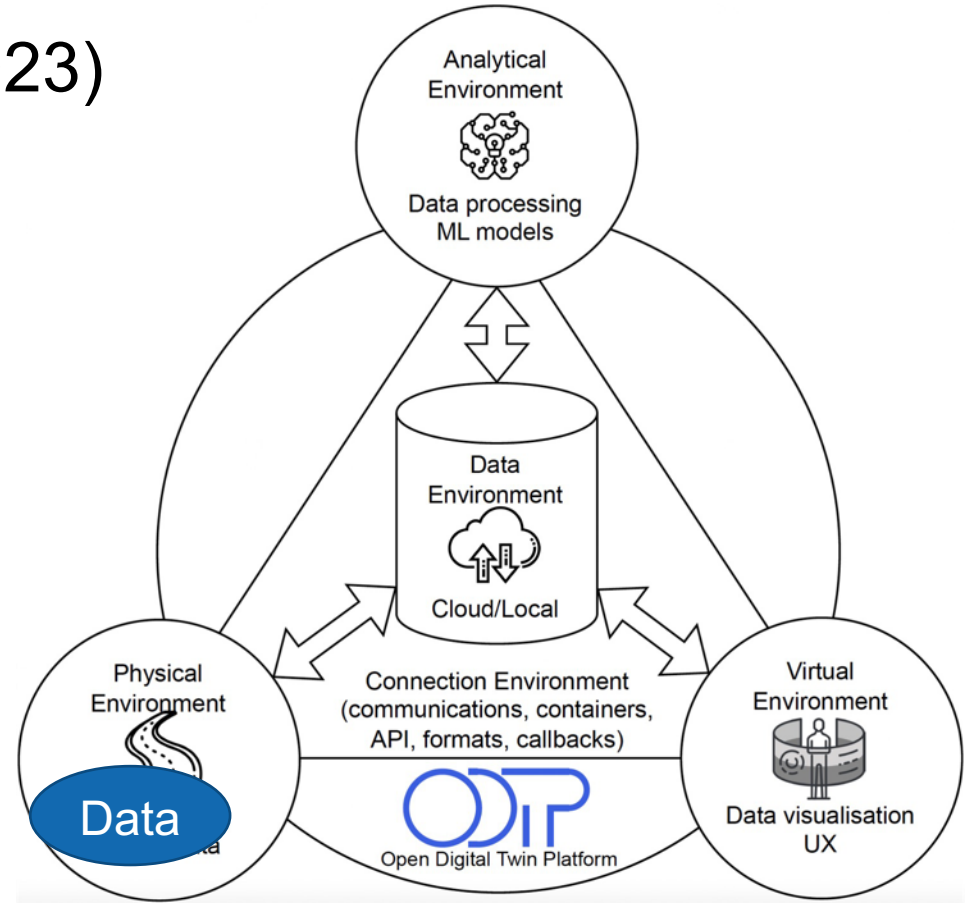
Traces in Open Digital Twin Platform (ODTP)

DATA TRACES

Open Digital Twin Platform

Digital Twin Traces (Swiss ORD Grant, 2023)

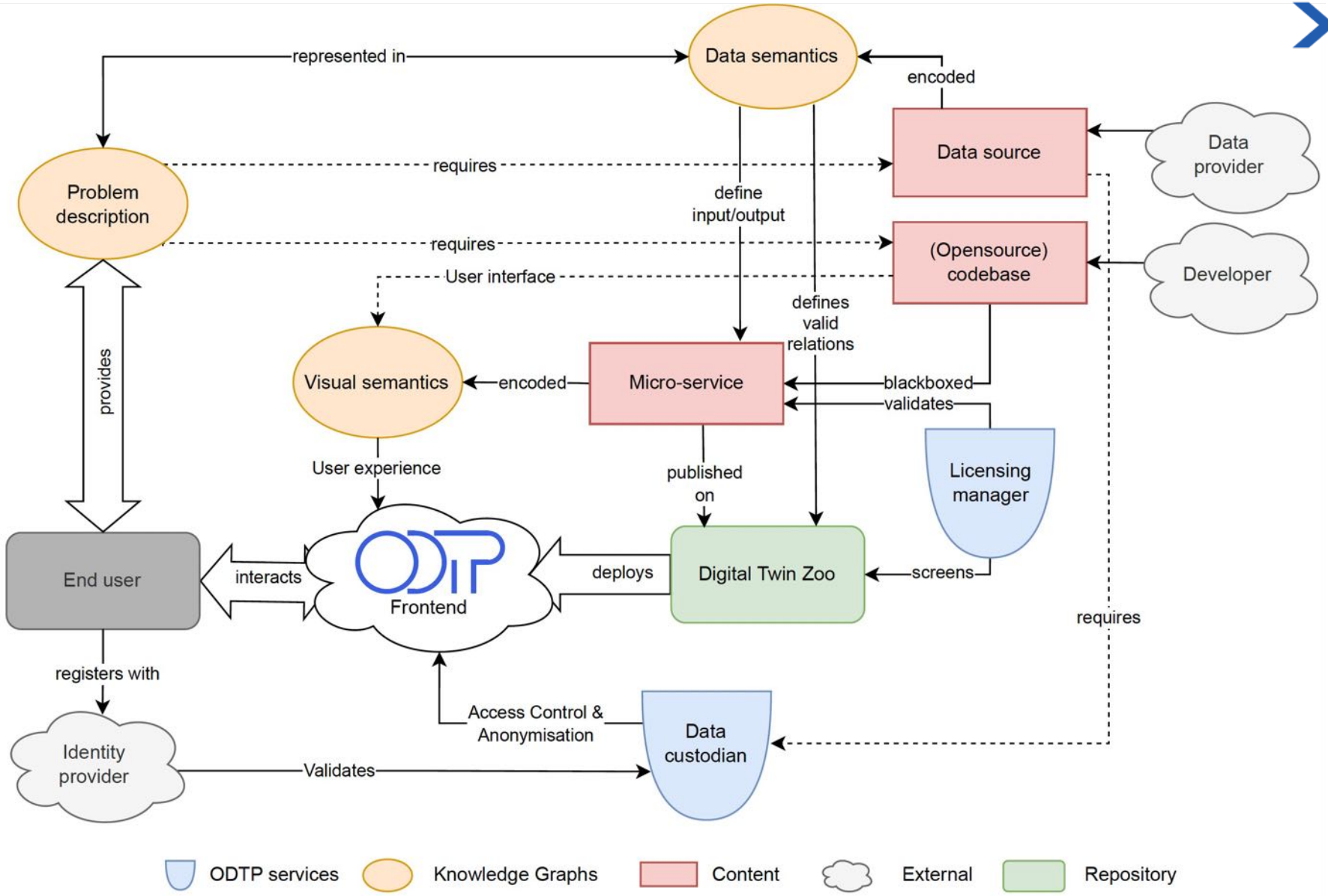
- Well-defined data flow with history
  - Used to “replicate” Digital Twin
- Manipulate parts of traces
  - Enables comparison of DTs
- Long-term: Assess data quality
  - Put uncertainty on data



