



THEMATIC SESSION

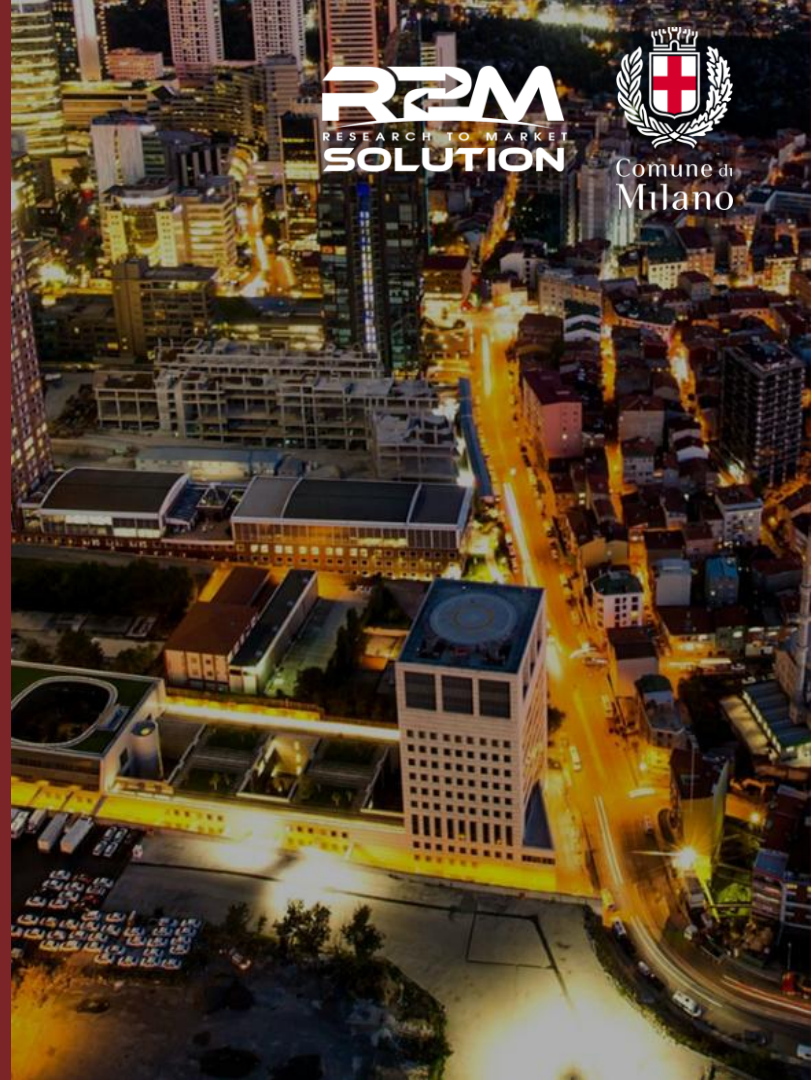
Data-Driven Smart, Inclusive & Sustainable Cities

Day 1 Wed. 08 Oct. 3.30 - 5.30 PM CEST

R2M
RESEARCH TO MARKET
SOLUTION



Comune di
Milano





SUSTAINABLE
PLACES 2025

8 October 2025 | 15:30 – 17:30 h.

Monte Rosa 91 Conference Centre, Milan



Data-Driven, Smart Inclusive & Sustainable Cities

Organised by



Comune di
Milano



Open
Geospatial
Consortium.

Contributors



EUnet4DBP



USAGE
Urban Data Systems
for Green Deal

Sponsored by



Open
Geospatial
Consortium.



BDTA
BUILDING DIGITAL TWIN ASSOCIATION

AGENDA

- Part I (50 min): Global Smart Cities showcase: Milan, Medina and Ferrara
- Part II (20 min): The Essential Frameworks: Standardisation and Digitalisation
- Part III (45 min): Overcoming Barriers to Impact: FOCAL & Panel Discussion

PART I: Global Smart Cities showcase: Milan, Medina and Ferrara

Mr. Marco Mazziaotti, Director - EU Direct Funding Managing Authority Dept., Milano (15 min)
Eng. Fahad Alfattani, Executive Manager, Clever Platform, representing Medina (15 min)
Mr. Piergiorgio Cipriano, Deda Next, representing the City of Ferrara (10 min)
Ms. Gloria Chindamo, CEO Myralia, representing the City of Voghera (10 min)

MILAN GLOBAL SHOWCASE

MARCO MAZZIOTTI

Director – EU Direct Funding, City of Milan

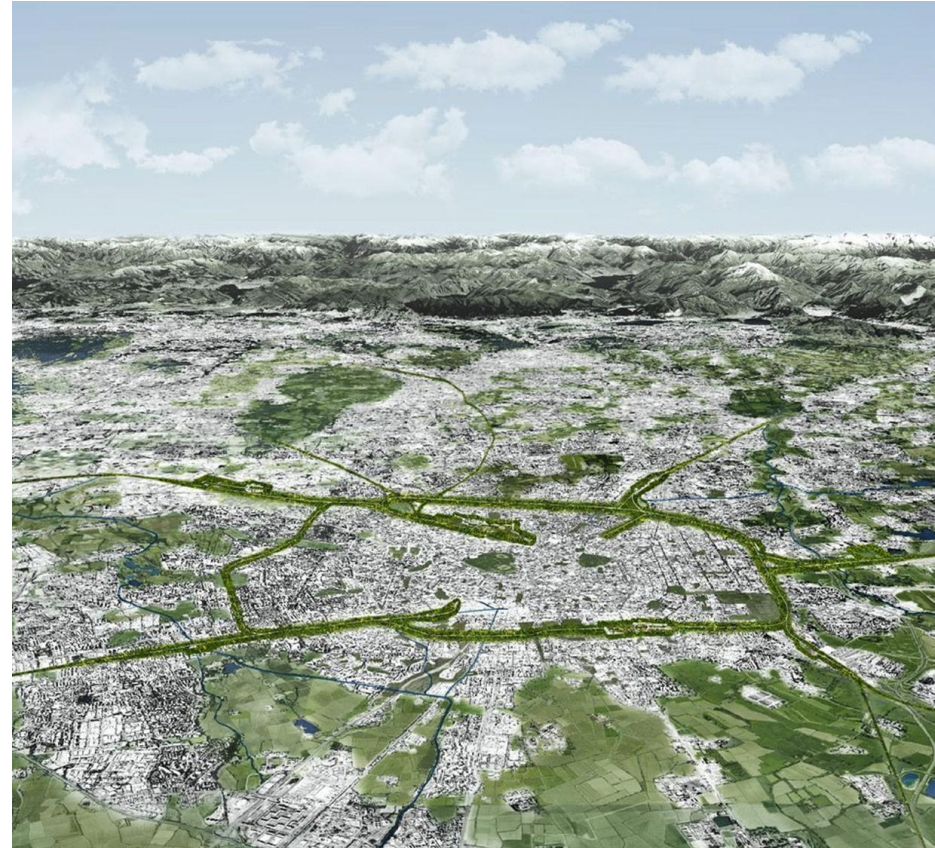


CONTEXT

With a population of almost **1.4 million inhabitants** and a dense and extended “urban region” (a polycentric metropolitan/regional area of between 7 and 10 million people) Milan is the most important economic centre in Italy.

The local ecosystem

- City of Milan: urban planning and development, welfare and housing services, environment, mobility, culture, innovation & economic urban development, digital
- Municipally-owned companies: MM, A2A, Amsa, Sea, Milano Ristorazione, ATM, Fondazione Milano (civic schools)
- Seven Universities: research & higher education centers
- Private sector: major companies, SMEs, entrepreneurial associations or trade unions, etc.
- Civil society: third sector (CSOs, NGOs, Co-operatives, citizens etc.)



Strategic plans and areas of interest

DUP

Single programming document

PGT

Urban Planning Document

Air and Climate Plan

PUMS

Sustainable Urban Mobility Plan

PTO

3-yr plan of public works



Digital



Environment
& Energy



Urban Regeneration



Welfare



Education



Mobility



Housing



Culture and
inclusion



Sport and
inclusion



Food Policy



Capacity building for LA officers

Overview of Direct EU Funds



Number of EU projects funded since 2011: 142
Ongoing projects: 43



**Total funding directly assigned for activities
carried out by the Municipality since 2010: 40.88 M €**
Ongoing: 20.75 M €
Total managed (as lead): 81.8 M €



**Total impact of EU Funds on the Milanese system
in ongoing projects: + 55.05 M €**

Some examples



Digital

Spotted



Providing an innovative solution based on the integration and customized processing of massive Open Data collections, including Earth Observation (EO) data, to monitor and support decision makers in the field of green areas management

UserCentriCities



Building a platform for local authorities to help them assess and compare their performance with their peers, and to launch a European community of decision-makers that share experience, knowledge and lessons learnt about how to implement user-centricity. At the same time, confirming and recognising the importance of local government in delivering digital government



Environment



Regen

It develops tools to **decarbonize and regenerate urban neighbourhoods** through digital innovation, citizen engagement, and sustainable design. It tests solutions in **four pilot cities** (Dublin, Beckerich, Milan, and Ladero) and **ten virtual cases** to promote **scalable, inclusive, and resilient urban transformation** across Europe.

100 Climate Neutral Cities by 20230 – Lets Gov & Climb

EU mission that supports **100 European cities** in becoming **climate-neutral by 2030**. It acts as a **testbed for green innovation and urban transformation**, focusing on clean energy, sustainable mobility, and citizen participation. These cities aim to lead Europe's **transition toward climate neutrality** and inspire others to follow.

Two projects financed: LETSGOV and CLIMB





Urban Regeneration



Clever Cities

Driving a new kind of nature-based urban transformation for sustainable and socially inclusive cities across Europe, Latin America and China, through exchange between cities, inclusive collaboration and multi-disciplinary learning

Goccia

Redevelopment of the spontaneous woodland that has grown around the former gasometer in the Bovisa district and return its green spaces to the community



Some examples



Mobility

Milan East Gate Hub (Mega and Mega 2)

An integrated multimodal transportation hub located in Segrate, Milan, designed to redefine the city's transportation landscape through the incorporation of Urban Air Mobility (UAM). A seamless interchange between traditional ground-based transport systems—such as metro, regional, and high-speed trains

Elaborator

A holistic approach for planning, designing, implementing and deploying specific innovations and interventions towards safe, inclusive and sustainable urban mobility including the Olympic paths in the City.

Some examples



Food Policy

Food Trails



Involvement of key European actors from the quadruple helix of innovation to design, test, and monitor the best place-based solutions that explore new opportunities for the development of a local sustainable food system

Food Wave



Raising young (aged 15-35) EU citizens' awareness and engagement regarding sustainable food consumption and production for climate change mitigation and adaptation

Some examples



Energy

Milan Municipality is involved **since 2013** in EU funded projects on **residential buildings refurbishment**.

They make some of our **residential buildings more energy efficient and comfortable** for tenants. But they also **helped our Administration beyond their primary scope**.

Continuous interaction with other international entities gave and is still giving our technicians a **much wider set of tools and knowledge** and the **close interaction with the academic and scientific world is being crucial** to make us work from new point of views.

Several non funded projects of our Municipality on this field used and are using **criteria from these EU funded projects**. Awareness was raised on how quality interventions are important for a better energy efficiency.

Medina

Eng. Fahad Alfattani

Executive Manager, Clever Platform



Lessons learned in Ferrara AIR-BREAK and USAGE projects

PIERGIORGIO CIPRIANO

Project Manager, Deda Next



deda. Group

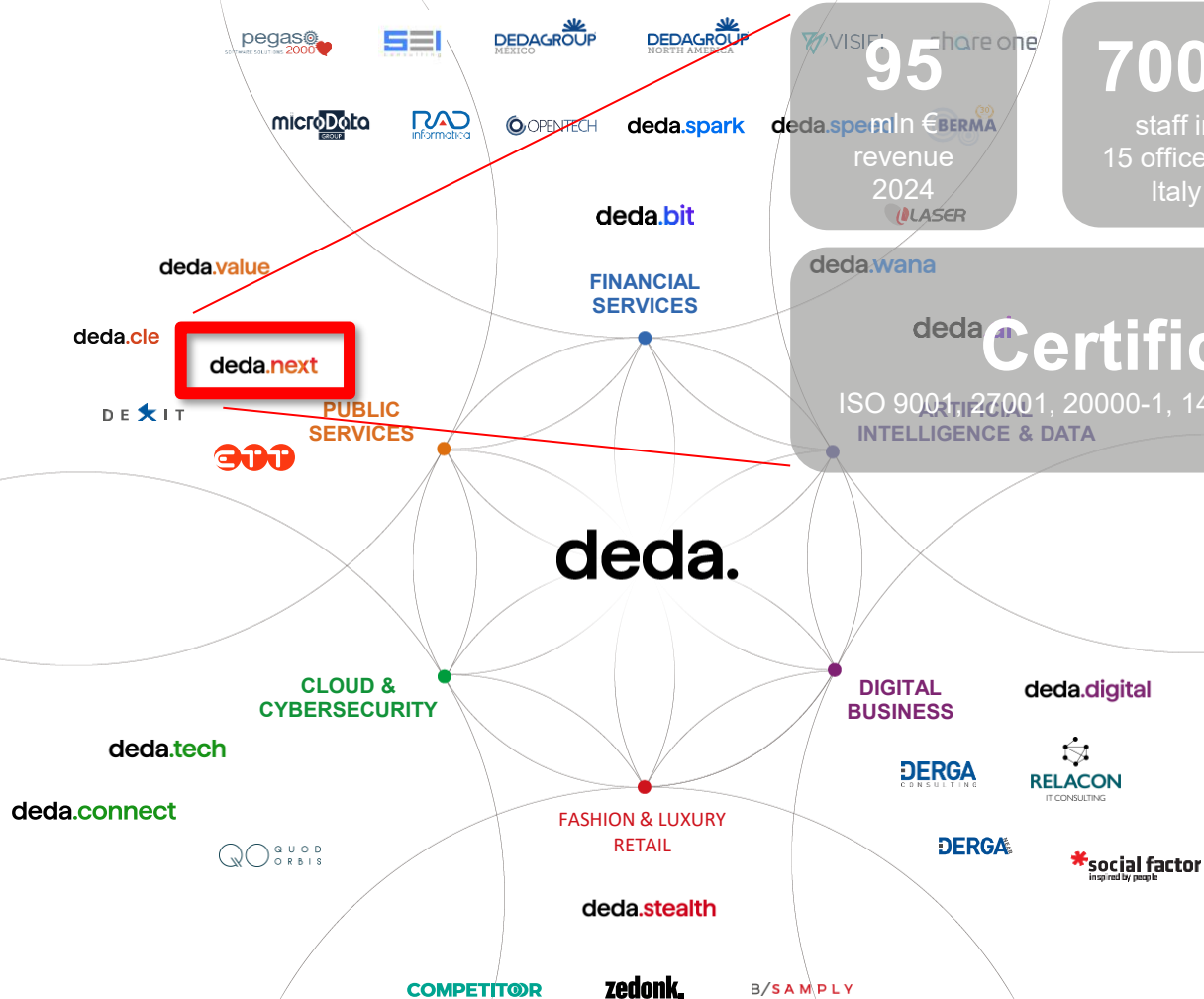
70
Offices
(56 in Italy)

50+
Countries

4,000+
Customers

€472
Mln consolidated
revenues in 2024

5,000+
Employees



95

revenue
2024

700+

staff in
15 offices in
Italy

350+

developers
Solution Hub

Certificates

ISO 9001, 27001, 20000-1, 14001; SA 8000; PDR-125
ARTIFICIAL
INTELLIGENCE & DATA

Green

Green policy strategies are focusing on renewable energy, conservation, biodiversity protection, the circular economy, and climate change mitigation and adaptation.

Digital

The digital transition, a key driver of economic transformation, encompasses the current rapid advancements in technology, the digitalisation and automation of industries, with a salient role artificial intelligence. Meanwhile, the proliferation of connectivity leading to a more interconnected and data-driven world.

Social

There is a deep and urgent need for ensuring social cohesion and providing greater well-being for people irrespective of socio-economic status, gender, territory, ethnicity or any other identity, through decision-making processes that are participatory and legitimate.

triple
transition

The map displays the Municipality of Cortina d'Ampezzo, outlined in black. The territory is divided into several color-coded zones: a dark green central area representing public green spaces, a light green area for private green spaces, and a yellow area for the urban zone. The map includes a network of roads (SP, SS, A) and numerous small villages. An inset map in the bottom left corner shows the location of Cortina d'Ampezzo within the larger context of the Italian Alps and the Adriatic Sea.

Metric	Value
Population	129400
Total area	400 km ²
Small villages	50
Urban area	95 km ²
UNESCO heritage	36 km ²
Public trees	41500
Public green areas	7 km ²
Private green areas	9 km ²

SUSTAINABLE PLACES 2025

Population 129400
Total area 400 km²
Small villages 50
Urban area 95 km²

UNESCO heritage 36 km²
Public trees 41500
Public green areas 7 km²
Private green areas 9 km²

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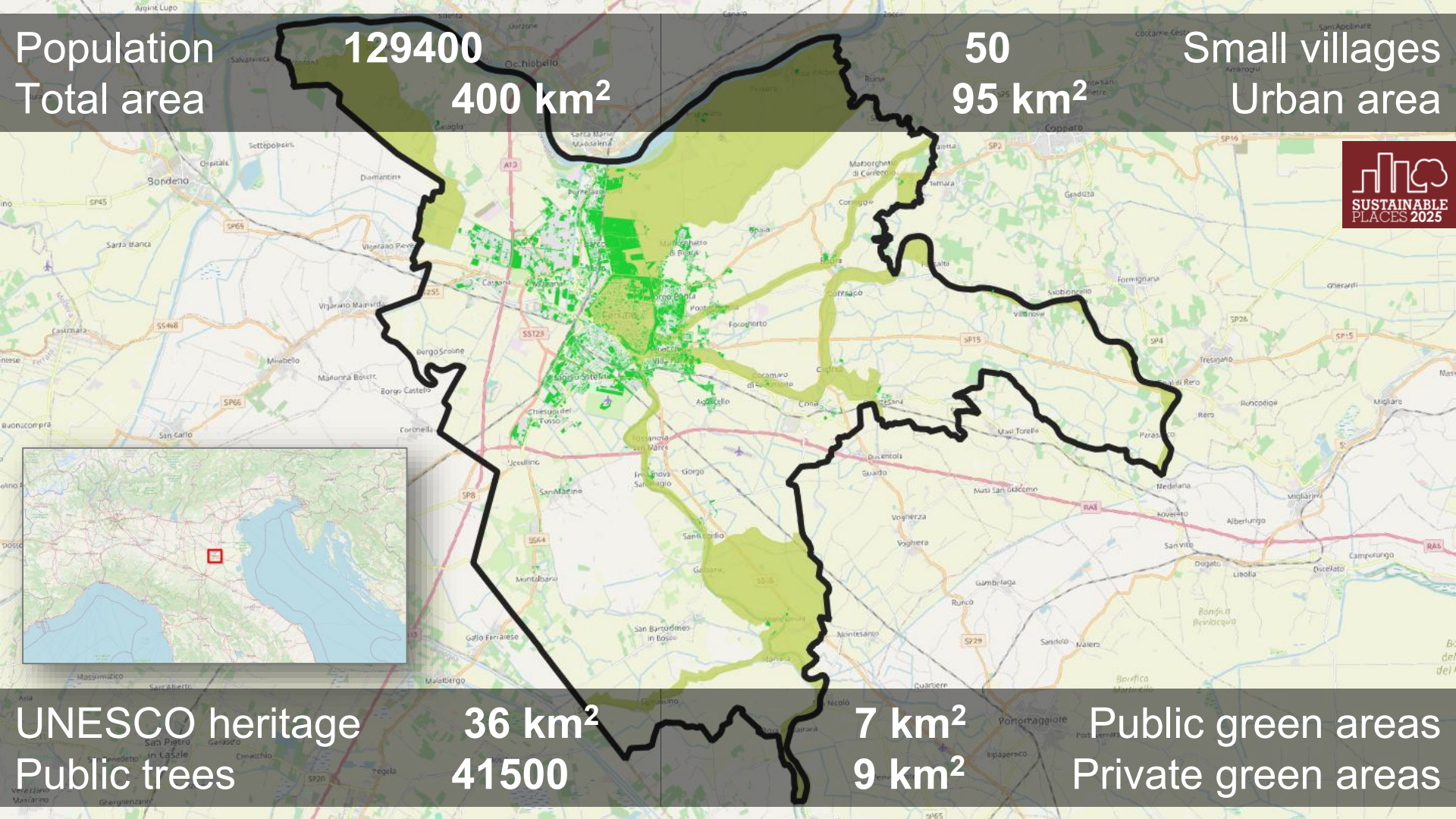
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SUSTAINABLE PLACES 2025



DATA&AI

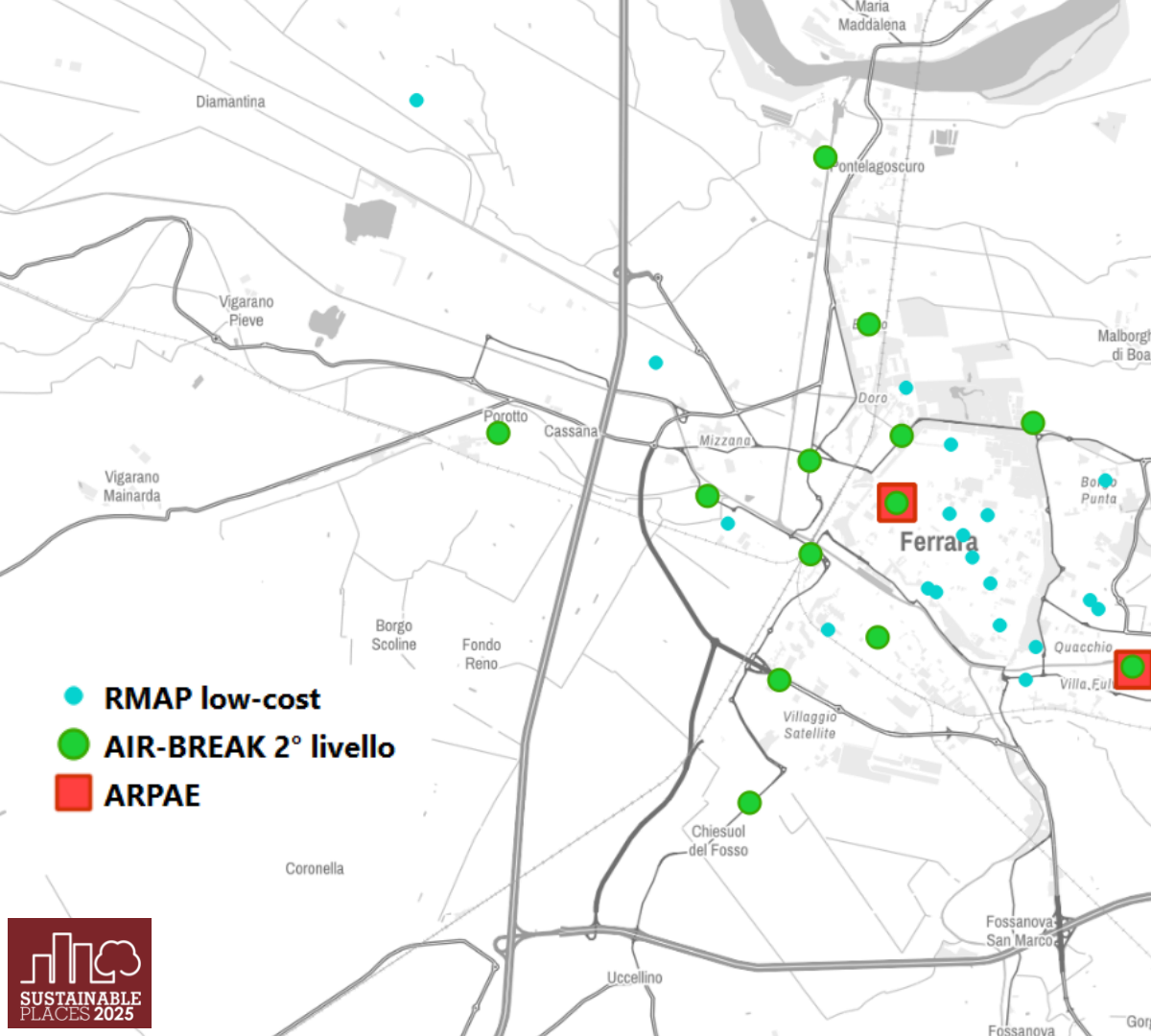
GIS

NEXT SMART CITY

PROGETTI INTERNAZIONALI

AIR BREAK

17 Luglio 2021



- RMAP low-cost
- AIR-BREAK 2° livello
- ARPAE

ARPAE – Certified AQ stations, data validated and official (not all parameters measured in all stations, data about PM available only at daily average)

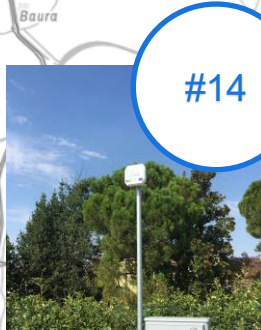
KK€



#2

AIR-BREAK 2° livello
Professional units, not certified. Hourly data not validated, not official
10 parameters in all stations

K€



#14

RMAP low-cost
Self-assembled measuring units, qualitative/demo data.
Only PM, CO2 (no gas)

180€



#30

Public dashboard + street totems

Co-creating User eXperience (UX)



Public dashboard (simple, no UoM / thresholds)

