

# Conférence BIM 2024

Jeudi 14 novembre 2024

SwissTech Convention Center, Lausanne

# FUSTIC

**FUTURE SUSTAINABLE TERRITORIES, INFRASTRUCTURES AND CITIES**

**Dr. Frederic Dreyer, EPFL Innovation & Ecosystem Manager**

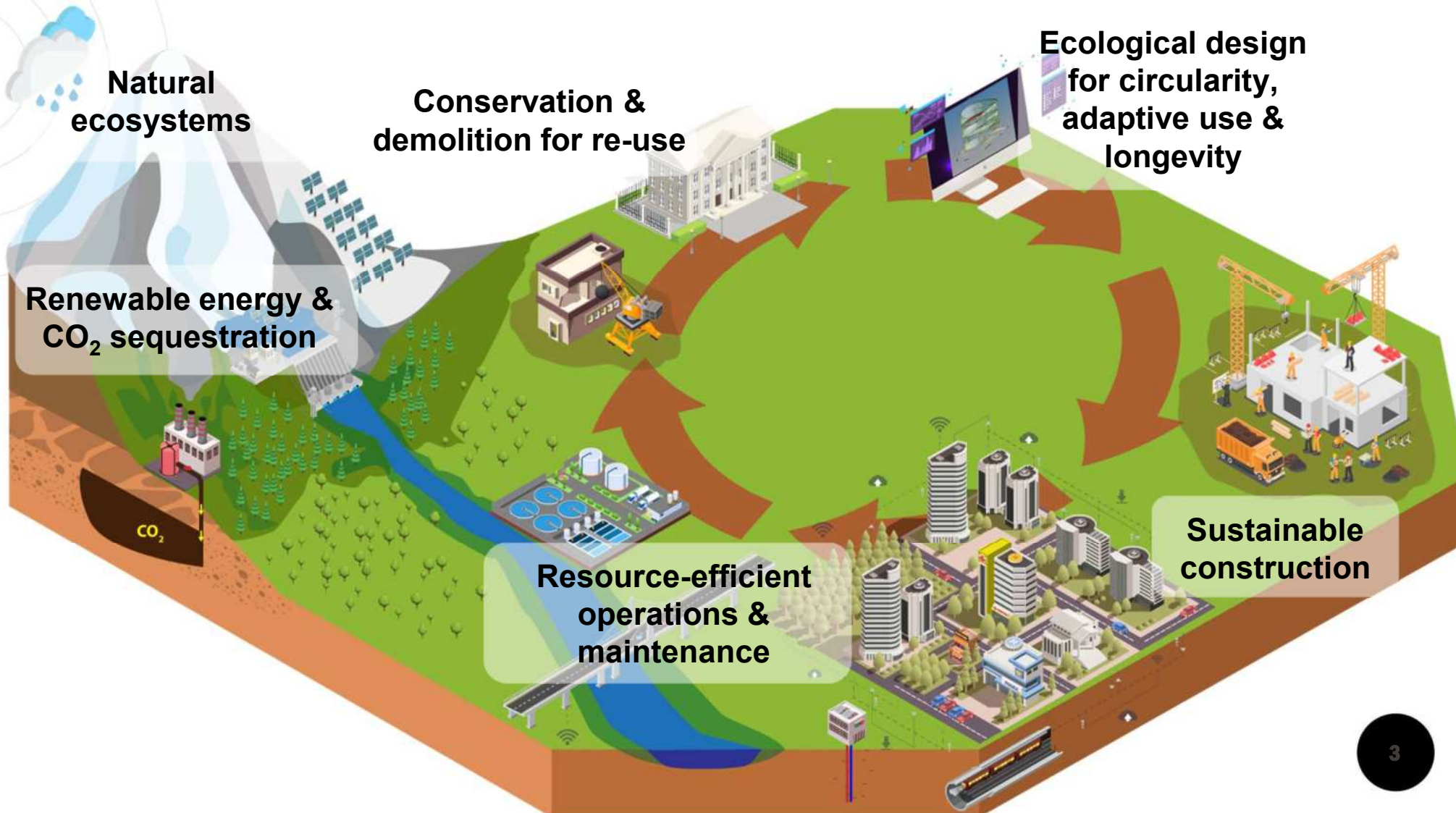
# Key figures

From 2022 to 2050

- Today, Half of humanity lives in cities
- Seventy million people migrate to cities every year
- By 2050, 70% of the world's population will live in cities
- Cities consume 80% of the world's resources and produce most of the world's waste
- Cities are responsible for 70% of the world's greenhouse gas emissions
- And use 80% of the world's energy
- Climate change undermines resilience and disrupts lives in cities
- Each year more than 3 million people die of diseases triggered by air pollution



# Towards circular economy and net zero





# OUR CONCEPT

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Fustic Association is process-oriented and works with **cross-organizations** to support digital technology and innovative best practices/products/services that will solve key economic, industrial, urban development and climate challenges **for a sustainable future.**



# OUR MISSION

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We want to **unlock the full potential of digital solutions**, inspire a culture of innovation and transformation, and bring viable solutions to our ecosystem & global markets, sciences and innovation at the service of Society.

Inspiring innovation and excellence are at the heart of everything FUSTIC Association does.

This embraces horizon scanning for **emerging technologies and trends**, leveraging cross-sector technology, and harnessing panels for expert advice and capability.