The ecosystem of Open Digital Twin Platform (ODTP)

ECOSYSTEM

End user perspective on Open Digital Twin Platform (ODTP)



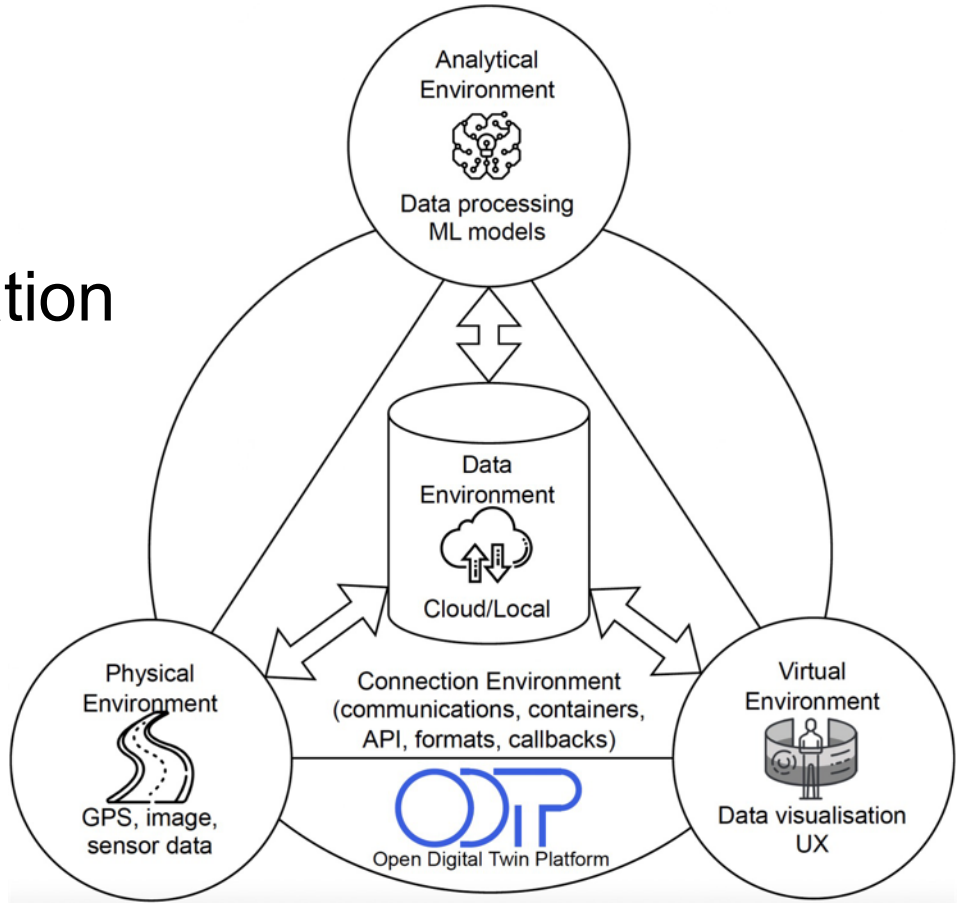
Standards for Open Digital Twin Platform (ODTP)

STANDARD

Open Digital Twin Standard

Develop Draft (Swiss ORD Grant, 2023)

- Definitions independent of implementation
  - Define Zoo
  - Define Traces
  - Define Components
  - Define APIs
  - Define services
  - Define Data Standards
  - Define Visualisations



Questions?

Email me at balacm@ethz.ch