



Laboratorio de Inteligencia de Ciudad (Colaboración Ayuntamiento- Universidad): **Gemelo Digital**

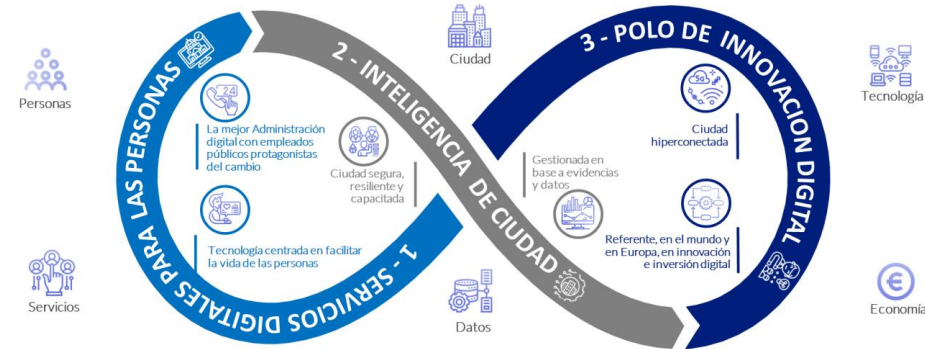
DIGITAL TWINS FOR INFRASTRUCTURES & CITIES

Ignacio González Tejada

BARCELONA, NOV 6, 2025



MADRID, CAPITAL DIGITAL – POLO DE INNOVACIÓN DIGITAL



Objetivo estratégico 3: *Polo de Innovación Digital*

Eje estratégico 6:



Referente, en el mundo y en Europa, en innovación e inversión digital



Programa 11. ECOSISTEMA DE INVERSIÓN E INNOVACIÓN DIGITAL

01.

DIGITAL TWINS INFRASTRUCTURES AND CITIES



Mission



Training on the application of digital technologies to the civil engineering and building sectors



Lead the digital transformation of the civil engineering sector



Foster connections between the multiple actors



POLITÉCNICA

UNIVERSIDAD
POLITÉCNICA
DE MADRID



ÉCOLE NATIONALE DES
PONTS
ET CHAUSSEES



M Ű E G Y E T E M 1 7 8 2

Civil Engineering & Architecture Schools of the EELISA alliance



AI and CS research
center



tyris.ai
Predictive Analytics

ALTA METRIS

Innovation SMEs



Fundación
Agustín de Betancourt

The Executive Master in Digital Twins



A one-year international master program addressed to engineers of the built & mobility environments.

Coordinated by four European leading Civil Engineering Universities and participated by public and private entities of all sectors related with the civil engineering and building sectors

To create the leaders of the digital transformation of the sector

The European Centre of Excellence in Digital Twins for Infrastructures & Cities



A platform to promote the creation of networks between the different players of the built & mobility environment.