# A UNIFYING ECOSYSTEM

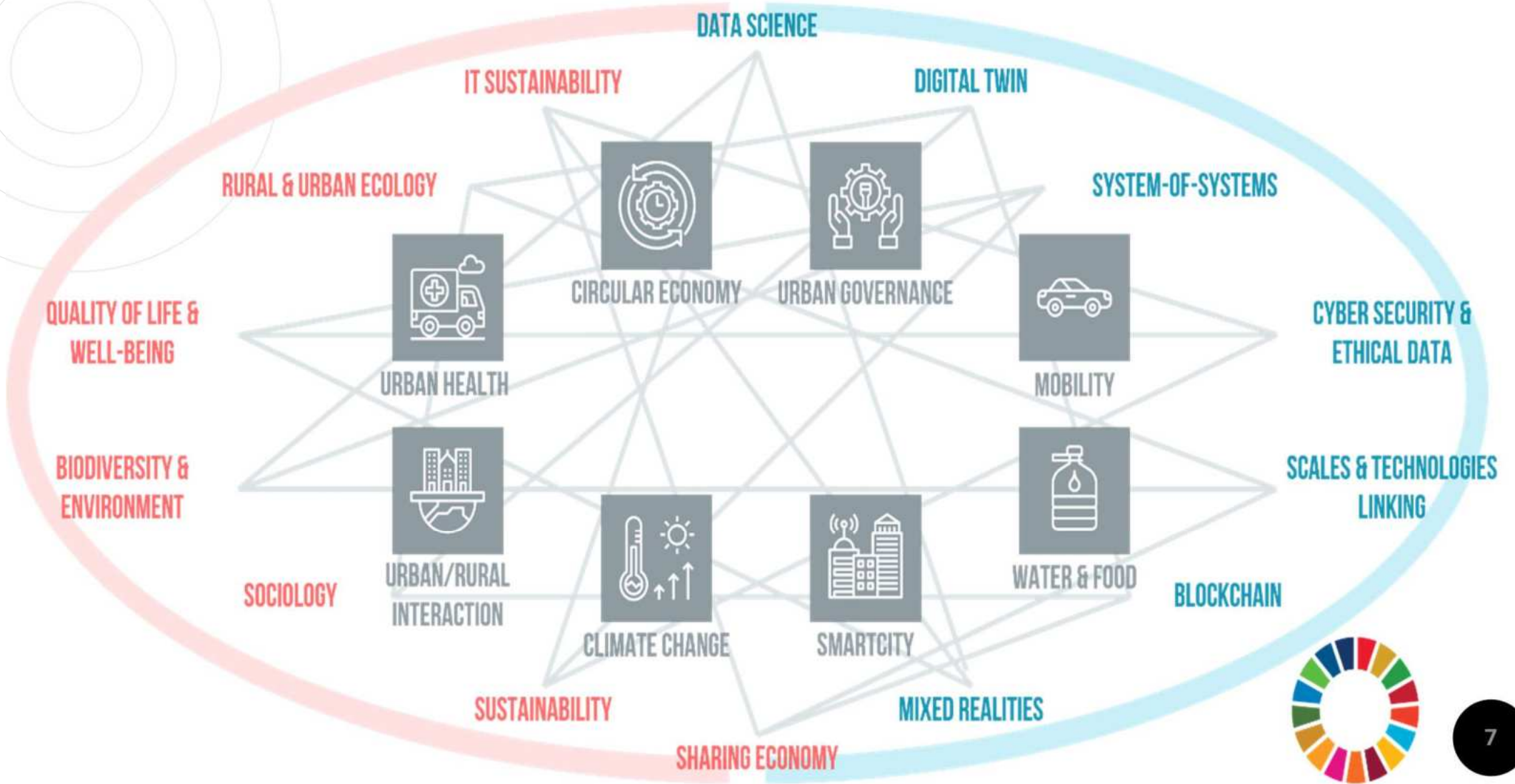
**FUSTIC** will reinforce the strength of its **actions** and leverage **collective solution-oriented** projects. From **start-ups** and **academics**, to **SMEs**, **corporates**, **NGOs** and **public institutions**,

**Act for shaping tomorrow's cities & territories!**



**Born at EPFL | Informed by Research | Ecosystem-Led**

# FUSTIC's TOPICS





**IBOIS**  
2000 Watt Smart Cities  
CO-Objectifs 21 SA

**URBES**  
SHEMATIC

**IMMO-ATELIER**

**ARCALIGNUM**  
**FAIRTIQ**  
Public transport made easy.  
**LTS AG**

**GO EKO**

**FUSTIC**

**N7**  
FUTURE SUSTAINABLE TERRITORIES, INFRASTRUCTURES AND CITIES

**VZUG**

**technis**  
**RESSLab**  
Reinforced Steel Structure Laboratory

**SUREAL**  
SUSTAINABILITY EXPERTS  
**STREETS**  
Urban Streets Portfolio Management Group

**Architectes.ch**

**PLANIBIM SA**

**CLESTRA**

**phyta biodesign**  
Sara El Kabiri, ARE

**LaSUR** | Laboratoire de sociologie urbaine

**AETERNUM**  
Enabling circular buildings

**Service de la promotion de l'économie et de l'innovation (SPEI)**

**EAS**  
Entrepreneur For Society

**Arcadie**

**CleantechAlps**

**REPUBLIQUE ET CANTON DE GENÈVE**

**my iHome**  
Séminaires Durables & Intégration

**TASQ**  
Travailler en confiance

**Building2050**

Yves Kazemi  
Inspecteur des forêts  
Direction générale de l'environnement (DGIE)