<https://airbreakferrara.net/che-aria-tira/>

Scegli di

☒ Vedere

☐ Non vedere 

l'inquinamento



Ferrara, oggi alle 15:00



Qualità dell'aria



Buona



Accettabile



Mediocre



Scadente



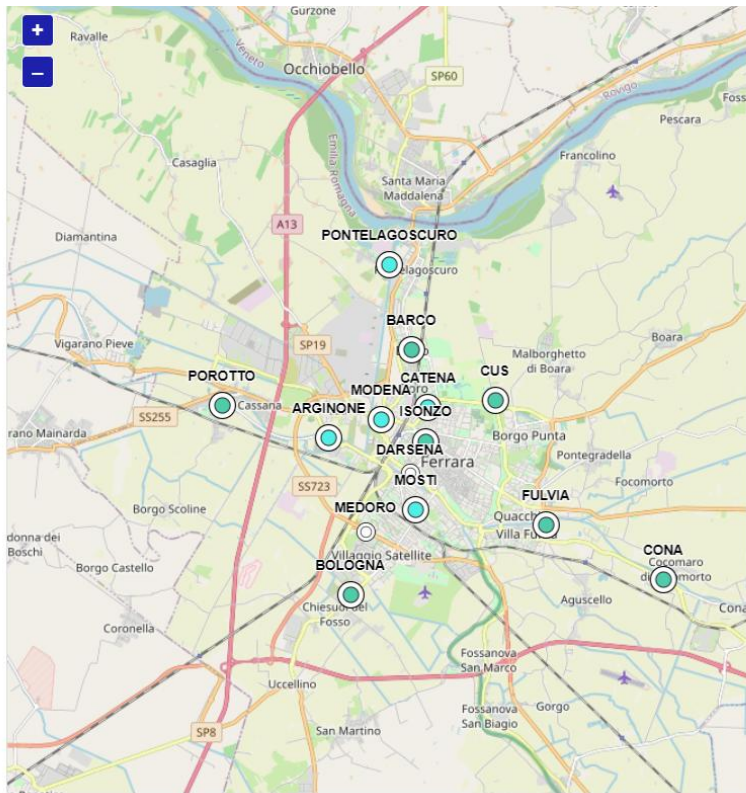
Inaccettabile



Pessima

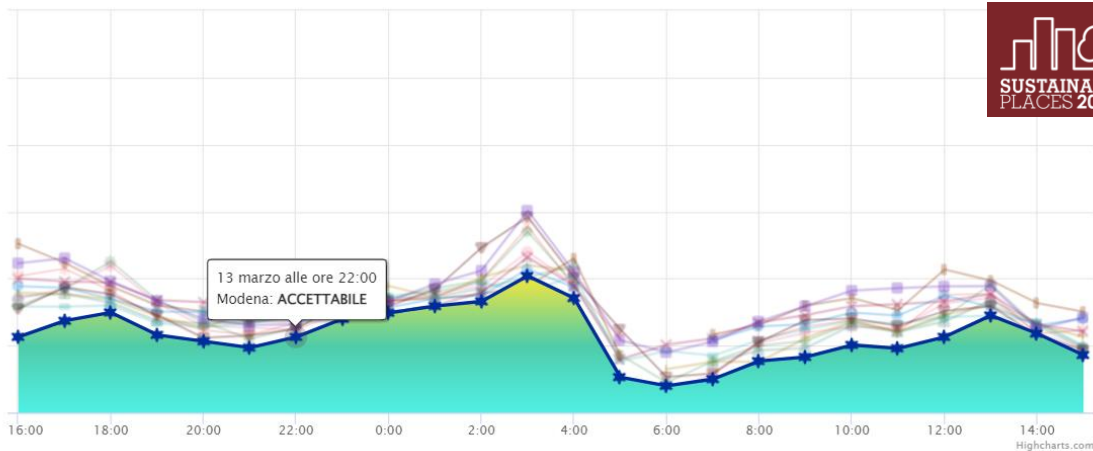
Public dashboard (simple, no UoM / thresholds)

<https://airbreakferrara.net/che-aria-tira/>



Nascondi tutte le centraline

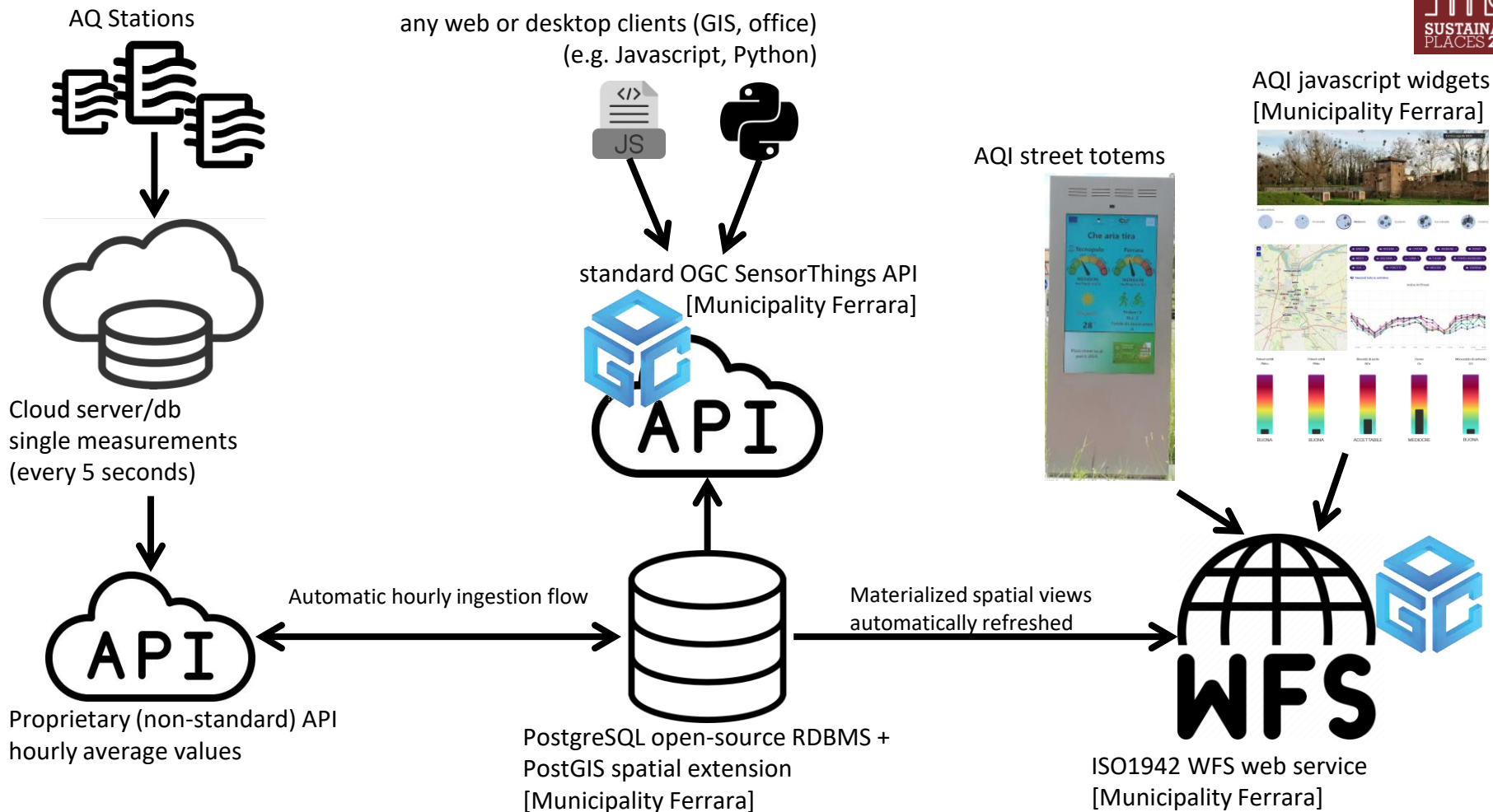
Indice AirBreak



Street totems

<https://tinyurl.com/v7ukkdh8>





OGC SensorThings API – QGIS plugin

<https://plugins.qgis.org/plugins/SensorThingsAPI/>



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 Plugin Tags



SensorThings API

Plugin ID: 2796 

The plugin enables QGIS to inspect dynamic sensor data published using SensorThingsAPI protocol (<https://www.ogc.org/standards/sensorthings>).

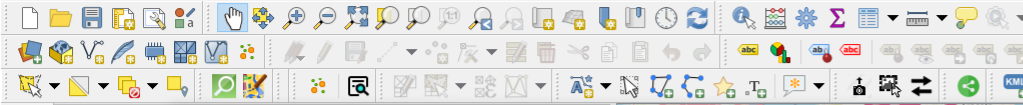
★★★★★ (17) votes

 Download latest

About

Details

Versions



Layer

- ☒ SE
- ☒ RS
- ☒ RO
- ☒ PT
- ☒ PL
- ☒ NO
- ☒ NL
- ☒ MT
- ☒ MK
- ☒ ME
- ☒ LV
- ☒ LU
- ☒ LT
- ☒ IT
- ☒ IS
- ☒ IE
- ☒ HU
- ☒ HR
- ☒ GR
- ☒ GI
- ☒ GB
- ☒ FR
- ☒ FI
- ☒ ES
- ☒ EE

Postazione

St. Johann im Pongau, Bezirkshauptmannschaft

Location of air quality station St. Johann im Pongau, Bezirkshauptmannschaft

St. Johann im Pongau, Bezirkshauptmannschaft - Air quality station St. Johann im Pongau, Bezirkshauptmannschaft

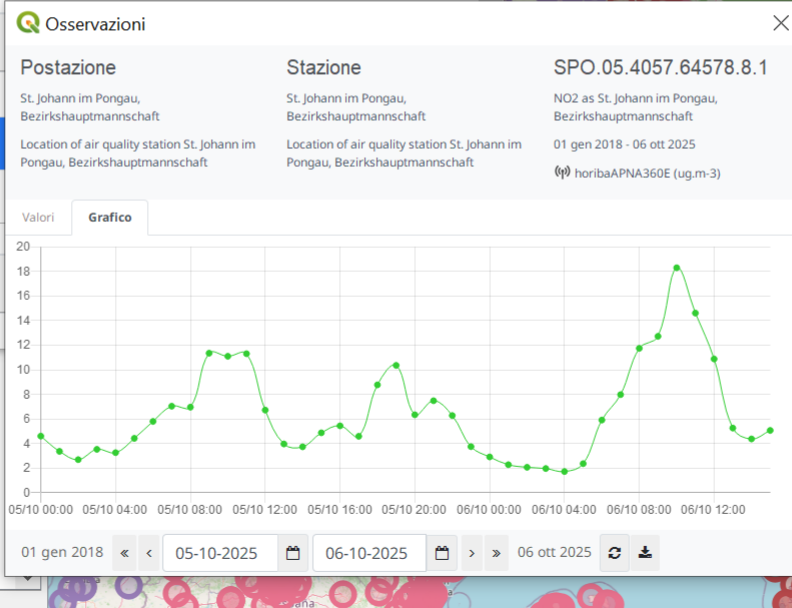
Osservazioni disponibili

Nome	Descrizione
SPO.05.4057.967.7.1	O3 as St. Johann im Pongau, Bezirkshauptmannschaft
SPO.05.4057.64578.8.1	NO2 as St. Johann im Pongau, Bezirkshauptmannschaft
SPO.05.4057.64579.38.1	NO as St. Johann im Pongau, Bezirkshauptmannschaft

Serie temporali complesse

Nome	Descrizione

Browser Layer Statistiche



Open data (air quality)

<https://dati.comune.fe.it/>



Comune di Ferrara

Città Patrimonio dell'Umanità

Dataset

Temi

Informazioni

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Air Break Index medio (ultima ora)

Sostenitori

0

Organizzazione



COMUNE DI FERRARA
Città Patrimonio dell'Umanità

Comune di Ferrara

Dataset

Gruppi

Flusso di attività

Air Break Index medio (ultima ora)

Air Break Index è un indice sintetico di qualità aria riferito all'area urbana di Ferrara e calcolato dai valori delle centraline sperimentali del progetto europeo AIR-BREAK. Si tratta di centraline non certificate (i dati ufficiali rimangono pertanto quelli delle 2 stazioni ARPAE); ogni centralina misura 6 parametri di qualità dell'aria (PM2.5, PM10, NO2, O3, CO, VOC) oltre a 3 parametri climatici (temperatura, umidità relativa, pressione atmosferica). I primi 5 parametri di qualità aria (PM2.5, PM10, NO2, O3 e CO) sono usati per calcolare l'indice sintetico: le rispettive medie orarie (in $\mu\text{g}/\text{m}^3$) vengono trasmesse al server IoT del Comune e confrontate con i range usati dall'Agenzia Ambientale Europea nel portale Air Quality Index (il range adottato CO è quello adottato dall'Environmental Protection Agency statunitense). Il parametro peggiore viene considerato come indice: si tratta di un valore adimensionale con una scala da 0 (buono) a oltre 100 (pessimo), in modo da facilitare la comprensione da parte di chi non ha dimestichezza con

Open data (air quality)

<https://dati.gov.it/>



Agenzia per l'Italia Digitale

Avanzamento digitale

Geodati



dati.gov.it

i dati aperti della pubblica amministrazione

Cerca nel sito



Dati ▾ Fare Open Data ▾ Monitoraggio ▾ Sviluppatori ▾ Scrivi alla redazione

Cerca tra i dataset

Air Break Index medio (ultima ora)



Per parola chiave



Ordina per:

Scegli una opzione ▾

Dataset Trovati: **13**

Air Break Index medio (ultima ora)

Air Break Index è un indice sintetico di qualità aria riferito all'area urbana di Ferrara e...

Pubblicato da: Regione Emilia-Romagna

Data di ultima modifica: 2023-07-06

MAP_SRVC

ZIP

CSV

GML

airbreak

ambiente

aria

indicatori-ambientali

Ambiente

Open data (air quality)

<https://data.europa.eu/>



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English

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data.europa.eu - The official portal for European data

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[Home](#) > [Datasets](#) > [Average Air Break Index \(last hour\)](#)

Dataset

Average Air Break Index (last hour)

 [dati.gov.it](#)

Updated: 06.07.2023

Dataset

Quality

Similar datasets

Dataset feed

Linked data



Cite

Air Break Index is a synthetic air quality index referring to the urban area of Ferrara and calculated from the values of the experimental units of the European project AIR-BREAK. Yes it deals with uncertified control units (the official data therefore remain those of the 2 ARPAE stations); each unit measures 6 air quality parameters (PM2.5, PM10, NO2, O3, CO, VOC) plus 3 climatic parameters (temperature, relative humidity,

Created

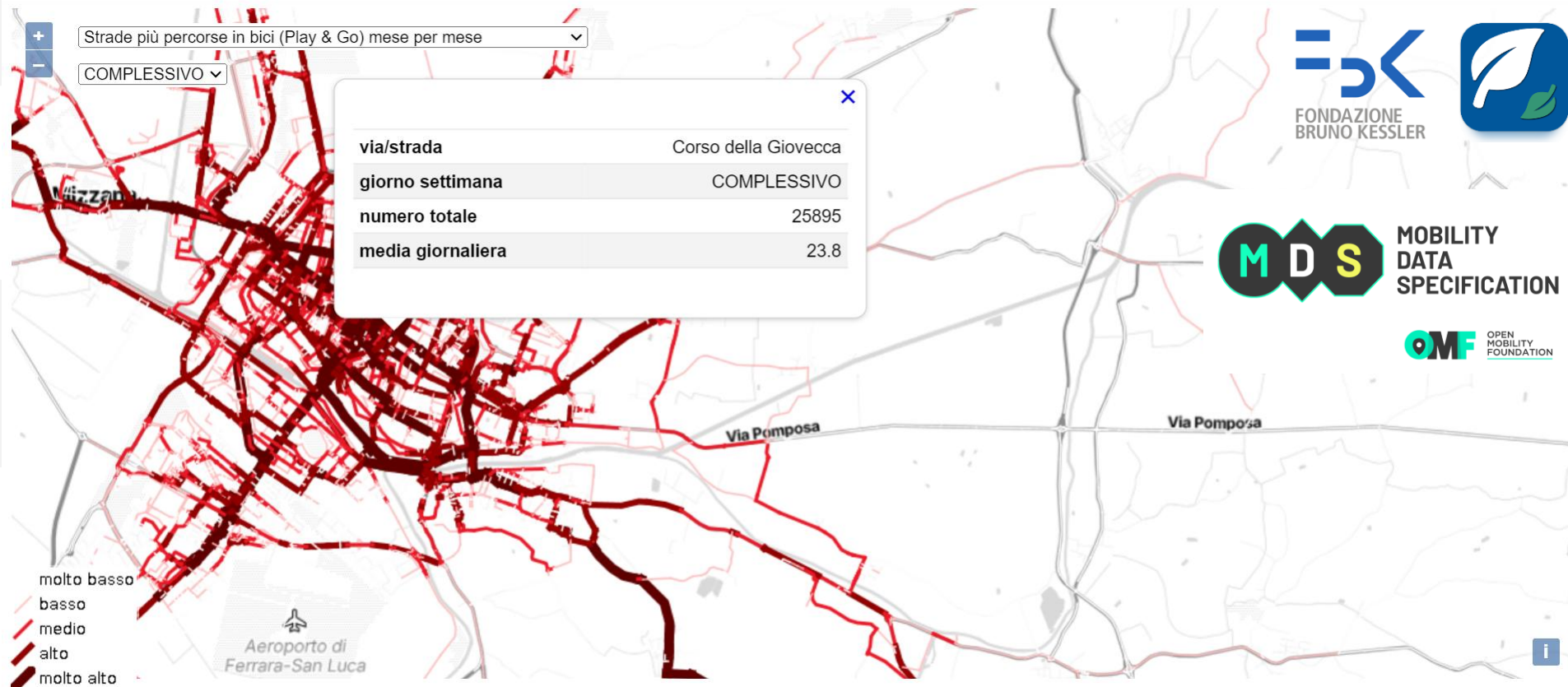
04.01.2022

Updated

06.07.2023

Data from external sources (active mobility)

<https://airbreakferrara.net/dati-sul-metabolismo-di-ferrara/>



Data from external sources (micromobility)

<https://airbreakferrara.net/micromobilita-con-monopattini-elettrici/>



Open data (micro-mobility)

<https://dati.comune.fe.it/>



Comune di Ferrara

Città Patrimonio dell'Umanità

[Dataset](#)

[Temi](#)

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Organizzazioni

Comune di Ferrara **2**

Gruppi

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Tag

airbreak **2**

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mobilità **2**

monopattini **2**

[+ Aggiungi un dataset](#)

monopattini



2 dataset trovati per "monopattini"

Ordina per:

Rilevanza



Strade più percorse da monopattini elettrici (sharing)

Questo dataset contiene il numero di transiti dei monopattini elettrici pubblici in sharing free-floating (Dott, Helbiz). Per ogni arco stradale è disponibile il conteggio...

WMS

WFS

Esri Shape

CSV

HTML

Open data (micro-mobility)

<https://data.europa.eu/>

data.europa.eu - The official portal for European data

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Datasets

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Select



Catalogues ⓘ

Select



monopattini

Datasets



Datasets found (6)

Sort by:

Relevance



Roads covered by electric scooters (sharing)

This dataset contains the number of transits of public electric scooters in free-floating sharing (Dott, Helbiz). For each roadway is available the monthly count (from May 2021) and the total total from start of service. —...



DATA&AI

GIS

NEXT SMART CITY

PROGETTI INTERNAZIONALI

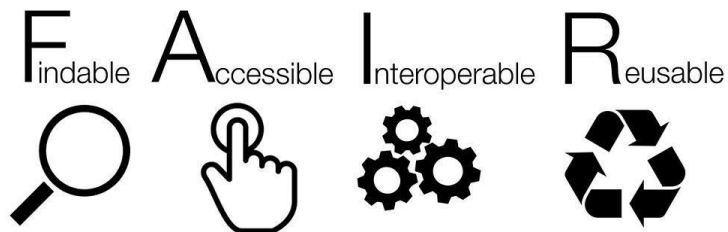
USAGE

14 Settembre 2022

USAGE (Horizon Europe)

Urban data SpAce for Green dEal

aims to provide solutions and mechanisms to make available **environmental and climate data**, collected, processed and shared on the basis of “**FAIR**” principles



Accordo per la costituzione del Data Space "USAGE"

Sommario

1. Premessa e Contesto
 - 1.1 Il Progetto Usage
 - 1.2 Obiettivi del Progetto
 - 1.3 Rilevanza Socio-Economica
 - 1.4 Il Dataspace "USAGE"
 - 1.5 Impegno Verso l'Innovazione e la Sostenibilità
2. Normativa Applicabile al Data Space di Dati Ambientali
 - 2.1 General Data Protection Regulation (GDPR)
 - 2.2 Direttiva 2007/2/CE "INSPIRE"
 - 2.3 Data Governance Act (DGA)
 - 2.4 Data Act
 - 2.5 Codice dell'Amministrazione Digitale
 - 2.6 Regolamento sull'Intelligenza Artificiale
 - 2.7 Regolamento di esecuzione (ue) 2023/1380
 - 2.8 Piattaforma Digitale Nazionale Dati
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 - 3.1 Fondatori
 - 3.2 Stakeholder
 - 3.3 Collaborazione e Sviluppo
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 - 4.1 Obiettivi e Scopo
 - 4.2 Governance

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d) Web service e API basati su standard aperti

La quarta modalità di interscambio dati prevista per il Data Space Ferrara è quella più in linea con le normative e le specifiche tecniche di livello nazionale, europeo e mondiale. Questa sezione contiene i riferimenti tecnici riguardanti le interfacce software, i protocolli, le operazioni, ecc. richiesti a livello di server o client per visualizzare, accedere e condividere i dati all'interno del Data Space urbano in oggetto.

I dettagli di questi riferimenti tecnici si basano su specifiche ben note definite da ISO, CEN, OGC e altre organizzazioni di standardizzazione richiamate da direttive europee (per esempio, la Direttiva 2007/2/CE "INSPIRE").

IN: Thermal images from satellite (2013-2023)

example →

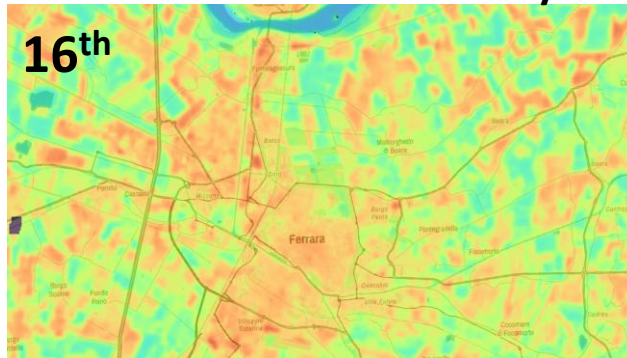
June '23

22nd



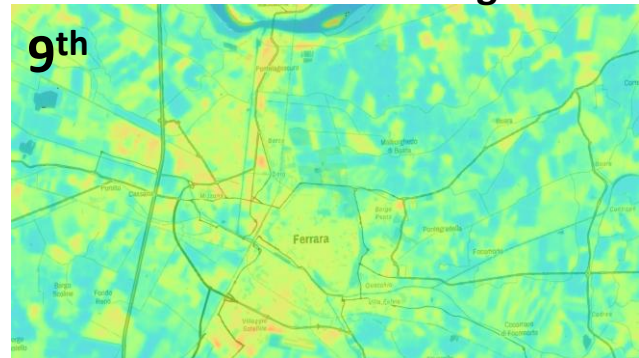
July '23

16th



August '23

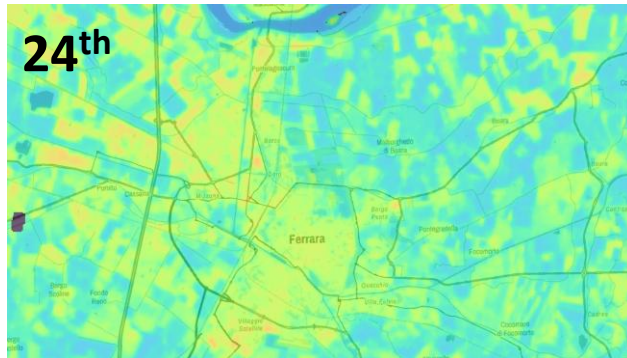
9th



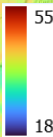
30th



24th

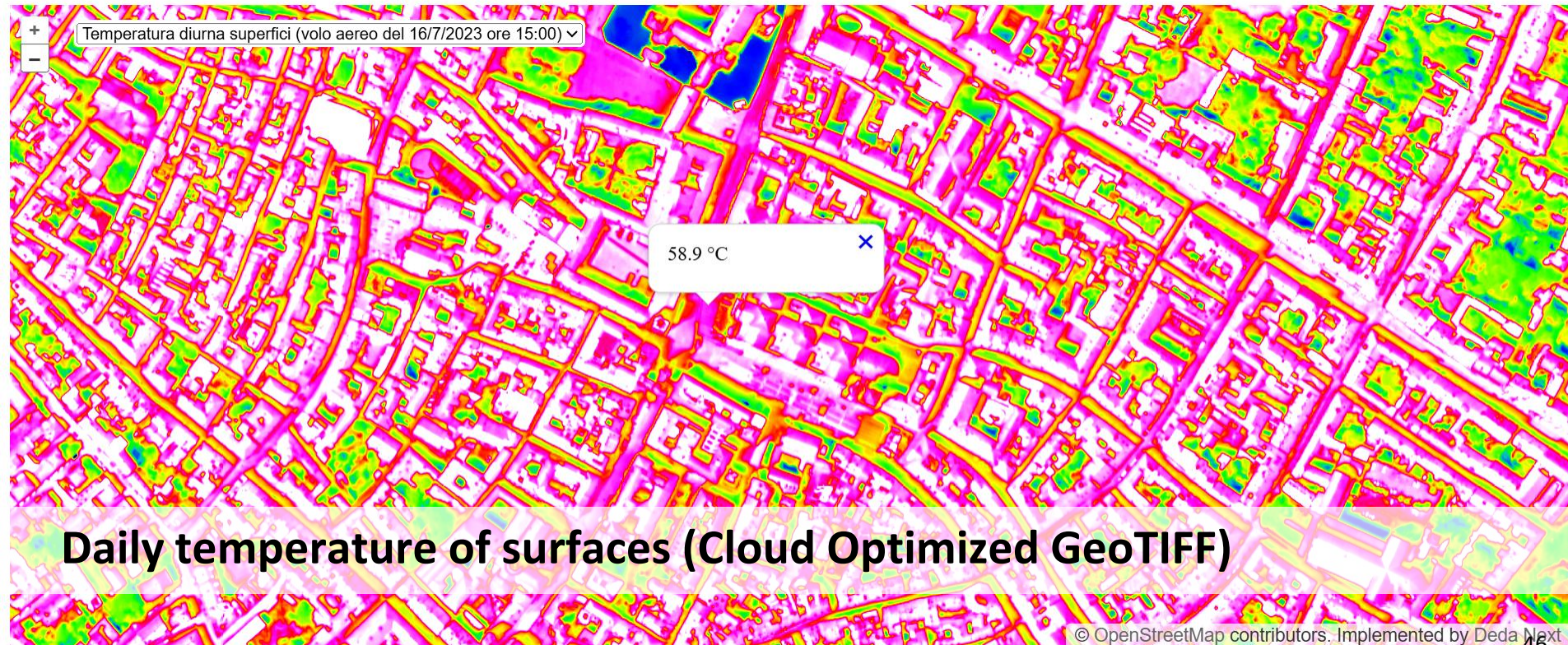


25th



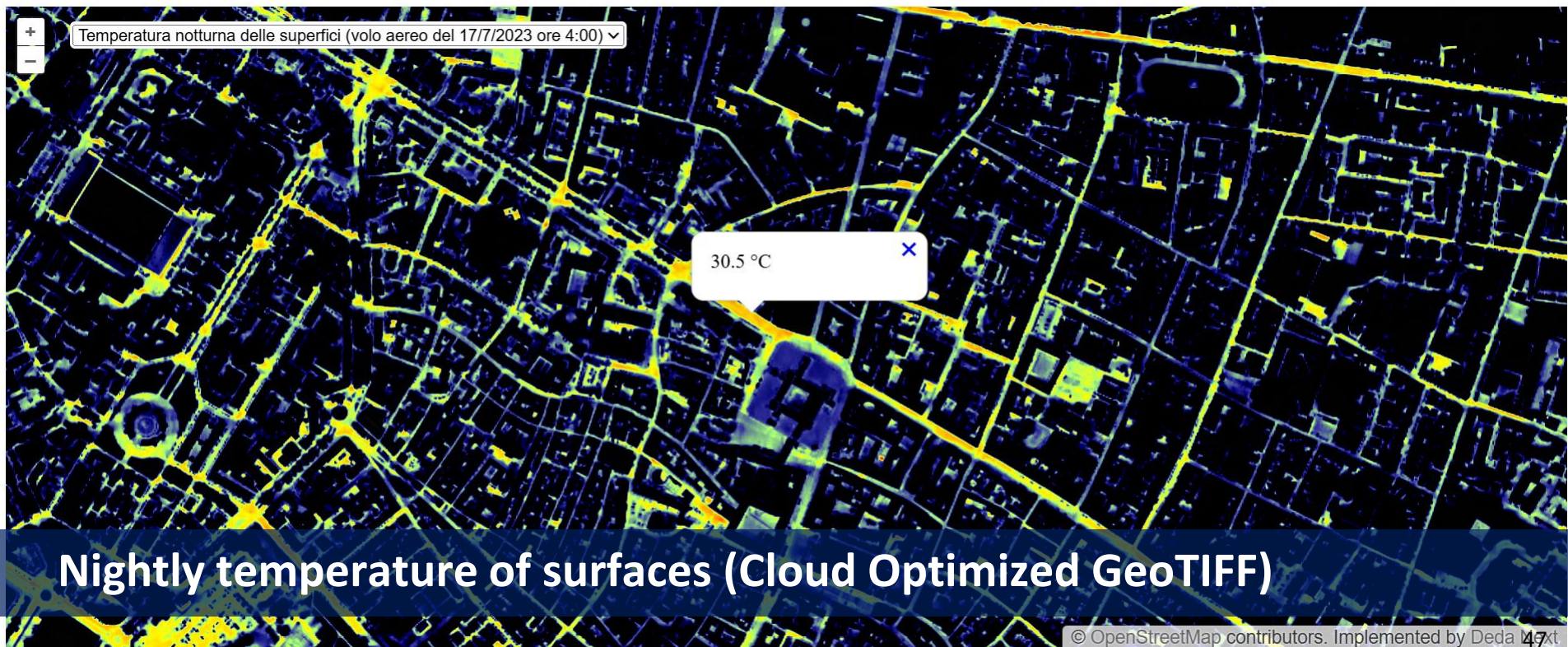
IN: Thermal images from aerial flight

https://sit.comune.fe.it/allegati/mappe/usage/06_temperatura_diurna_superfici.html



IN: Thermal images from aerial flight

https://sit.comune.fe.it/allegati/mappe/usage/05_temperatura_notturna_delle_superfici_17_07_2023.html



A heatmap visualization overlaid on a map of a rural or semi-urban area. The color scale ranges from dark blue (cooler) to red (warmer). A large, irregularly shaped red and orange area dominates the center-right portion of the map, indicating higher temperatures. This area is surrounded by patches of yellow and green, which are more prevalent in the western and northern parts of the visible map. The background map shows roads, fields, and some buildings. In the top-left corner, there is a small interface element with a plus sign, a minus sign, and a dropdown menu containing the text "Isole di calore nel periodo 2013-2023 (valori medi nel mese di luglio)". In the bottom-right corner, there is a copyright notice: "© OpenStreetMap contributors. Implemented by Deda Nex".