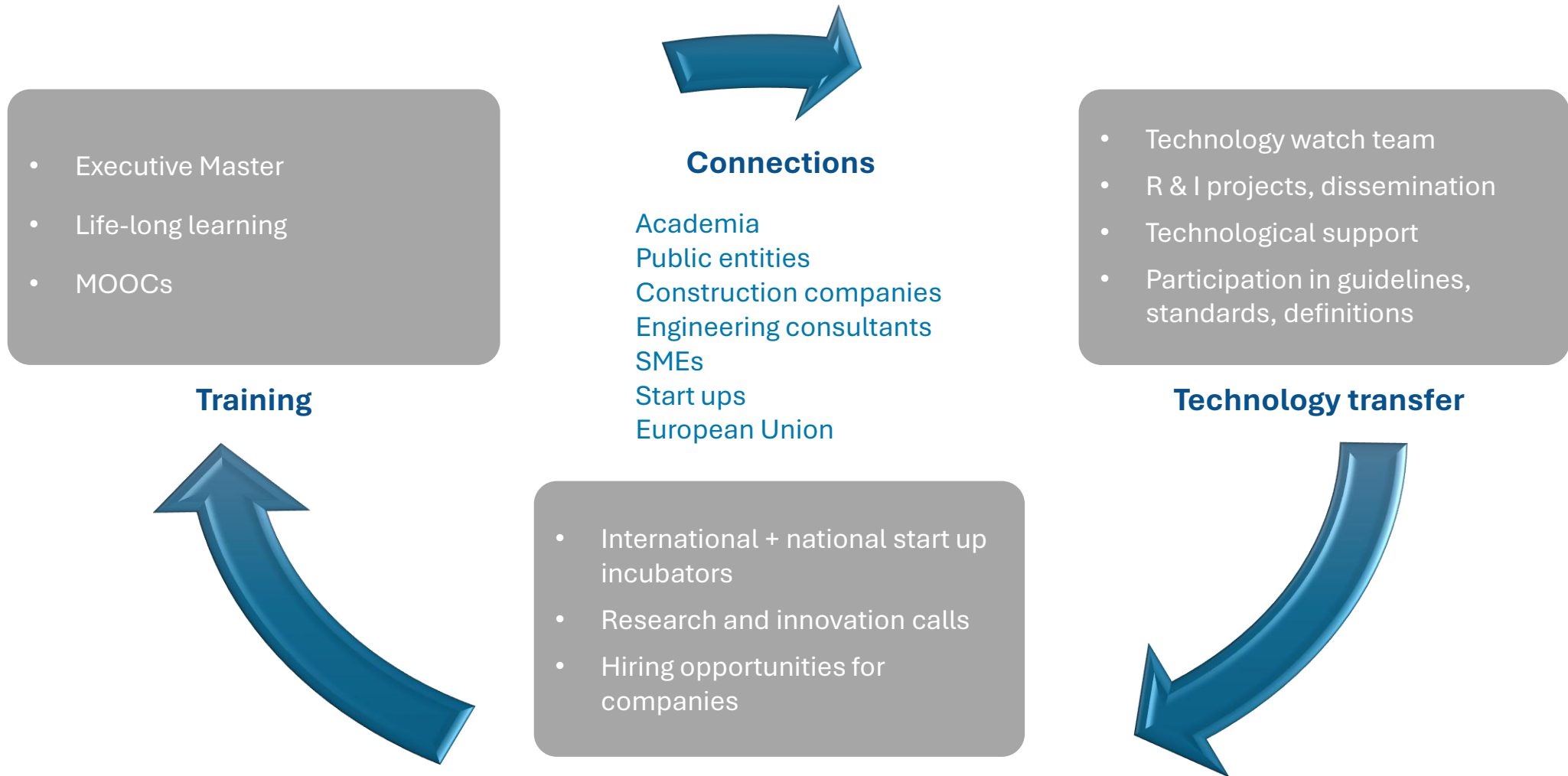
The main goal is accelerating the digital transformation of the sector, with three main lines of action:

- Training.
- Research and technology transfer.
- Entrepreneurship promotion.

02.

DIGITAL TWINS CENTRE OF EXCELLENCE





03.

TRAINING PILLAR

EXECUTIVE MASTER IN
DIGITAL TWINS FOR
INFRASTRUCTURES
AND CITIES





Executive

Targeted to professionals
in the built environment

Structured to facilitate
conciliation with work



One year

60 ECTS master
program, from Sep'24
to July'25



Blended

Online evening live sessions
(Mon to Wed 6 to 8:30pm CET)

Three onsite
meetings (Thu-Sat)
in Madrid, Budapest & Paris



Faculty

Combination of
professors and experts
from academia
and industrial partners



Joint Diploma

An institutional master
jointly organized by four
leading European
Civil Engineering
universities



Global

Students from all over
the world, not necessarily
from the coordinating
universities countries
Fully taught in English



Project based

Learning-by-doing
through real capstone
projects under the
mentorship of our
industrial partners.



Networking

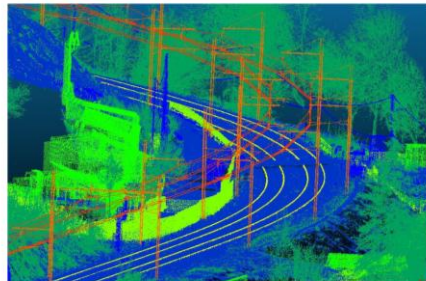
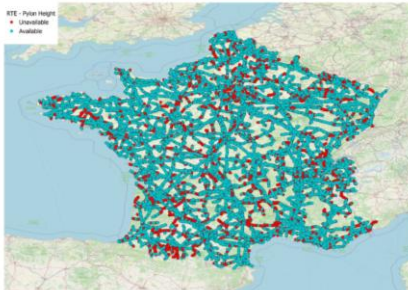
Encouraged through
onsite events, capstone
projects, conferences, team
group
tasks...