**Life Eternity**

**La Source.**  
Institut et Haute Ecole de la Santé

**Media<sup>x</sup> Design Lab**

**TRANSP-OR**

**eeproperty**

**ARCIT**

**hepia**

**Adrestia Legal**

**GREEN GO WEB**

**vizzia**

**STRUCTURAL EXPLORATION LAB**

**AGROPÔLE**  
**WasteFlow**

**SEPAR**

**Ville de Lausanne**

**carrière**  
Architecture et aménagement

**CIS EPFL**

**BRÖNNIMANN & GOTTREUX ARCHITECTES SA**

**Bioperf.biz**

**naef**

**SPARROW**

**GREEN GO WEB**

**EPFL**

**STRUCTURAL EXPLORATION LAB**

**droopie**

**AFRY**

**LOSINGER MARAZZI**

**mo hO**  
mobel/homme

**Human-Environment Relations in Urban Systems**

**SWISSRAIL**

**We Robotics**  
THE POWER OF LOCAL

**blueark**  
Entremont

**ROMANDE ENERGIE**

**PROSPERITY DIGITAL**

**Interface Transport**

**uzuflly**  
matching your world

**EHL**

**HEIMA**  
DISCOVERY MADE POSSIBLE

**ECONOMY OF TRUST FOUNDATION**

**AFRY**  
**marks**

**HALEON**  
For Health. With Humanity.

**LA POSTE**

**Assimina WALTHER**  
Architecte expert EPFL - SIA

**SBB CFF FFS**

**HENRY**  
TRANSPORTS

**M.I.S TREND**

**Sautter Jacquemoud**

**ETUDE DE NOTAIRES**

**TVT**  
Technologies at Communications

**citéz**

**EERL**

**eawag**  
aquatic research

**codos**

**system logics**

**helvetia**  
environnement

**mobility lab**  
sion valais

**ALICE**  
(Atelier de la conception de l'espace)

**clim ↔ act**

**LUTS**

**SHADEME**

**BRIDGEOLOGY**

**Hes-so/Genève**

**wood bee**  
INSPIRED BY NATURE

**EPFL**

**ecoCloud**

**system logics**

**SOLARIMPULSE FOUNDATION**

**URBAN HUB**  
GENÈVE

**SWISS INSPECT**

**RediLink**

**Unil**  
Observatoire universitaire du vélo et des mobilités actives

**REM**

**SWISS AIM**

**STEINER**

**PHIDA**  
GROUPE

**atelier nova**

**REON**  
REUSE IS ON!

**DIGITAL TWINS**

**POPEY.IO**

**DAMOUR**  
LABORATION

**URBAN HUB**  
GENÈVE

**RediLink**

**Unil**  
Observatoire universitaire du vélo et des mobilités actives

**REM**

**SWISS AIM**

**STEINER**

**PHIDA**  
GROUPE

**A-ARCHITECTES SARL**  
43 AVENUE DE CHÂTELAINE  
CH 1203 GENÈVE

**I Gère**

**smart living lab**

**Malcolm Onifadé**  
Refuge Project

**EDAPHOS ENGINEERING**

**CCI FRANCE SUISSE**  
Handelskammer Frankreich-Schweiz

**CCE**

**Product DNA**

**OXARA**

**PRELCO**

**MAGENTA EKO**

**Terre des hommes**  
Helping children worldwide

**ENAC-IT4R**  
**EPFL**

**HiFLOW**  
Simon Elias Bibri

**SWISS MADE CONSULTING**

**EESD Raized ventures**

**ENAC**

**enerdrape**

**citec**

**ENOKI**  
conception durable

**rebuILT**

**KUNY DE MORSER ARCHITECTES**

**STEEN**  
Sustainable Energy

**ti**

**HOBEL**  
HUMAN-ORIENTED QUALITY ENVIRONMENT LAB

**HOBEL**  
HUMAN-ORIENTED QUALITY ENVIRONMENT LAB

**SmartHelio**

**Habitat H**

**Research R**

**Center C**

Thibaut Goussebaile  
Patrick de la Chesnais  
Ahmed Wael Ismael  
Jacques Herman

**cem**

**Lab**  
Switzerland

**sb**  
swissbim

**Gerflor**  
thefloorinaround

**EPFL VITA**

Luka Biernacki

nueschdevelopment

**MATTHEY - PETIT SA**



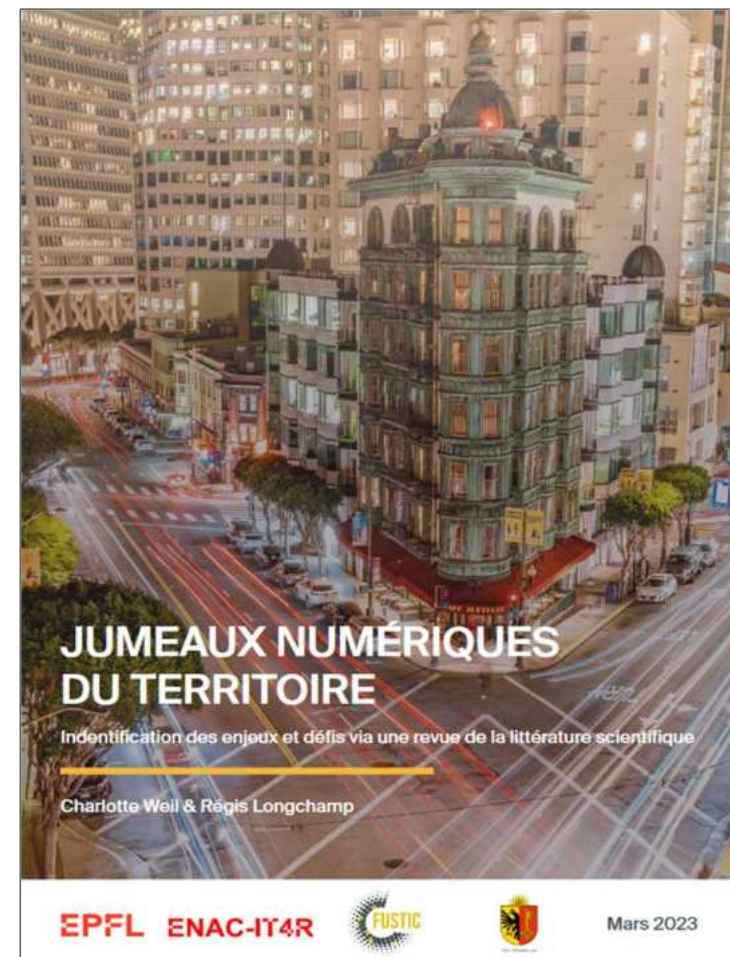
WHAT

NOW?