SPECTRAL • VALUE

AVT Airborne Sensing Italia srl

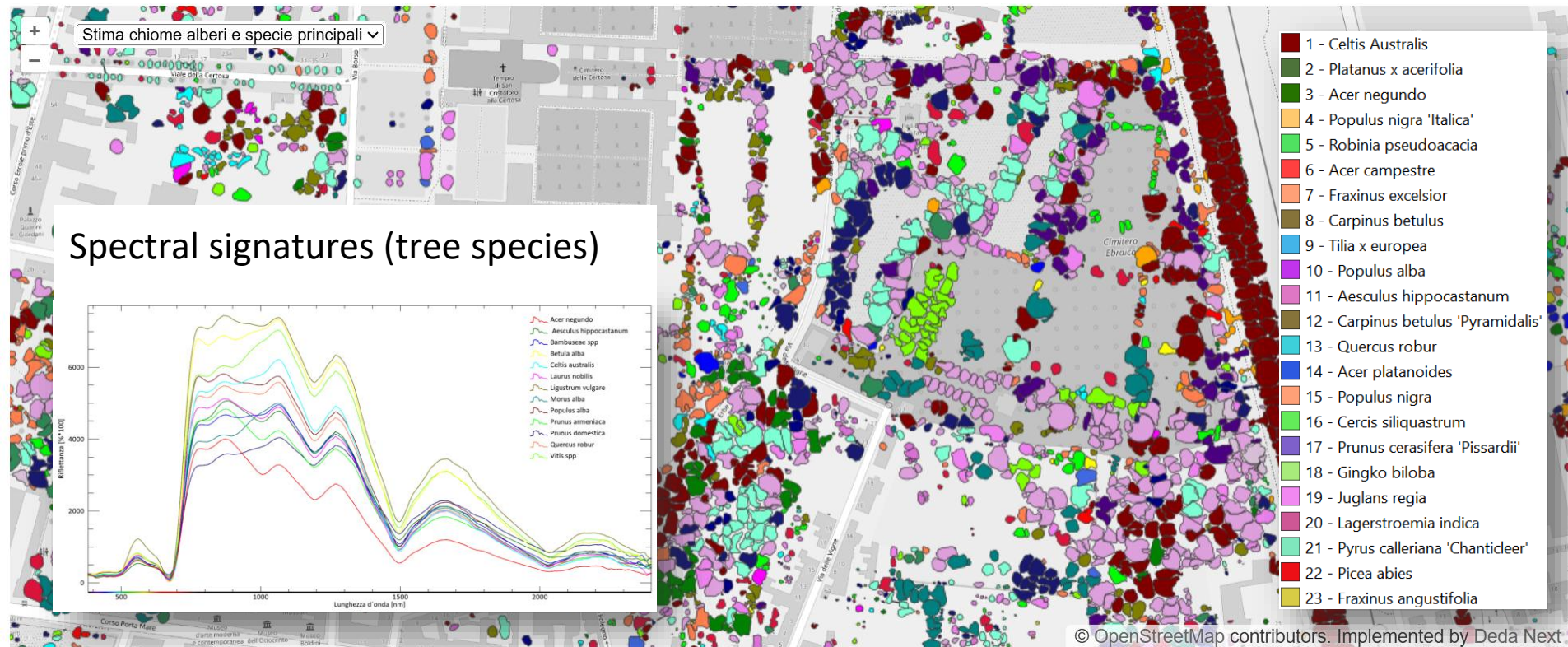


Points cloud → DSM in standard COG format (grid 100 cm)

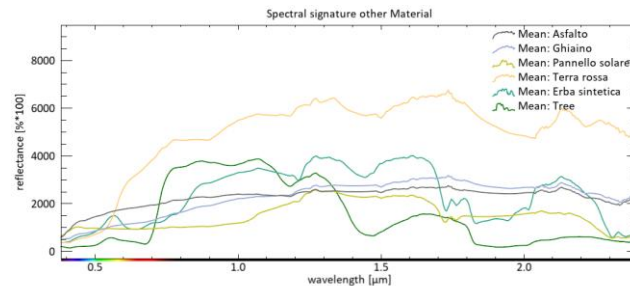
Hyperspectral image (+360 bands, 100 cm)



Single tree canopy in public & private areas (DL + ML)



Spectral signatures (tree species)

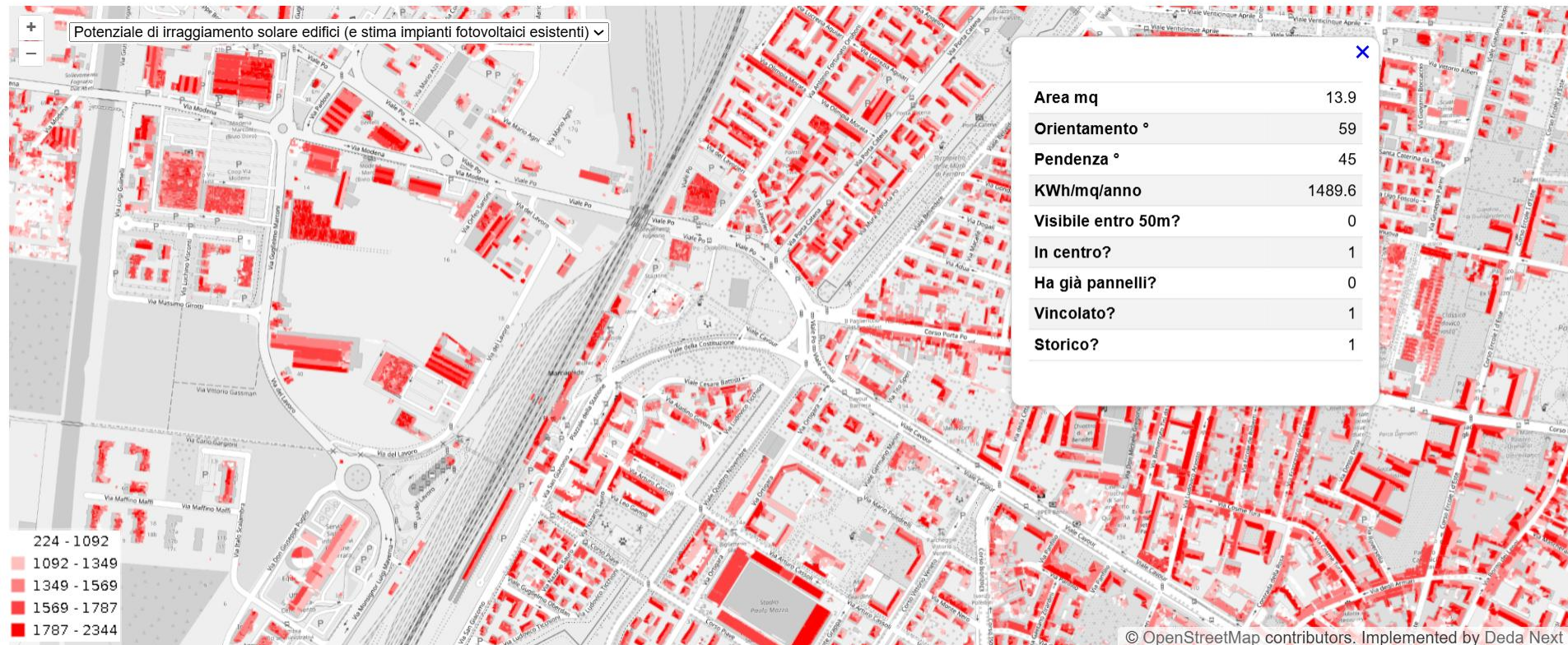


Materials of surfaces (1m resolution)

- Asfalto
- Bitume nero
- Cemento
- Ciottolato
- Erba sintetica
- Altro
- Ghiaino
- Guaina bianca
- Lastricato
- Metallo
- Pannello solare
- Porfido
- Tartan
- Tegola rossa
- Terra rossa
- Vetro
- Sabbia
- Suolo misto vegetazione
- Suolo nudo
- Prato
- Bassa vegetazione
- Alta vegetazione
- Acqua

Solar potential of buildings' roofs

https://sit.comune.fe.it/allegati/mappe/usage/10_potenziale_di_irraggiamento_solare_edifici.html



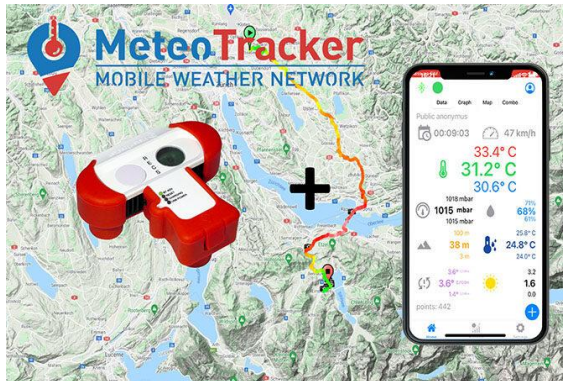
Simulation 'PMI' area (industrial)

South-facing roofs with no restrictions & no solar panels installed

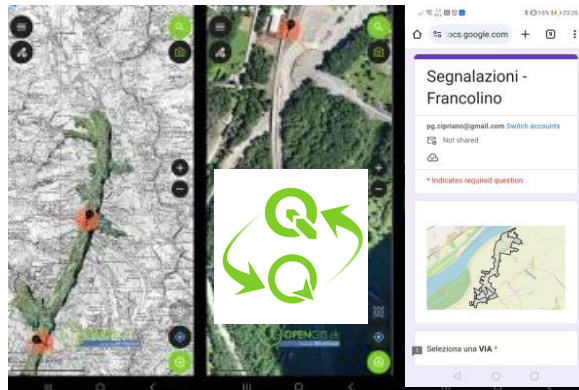
- total area: 340K m²
- annual solar potential: 560K MWh

Citizen Science Ferrara

www.citizenscienceferrara.org



**Air temperature measurements
(urban heat islands)**



Crowd-mapping of flooded areas



Biodiversity census

With:

- Istituto tecnico 'Copernico'
- Istituto agrario 'Navarra'
- ITS TEC Ferrara
- Museo di Storia Naturale
- Fiumana APS
- Legambiente ER
- +200 single citizens

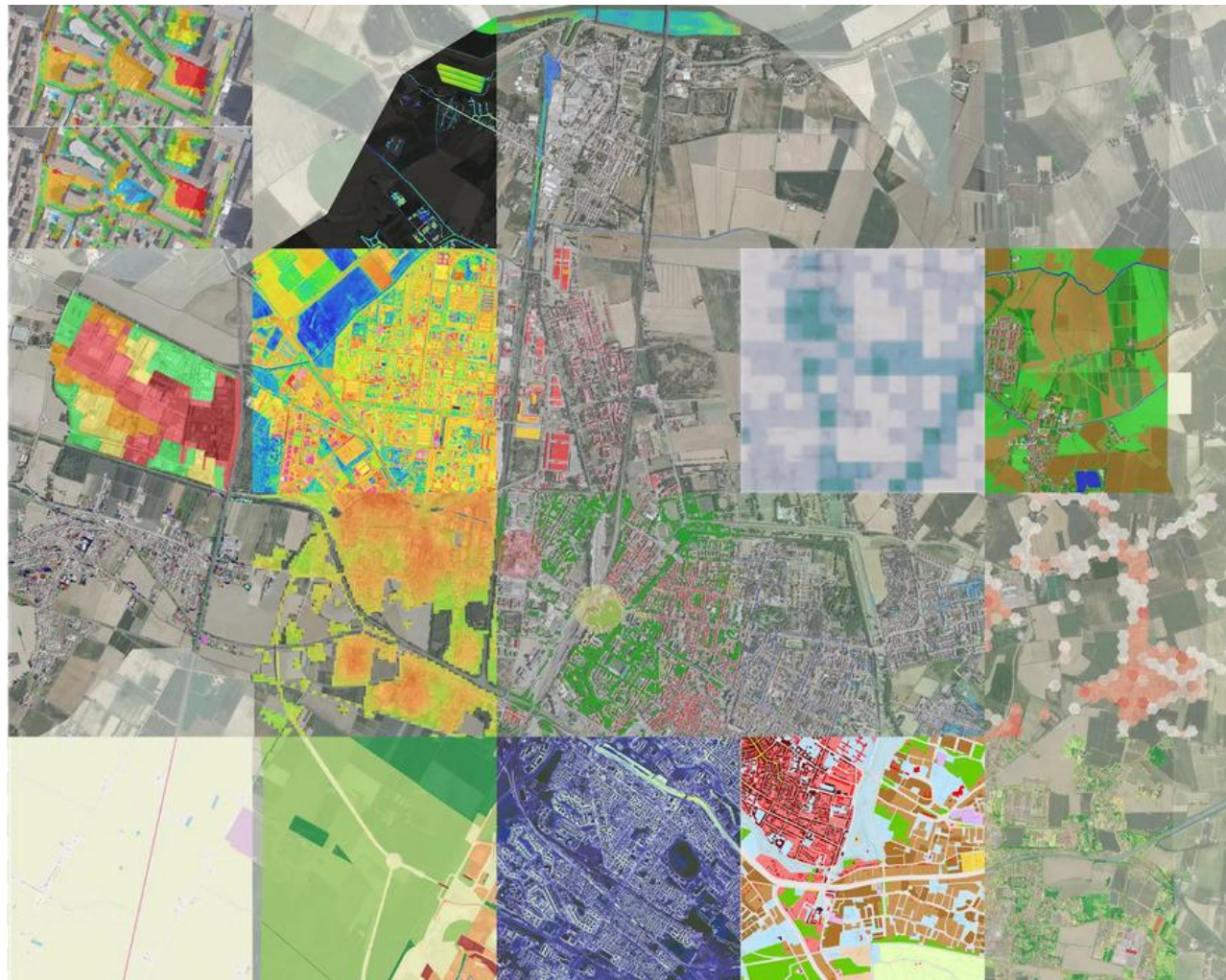
Conclusion

+200 (geo)datasets
on

dati.comune.fe.it

via OGC standard
services/formats

(included Citizen
Science)



Grazie | Thanks

piergiorgio.cipriano@dedagroup.it



#VOGHERADIGITAL



GLORIA CHINDAMO

Governance & Strategic Partnerships Advisor



#VOGHERADIGITAL

Municipality of Voghera (since 2020)

Political role focused on the strategic coordination of “Voghera Digital” and the digital transition of the public administration.

Piedmont Region (2022)

Project management for the National Recovery and Resilience Plan in complex environmental procedures, innovation and digital transformation.

Lombardy Region (since 2023)

Coordination of PNRR projects focused on complex environmental procedures and digital transformation.





Best Digital Event Award 2021
We Make Future
Festival of Digital and Social Innovation



With Renato Brunetta – Minister of Public Administration
For “Public Value: Public Administration doing well”
SDA Bocconi – Mentioned Voghera Digital



Comune di Voghera

#VOGHERADIGITAL HUB 2023

Programma incontri di divulgazione digitale.

NUOVE COMPETENZE PER AZIENDE E ASSOCIAZIONI

Consapevolezza digitale.
Destinatari: Aziende, Associazioni, Startup, Innovatori.
Conoscenza digitale pregressa necessaria: Base

Lunedì 27 febbraio ore 14:00-15:30 - #1 Proposta di valore
Lunedì 06 marzo ore 14:00-15:30 - #2 Segmenti di clienti
Lunedì 13 marzo ore 14:00-15:30 - #3 Canali di distribuzione
Lunedì 20 marzo ore 14:00-15:30 - #4 Relazione con i clienti
Lunedì 27 marzo ore 14:00-15:30 - #5 Fonti di reddito
Lunedì 03 aprile ore 14:00-15:30 - #6 Strutture dei costi
Lunedì 17 aprile ore 14:00-15:30 - #7 Attività chiave
Lunedì 08 maggio ore 14:00-15:30 - #8 Partner chiave
Lunedì 15 maggio ore 14:00-15:30 - #9 Risorse chiave

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www.comune.voghera.pv.it
www.vogheradigital.com

Hub Voghera Digital, presso Sala Zonca via Ugo Gola 1, Voghera (PV)

Comune di Voghera

#VOGHERADIGITAL HUB 2023

Programma incontri di divulgazione digitale.

ABC DIGITALE PER TUTTI
Per imparare le basi del digitale.
Destinatari: Incontri aperti a tutti.
Conoscenza: Nessuna

Giovedì 23 febbraio ore 10:30-12:00
Tecnologie dell'informazione e della comunicazione, utilizzo di internet e delle diverse funzionalità disponibili

Giovedì 02 marzo ore 10:30-12:00
Identità digitale e forme di comunicazione online: email, messaggi, social.

Mercoledì 08 marzo ore 15:00-16:30
Sicurezza online: Proteggersi da truffe e frodi gestendo in modo sicuro le informazioni personali.

Giovedì 16 marzo ore 10:30-12:00
Utilizzo di programmi e applicazioni: a cosa servono, come installarli e come gestirli.

**Gli incontri sono aperti a tutti.
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www.comune.voghera.pv.it
www.vogheradigital.com

Hub Voghera Digital, presso Sala Zonca via Ugo Gola 1, Voghera (PV)

ABC DIGITALE PER TUTTI
Per imparare le basi del digitale.
Destinatari: Incontri aperti a tutti.
Conoscenza: Nessuna

DIGITALE INCLUSIVO
Per conoscere i nuovi servizi del Comune.
Destinatari: Incontri aperti a tutti.
Conoscenza pregressa necessaria: Base

DIGITAL SOCIAL LAB
Laboratori di comunicazione social.
Destinatari: Studenti, Neet, Giovani.
Conoscenza pregressa necessaria: Base

NUOVE COMPETENZE
Consapevolezza digitale nelle attività.
Destinatari: Aziende, Associazioni, Innovatori.
Conoscenza pregressa necessaria: Base

Digital courses for:

- Citizens
- School
- Local shops
- Business
- Stakeholder



“Miglior evento digitale 2023”: il premio a Voghera Digital nell’ambito dell’Assemblea Nazionale di ANCI

Genova - Award:

Best Digital Event 2023 – awarded to Voghera Digital for the quality of its digital literacy courses during the ANCI National Assembly.



Rimini - Awards:

Techstars Startup – Voghera Digital as mentor of Pavia students who achieved 2nd, 3rd place, and a special mention.



Province of Pavia:
Meeting with the
municipalities of the
province to share
the **replicable
Voghera Digital
model**.



Meeting with
Department of
Public
Administration
to share the
**replicable Voghera
Digital model**.



#VogheraDigital and
neighboring municipalities

#RivaDigital
#CodevillaDigital
#VarziDigital

In 2024, we opened
6 digital facilitation hubs in
Voghera,
1 in Rivanazzano Terme,
1 in Codevilla,
1 in Varzi.





Quinta Edizione
Festival

#VOGHERADIGITAL

DAL 10 AL 12 OTTOBRE 2025

Storia della Tecnologia

COME TUTTO È INIZIATO

MOSTRA STORICA
Saranno esposti apparecchi di interesse storico e culturale provenienti da appassionati e collezionisti. Durante la mostra i visitatori potranno provare l'utilizzo di alcuni telefoni che hanno fatto la storia.

IERI
DAL 10 AL 12 OTTOBRE 2025

MOSTRA STORICA: DELLA TELEFONIA, DELLA RADIO E DELLA FOTOGRAFIA
DAL 10 AL 12 OTTOBRE - CIRCOLO IL RITROVO
10 OTTOBRE ORE 10:30 - INAUGURAZIONE MOSTRA

CONFERENZA: STORIA DELLA TELEFONIA E DELLE TELECOMUNICAZIONI
10 OTTOBRE ORE 18:00 - CIRCOLO IL RITROVO

SPETTACOLO: RACCONTI DI CINEMA ORNELLA MUTI con PINO MELFI QUARTET
11 OTTOBRE ORE 21:00 - TEATRO VALENTINO GARAVANI



DAL 17 AL 19 OTTOBRE 2025

INNOVARE ADESSO

Sfide e opportunità dei territori

Quinta Edizione
Festival

#VOGHERADIGITAL

OGGI
DAL 17 AL 19 OTTOBRE 2025

VOGHERA DIGITAL ESCAPE ROOM: ESCAIP ROOM - OLTREROOM
DAL 17 AL 19 OTTOBRE - SALA PAGANO

DIBATTITO: AI ED ECONOMIE EMERGENTI. GIOVANNI BOZZETTI - Pres. FIERA MILANO
17 OTTOBRE ORE 18:00 - EX CASINO SOCIALE

INCONTRO NAZIONALE: IDEE E PROGETTI DAI TERRITORI - RETE WE MAKE FUTURE
18 OTTOBRE ORE 14:30 - HUB VOGHERA DIGITAL

CINEMA: 13ma ediz. VOGHERA FILM FESTIVAL SCENEGGIATURE - HORROR - CORTOMETRAGGI
18 OTTOBRE ORE 15:18-21:30 - CINEMA ARLECCHINO

LIVE PERFORMANCE: AI E MADE IN ITALY DOPPIAGGIO ITALIANO ON STAGE
19 OTTOBRE ORE 21:00 - CINEMA ARLECCHINO



DAL 24 AL 26 OTTOBRE 2025

PARLIAMO DI FUTURO

Quinta Edizione
Festival

#VOGHERADIGITAL

DOMANI
DAL 24 AL 26 OTTOBRE 2025

VOGHERA DIGITAL YOUNG COMPETITION GIOVANI CHE PROGETTANO IL DOMANI
24 OTTOBRE ORE 10:00 - AUDITORIUM BARATTA

AI E DIGITALE PER LA SCUOLA DSA: UNA SCUOLA DAVVERO INCLUSIVA
24 OTTOBRE ORE 21:00 - HUB VOGHERA DIGITAL

INTELLIGENZA ARTIFICIALE PER TUTTE LE ETÀ LABORATORIO DI ALFABETIZZAZIONE DIGITALE
25 OTTOBRE ORE 10:30 - HUB VOGHERA DIGITAL

VOGHERA IXPIRA QUANDO LO SGUARDO È RIVOLTO AL FUTURO
26 OTTOBRE ORE 20:30 - EX CASINO SOCIALE



Voghera Digital is our way of engaging people in the sustainable development of the territory.
Only through raising citizens' awareness can we truly address data and climate issues.



Home

PROGRAMMA FESTIVAL 2025

Eventi&Hub

Valori&Call

Press



#VogheraDigital: il festival dell'innovazione digitale

Ogni anno l'evento #VogheraDigital, accoglie attorno ad un grande tavolo virtuale, l'amministrazione pubblica, gli enti, le associazioni, le aziende, le scuole e tutti i cittadini, per stimolare il dibattito sui valori di uno sviluppo sostenibile e condividere la visione di città che vogliamo diventare.



**Quinta Edizione
Festival**



#VOGHERADIGITAL

IERI
DAL 10 AL 12 OTTOBRE 2025

OGGI
DAL 17 AL 19 OTTOBRE 2025

DOMANI
DAL 24 AL 26 OTTOBRE 2025

*Un viaggio nel tempo della tecnologia
per una società che sta cambiando*

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www.vogheradigital.com

After this 2025 Festival
we will open
our Open Data Website

Gloria Chindamo

g.chindamo@gloriachindamo.it

PART II: The Essential Frameworks: Standardisation and Digitalisation in Practice

Dr. Ed Loscos, President, Building Digital Twin Association (10 min)

Current European and International Standardisation perspectives and regulations of the (near) future.

Dr. Francesca Noardo, Open Geospatial Consortium + EUnet4DBPs) (10 min)

An unblocking step towards digitalisation: Digital Building Permit and digitalisation experiences.