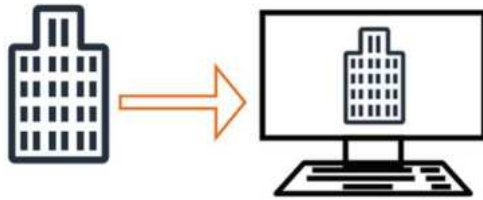
*Urban digital twins*  
**≈ Jumeaux numériques du territoire**



# Definitions : Urban digital twinning

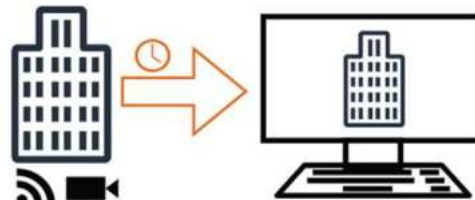
## Digital Model

Virtual reflects physical.



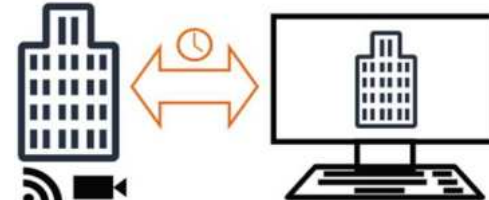
## Digital Shadow

Virtual reflects physical realtime



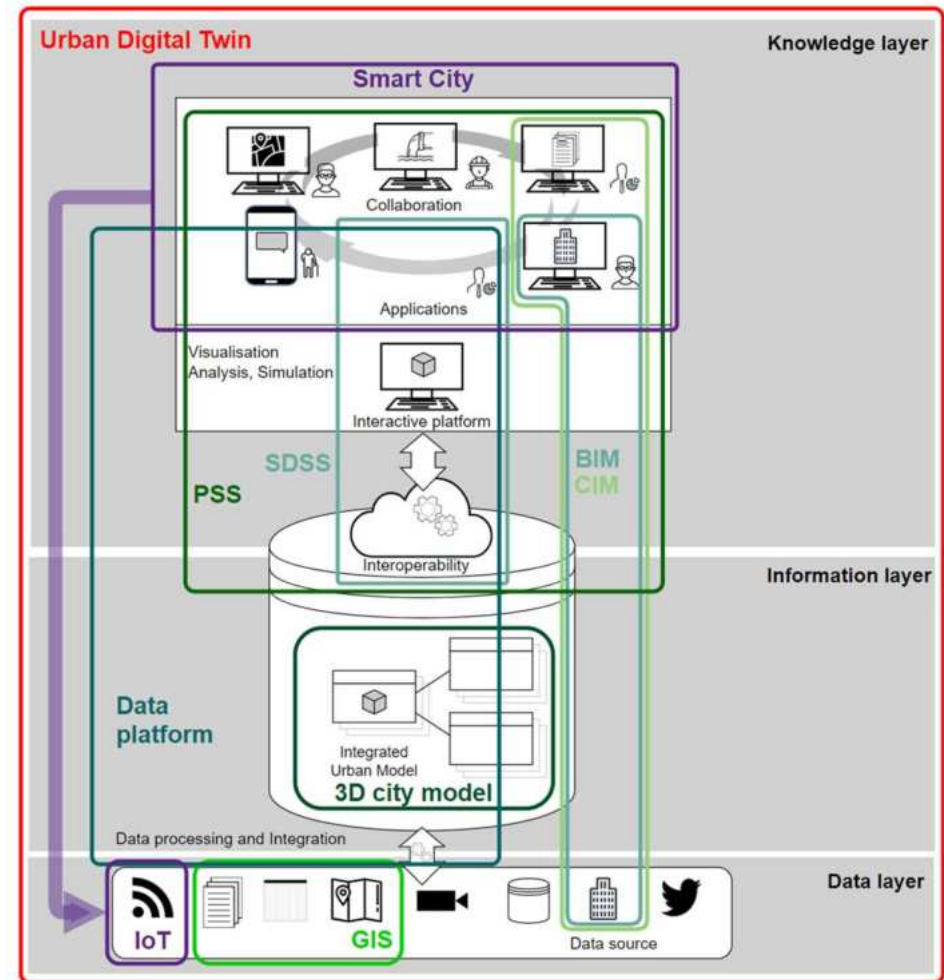
## Digital Twin

Bi-directional data flows



# Definitions: Urban Digital Twin

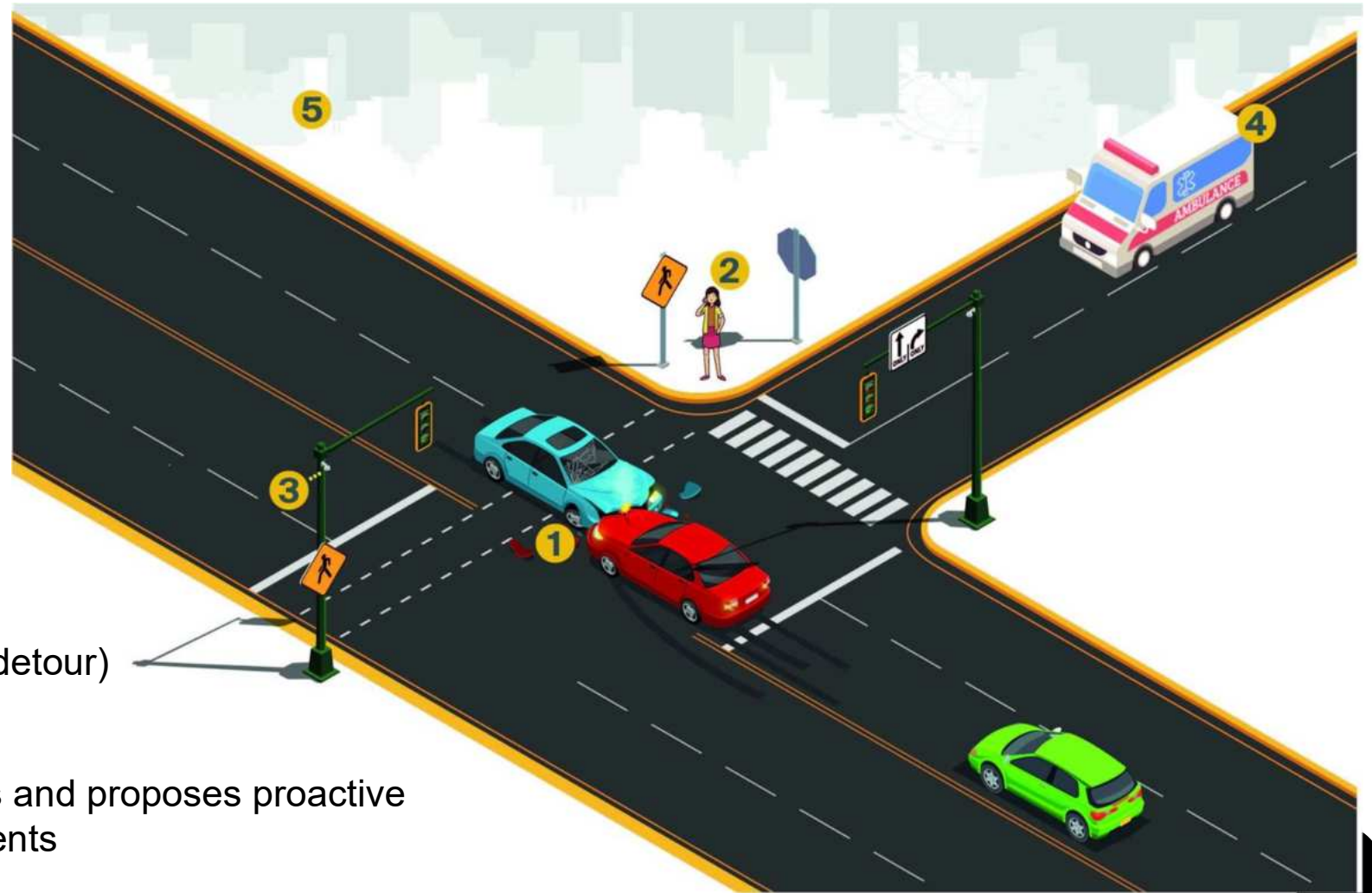
Smart City  
Cognitive City  
City Digital Twin  
Virtual City  
Urban brain  
Geographical Information System  
Building Information Modeling  