Future Standards on DTw in the Built Environment

Eduard Loscos

BDTA President
Research Manager at IDP – BUREAU VERITAS
Honorary Professor Teesside University



A BUREAU VERITAS COMPANY



What is the BDTA??
EU Non-profit created in
Antwerpen

VISION

To allow the coordination of a multicriteria efficient decision-taking across all AECOO stakeholders by digitally duplicating EU building stock.



MISSION

Develop an Open & Trustworthy Technoeconomic Ecosystem to advance towards full implementation of Building Digital Twin Environments across all the stakeholders and lifecycles of AECOO* Smart and Connected Real State and Infrastructure Assets, including occupants, through professional development and community.

**Architecture, Engineering, Construction, Owner & Operator*

GUIDING PRINCIPLES

GP 1. OPEN

Develop an Open Technology Framework ready to evolve as a community along the lifespan of AECOO assets and cities

GP 2. ETHICAL

Provide a Citizen Centered Vision to guarantee Privacy and Ethical usage of the generated data

GP 3. RELIABLE

Synchronize updated information of smart and connected buildings towards an un-siloed complete information

GP 4. CIRCULARITY

Allow seamless environmental assessment across lifecycles for a circular management of building environment

GP 5. CLIMATE GOALS

Optimize Energy Performance in buildings by reducing gap projections between lifecycles

GP 6. ECONOMIC VALUE

Generate trustworthy baselines to generate economical guarantees to current and new business in AECOO sector

BDTA STRATEGIC AXIS

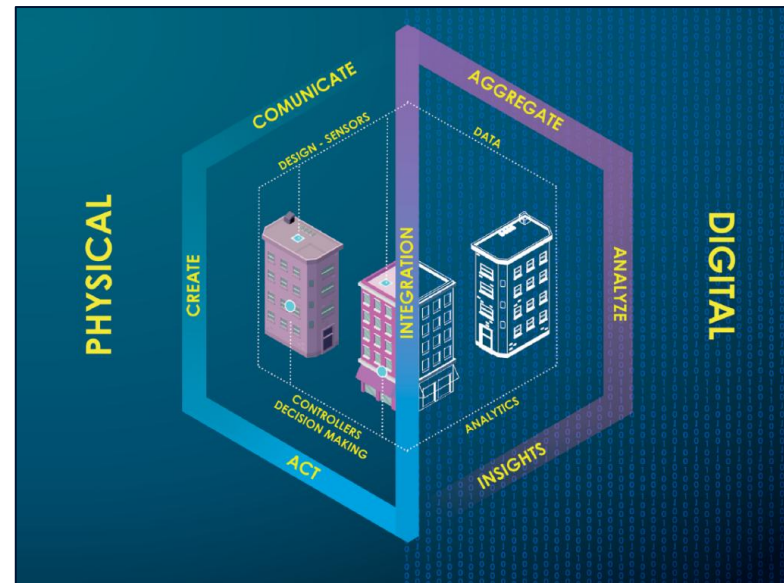
Community agreed developments in Processes, Skills and Tools!

METHODOLOGY: Definitions and New Roles

PUBLICATIONS: White Papers, Technology Insights, Standards

OPEN TECHNOLOGY: Data governance tools and best practices

BDTw COMMUNITY: Events and Working groups



BDTA WORKING GROUPS

WG1. DEFINITIONS AND ROLES → Standardization roadmap, trainings and certifications

WG2. DATA INTEROPERABILITY → Ontology Network Catalog development for Data Reference Architecture in BDTw

WG3. SIMULATION ACROSS LIFECYCLE → Simulation Model Tracking System (STMS) and SIMBots

WG4. ETHICAL AND PRIVACY METRICS → Trustworthiness assessment

WG5. CIVIL INFRASTRUCTURES → Dedicated Use Cases & Vertical Aggregation

WORKING GROUP #1: BDTE DEFINITIONS & ROLES

Ambition: To generate a community based common set of definitions, roles and their related procedures, to reach interoperable Building Digital Twins Environments (*Interrogative and Predictive Purpose*).

A set of **Building Digital Twin Definitions** generated under the SPHERE research were collected as an open White Paper in Q4 2019.



SPHERE project has received funding from the European Union's H2020 programme under Grant Agreement No. 820805.



WORKING GROUP #1: BDTE DEFINITIONS & ROLES

2019 BDTA whitepaper



The DT development in the manufacturing industry is underway in parallel with and learning from a highly related digital manufacturing technology called cyber-physical systems (CPS), a term first coined in 2006 by Helen Giller from the US National Science Foundation (Law and Isenhardt 2017).

The concept of a cyber-physical system is a manufacturing system where both physical components and their virtual counterparts or extensions are integrated using sensors, controllers, and computer algorithms, such that the physical space can be monitored, coordinated and controlled by the virtual side in an automated manner a seamless manner (Wang et al. 2019).

Cyber-physical systems and Digital Twins are similar in that they have physical-digital connection, near real-time interaction, integration of organizational management across an asset's life cycle, and providing the means to enhance collaboration, yet they differ in their level of representation of the asset. Cyber-Physical systems focus on computing communication, and control (CC) primarily for automation and the cyber system consists of algorithms not of a digital representation.

CPS require a data stream of controller or sensor inputs from the physical asset, algorithms that provide computations, and their outputs communicated to control the physical system, with potential feedback loops. The computational algorithms can be of any kind, whereas the algorithms do not need to feature any digital representation of the asset itself.

In contrast, Digital Twin's focus on a virtual representation of a physical asset in relevant forms that can provide for simulation on top of real-life data, and operational management decision support (Tao et al. 2019). As such a CPS can be, but does not have to be, part of a Digital Twin and when it does, it is typically referred to as being instantiated through CPS twinning (Damenovic & Behrendt 2019). DT's and CPS are thus emerging as two separate yet linkable digital transformation R&D efforts.

Digital Twin Definitions | 21

20 | Digital Twin Definitions

5. NEW DEFINITIONS OF BUILDING DIGITAL TWINS FOR AECOO FROM THE SPHERE PROJECT

Whilst the Design and Construction phase have usually been the ultimate purpose of all AECOO's stakeholders, a change is currently occurring connecting works carried out on buildings under "design, manufacturing, and construction" with their future operational performance, extended AECOO to the AECOO sector (Architecture, Engineering, Construction, Ownership AND Operation). This connection across life phases is the ultimate mission of current Product Life Cycle Management systems and tools under development.

Under the SPHERE project (operational project as Grant Agreement No. 101090) a set of definitions have been developed by the consortium to help drive the technical Digital Twin development for the AECOO sector, forming the core of this White Paper. The definitions help to provide a common understanding both on what provides for a Building Digital Twin, and the deeper knowledge on how to implement it, to create a common definition landscape across stakeholders in the AECOO sector.

The definitions development fit with the technical objective of the SPHERE H2020 EU project which is to develop an ICT platform able to manage and update both static and dynamic building information across the design, construction/innovation and operation phases from multiple sources, and utilize this information both in operational energy control, and for feed-backs from operations to design.

Digital Twin Definitions | 21

Beyond SPHERE, the definitions proposed below are aligned with the same concept raised by Digital Built Britain mentioned in the previous section, yet expand their scope to fill the existing gap between BIM current definitions and procedures with the completion of a real Digital Twin Environment for Buildings as already known in other Manufacturing Sectors.

All the new definitions and related procedures developed in SPHERE, as shared below forming an initial definition landscape, serve to provide a set of implementation Building Digital Twin definitions that will be tested in 4 real AECOO pilots across the EU (including New buildings and major retrofitting projects in existing assets) in the following 3 next years.

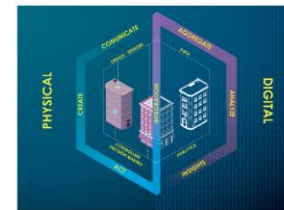


Figure 4: The Digital Twin concept. Data are captured and measured in a digital platform, which, in turn, performs real-time analysis to optimize the design and the performance obtained by the Digital Twin on Design/Construction/Operation.

Digital Twin definitions for new buildings

As such, the following definitions as per Exhibit 6 have been developed for Digital Twins of new buildings to initiate a common definition landscape.

WORKING GROUP #1: BDTE DEFINITIONS & ROLES

2019 BDTA whitepaper



EXHIBIT 8. PROPOSED NEW DEFINITIONS LINKING BIM TO DIGITAL TWINS FROM SPHERE



A Building Digital Twin that is linked to throughout the life of a specific corresponding physical product, meaning pricing when the asset starts its operation. In the AECO world, this instance corresponds to the legacy building as Built Documentation. This type of Digital Twin may contain, but again is not limited to, the following information sets:

- A fully Information Model which will include the 3D model with General Dimensioning and Tolerances (GD&T) that describes the geometry of the physical instance and its components;
- Bill of Materials that links current and previous versions and components directly related to architecture, structural and building services;
- Bill of Processes that links the operations that were performed in creating this physical instance (based on the logs and project variations generated after the following bill, entry with the results of any measurements and tests on the instance (e.g. Cloud Point) surveys of inner spaces, structural load tests, Geotechnical...);
- A Service Record that describes past services performed and components replaced (Major/Minor Renovation and repair (Upgrading), Operational Status captured from actual sensor data, actual, past actual, and future predicted (BIM, SCADA/PLC systems, Facility Management Systems, Simulations...);
- Employer Requirements included inside the contracts, previous legal and contractual information of the kind;
- An Information Model in the form of an Object Type DB which will include 3D Geometrical information as well as Materials and Elements Inventory;
- Bill of Processes as a comprehensive log of past processes and actions based on Measured and Confirmed commitments;
- Bill of Services as the current evolution on the functional characteristics of the asset, starting back from initial Employer Requirements;
- Bill of Disposal (e.g. Material Passports, Selected Decommission Instructions, Greater Construction...).

BDTP evolution are closely to BIM via iterative improvements through Model Simulations as well as for the usage of first simulated values as baseline of DTIs after the commissioning of a real building asset.

In AECO, similar to manufacturing, this type of Building Digital Twin is the aggregation of multiple, isolated, of having an independent data structure. DTAs are a competing context with BIM or project data sets in all DTIs, hence allowing ad-hoc or proactive queries for benchmarking and comparisons.

EXHIBIT 9. PROPOSED NEW DEFINITIONS LINKING BIM TO DIGITAL TWINS FROM SPHERE



This type of DTI is following the same principle than in manufacturing use case, by having similar DTIs. However, in general AECO products presents a smaller number of assets and much more heterogeneity than manufacturing products. In addition, the legal persons involved in their production are many more than in manufacturing supply chains (e.g. OEMs and OEMs, 1000s) providing a much more distributed data ownership. These two elements characteristics of AECO use cases may hinder both the representativeness of the aggregated data as well as the potential of queries scopes.

From the point of view of many related stakeholders of the AECO sector (owners, tenants, Public Administrations, associations...), a real data framework has to be considered jointly as a container for the products held inside itself containing like appearance, features, and personal goods. These contents, as well as important components of the building services and auxiliary systems (e.g. Buildings Automation), could have their own Digital Twin Instances. The interaction among these multiple Digital Twin Instances will highly expand the boundaries of assets to represent information. On the other side, being assets are nowadays producing DTIs from Critical Civil Infrastructures and even whole districts are proposed, their existing infrastructure scale and data-model, Building scale in this stage in between cities and its contents, and the representation of Building Digital Twin across the Digital Twin scales will allow the vertical aggregation from agencies to districts. In these, BDTAs will get the focus on the AECO stakeholders needs of relevant information and optimized queries.

Beyond this, by the creation of any DTI, two main purposes are sought to be achieved: firstly, by having a connection from DTIs and DTIs and interrogative (applying to DTIs as well as to DTAs in-depth analysis). As it happens to be in any DTI, these two basic drivers may include complementary different requests depending on which is the role of the stakeholder interacting and the type of the Digital Twin.

EXHIBIT 9. PROPOSED NEW DEFINITIONS LINKING BIM TO DIGITAL TWINS FROM SPHERE



Using existing information of information related to AECO projects under the ISO 15926-1:2018 will bring most of the desired features to create a BDTP during design and construction phases. The Project Information Model content mainly on BIM Model developed inside the CDE will be the main source of data (DTI) although not the only one, since BDTIs will include at least, although not limited to, a BIP legal document signed by the main stakeholders involved in the phase, developing legal framework, standards, technical properties, performance, data property and the scope and all internal and external requirements (PHI/PLI, as well as the City of the key organizations, practices related to the setting, including terms legal information (e.g. Conditions, Intellectual...), as well as its geometrical information (topological, semantic, geometrical, temporal...), it also includes other not structured data, containing an Information Model. Also a BIP signed by a BDTI should include links between other datasets related to the model which are more managed and controlled dynamically. In relation to this managing the data of the PIM outside of the BIM Model itself is a challenge that BDTI should address.

BDTIs must integrate all the relevant information stored by the BIP and will hence progressively use past Information Models to structure this type of Digital Twin, by considering again AECO products developed under the ISO 15926-1:2018, a new asset entering in its operation and construction phase will include some the datasets of the AM starting on from the previous AM (last Model of Information). This initial AM and its following recordings will hence provide the necessary Information of the current instance including the General Dimensioning and Tolerances (GD&T), Bill of Materials and the Bill of Representative Processes (including evolutions in the BIP and BIP communications), along with the results of any measurements and tests on the instance (e.g. Cloud Point) surveys of inner spaces, structural load tests, Geotechnical...), A Service Record that describes past services performed and components replaced (Major/Minor Renovation and repair (Upgrading), and Operational Status captured from actual sensor data, actual, past actual, and future predicted (BIM, SCADA/PLC systems, Facility Management Systems, Simulations...), All of this information must be linked dynamically to the BIM Models that comprises the AM.

The computational construct of how to allow enough specification of an heterogeneous set of Digital Twins is a not most understood topic of the Building Digital Twins. However, there are some developments in current BIM Task Intelligently joining this concept, like the use of standardized terminologies in order to homogenize the whole aggregation of information. Moreover, according to ISO 15926-1:2018, AM could be the way to develop specifications that allow to manage BIMs, however it implies a set of standardized definitions of the model objects used in the AM.

SPHERE project is currently proposing horizontal BDTIs by the usage of a Platform as a Service Architecture which will include at least the following services:

- Linked Data Semantics Ontology
- Integrated IoT Platform
- IoT Gateway
- Block Chain
- Digital Twin Object Libraries

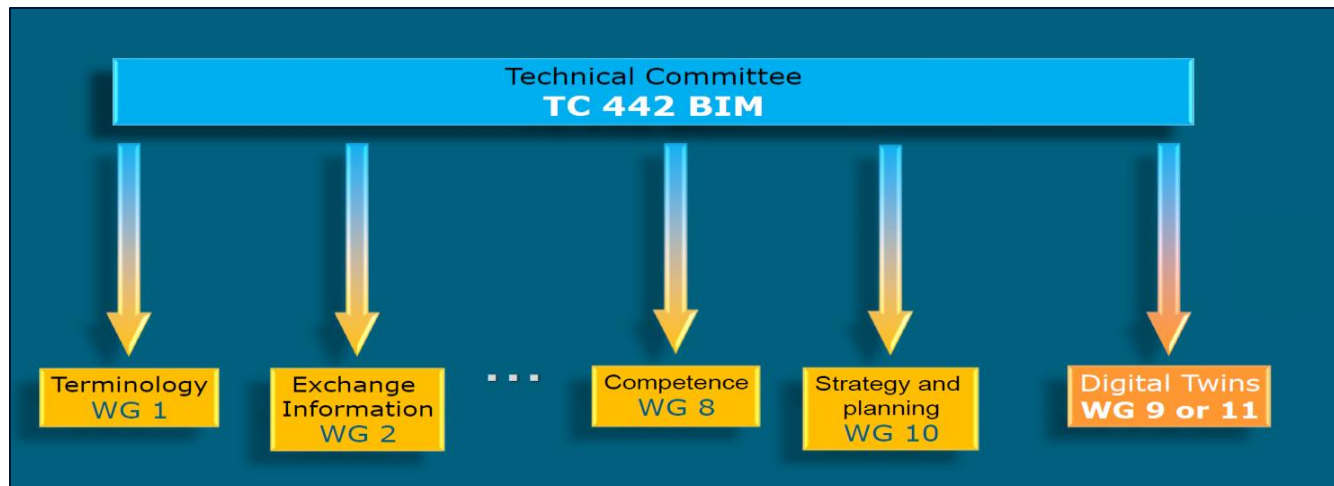
Assumptions based on the experience in manufacturing allow to forecast this will be the most rewarding by a complete multi-organizational PIM ecosystem of federated and vertical Building-confined aggregations.

The BDTI will be able to expand any current CDE functionalities to be able to manage all the PIM and AM information dynamically, plus the connection with the on-site monitoring and actuators, especially for the asset operational stage.

WORKING GROUP #1: BDTE DEFINITIONS & ROLES

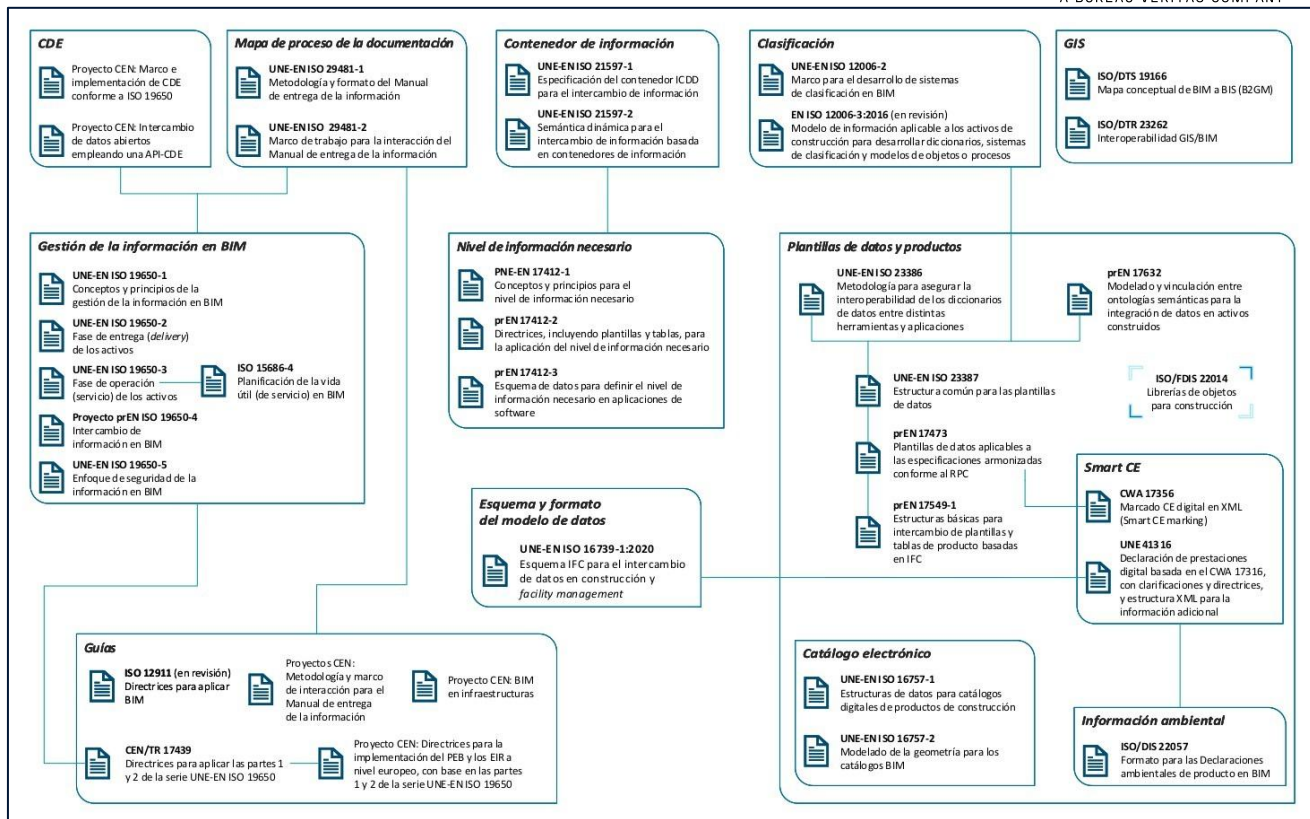
First Steps 2022 → Creation of the Working Group 9 (Building Digital Twins) under 442 Technical Committee

Secretariat:



WORKING GROUP #1: CEN Technical Committee 442 (BIM)

BIM norms map 2020
(source UNE)



WORKING GROUP #1: BDTE DEFINITIONS & ROLES

Technical Committee 442 (BIM) Structure

Working group	Title	Scope
CEN/TC 442/WG 1	Terminology	Provide advice to the TC 442 WG's on matters and issues related to BIM Terminology and harmonization of language across the standards developed by TC 442 Work in close cooperation with ISO/TC 59/SC 13/TF 01 Terminology
CEN/TC 442/WG 2	Exchange information	Develop and propose to TC442 when relevant, standards and guidelines to specify data structure for entities, geometry, and related properties as well as classification for exchanging data models. The data model ensures exchange of object-based information
CEN/TC 442/WG 3	Information Delivery Specification	Develop and propose to TC442 when relevant, standards and guidelines to specify how to describe the required information supporting a given process. Develop and propose to TC442 when relevant, standards and guidelines for Information Management using BIM

WORKING GROUP #1: BDTE DEFINITIONS & ROLES

Technical Committee 442 (BIM) Structure

Working group	Title	Scope
CEN/TC 442/WG 4	Support Dictionaries	To develop and propose to TC442 when relevant, standards and guidelines to enable all stakeholders to operate using common machine-readable language by: - Providing and improving: - o methodologies to describe governance of dictionaries and their content; - o methodologies to describe construction objects based on data template and property dictionaries; - o methodologies to specify how to apply linked data and semantic web technologies. - Facilitating the WG4 standards implementation by providing guidelines for stakeholders; Investigating and facilitating the use of classification(s) systems by stakeholders

WORKING GROUP #1: BDTE DEFINITIONS & ROLES

Technical Committee 442 (BIM) Structure

Working group	Title	Scope
CEN/TC 442/WG 5	Chair's Advisory Group	The Chairperson's Advisory Group, “CAG”, is a permanent group created with the aim to coordinate and advise on generic issues across the CEN/TC 442 working groups. It provides a repository for information which is essential for the working groups during the drafting stages of their standards. The Chairperson's Advisory Group “CAG” does not develop standardization deliverables or makes formal decisions. The Advisory Group reports to CEN/TC 442. The Secretariat of the Advisory Group shall be the Secretary of CEN/TC 442. The Convenor shall be the Chairperson of CEN/TC 442.

WORKING GROUP #1: BDTE DEFINITIONS & ROLES

Technical Committee 442 (BIM) Structure

Working group	Title	Scope
CEN/TC 442/WG 6	Infrastructure	Identify key stakeholders, investigate existing activities and formulate the need for standardization related to the implementation of BIM for infrastructure in Europe, not covered by existing standards and ongoing standards development. Make recommendation on whether standards should be developed and if so, how this should be done.
CEN/TC 442/WG 7	Horizontal role	Investigate and propose collaborative framework between CEN/TC 442 and other CEN and CENELEC TCs and standards committees with an interest in BIM methodologies and processes, To produce normative or informative documents to support the implementation of the horizontal role.
CEN/TC 442/WG 8	Competence	<i>Develop and propose to TC442 when relevant, standards and guidelines defining requirements of competence, knowledge and skills related to the Information Management enabled by the Information Modelling.</i>

WORKING GROUP #1: BDTE DEFINITIONS & ROLES

Technical Committee 442 (BIM) Structure

Working group	Title	Scope
CEN/TC 442/WG 9	Digital twins in built environment	<i>Standardization in the field of structured information for the digital twins applied to the built environment, considering methodologies and formats to define, describe, exchange, monitor, record and securely handle digital twin's data and its related processes in relation with AECOO (Architecture, Engineering, Construction, Operation & Ownership). Digital twins applied to other industries, such as aerospace, cars or machines, are out of the scope of this proposal.</i>
CEN/TC 442/WG 10	Strategy and planning	

WORKING GROUP #1: BDTE DEFINITIONS & ROLES

Technical Committee 442 (BIM) Structure

Working group	Title	Scope
CEN/TC 442/WG 11	BIM objects for construction works	<i>WG 11 had their first meeting November 8th 2024. The current work item involves standardizing the use of BIM object in the built environment. The work is based on the Norwegian Standard NS 8360-series that has been used in Norway since 2015</i>
CEN/TC 442/WG 12	Digitalization of construction products performance characteristics	<i>WG 12 had their first meeting 2024-10-29 in Brussels. Targets how to use CPR and Digital Product Passports DPP System of construction Products.</i>

Technical Committee 442/WG9 WI → Case Studies TR

**WI 00442049 CEN/TR
18077:2024** Digital
twins in built
environment - Use
cases (Published)

<https://www.une.org/encuentra-tu-norma/busca-tu-norma/norma?c=N0073780>



UNE-CEN/TR 18077:2024 (Ratificada)

🇪🇸 Modelado de la información de construcción. Gemelos digitales aplicados al entorno construido. Casos de uso (Ratificada por la Asociación Española de Normalización en diciembre de 2024.)

🇬🇧 Building information modelling - Digital twins applied to the built environment - Use cases (Endorsed by Asociación Española de Normalización in December of 2024.)

🇫🇷 Modélisation des informations de la construction - Jumeaux numériques appliqués à l'environnement bâti - Cas d'usage (Entérinée par l'Asociación Española de Normalización en décembre 2024.)