City Information Modeling  
Digital 3D City Models  
Planning Support Systems  
Spatial Decision Support System



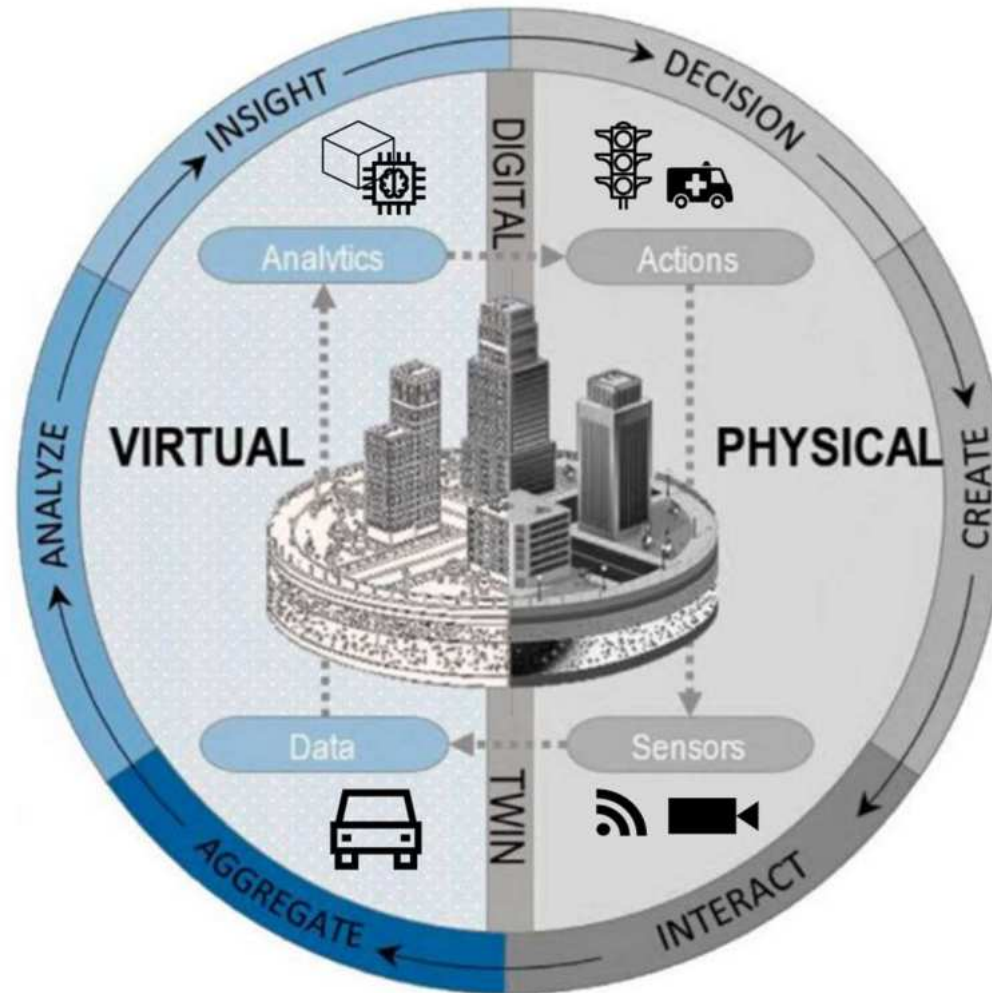
Adapted from Gil 2020

# Example

- 1 Accident
- 2 Citizen alert
- 3 Automatic alert
- 4 Digital twin response (ambulance + traffic detour)
- 5 The digital twin learns and proposes proactive solutions to future events



# Example



Adapted from Petrova-Antonova & al, 2019

# Urban Digital Twins

## *Challenges*

- Identify open issues & key challenges in the scientific literature to consider when implementing an *Urban Digital Twin*.
- Identify the aspects that should lead to further academic research.