Fecha ratificación: 2024-12-01 / **Vigente**

ICS: 35.240.67 / Aplicaciones de las tecnologías de la información en la industria de la edificación y de la construcción

CTN: CTN 332 - Digitalización de la información para edificación y obra civil

Equivalencias internacionales: CEN/TR 18077:2024 (Idéntico)

WI 00442049 CEN/TR 18077:2024 Digital twins in built environment - Use cases (Published)

#	Name	General info	Main use	Asset type	Phase
1	D2EPC THESS	Building Residential	Energy Performance	Building Residential	Operation
2	D2EPC NICOSIA	Building School	Energy Performance	Building Tertiary	Operation
3	PLANON DT	Smart Climatized Asset/Space Management	Energy Performance, Control, Events, Space Management	Building Tertiary	Operation
4	SAMBA	Building Office, Coworking	Operation	Building Tertiary	Operation
5	H2 ELECTRO	DT For Technical Marketing	Marketing	Others (Machinery)	Production (Offsite Construction)
6	BRIDGE WEBGL	Bridge INFRA	Maintenance, MARKETING	Civil Infrastructure (Linear)	Operation
8	CRANE	Building Crane	Planning Construction Operations	Others (Machinery)	Operation
9	KUBIK	Building	Test Lab	Building Industrial	Design
10	BRIDGE ZUBIOTE	Bridge INFRA	TEST BRIDGE	Civil Infrastructure (Linear)	Design
13	BIM2TWIN	Digital Twin Of Construction Execution	Construction Management	Building Tertiary	Execution (Onsite Construction)
14	ENERGY_TWIN	Building Office	Commissioning, Operation	Building Tertiary	Commissioning
15	BRIDGE BAsT	Bridge Rail/Road Infra	Operation, Maintenance	Civil Infrastructure (Linear)	Operation
16	ROAD TU	Road Infra	Operation	Civil Infrastructure (Linear)	Operation
20	SNCF	Rail Infra	KNOWLEDGE OPTIMISATION	Civil Infrastructure (Linear)	Operation
21	ZADAR	Airport Infra	Maintenance	Civil Infrastructure (Punctual)	Operation
22	AVILES PORT	Port Infra	Operation, logistics	Civil Infrastructure (Punctual)	Operation

WI 00442049 CEN/TR 18077:2024 Digital twins in built environment - Use cases (Published)

#	Name	General info	Main use	Asset type	Phase
23	SETEC-StMALO	Port Infra	Heritage	Civil Infrastructure (Punctual)	Reconstruction/preservation
25	ETSICCP	Building School	Operation	Building Tertiary	Operation
26	IRRIGATION	Smart Irrigation Management	Operation	Utility network	Operation
27	LLOBREGAT	BUILDING (Council)	Operation	Building Tertiary	Operation
28	HIDROPOWER	Powerplant Rabenstein (AUSTRIA)	Maintenance, optimization, simulation and VR	Energy Infrastructure	Operation
29	NUCLEAR_DECOMMM	(Confidential)	Optimization, Simulation, Training	Building Industrial	Dismantling
30	ST_ETIENNE (see note 1)	Building School	Optimization, simulation, operation	Building Tertiary	Operation
31	ECOLE CENTRALE	Building School	BIM model, CMMS and BMS DATA.	Building Tertiary	Operation
32	LILLE	Building Public	Facilities ticketing system interface	Building Tertiary	Operation
33	TNO SPHERE	Building Residential	Energy management	Building Residential	Operation
34	VTT SPHERE	Abloy factory	Energy optimization	Building Tertiary	Operation
35	EGIS	Gironde Estuary, Grand Port Maritime de Bordeaux	Operation and maintenance	Civil Infrastructure (Punctual)	Operation

Note 1: Approval pending by AFNOR

2023: 1st NWI

Example of Case Study

DTWIN Puerto de Avilés

CEN/TC 442/WG 9

1 Use case: DIGITAL TWIN FOR SEA PORTS (SMART AND CONNECTED)

1.1 General information

Typology: Critical transport infrastructure

Location: Avilés and Barcelona Port Authorities

Asset owner: Avilés Port Authority

Building Digital Twin (BDT) manager: Sergio Velázquez Correa

1.2 Main use of the DT

A Port DT is a platform that integrates a set of web services that help to visualize and manage assets, infrastructure and superstructure through the link between the geometric and geographic representation of BIM/GIS and the cadaster data, investment plans, new assets, files of external and own projects within of the port infrastructure, together with the administrative information managed by the existing solutions in terms of maritime traffic management, port community systems, occupancy level and planning of operations, maintenance and operation and compliance with environmental regulations.



Fig. 1. Digital Twin Platform for the port terminals allocation management, including cadaster and other public and private data for the users

Integration of information about port assets, managed by the Dynamics NAV management software (through SOAP web services, published by the same software) with the geometric identification of each asset represented in the GIS viewer, query filters are added and search that allow the user to interact with the information and geometry, contains other functionalities that allow viewing the detailed information of the asset, downloading the filters made into Excel files and navigating to the management software through links managed in the DT platform and NAV DYNAMICS.

1.3 Description of the DT

Currently, seaports handle more than a half of all goods traded between the EU-28 and the rest of the world. To this respect, a port DT will help maritime and logistics industry to be:

CEN/TC 442/WG 9

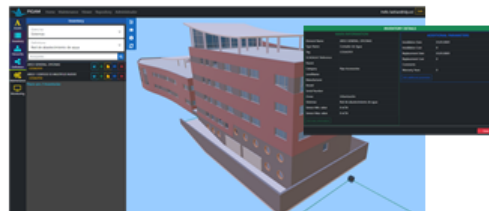


Fig. 2. Integration of DIGITAL TWIN as a service for the management and maintenance of building assets, industrial plants, treatment plants, etc. Administrative building of Avilés Port Authority

The asset inventory modules, preventive and corrective maintenance management of the asset and the link with the asset monitoring system controlled through IoT technology managed by AGATA are incorporated as part of the solution.

1.5 Replication potential

A port DT is a vehicle to attain the maximum post-project uptake of the Asset Digital Twin foreground and its impact on the widest possible audience of EU Ports Authorities, Terminal Operators and Multimodal Logistics Experts (Researchers), as well as more general audiences either in the Logistic Sector or Public Administration. Although each port infrastructure is different, the replicability of the Port DT is feasible because it can be implemented as a trustworthy and accurate digital representation of the critical infrastructure and its systems, it can create feedback loops that can enable near real-time data transfer between the virtual replicate and critical infrastructure systems including simulated data series, the creation of a common data environment, implement data analytics, including machine learning and simulation which can provide predictive tools "what-if" situations.

1.6 Relevant links

1. The Digital Twin of Port of Rotterdam: https://mediaspaces.esri.com/media/tr/1_vive4tato
2. Analytics with digital twinning: A decision support system for maintaining a resilient port. Chenhao Zhou, Jie Xu et al. Decision Support Systems 143 (2021) 113496.
3. Multi-asset applications and development challenges of digital twin-driven management in global smart ports. Kan Wang et al. Case Studies on Transport Policy, Volume 9, Issue 3, September 2021, Pages 1298-1312

1.7 Contact information.

Name, email and telephone of a contact person on behalf of the DT owner and/or the BDT manager. This information will not be included in the final TR, but will be used to ask for further information, if needed.

WI 00442049 CEN/TR 18077:2024 Digital twins in built environment - Use cases (Published)

	USE CASE	MAIN USE #	SECONDARY USE #
1	Optimization Design		16
2	Optimization Construction	8,13	
3	Optimization Commissioning	14	
4	Optimization Operation (Energy Performance)	1,2,14,30,33,34	3,4,27,31
5	Optimization Operation (Space and Administrative Management)	3,22,25,27,32	4,20,30,31
6	Optimization Operation (Logistics)	35	20,22
7	Optimization Operation (Heritage)	23	
8	Optimization Maintenance	15,16,20,21,28,31	6,22,25,27
9	Optimization Dismantling	29	16
10	Safety	4	29
11	Training		4,28,29
12	Marketing	5,6	
13	Test Lab	9,10	
14	Others	26	34,35

All the case studies have been grouped following similar characteristics to extract representative guidelines of the examples received, with dedicated focus on extracting potential use cases.

WI 00442055 prEN 18162 Building information modelling - Digital twins applied to the built environment — Concept and definitions (*Enquiry open 2025-02-06*)

Documents to consider



BDTA
BUILDING DIGITAL TWIN ASSOCIATION
Driving innovation in Building Digital Twins!

CEN TC442/WG9: 8th Meeting (On-line)
New Working Item proposal

20th October 2023

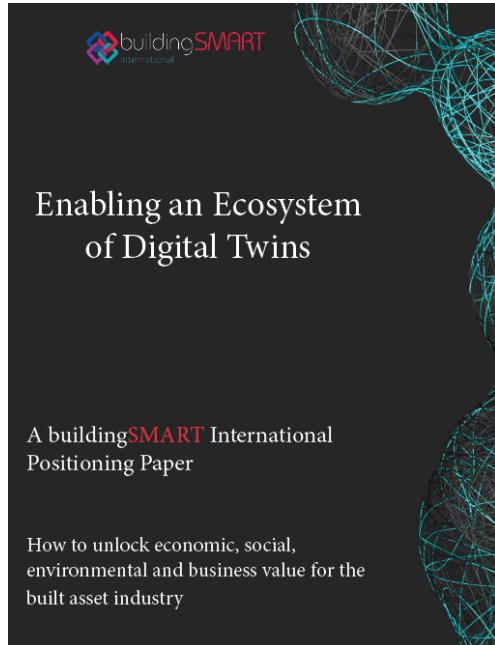
WI 00442055 prEN 18162 Building information modelling

- Digital twins applied to the built environment — Concept and definitions (*Enquiry open 2025-02-06*)

Documents to consider

- **SPHERE/BDTA White Paper 1 (2019)**
- **BuildingSmart Position Paper (2020)**
- **Digital Twin Construction paper (2020)**
- **ISO 23247-1-2021 (2021)**
- **ISO 30373**

Documents to consider



- SPHERE/BDTA White Paper 1 (2019)
- **BuildingSmart Position Paper (2020 & 2023 update)**
- Digital Twin Construction paper (2020)
- ISO 23247-1-2021 (2021)
- ISO 30373



Documents to consider

- SPHERE/BDTA White Paper 1 (2019)
- BuildingSmart Position Paper (2020 & 2023 update)
- **Digital Twin Construction paper (2020)**
- ISO 23247-1-2021 (2021)
- ISO 30373

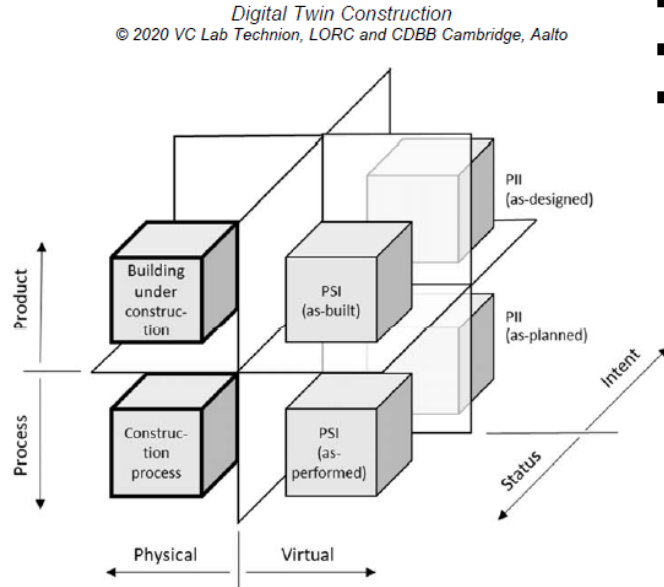


Figure 5. Information aspects of the domain within the three-dimensional space defined by the digital – physical, the product – process and the ex-ante and ex-post dimensions.

Digital Twin Construction
© 2020 VC Lab Technion, LORC and CDBB Cambridge, Aalto

Digital Twin Construction

Rafael Sacks, Technion IIT

Ioannis Brilakis, University of Cambridge

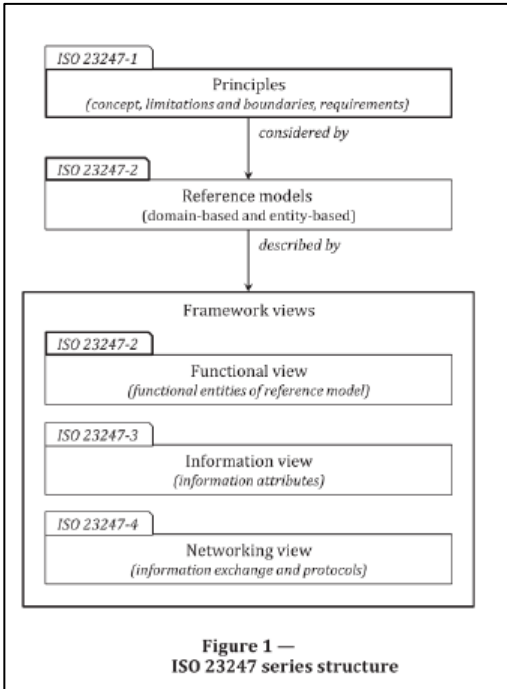
Ergo Pikas, Aalto University

Sally Xie, University of Cambridge

Mark Girolami, University of Cambridge

Documents to consider

- SPHERE/BDTA White Paper 1 (2019)
- BuildingSmart Position Paper (2020 & 2023 update)
- Digital Twin Construction paper (2020)
- **ISO 23247-1-2021 (2021)**
- ISO 30373



Automation systems and integration — Digital twin framework for manufacturing

Part 1: Overview and general principles

Documents to consider



ISO/IEC 30173

Edition 1.0 2023-11

INTERNATIONAL
STANDARD

- SPHERE/BDTA White Paper 1 (2019)
- BuildingSmart Position Paper (2020 & 2023 update)
- Digital Twin Construction paper (2020)
- ISO 23247-1-2021 (2021)
- **ISO 30373 (2023)**

3.1.1 digital twin DTw

digital representation (3.1.8) of a *target entity* (3.1.3) with data connections that enable convergence between the physical and digital states at an appropriate rate of synchronization

Note 1 to entry: Digital twin has some or all of the capabilities of connection, integration, analysis, simulation, visualization, optimization, collaboration, etc.

Note 2 to entry: Digital twin can provide an integrated view throughout the life cycle of the target entity.

WI 00442055 prEN 18162 Building information modelling - Digital twins applied to the built environment — Concept and definitions (*Enquiry open 2025-02-06*)

CEN/TC 442/WG 9

Date: 2024-11

prEN XXXXX:2024

Secretariat: UNE

Building information modelling — Digital twins applied to the built environment — Concept and definitions

CCMC will prepare and attach the official title page.

WI 00442055 prEN 18162 Building information modelling - Digital twins applied to the built environment — Concept and definitions (*Enquiry open* 2025-02-06)

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WORKING GROUP #1: BDTE DEFINITIONS & ROLES

Technical Committee 442/WG9 Liaisons

ISO/IEC JTC 1/SC 41

Manufacturing sector has strongly embraced the concept in their industry 4.0 approach, reaching the first ISO in the matter

manufacturing sector has strongly embraced the concept in their industry 4.0 approach, reaching the first ISO in the matter → **ISO 23247**

Abstract

[Preview](#)

This document provides an overview and general principles of a digital twin framework for manufacturing including:

- terms and definitions;
- requirements of the digital twin framework for manufacturing.

General information

Status :  Published

Publication date : 2021-10

Edition : 1

Number of pages : 12

Technical Committee : **ISO/TC 184/SC 4** Industrial data

ICS : **25.040.40** Industrial process measurement and control | **35.240.50** IT applications in industry

WORKING GROUP #1: BDTE DEFINITIONS & ROLES

Technical Committee 442/WG9 Liaisons

Currently working on a
Reference Architecture
→ **ISO/IEC 30188**
Digital twin RA

NEW
PROJECT

ISO/IEC AWI 30188

Digital Twin — Reference architecture

Under development

Drafting has started.

WORKING GROUP #1: BDTE DEFINITIONS & ROLES

Technical Committee 442/WG9 Liaisons

This document provides guidance on the integration of IoT systems and digital twins in data spaces.
PWI JTC1-SC41-17

Currently working on a
Reference Architecture
→
SC41/AG31 report
Guidance on the
integration of IoT and
digital twin in data
spaces

GENERAL INFORMATION

Status: 🔄 Under development

Publication date :

Working Groups :

Category: [Citiverse](#)

SDO:
[ISO](#)

Latest published version :

https://www.iec.ch/dyn/www/f?p=103:38:9406018951756:::FSP_ORG_ID,FSP_APEX_PAGE,FSP_PROJECT_ID:20486,23,118815

WORKING GROUP #2: OPEN TECHNOLOGY FRAMEWORK

Ambition: Generate an Open Technology Framework which will allow an improved interoperability across Building Digital Twins.

The technology backed by BDTA will follow our guiding principles to advance towards the proposed Vision and Mission.

Whenever possible, developments will consider external Open Standards.

Open knowledge generated in parallel EU projects welcomed!!!



WORKING GROUP #2: OPEN TECHNOLOGY FRAMEWORK

10/2021 → Kick off meeting as
Coorganised Event with ECTP



<https://www.cibw78-ldac-2021.lu/programme/side-events/>

Thursday, 14 October 2021 - Workshop Linking EU H2020 projects on digitization in the construction and maintenance industry: Linked Data and ontologies for BIM and Building Digital Twins

Date: Thursday, 14 October 2021

Room: José Enschi

Chaired by Mathias Bonduel, Neanex Technologies, and Pierre Bourreau, Nobatek/INEF4

In at least five finalizing European H2020 research projects** focusing on digitization in the building industry, Linked Data technologies are actively applied to tackle well-known interoperability challenges in the sector. Naturally, this resulted in the creation of a series of technical deliverables (ontologies, data modelling patterns constraints, processes, tools, etc) with both similarities and differences between the different ongoing projects. During the workshop, each of the five projects will share their technical insights on the subject through short technical presentations. The audience might expect to get a view on the reasons for applying Linked Data, the progress made during the project and the lessons learned. At the end of the presentations a roundtable discussion will be held between the different projects to discuss how the Linked Data related outcomes of the different projects can support each other and persist through the BDTA after the independent projects have ended.

** H2020 research projects involved in the workshop:

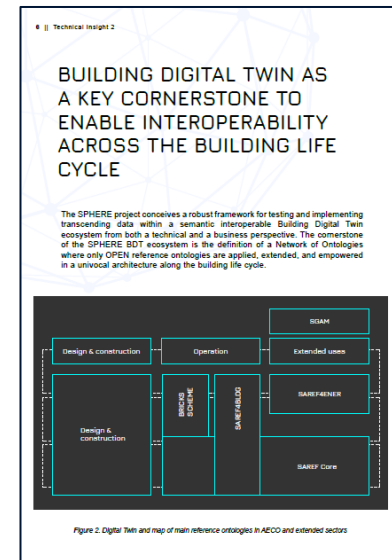
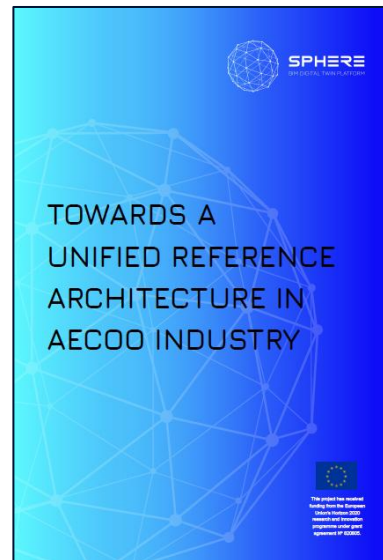
- SPHERE: <https://sphere-project.eu/>
- BIM4EEB: <https://www.bim4eeb-project.eu/>
- BIM-SPEED: <https://www.bim-speed.eu/en>
- BIM4REN: <https://bim4ren.eu/>
- BIMERR: <https://bimerr.eu/>



WORKING GROUP #2: OPEN TECHNOLOGY FRAMEWORK

PUBLICATIONS 2022

Technical Insight #2 (published in May 2022)



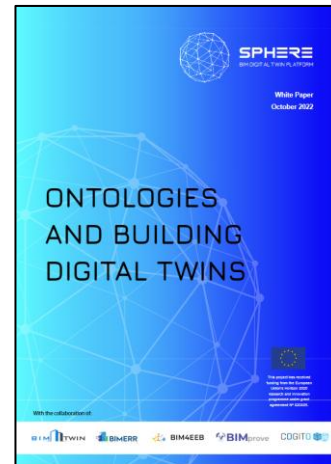
WORKING GROUP #2: OPEN TECHNOLOGY FRAMEWORK

PUBLICATIONS 2022

White Paper #3

Ontology Network for BTDEs

In collaboration with 5 sister projects!!!



BIM4EEB



BIMprove

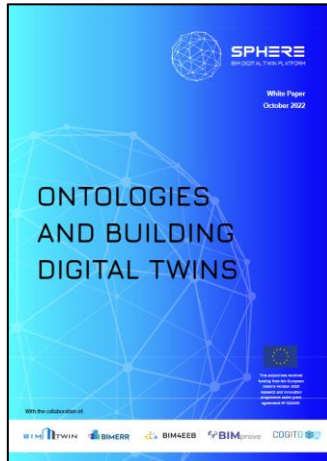


WORKING GROUP #2: OPEN TECHNOLOGY FRAMEWORK

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WORKING GROUP #2: OPEN TECHNOLOGY FRAMEWORK



The class `bot:Interface` is used to describe the relationship between some specific zones and elements in detail. The concept of `bot:Interface` is useful in different situations:

- the heat transmission area of the surface between a space and an adjacent wall can be used to determine the heat loss from that space through this wall;
- the localisation of the intersection between a pipe and a wall can be used to specify where to apply fire sealing;
- the type of access between two zones can be used to specify access restrictions for use in door navigation.

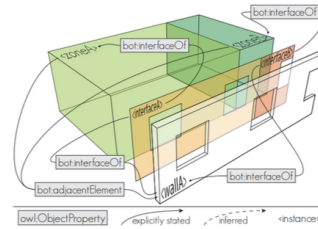


Figure 16: Interfaces between two zones and a wall. Inter faces can be used to qualify (i.e., attach additional information to) topological relationships between zones, elements, or zones and elements.

Geometry and properties are outside the scope of BOT but there are ways to integrate them as well.

BOT is designed to function as a central element in the interdisciplinary communication. In addition, it aims at being the key entry point to connect the construction sector to adjacent domains.

BIM4EEB Digital Construction Ontologies, DiCon⁴⁷

Digital Construction Ontologies (DiCon) were developed in the BIM4EEB based on the earlier ontology work carried out in the DiCon project in Finland. DiCon is composed of a set of interrelated ontology modules that aim to capture the different aspects of construction and renovation projects. Since there are significant standardized data models and other ontology work in this domain – as reported in this white paper – the objectives of DiCon have been to link to and integrate with these other models.

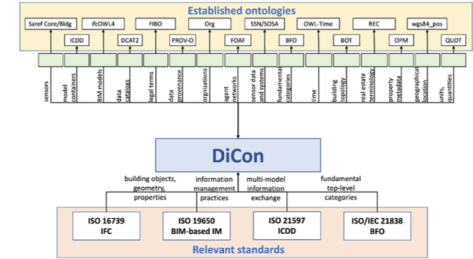


Figure 17: Relationships of DiCon with relevant standards and established ontologies

Figure 17 shows the relationship of DiCon ontologies with the relevant standards and established ontologies related to construction domain. As technical solutions for integration the DiCon uses the following:

- A top-level ontology for the uniform categorization of concepts in the different modules of DiCon.
- Alignment modules that establish the correspondences of DiCon terms with the terms of other ontologies. All the references to external concepts are placed in the alignment modules (except for instance vocabularies).

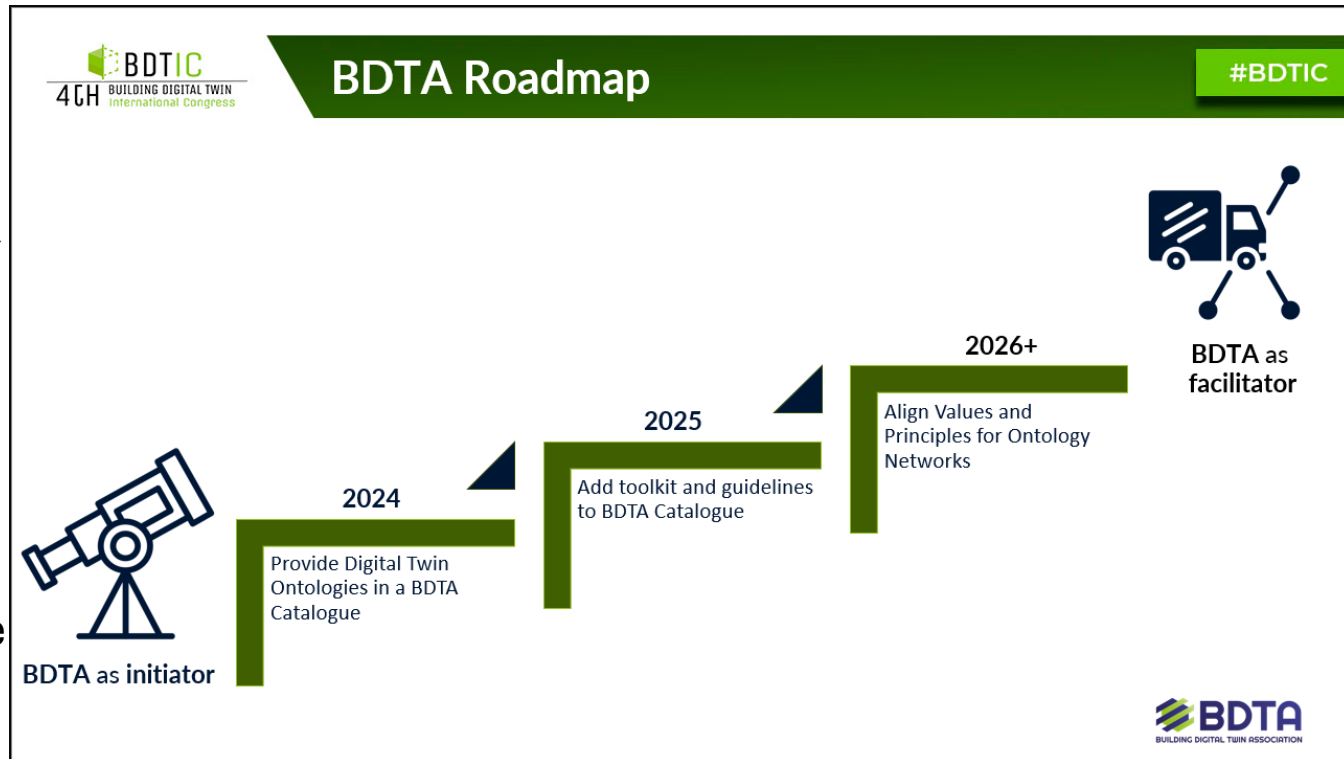
As shown in Figure 17, the standards considered most relevant for DiCon are:

- ISO 16739 Industry Foundation Classes (IFC): The universally supported BIM standard, according to which BIM models are used in BIM4EEB and DiCon.
- ISO 19650 BIM-based information management: A process standard whose relevant terminology is formalized in the DiCon.
- ISO 21597 Information Container for Linked Document Delivery (ICDD): A standard for the exchange of packages of interrelated documents or models.
- ISO/IEC 21838 Basic Formal Ontology (BFO): A standard top-level ontology used in DiCon.

DiCon is organized into several modules, shown in Figure 18 as blue boxes, where the arrows between the blue boxes represent the import relations (`owl:imports`) between the modules.

WORKING GROUP #2: OPEN TECHNOLOGY FRAMEWORK

First **Roadmap**
agreed in BDTIC4
during the
7th Workshop of the
WG2



WORKING GROUP #2: ONTOLOGY NETWORK CATALOGUE

Chronology:

04/2024 → WG2 Meeting during BDTIC4: Ontology Network Catalog
Proposed by the experts

07/2024 → BDTA Internal Project generated by SEMMTECH and accepted by
the board

02/2025 → First publication of the BDTA's OntNetCatalog

Expected 04/2025 → End of Phase I



WORKING GROUP #2: ONTOLOGY NETWORK CATALOGUE

Driving the future of BDT : The launch of this platform reinforces BDTA's mission to lead open advancements in the *Building Digital Twin* domain.

Ontology Catalogue

The BDTA Ontology Catalogue platform aims to ensure building digital twin ontologies can be shared, explored, accessed and used. This catalogue serves as a central hub for discovering ontologies relevant to the building digital twin domain, helping to improve collaboration, reuse and exchange of knowledge across the domain and industry. See the About page for more information.



ONTOLOGIES
for Building Digital Twins

WORKING GROUP #2: Ontology Network Catalog



 Home <u>Ontologies</u> About Contact Type to start searching...					
Ontologies					
10 entries per page Search:					
Name	Website	Description	License	Domain	Release date
AEC3PO: Architecture, Engineering, Construction Compliance Checking and Permitting Ontology	↗	AEC3PO is designed to model compliance and permitting processes in the construction industry, on ...	-		19/12/2023
BPO: Building Product Ontology	↗	The Building Product Ontology defines concepts to describe (building) products in a schematic way...	CC BY 4.0		13/01/2025
Brick Ontology	↗	Brick is an open-source effort to standardize semantic descriptions of the physical, logical and ...	BSD		13/01/2025
Building Topology Ontology	↗	The Building Topology Ontology (BOT) is a minimal ontology for describing the core topological co...	W3C Community Contributor License Agreement (CLA)		13/01/2025
Digital Construction Ontologies (DiCon)	↗	Digital Construction Ontology - semantic interoperability between systems in the construction and...	CC BY 4.0		01/07/2022

WORKING GROUP #2: ONTOLOGY NETWORK CATALOGUE

In 2025: End of PHASE I...

Ontologies Catalogue

- A comprehensive directory of Ontologies in the BDT domain
- Facilitate easy search of Ontologies in the BDT domain
- Enable users to understand the scope, purpose and structure of available ontologies



WORKING GROUP #2: ONTOLOGY NETWORK CATALOGUE

... and start of PHASE II

Toolkit and guidelines

- Ontology adoption and interaction supported for various applications and projects
- Improved collaboration among software providers, ontology developers and users
- Basic training and guidelines available for users



WORKING GROUP #2: ONTOLOGY NETWORK CATALOGUE

PHASE I – 2025 – Final Steps

Screen and include ontologies related to three key

conclusions



UNE-CEN/TR 18077:2024

 Modelado de la información de construcción. Gemelos digitales aplicados al entorno construido. Casos de uso (Ratificada por la Asociación Española de Normalización en diciembre de 2024.)

 Building information modelling - Digital twins applied to the built environment - Use cases (Endorsed by Asociación Española de Normalización in December of 2024.)

 Modélisation des informations de la construction - Jumeaux numériques appliqués à l'environnement bâti - Cas d'usage (Entérinée par l'Asociación Española de Normalización en décembre 2024.)



WORKING GROUP #2: ONTOLOGY NETWORK CATALOGUE

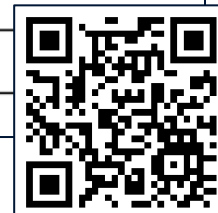
PHASE I – 2025 – Final Steps

Screen and include ontologies related to three key Use Cases extracted from **CEN TR18077:2024** conclusions

1- Building Digital Twin Operation & Maintenance (O&M) Optimisation

Use cases IV, V, VI, VII and VIII

I	Design Optimization
II	Construction Optimization
III	Commissioning Optimization
IV	Operation Optimization (Energy Performance)
V	Operation Optimization (Space and Administrative Management)
VI	Operation Optimization (Logistics)
VII	Operation Optimization (Waste Management)
VIII	Maintenance Optimization



WORKING GROUP #2: ONTOLOGY NETWORK CATALOGUE

PHASE I – 2025 – Final Steps

Screen and include ontologies related to three key Use Cases extracted from **CEN TR18077:2024** conclusions

2 - Building Digital Twin Prototype Optimisation

Use cases I, II, III, IV, and VI

I	Design Optimization
II	Construction Optimization
III	Commissioning Optimization
IV	Operation Optimization (Energy Performance)
V	Operation Optimization (Space and Administrative Management)
VI	Operation Optimization (Logistics)
VII	Operation Optimization (Waste Management)
VIII	Maintenance Optimization



WORKING GROUP #2: ONTOLOGY NETWORK CATALOGUE

PHASE I – 2025 – Final Steps

Screen and include ontologies related to three key Use Cases extracted from **CEN TR18077:2024** conclusions

3 - Digital Building Permits

Use cases I, II, III

I	Design Optimization
II	Construction Optimization
III	Commissioning Optimization
IV	Operation Optimization (Energy Performance)
V	Operation Optimization (Space and Administrative Management)
VI	Operation Optimization (Logistics)
VII	Operation Optimization (Waste Management)
VIII	Maintenance Optimization



BARCELONA SCEWC 2025

BDTA – DTC Workshop

**Critical Civil
Infrastructures**

Railway, Roads

Ports, Airports

Water & Energy utilities



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<https://buildingdigitaltwin.org/>

Figure 4: The Digital Twin concept: Data are captured and streamed to a digital platform, which, in turn, performs real-time analysis to optimize the design and the performance (sketch by: M. Elagiry based on Deloitte University Press).



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Milano



A BUREAU VERITAS COMPANY



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VERITAS



An unblocking step towards digitalisation: Digital Building Permit and digitalisation experiences.

Dr. Francesca Noardo

Project Manager, OGC





Open
Geospatial
Consortium



Comune di
Milano

OGC

OPEN GEOSPATIAL CONSORTIUM

FRANCESCA NOARDO

Researchers & Project Manager at OGC

An unblocking step towards digitalisation

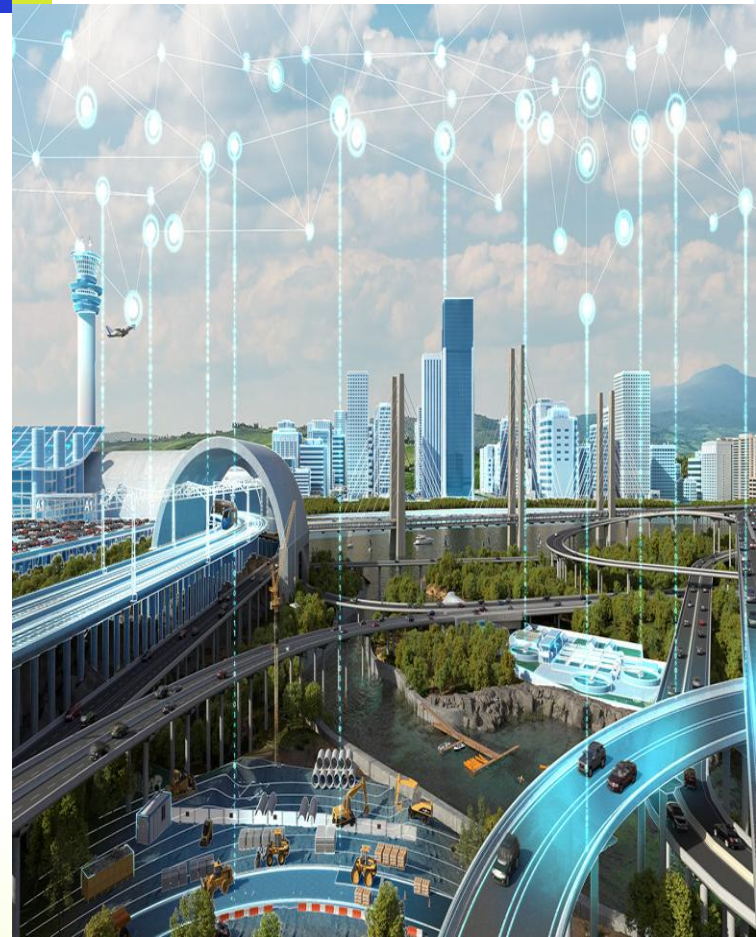
Digital Building Permit and digitalisation experiences.



Francesca Noardo

08/10/2025

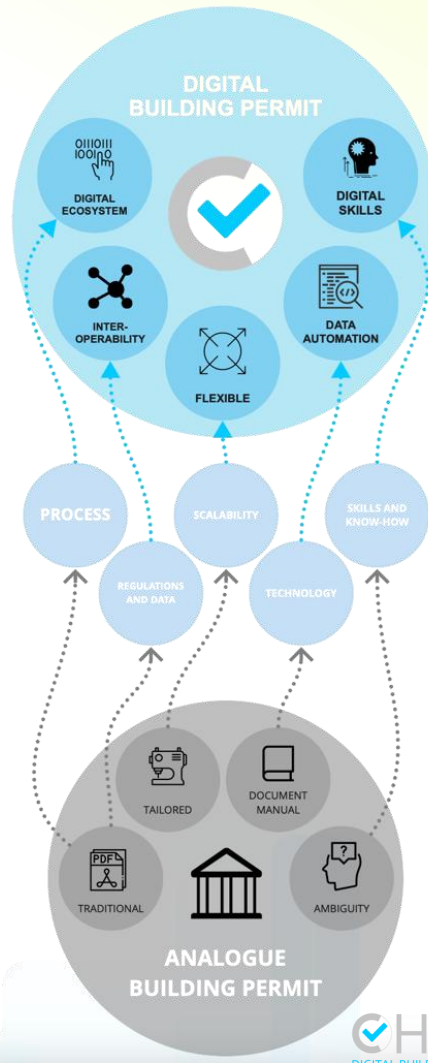
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Digital Building Permit



Digital Building Permit implies the transition from analogue document-based documents to digital processes based on data (Building Information Models, 3D city models).



DIGITAL BUILDING PERMIT

80% more efficient process:

50% faster
Higher value of human work
Fair tax changes
Transparency and predictability

Higher quality of the checking:

Accuracy and objectiveness
New advanced analysis

Digitally-led process:

Management from remote (less CO2)
Paper and resources saving
More efficient use of construction-generated data

ANALOGUE BUILDING PERMIT

Digital Building Permit challenges

Need for **intersectoral** collaboration

Need for **multidisciplinary** collaboration

High **diversity**

Need for **interoperability** and
standardisation

The EUnet4DBP – European network for Digital Building Permit

Start 2020



Mission - To **accelerate the digital transformation** of the building permit process.

Vision - Development of **flexible, scalable and re-usable** digital and (semi-) automated building permit tools and methods in a common effort and under the umbrella of an open science framework, by sharing experiences and building-up knowledge.



Process

Including human practices and bureaucratic workflows to be taken into account and likely changed to adopt the new digital approach.



Rules and requirements

As formulation of criteria and guidelines to be followed for the successful achievement of the objectives in all the steps and aspects of the use case, including rule interpretation and model preparation.



Technology

Regarding any aspect related and allowing the successful implementation of the previous ones.

Goal 1

Support the building permit process in becoming more **efficient and automated**.

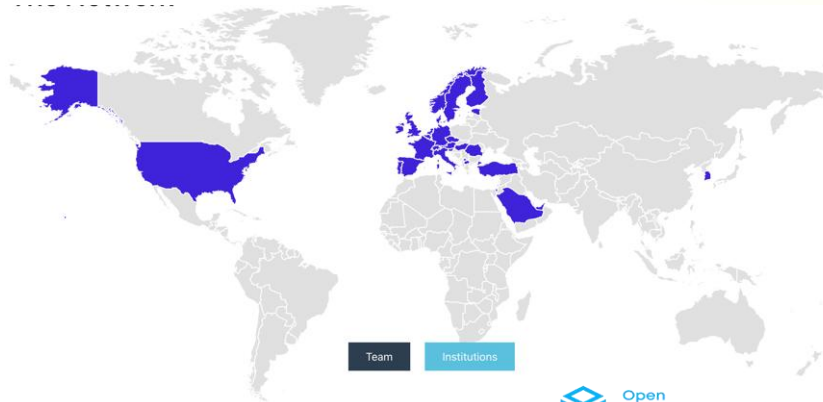
Goal 2

Support to rule interpretation and information requirements in becoming as **simple** and as **machine readable** as possible in order to guarantee a certain level of automation.

Goal 3

Support the wide adoption of **interoperable** technologies based on open standards.

The EUnet4DBP – European network for Digital Building Permit



EUnet4DBP – the network 2025

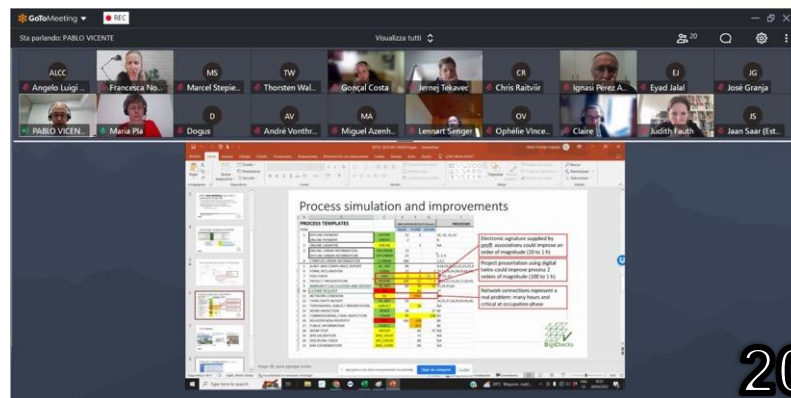
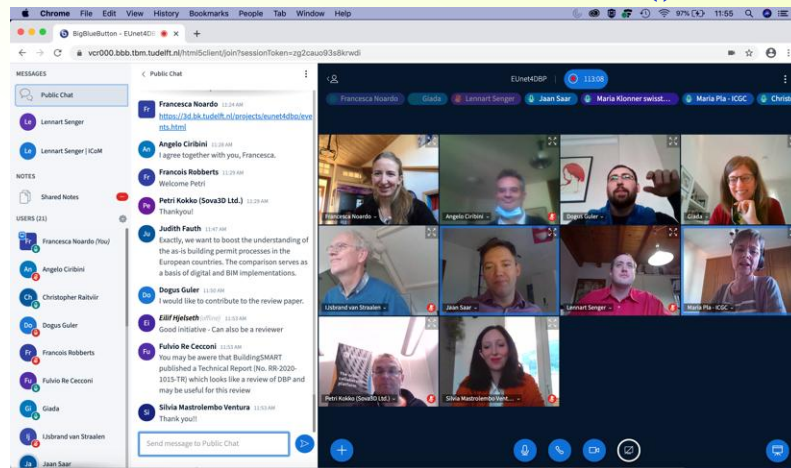
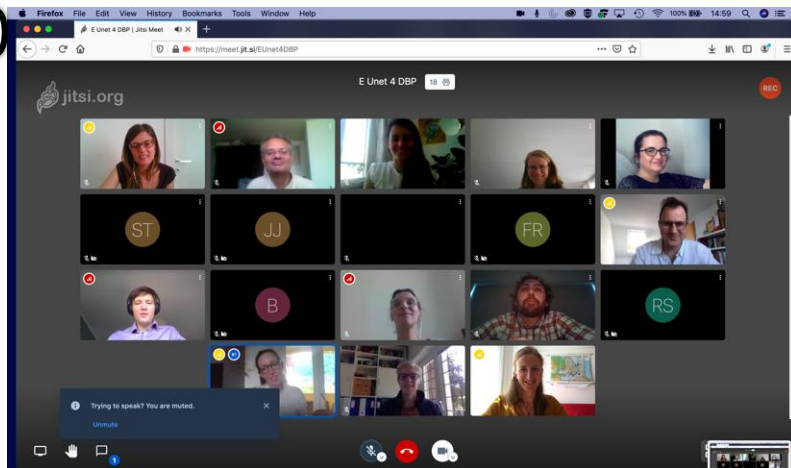
> 80
institutions



The EUnet4DBP – European network for Digital Building Permit

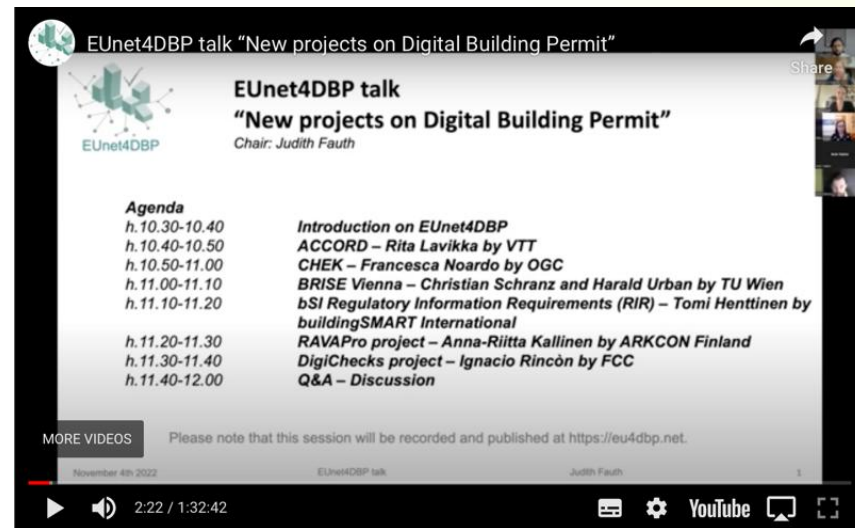
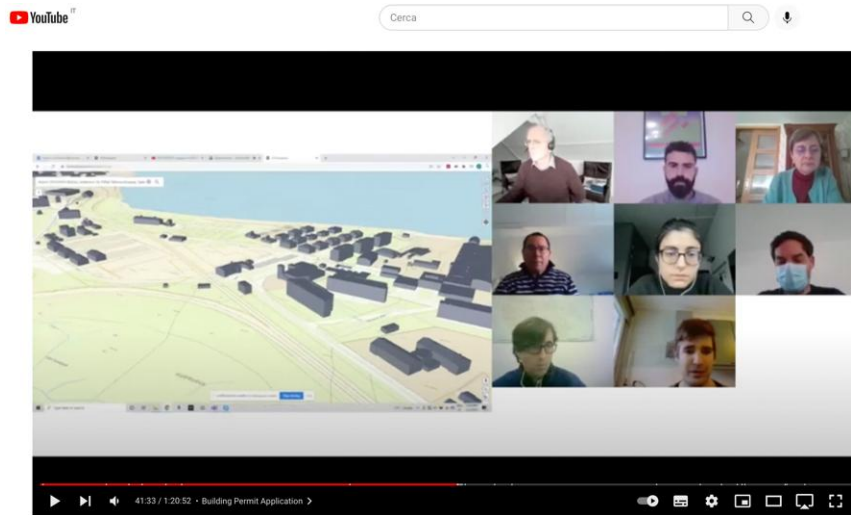
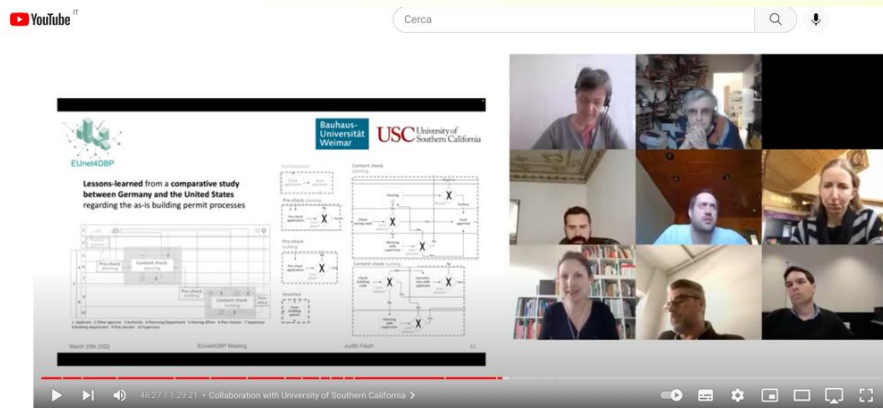
2020

EUnet4DBP activities –
Quarterly meetings



2025

The EUnet4DBP – European network for Digital Building Permit



The EUnet4DBP – European network for Digital Building Permit



EUnet4DBP activities – common papers and studies



Unveiling the actual progress of Digital Building Permit: Getting awareness through a critical state of the art review

Francesca Noardo^{a,*}, Dogus Guler^b, Judith Fauth^c, Giada Malacarne^d, Silvia Mastrolemo Ventura^e, Miguel Azenha^f, Per-Ola Olsson^g, Lennart Senger^h

^a 3D Geoinformation, Delft University of Technology, Delft, The Netherlands
^b Department of Geomatics Engineering, University of Calabria, Arcavacata, Italy
^c Department of Construction Engineering, Fraunhofer ITX, Berlin, Germany
^d Department of Civil, Environmental and Geomatics Engineering, University of Milano, Milan, Italy
^e Department of Physical Geography, Institute of Construction Management, University of Applied Sciences, Vienna, Austria

ARTICLE INFO

Keywords:
Digital building permit
BIM
GIS
GeobIM
Compliance checking
Rule checking



Full length article

Taxonomy for building permit system - organizing knowledge for digitalization

Judith Fauth^{a,*}, Tanya Bloch^b, Francesca Noardo^c, Nicholas Nisbet^d, Sten Peter Nørkjær Gade^e, Jernej Tekavec^f

^a Fraunhofer ITX, Berlin, Germany
^b Fraunhofer ITX, Berlin, Germany
^c Department of Geomatics Engineering, University of Calabria, Arcavacata, Italy
^d Department of Civil, Environmental and Geomatics Engineering, University of Milano, Milan, Italy
^e Department of Physical Geography, Institute of Construction Management, University of Applied Sciences, Vienna, Austria
^f Department of Geomatics Engineering, University of Applied Sciences, Vienna, Austria

ARTICLE INFO

Keywords:
Building permit
Taxonomy
Knowledge organization
Digitalization

1. Introduction

Building permitting plays an important role in the construction industry. It constitutes the act of authority of the local administration based on the application of the measures laid down by law relating to siting, design execution and operation of construction. It aims to secure the safety, sustainability and compliance of buildings with the local regulations.

Current building permit systems, still mostly based on analogue documents and processes, have limitations that hinder their efficiency and transparency [1]. Digitalization, which includes using digital data as input and output and digital tools to support or automate checking, has the potential to address these challenges and improve the process [2,3]. Despite the potential

the AEC domain, the goal. As the permit sectors, including the challenge of a component of tools for implementation of vital [5]. To support domain, a basis of knowledge only the technological technological infrastructure on different level. As part of a study European Network dataset was collected

Comparative study on building permit processes in Europe

Fauth, Judith (Contact person) ; Deac-Kaiser, Stefanie-Brigitte ; Nørkjær Gade, Sten Peter ; Raj, Kavita ; Goul Pedersen, Jonas ; Olsson, Per-Ola ; Mastrolemo Ventura, Silvia ; Granga, José ; Nisbet, Nicholas ; Hirsensalo, Antero ; Verstraeten, Ruben ; Rutesic, Snezana ; Labruno, Céline ; Raivier, Christopher ; Urban, Harald ; Schranz, Christian ; Tomanová, Štěpánka ; Stojanov, Trajcho ; Plešková, Zlatica ; Lőrinc, Éva Veronika ; Kallinen, Anna-Riitta ; Misulani, Ieva ; Tekavec, Jernej

The publication provides a comparative analysis of building permit procedures from a vast number of countries in Europe.

Files

Building_permit_process_in_Europe_v2.pdf

< 1 of 95 >



EUnet4DBP

European Network for Digital Building Permit

EUnet4DBP Publication Series

The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Volume XLIV-4/W1-2020, 2020
3rd BIM/GIS Integration Workshop and 15th 3D GeoInfo Conference, 7–11 September 2020, London, UK

INTEGRATING EXPERTISES AND AMBITIONS FOR DATA-DRIVEN DIGITAL BUILDING PERMITS – THE EUNET4DBP

F. Noardo^{1,*}, G. Malacarne², S. Mastrolemo Ventura³, L.C. Tagliabue⁴, A.L.C. Ciribini⁵, C. Ellul⁶, D. Guler⁷, L. Harrie⁸, L. Senger⁹, A. Waha¹⁰, J. Stoter¹¹

¹ 3D Geoinformation group, Delft University of Technology, Delft, The Netherlands – (f.noardo, j.e.stoter)@tudelft.nl

² Fraunhofer Italia Research, Bolzano-Bozen, Italy – giada.malacarne@fraunhofer.it

³ Dept. of Civil, Environmental, Architectural Engineering and Mathematics, University of Brescia, Brescia, Italy – (silvia.mastrolemoventura, lavinia.tagliabue, angelo.ciribini)@unibs.it

⁴ Dept. of Geomatic Engineering, University College London, London, UK – c.ellul@ucl.ac.uk

⁵ Department of Geomatics Engineering, University of Calabria, Arcavacata, Italy

⁶ Department of Physical Geography, Institute of Construction Management, University of Applied Sciences, Vienna, Austria

⁷ Institute of Construction Management, University of Applied Sciences, Vienna, Austria

⁸ Digital Ltd, London, UK

KEY WORDS: Digital Building Permits, 3D

ABSTRACT:

CHEK+EUnet4DBP Maturity Model

Braholi, Oripla (Researcher) ; Alade, Mariana (Researcher)

Contributors

Researchers:

Noardo, Francesca ; Fauth, Judith ; Tekavec, Jernej ; Urban, Harald

MASTROLEMO VENTURA, Silvia ; Raj, Kavita

The CHEK+EUnet4DBP Maturity Model is a validated assessment framework designed to measure and guide the digital transformation of building permit processes in public authorities. Structured across four dimensions, Process, Organisation, Technology, and Information, the model covers 37 key maturity areas (KMAs), each with granular levels of maturity, to help municipalities assess their current status.