# Methodology

## 1. Papers selection criteria :

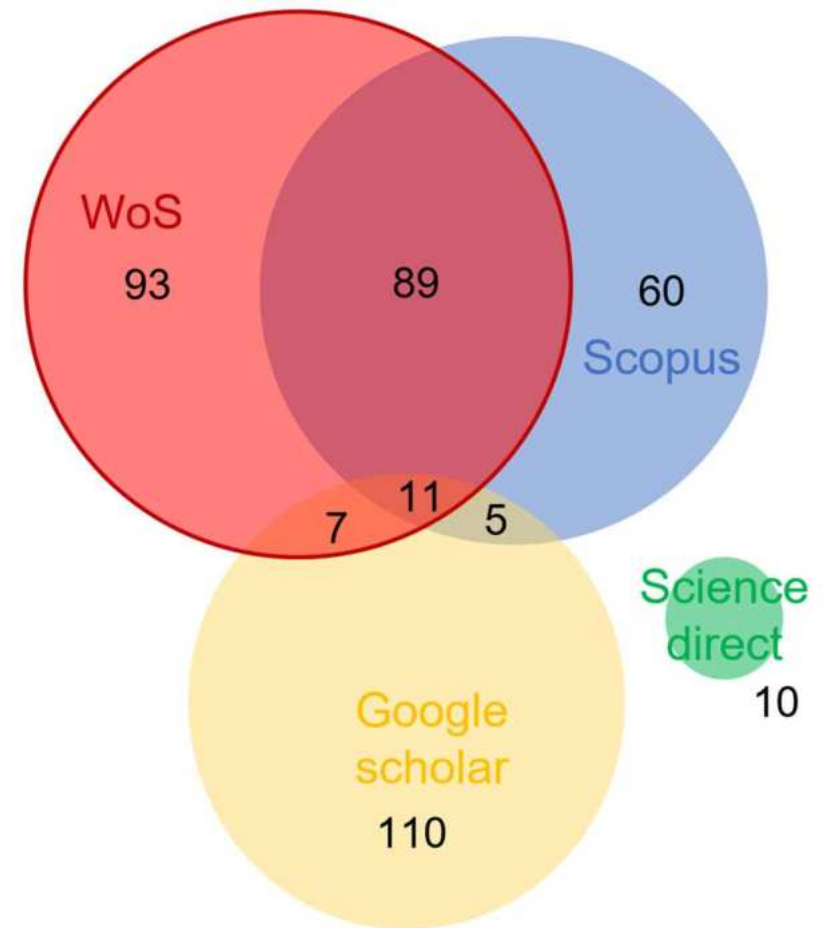
*"Urban Digital Twin" in the title, abstract, or keywords, or "Urban Data Platform" in the title from 2012 to October 10th, 2022*