Files

Evolution of the CHEK+EUnet4DBP MM.pdf

< 1 of 5 >



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Communities

European Network for Digital Building Permits

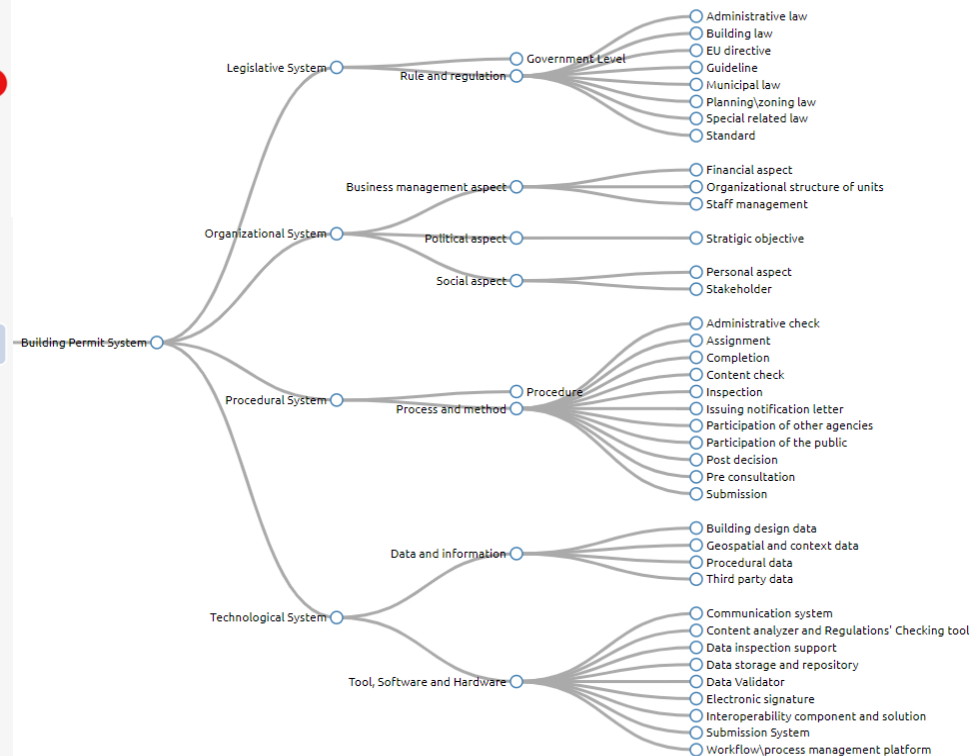
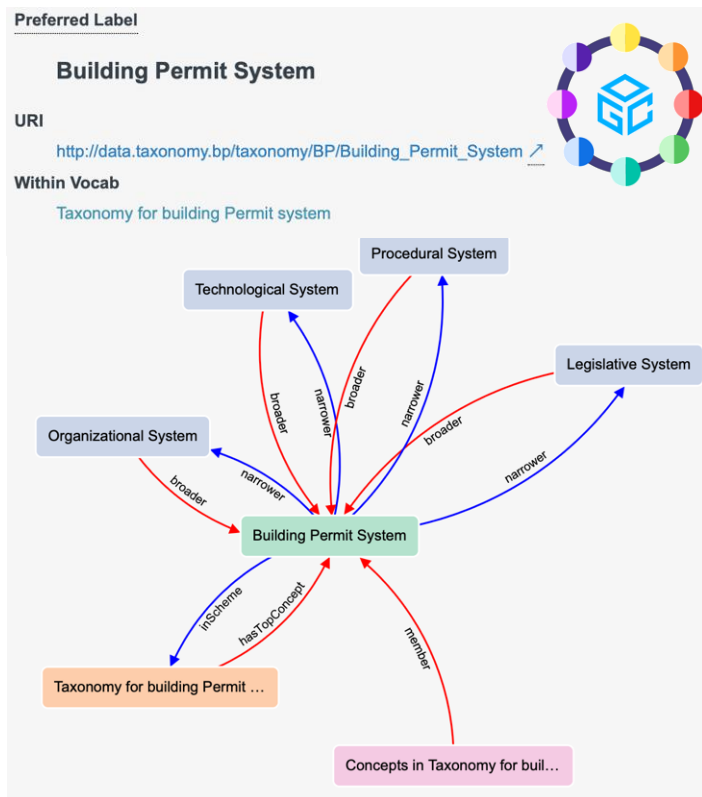
The EUnet4DBP – European network for Digital Building Permit

Judith Fauth, Tanya Bloch, Jernej Tekavec, Francesca Noardo, Nicholas Nisbet, Stefanie Brigitte Kaiser, Peter Nørkjær Gade, *submitted - Advanced Engineering Informatics*

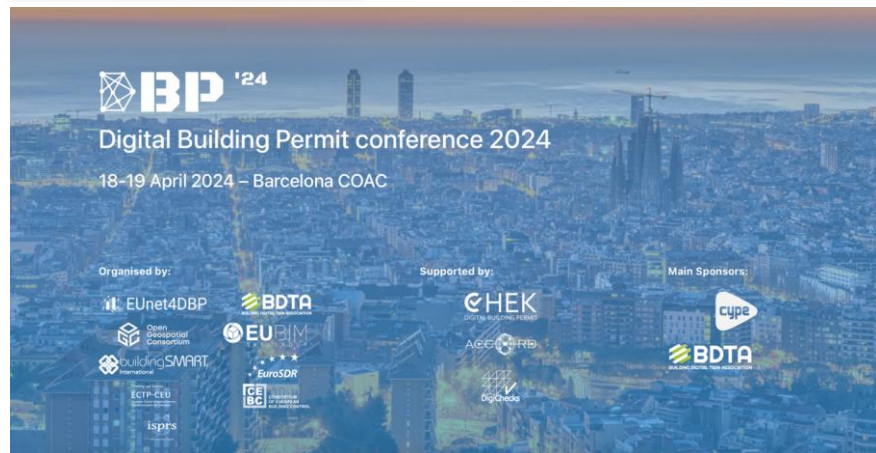
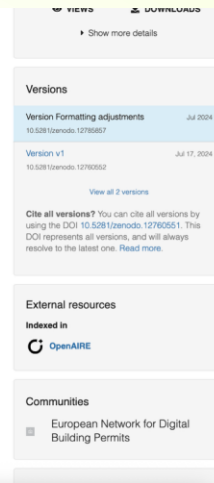
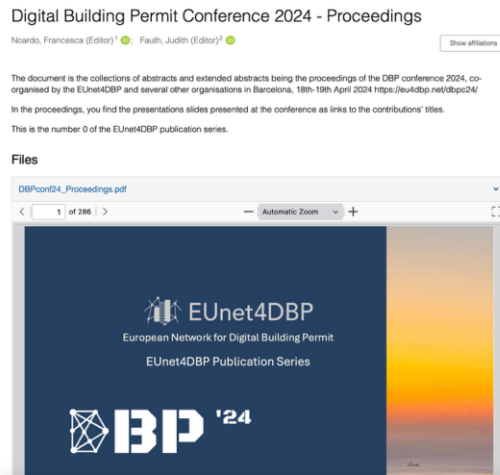
Taxonomy for building permit system - organizing knowledge for building permit digitalization.

<http://defs-dev.opengis.net/vocprez-hosted/object?uri=http%3A//data.taxonomy.bp/taxonomy/BP>

EUnet4DBP activities –
common papers and studies



The EUnet4DBP – European network for Digital Building Permit



The EUnet4DBP – European network for Digital Building Permit



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CONFERENCE COMMITTEE

SUBMISSION

REGISTRATION

PROGRAM



<https://dbp25.conf.tuwien.ac.at>



Digital Building Permit conference 2025

02–04 December 2025 – Vienna, Austria

Overview

Digitalisation of building permits was detected as the critical knot to be solved, in order to pave the way towards massive digitalisation in the construction industry, and to enable the potential of automation and optimisation in the management of building and city data.

CHEK – Change toolkit for Digital Building Permit



Horizon Europe HORIZON-CL4-2021-TWIN-TRANSITION-01-10. G.A. 101058559

October 2022 – September 2025

<https://chekdbp.eu>

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Funded by
the European Union

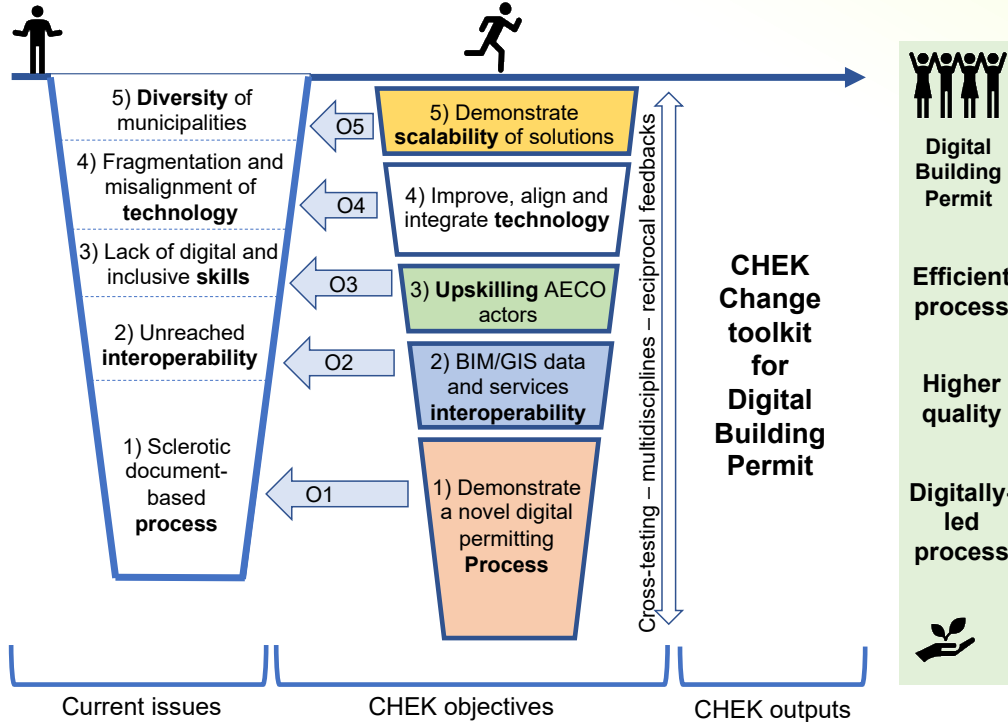


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Geospatial
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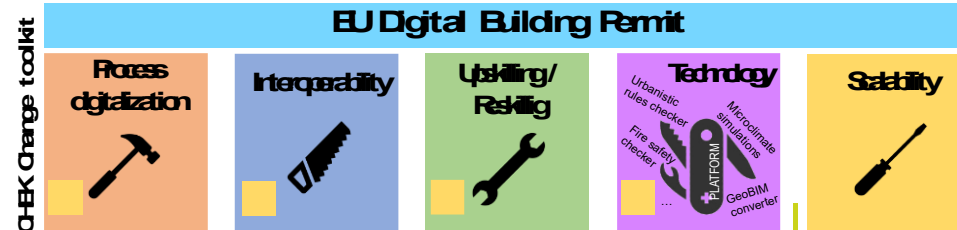
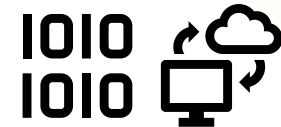


www.ogc.org

CHEK – Change toolkit for Digital Building Permit



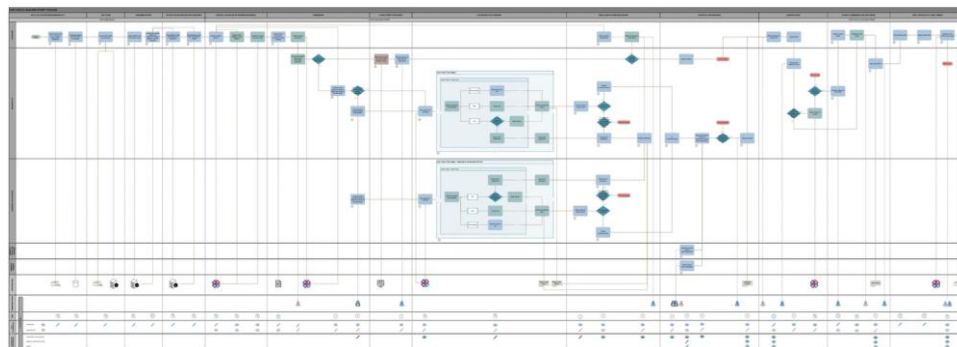
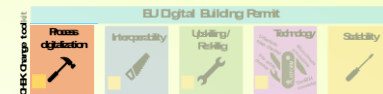
Process change – Information requirements – GeoBIM – OpenAPI-based microservices – Training



CHEK – Change toolkit for Digital Building Permit

Objective 1: To develop and demonstrate novel DBP processes

CHEK Process Map



zenodo

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Zenodo.org will be unavailable for 2 hours on September 29th from 06:00-08:00 UTC. See announcement.

March 31, 2023

Dataset Open Access

CHEK To-be Digital Building Permit process map

Orjola Braholli; Mariana Ataide; Ilaria Di Blasio; Kavita Raj; Dietmar Siegele

Project member(s)

Coccia, Milena; Pires, Carla; Cytroky, Jif; Espinho, André

Related person(s)

Bolpagni, Marzia; Fauth, Judith

Research group(s)

Mastrolemo Ventura, Silvia; Ciribini, Angelo Luigi Camillo; Noardo, Francesca

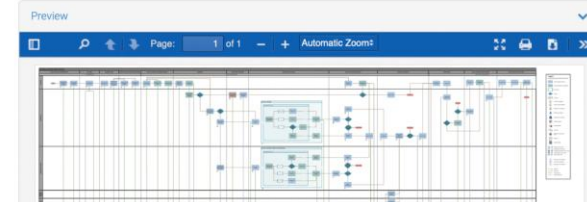
To-be process map for digital building permit process as developed within the HORIZON EUROPE project 'Change toolkit for Digital Building Permit' (CHEK) <https://chekdbp.eu>

It is described in the CHEK project deliverable D1.1.

This project has received funding from the European Union's Horizon Europe programme under Grant Agreement No.101058559

The file is provided in

- SVG format, open vector editable format;
- Visio format, proprietary but editable format;
- PDF format.



196

views

178

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See more details...

Indexed in

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Publication date:

March 31, 2023

DOI:

DOI: 10.5281/zenodo.7789036

Keyword(s):

Building Permit Digital Building Permit digitalisation
BIM GeoBIM Process map

Grants:

European Commission:

- CHEK - Change toolkit for digital building permit (101058559)

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Versions

Version 1.0

10.5281/zenodo.7789036

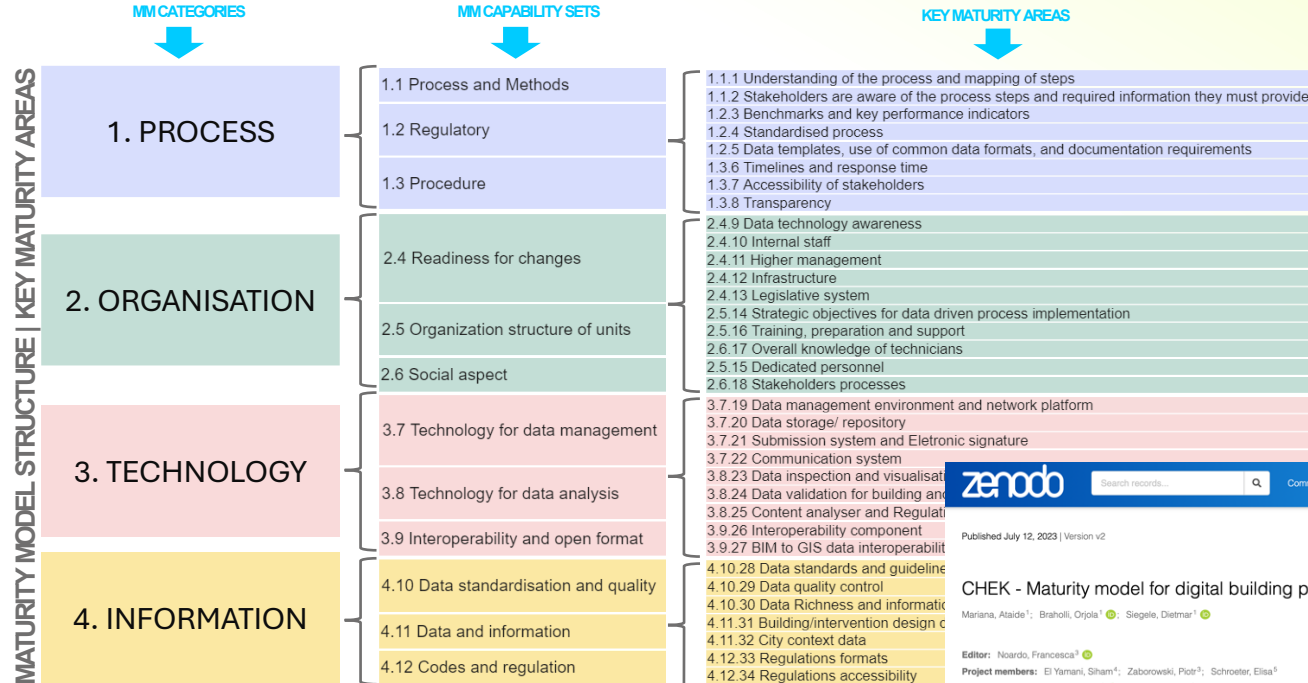
Mar 31, 2023

CHEK – Change toolkit for Digital Building Permit

Objective 1: To develop and demonstrate novel DBP processes



CHEK Maturity Model



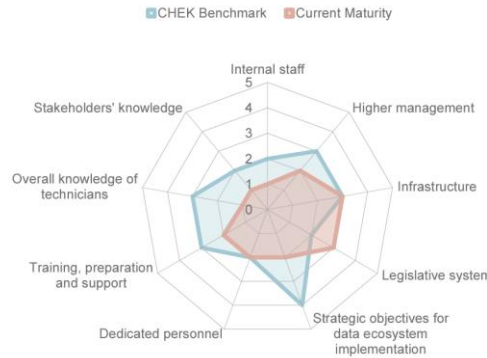
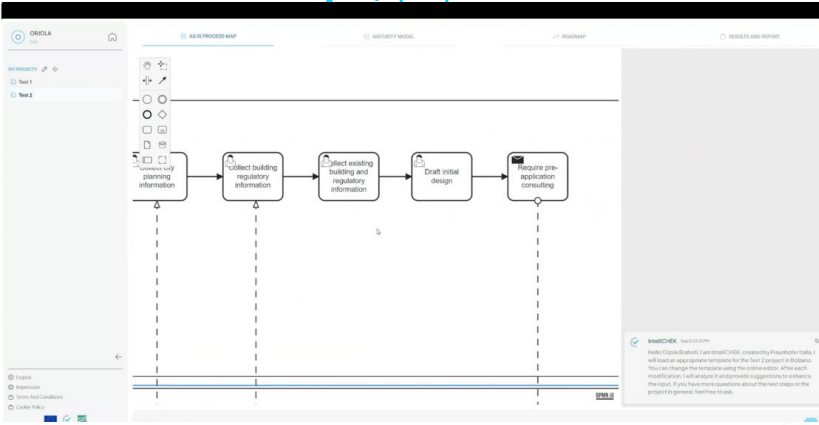
The screenshot shows the Zenodo page for the "CHEK - Maturity model for digital building process". The page includes the following information:

- Published:** July 12, 2023 | Version v2
- Model:** Open
- Views:** 27
- Downloads:** 35
- Editors:** Nardo, Francesca¹
- Project members:** El Yamani, Siham¹; Zaborowski, Piotr²; Schroeter, Elisa⁵
- Related persons:** Fauth, Judith^{1,2}; Tekavec, Jernej²
- Description:** CHEK Digital Building Permit Maturity Model (CDBPMM) as developed within the HORIZON EUROPE project 'Change toolkit for Digital Building Permit'. (CHEK) <https://chekdbp.eu>
- It is described in the CHEK project deliverable D1.2.**
- Funding:** This project has received funding from the European Union's Horizon Europe program under Grant Agreement No. 101058559.
- Main goal:** The main goal of the CHEK Digital Building Permit Maturity Model (CDBPMM) is to help building authorities and other organisations assess their maturity in implementing a digital building permit process. The CDBPMM defines a fully implemented and optimised digital permit process as the highest level of maturity. Using this model, organisations can evaluate their current maturity level, identify capability gaps, and develop a strategic roadmap to incrementally enhance their processes, organisation, technology, and information systems to achieve higher levels of digital integration, efficiency, quality, and transparency in permitting workflows.
- Versions:**
 - Version v2:** 10.5281/zenodo.10277474 | Jul 12, 2023
 - Version v1:** 10.5281/zenodo.10276314 | Dec 6, 2023
- Cite all versions?** You can cite all versions by using the DOI 10.5281/zenodo.10276313. This DOI represents all versions, and will always resolve to the latest one. [Read more.](#)
- External resources**

CHEK – Change toolkit for Digital Building Permit

Objective 1: To develop and demonstrate novel DBP processes

CHEK Change management Virtual

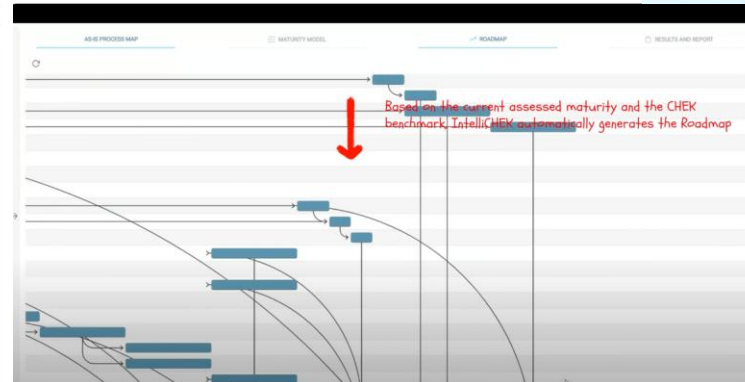
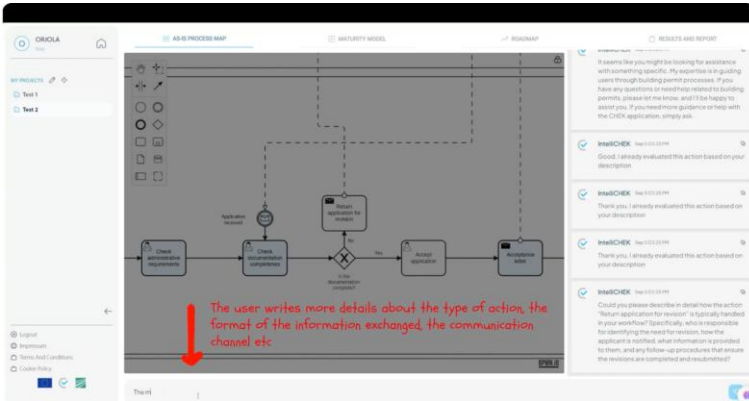


CHEK Change Management Assistant

Log in to start improving your Building Permit process.

Login

Don't have an account? [Register here](#)



<https://chek.fraunhofer.it/app/login>

CHEK – Change toolkit for Digital Building Permit

Objective 2: To enforce data and service interoperability

Regulations interpretation and Formal Data requirements

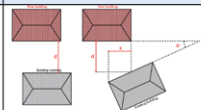
Regulation: Distances

Definitions - Regolamento edilizio comunale of the Municipality of Ascoli Piceno - Art. 13

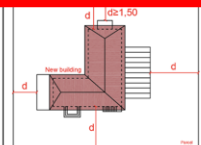
Clarifications by municipality technicians (informal)

In New Building

In Context



The sentence "For graded buildings (i.e. buildings which are composed by horizontally or vertically articulated volumes), the distance is measured at each setback." Just reinforces the idea that the minimum distance is considered among any possible protruding volume of the building, in any position of the façade.



Public areas for services: see primary and secondary infrastructure above

Walls
Façade
Building interior space? (Patio, yard, cloister)

(Existing in the context)
Walls/Buildings
(New building)
Façade / wall surface
Building Interior space? (Patio, yard, cloister)

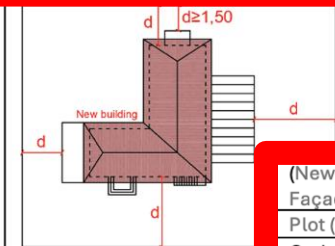
Façade
Plot (polygon)
Cadastral parcels (ownership)
Implementation plans plots / compartments
Road
Public parking
Utilities (sewerage, water supply, electricity and gas network)

(New building)
Façade / wall surface
Plot (polygon)
Cadastral parcels (ownership)
Implementation plans plots / compartments
Road
Public parking
Utilities (sewerage, water supply, electricity and gas network)

Paragraph p – Building- boundaries distance. It is the minimum distance between the vertical projection of the wall of the building and the boundary of the plot (considering all the building volumes and protrusions),

Border:

- separation line of the different existing ownerships,
- line defining the different plots or compartments of the implementation plans,
- bordering line of public areas for services or equipment, identified in urban planning instruments.



Public areas for services: see primary and secondary infrastructure above

(New building)
Façade / wall surface
Plot (polygon)
Cadastral parcels (ownership)
Implementation plans plots / compartments
Road
Public parking
Utilities (sewerage, water supply, electricity and gas network)



Table 4

CHEK CityJSON profile for the municipality of Ascoli Piceno

Title	Semantics and Structure -> CityJSON Profile							Geometry				
	CityJSON Class	CityJSON module	CityJSON property	notes	Attribute value type	spatial representation type	reference data model	Accuracy	Spatial resolution	Reference system	Unit of measure	Data format
Existing building - Function	Building	Building	?		codelist 'APC_BuildingFunctl'		CityGML v.3	-	-	-	-	JSON
Existing Building - legalHeight	Building	Building Extension?	legalHeight	attribute to host, in the future, the height mea-								JSON
Existing Building - legalVolume	Building	Building Extension?	legalVolume	attribute to host, in the future, the volume of th-								JSON
Existing building - Façade	WallSurface	Building	semanticSurface?		-	MultiSurface / CompositeSurface?	CityGML v.3	10 cm	LoD1.3????	projected national CRS	m	JSON
Existing building - Façade	WallSurface	Building	parent	to building	-	-	CityGML v.3	-	-	-	-	JSON
Existing building - Façade - hasWindows	WallSurface	Building Extension?	hasWindows		Boolean	-	CityGML v.3	-	-	-	-	JSON
Road	Road	Transportation	semanticSurface?		-	MultiSurface / CompositeSurface?	CityGML v.3	10 cm	LoD0 (3D)	projected national CRS	m	JSON
Sidewalk	TrafficArea (or Traffic square?)	Transportation	semanticSurface?		-	MultiSurface / CompositeSurface?	CityGML v.3	4 cm	LoD0	projected national CRS	m	JSON
Road furniture areas	AuxiliaryTrafficArea (or TrafficSquare?)	Transportation	semanticSurface?		-	MultiSurface / CompositeSurface?	CityGML v.3	4 cm	LoD0	projected national CRS	m	JSON
Public Areas	AuxiliaryTrafficArea (or TrafficSquare?)	Transportation	semanticSurface?		-	MultiSurface / CompositeSurface?	CityGML v.3	4 cm	LoD0	projected national CRS	m	JSON

Regulations interpretation and Formal Data requirements

Title	Semantics and Structure → INSPIRE Profile		
	INSPIRE Class	INSPIRE Theme module	INSPIRE property
Cadastral parcel	CadastralZoning	CadastralParcel	
Urban zone	ZoningElement	PlannedLandUse	
Urban zone - Zone	ZoningElement	PlannedLandUse	specific
Utilities (sewerage, water supply, etc.)	ZoningElement	LandUse	specific
Max allowed building height	OfficialDocumentation	PlannedLandUse extension	Max allowed building height
Max buildability index (m3/m2)	OfficialDocumentation	PlannedLandUse extension	Max buildability index (m3/m2)
Max Territorial buildability index (m3)	OfficialDocumentation	PlannedLandUse extension	Max Territorial buildability index (m3)
Min Building-building Distance (m)	OfficialDocumentation	PlannedLandUse extension	Min Building-building Distance (m)
Min Building- parcel border Distance (m)	OfficialDocumentation	PlannedLandUse extension	Min Building- parcel border Distance (m)
PLOT	part of ZoningElement	PlannedLandUse extension	

EU Digital Building Permit					
2024 Change to build	Process digitalisation 	Inequality 	Upskilling/ Retraining 	Technology 	Sustainability 
					

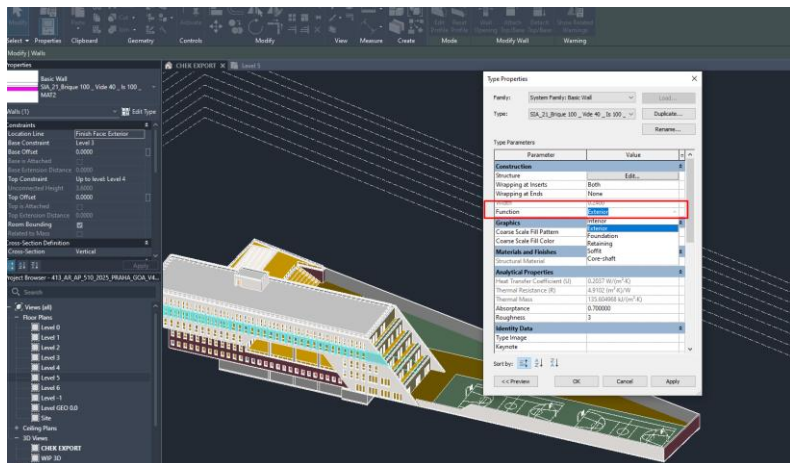
		Geometry		Accuracy	
			2 cm		
			310 cm		
			3 -		
			?		
			?		
			310 cm		
			3 -		
			ext		
			ext		
			310 cm		
			CityGML		
			ext		
			310 cm		
			CityGML		
			34 cm		
			CityGML		
			3 cm		
			CityGML		
			4 cm		
			CityGML		
			310 cm		
			CityGML		
			32 cm		
			CityGML		
			32 cm		
			CityGML		
			3 -		
			ext		
			CityGML		
			32 cm		

	Reference system	Accuracy	Resolution	Unit or measur	Data format
D0.3	SPIRE -	20 cm?	Spatially resolved LoD0	projected national CF m	JSON
	SPIRE -	20 cm?	LoD0	projected national CF m	JSON
	SPIRE -	-	LoD0	-	JSON
	SPIRE -	-	LoD0	projected national CRS	JSON
D1.3	SPIRE -	-	-	m	JSON
	SPIRE -	-	-	m3/m2	JSON
	SPIRE -	-	-	m3/m2	JSON
	SPIRE -	-	-	m	JSON
	SPIRE -	-	-	m	JSON
D2.3	SPIRE -	20 cm?	-	projected national CF m	JSON
			LoD0		

CHEK – Change toolkit for Digital Building Permit

Objective 2: To enforce data and service interoperability

Regulations interpretation and Formal Data requirements



- + Simplicity, but limitations in expression power
- + IDS : From human to machine readable format
- + Combining IDS with **microservices** to extend its capabilities
- + IFC validator: validations of PSet's / IDS content
- + IDS > Dirroots (automatic extraction)



IDS → IFC CHEK profile and modelling guidelines; IDS-based Revit exporter

RDFApps / IDSChecker / CHEK / CHEK_Ascoli_Piceno.ids

Code Blame 303 lines (303 loc) · 14.6 KB Code 55% faster with GitHub Copilot

```
23      </ids:property>
24      </ids:requirements>
25      </ids:specification>
26      <ids:specification name="Each building should have CHEK_common.TypeOfConstruction property" ifcVersion="IFC4">
27        <ids:applicability minOccurs="0" maxOccurs="unbounded">
28          <ids:entity>
29            <ids:name>
30              <ids:simpleValue>IFCBUILDING</ids:simpleValue>
31            </ids:name>
32          </ids:entity>
33        </ids:applicability>
34      </ids:requirements>
35      <ids:property cardinality="required">
36        <ids:propertySet>
37          <ids:simpleValue>CHEK_common</ids:simpleValue>
38        </ids:propertySet>
39        <ids:baseName>
40          <ids:simpleValue>TypeOfConstruction</ids:simpleValue>
41        </ids:baseName>
42      </ids:property>
43    </ids:requirements>
44  </ids:specification>
45  <ids:specification name="Each building should have CHEK_common.Height property" ifcVersion="IFC4">
46    <ids:applicability minOccurs="0" maxOccurs="unbounded">
47      <ids:entity>
48        <ids:name>
49          <ids:simpleValue>IFCBUILDING</ids:simpleValue>
50        </ids:name>
```


CHEK – Change toolkit for Digital Building Permit

Objective 2: To enforce data and service interoperability

Key Standard Data models profiling tools

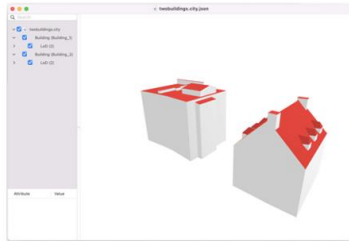
OGC Data Exchange toolkit → CHEK CityJSON profile



SHACL rule

```
<#lod3.3>
a sh:NodeShape ;
sh:targetClass city:Building, city:BuildingPart, city:BuildingRoom, city:BuildingStorey,
city:BuildingUnit, city:BuildingInstallation;
sh:not [
  sh:sparql [
    sh:prefixes ex ;
    sh:select """
      SELECT $this (city:lod as ?path) (?lod as ?value) WHERE {
        $this city:hasGeometry/city:lod .
        FILTER regex(str(?lod), '^(3.3|4.*)$')
      } LIMIT 1
    """ ;
  ];
  sh:message "Building has lod < 3.3" ;
  sh:severity sh:Violation
];
```

Data example



```
{
  "type": "CityJSON",
  "version": "1.1",
  "metadata": { ... },
  "CityObjects": {
    "Building_1": {
      "geometry": [
        {
          "boundaries": [ ... ],
          "lod": "2",
          "semantics": {
            "surfaces": [
              {
                "type": "GroundSurface"
              },
              {
                "type": "WallSurface"
              },
              {
                "type": "RoofSurface"
              }
            ]
          },
          "values": [ ... ]
        },
        {
          "type": "MultiSurface"
        }
      ]
    },
    "Building_2": {
      "type": "Building"
    }
  },
  "vertices": [ ... ],
  "lod": "3.3"
}
```

```
<#city-objects-Building_1> a city:Building ;
city:hasGeometry [
  city:hasSurface [
    a city:GroundSurface, gml:MultiSurface ;
    city:boundaries ( ( <#vertices-0> <#vertices-1> <#vertices-2> ) )
  ], [
    a city:WallSurface, gml:MultiSurface ;
    city:boundaries ( ( <#vertices-11> <#vertices-9> <#vertices-12> ) )
  ], [
    a city:RoofSurface, gml:MultiSurface ;
    city:boundaries ( ( <#vertices-20> <#vertices-19> <#vertices-21> ) )
  ];
  city:lod "3.3" ;
]
```

CHEK profile editor



PROFILE DATASET REQUIREMENTS CONTENT REQUIREMENTS

Profile title *

Dataset description

CLEAR GENERATE PROFILE

→ “You can trust these data, and use them to obtain reliable results”

→ Checking can have legal value!

Validation report

```
Validation Report
Conforms: false
Results (6):
Constraint Violation: NotConstraintComponent (http://www.w3.org/ns/shacl#NotConstraintComponent):
Severity: sh:Violation
Source Shape: <file:///github.com/opengeospatial/cityjson-profiles/cityjson/shapes/TTALicense>
Focus Node: <http://example.com/geo/building.ttl#city>
Value Node: <http://example.com/geo/building.ttl#city-objects-Building_1>
Message: License does not support commercial usage
Constraint Violation: NotConstraintComponent (http://www.w3.org/ns/shacl#NotConstraintComponent):
Severity: sh:Violation
Source Shape: <file:///github.com/opengeospatial/cityjson-profiles/cityjson/shapes/TTALod3.3>
Focus Node: <http://example.com/geo/building.ttl#city-objects-Building_1>
Value Node: <http://example.com/geo/building.ttl#city-objects-Building_1>
Message: Building has lod < 3.3
Constraint Violation: NotConstraintComponent (http://www.w3.org/ns/shacl#NotConstraintComponent):
Severity: sh:Violation
Source Shape: <file:///github.com/opengeospatial/cityjson-profiles/cityjson/shapes/TTARoadRequired>
Focus Node: [ ]
Value Node: [ ]
Message: Dataset contains no Road objects
```

CHEK – Change toolkit for Digital Building Permit

Objective 2: To enforce data and service interoperability

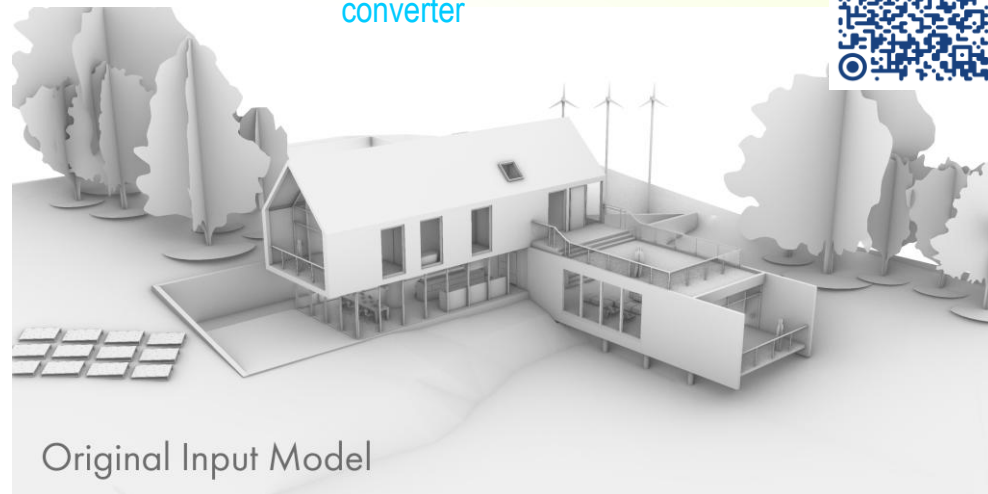
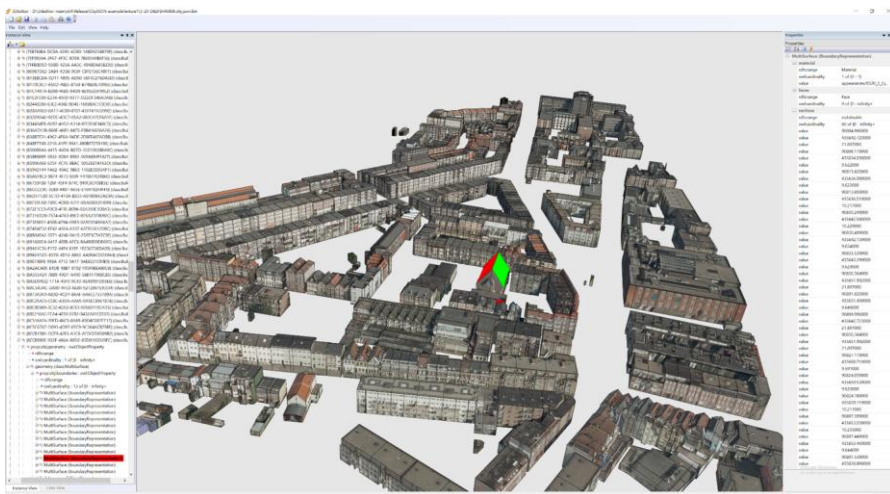
GeoBIM



Geo to BIM converter



BIM to Geo
converter



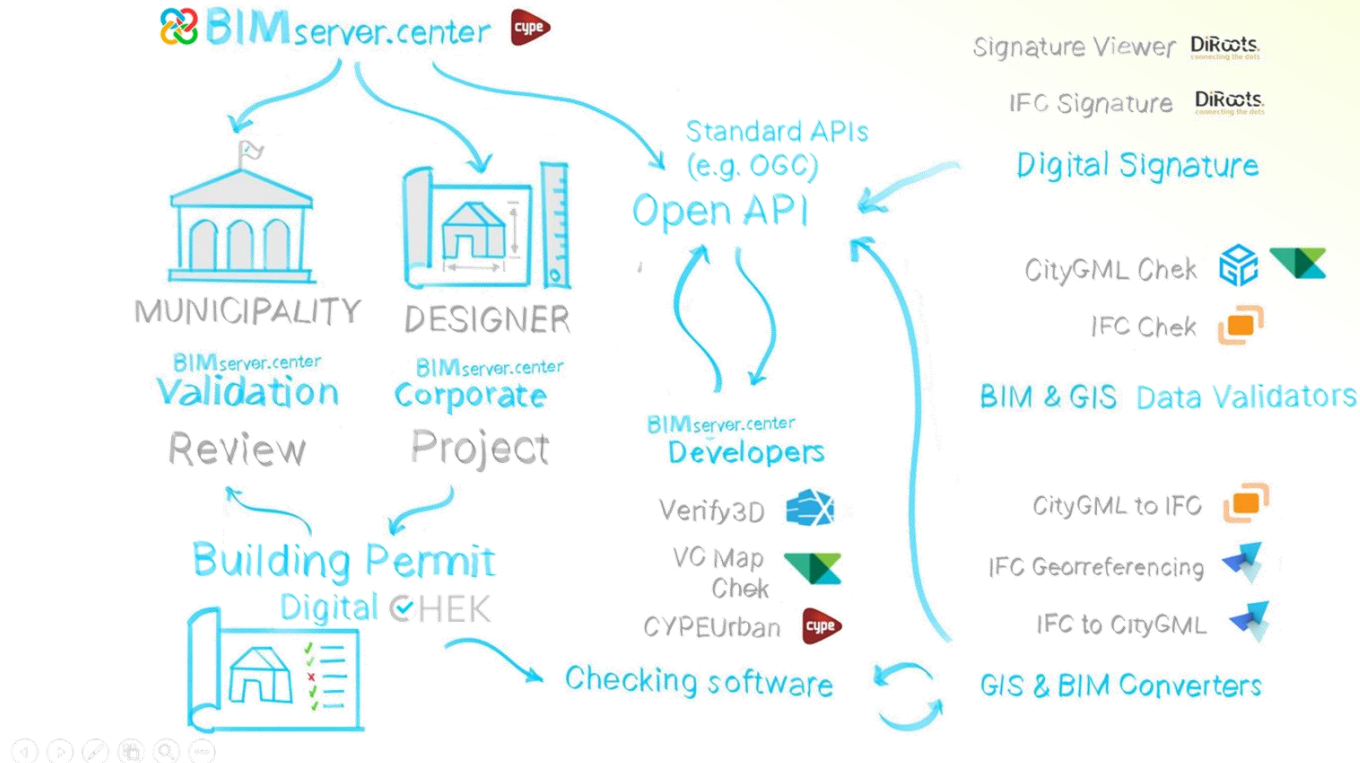
D3.4 Final GeoBIM CHEK Best Practices



Joint WG on GIS and BIM integration

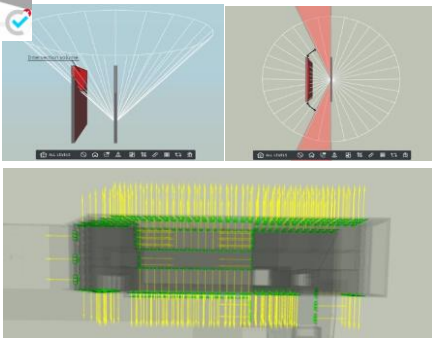
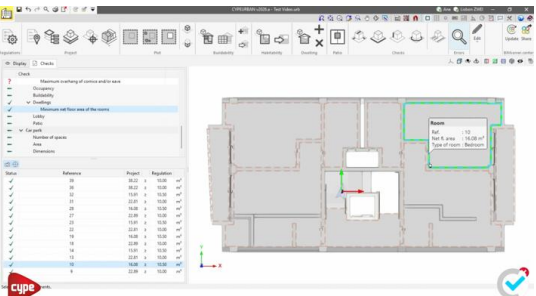
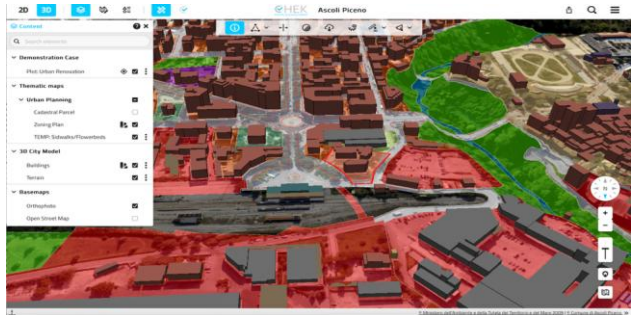
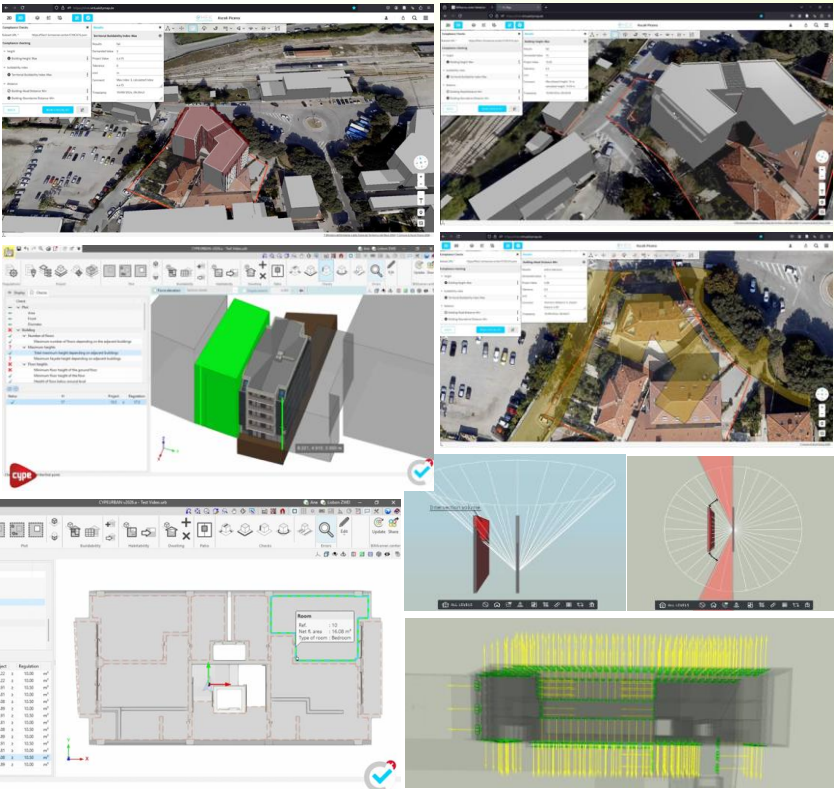
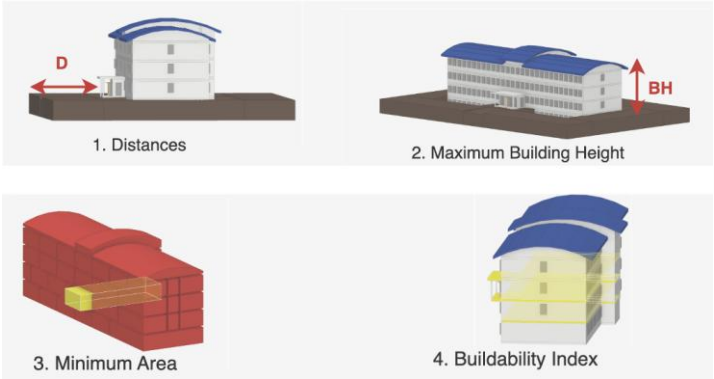
CHEK – Change toolkit for Digital Building Permit

Objective 4: Set of integrated software tools, for (Semi)Automatically check compliance to the CHEK regulations using 3D city models and BIMs as input



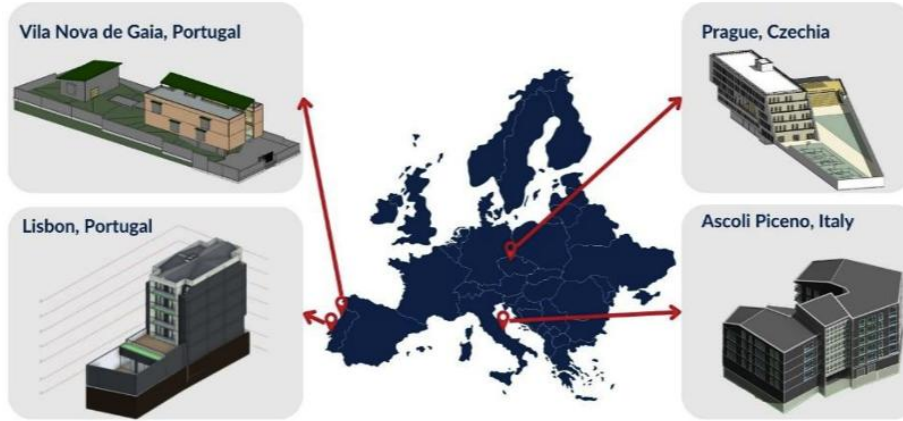
CHEK – Change toolkit for Digital Building Permit

Objective 4: Set of integrated software tools, for (Semi)Automatically check compliance to the CHEK regulations using 3D city models and BIMs as input

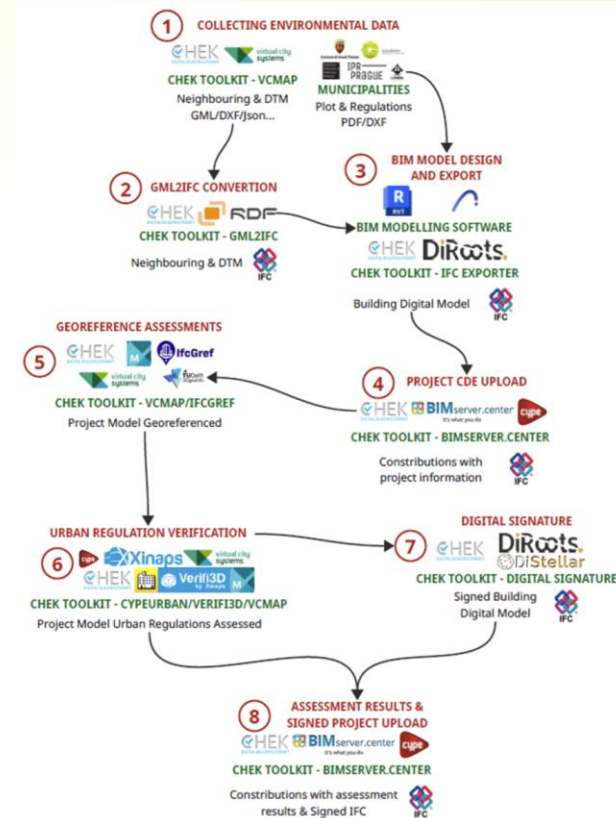
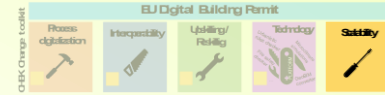


CHEK – Change toolkit for Digital Building Permit

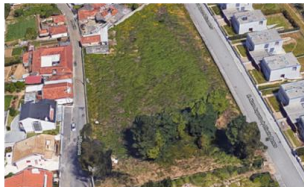
Objective 5: Demonstrate effectiveness and scalability of delivered solutions.



D6.5 Digital
Building Permit
best practices
and scalability
guidelines



Vila Nova de Gaia (PT)



Lisbon (PT)



Ascoli Piceno (IT)



Prague (CZ)

Conclusions



Address the process, organisational and business aspects

Start from Data requirements

Define modular standardised architectures (even if using proprietary software)

Train operators

RELY ON OPEN STANDARDS (OGC, bSI)

Best practices documents being published very soon

You can find all the CHEK results at https://chekdbp.eu/?page_id=5267

Next steps – what should you do for us to support you better in achieving more and additional value

- 1) Bring input from use cases
- 2) Promote digitalization to support decision-making
- 3) Move towards standardized approaches
- 4) Join communities who can help:
EUnet4DBP, Standardisation communities



Thanks

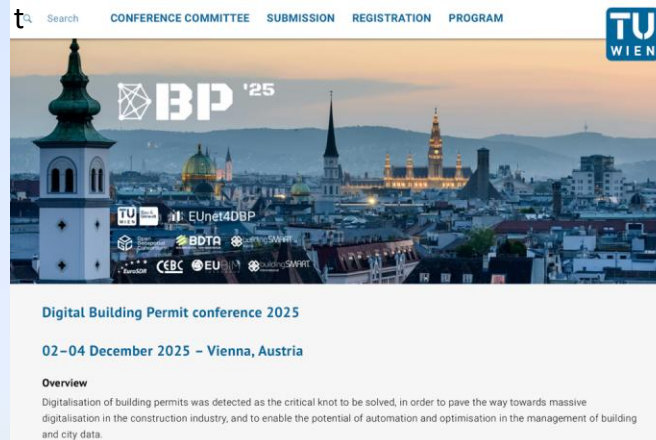
<https://www.ogc.org>

OGC iDays

OGC Innovation days, Frankfurt, December 2025

<https://eu4dbp.net>

<https://dbp25.conf.tuwien.ac.a>



The screenshot shows the website for the Digital Building Permit conference 2025. The header includes a search bar and navigation links: CONFERENCE COMMITTEE, SUBMISSION, REGISTRATION, and PROGRAM. The TU WIEN logo is in the top right corner. The main banner features a cityscape at night with the text 'DBP '25' and a list of sponsors including TU Wien, EUnet4DBP, BDTA, and others. Below the banner, the text reads 'Digital Building Permit conference 2025' and '02-04 December 2025 - Vienna, Austria'. An 'Overview' section follows, stating: 'Digitalisation of building permits was detected as the critical knot to be solved, in order to pave the way towards massive digitalisation in the construction industry, and to enable the potential of automation and optimisation in the management of building and city data.'

✉ fnoardo@ogc.org



PART III: FOCAL & Panel Discussion

The FOCAL Project – A call to action

Dr. Eric Samakinwa, Climate Service Center Germany. (10 min)

Panel Discussion, Moderated by Mr. Muthu Kumar, OGC (45 min)

Introducing Gloria Chindamo, CEO Myralia, representing Voghera

Mr. Marco Mazziotti, Director - EU Direct Funding Managing Authority Dept., Milano

Eng. Fahad Alfattani, Executive Manager, Clever Platform, representing Medina

Mr. Piergiorgio Cipriano, Deda Next, representing the City of Ferrara

The FOCAL Project – A Call to Action

Dr. Eric Samakinwa

Researcher, Climate Service Center Germany



Panel Discussion



Moderator
Muthu Kumar
OGC



Panel Member
Marco Mazziotti
Milano



Panel Member
Fahad Alfattani
Medina



Panel Member
Piergiorgio Cipriano
Ferrara



Panel Member
Gloria Chindamo
Ferrara

Q&A

Conclusions



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THANK YOU