→ 200 papers select **Web of Science**™

## 2. Double (human!) reading extracting

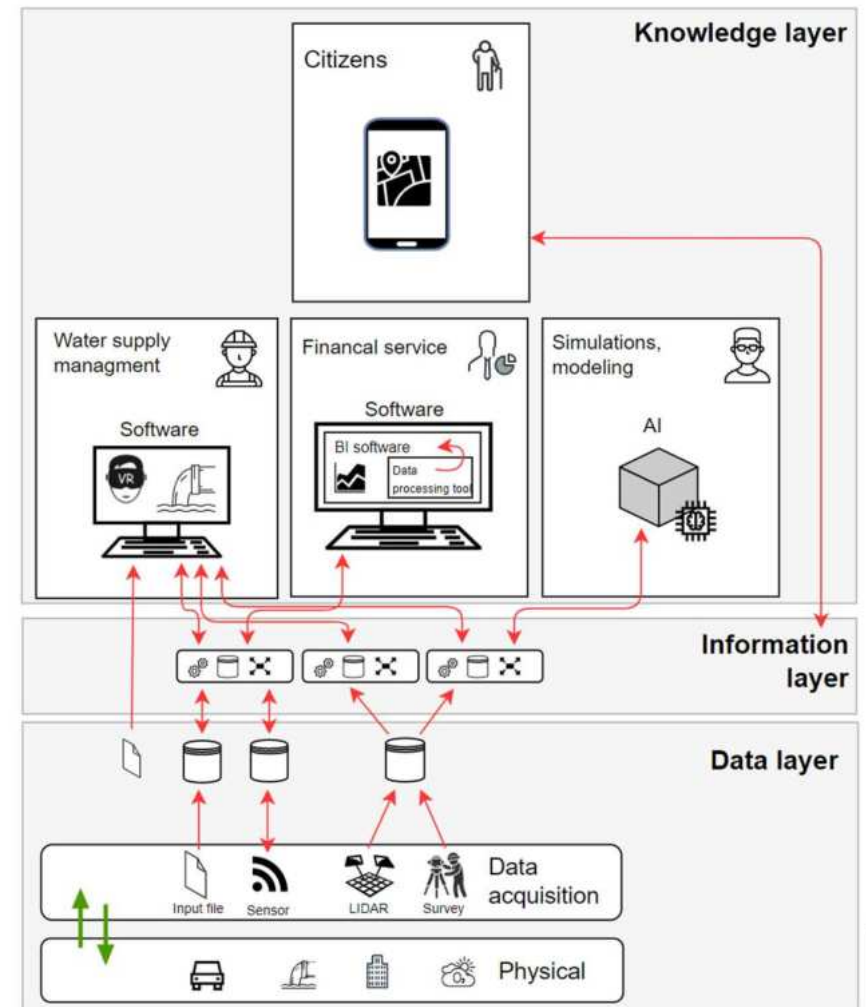
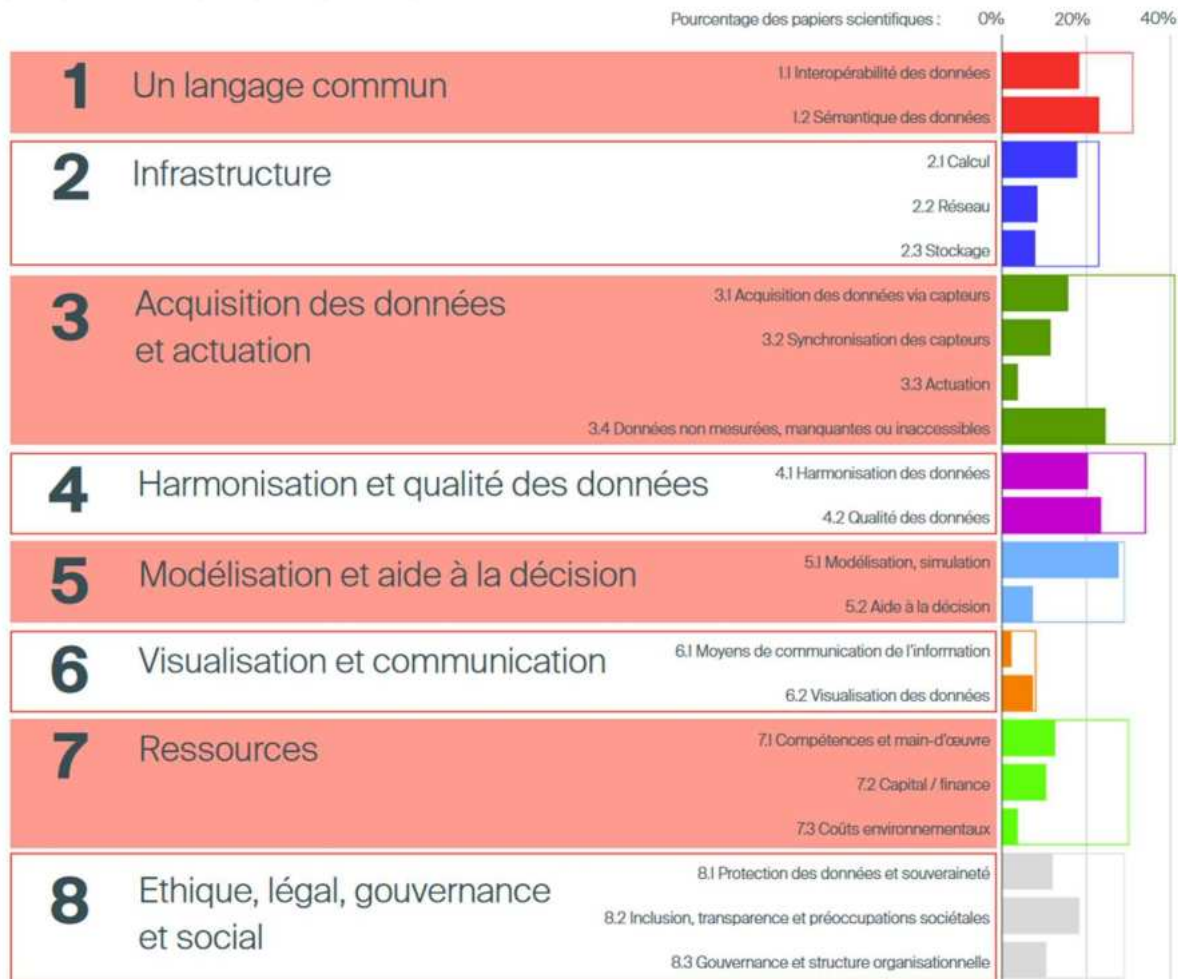
- main issues,
- unresolved challenges

→ DB of challenges structured based on Shahat's framework

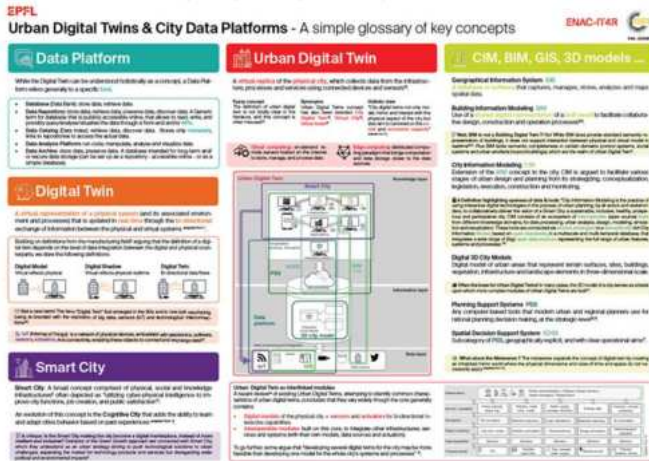




# Challenges



# To find out more...



Urban Digital Twins & City Data Platforms - A simple glossary of key concepts

October 2022  
1 page  
English



Literature review to identify key challenges of Urban Digital Twins

March 2023  
78 pages  
English



JUMEAUX NUMÉRIQUES DU TERRITOIRE  
Identification des enjeux et défis via une revue de la littérature scientifique

March 2023  
16 pages  
French

Innosuisse - Swiss Innovation Agency



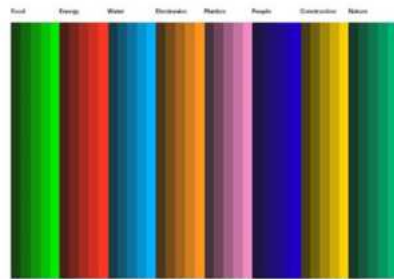
Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra



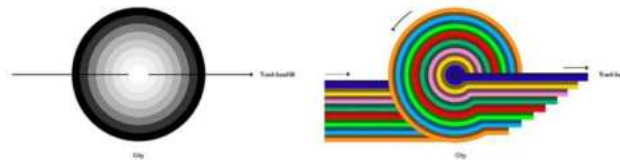
# THE BLUE CITY PROJECT

# The Blue City Project

## Objectif : “Digital Twin”

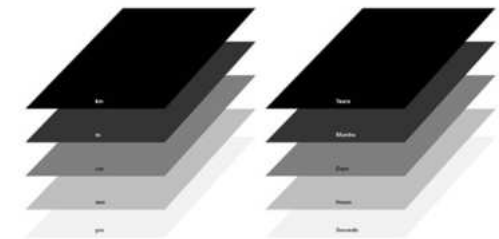


Flows



Linear flow

Circular flows



Spatial scale

Temporal scale

The **Blue City** project aims to map a city's network of interconnected **FLOWS** and create a responsive **URBAN DIGITAL GAME** to support evidence-based collective decisions aimed at improving urban well-being, sustainability, resilience and maximizing ecological value.



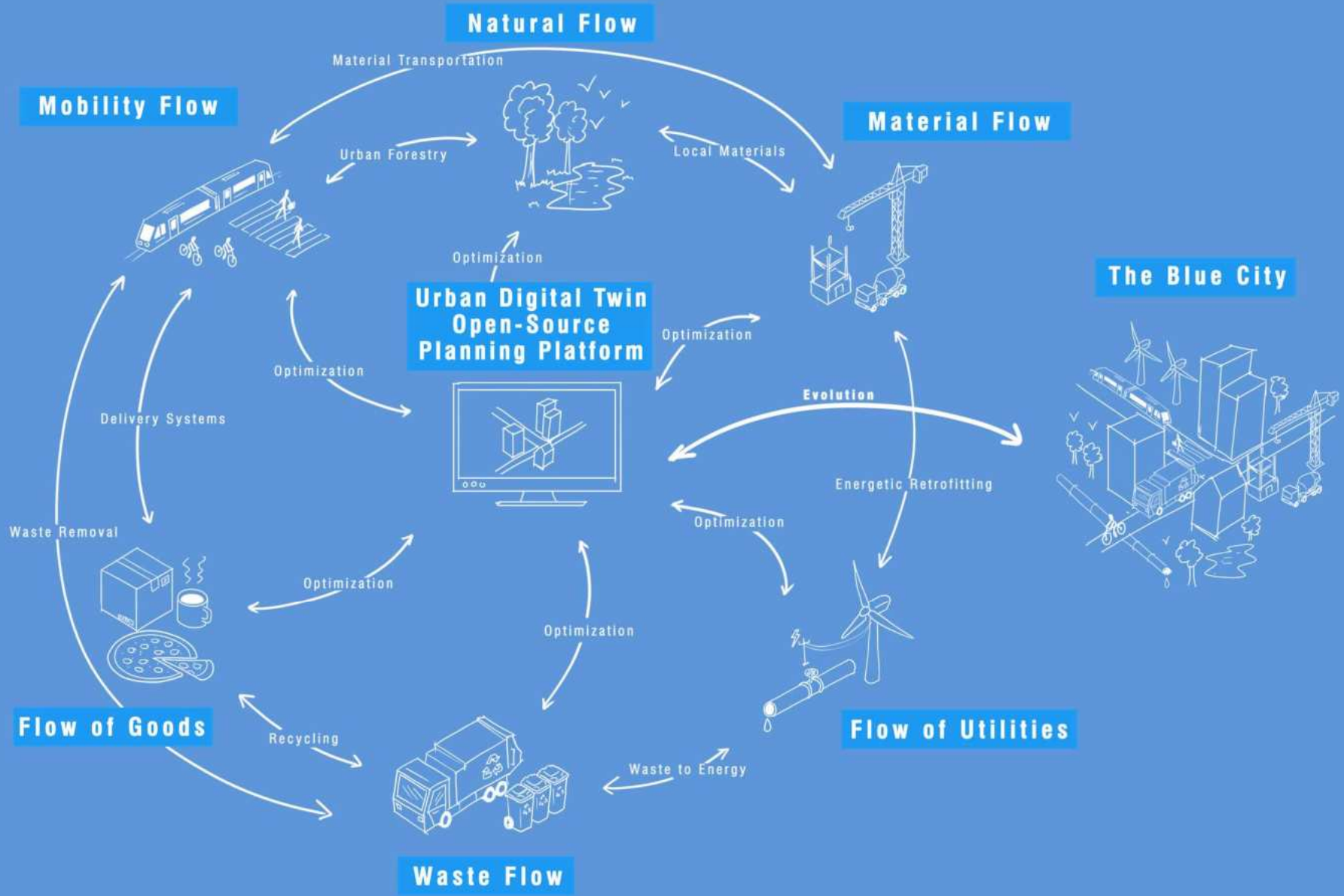
# The Blue City Project

## A living lab: Lausanne



In collaboration with research and implementation partners, as well as the City of Lausanne, the project explores how **BLUE CITY** can become a catalyst for the transition from a linear city to a **CIRCULAR CITY**.





# GET IN TOUCH With Us!

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- [www.fustic.org](http://www.fustic.org)

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