CAPSTONE DEFENSES DIGITAL TWINS

CAPSTONE PROJECTS

Hands-on real-world cases of applied digital twins, proposed and mentored by 1-2 industrial partners, and coordinated by faculty of the Master Program.

Developed in groups of 3-4 students between November and July, with 2 onsite workshops and a final presentation at the closing ceremony





MADRID ONSITE EVENT



PARIS ONSITE EVENT

EXECUTIVE MASTER.



BUDAPEST ONSITE EVENT



04.

TECHNOLOGY TRANSFER AND CONNECTION



Collaboration agreement with Ayuntamiento de Madrid



A collaboration agreement focused on the development of real cases of demonstrators of innovative projects for the digitalization and sustainability of the civil infrastructures of the Municipality of Madrid.

FLAGSHIP PROJECTS

Developing a Predictive Model of Mass Events' Impact on Mobility within an Urban Digital Twin Framework

TEAM

Project mentored by
NOMMON and INECO and
supervised by UPM.

Autors:

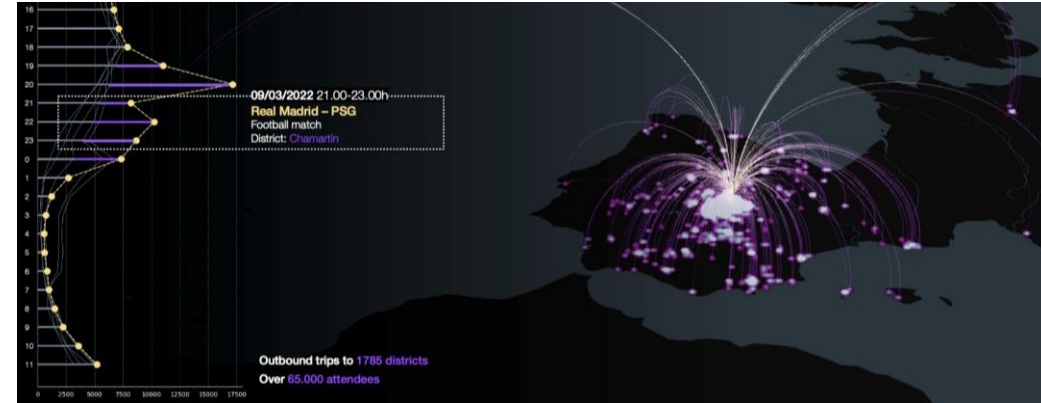
Francisco José Cartelle
Antía Fernández Fernández

This capstone project examines the growing occurrence of mass events in Madrid and their impact on urban mobility in 12 districts of the city of Madrid.

By combining data analysis techniques with urban and transport planning principles, it develops a predictive transformer model for integration into Madrid's evolving Digital Twin platform.

Benefits

- Assess the impact of mass events on Madrid's urban mobility and develop an AI-based model to predict and simulate these effects.
- Create a methodology for analysing mobile network data to predict mobility patterns across various urban settings.
- Develop a replicable framework that can be adapted to other cities hosting mass events.



05.

DISSEMINATION & NETWORKING



Seminar: El gemelo digital de la ciudad de Madrid



PRESENTACIÓN GEMELO DIGITAL DE MADRID DEMOSTRADOR

Capital Digital
MADRID

Con la colaboración de

CAMINOS MADRID

Collegio de Ingenieros de Caminos, Canales y Puertos

AYUNTAMIENTO DE MADRID

DIGITAL TWINS

Martes, 30 de abril, 09:00
Salón de actos del Colegio de Ingenieros de Caminos, Canales y Puertos
Calle de Almagro, 42 28010 Madrid (Metro Rubén Darío)

Click para acceder a la ubicación

"Madrid, Capital Digital", es la estrategia para facilitar y acelerar la transformación digital y reforzar el posicionamiento de Madrid como una ciudad referente en el contexto digital. Uno de los objetivos de esta estrategia es dotar de inteligencia a la ciudad, con una gestión basada en datos que facilite la toma de decisiones aplicando tecnologías emergentes para la hiperconectividad e hiperautomatización.

En el marco de esta estrategia, uno de los compromisos adquiridos es el de **Reproducir digitalmente la ciudad y sus servicios para facilitar la toma de decisiones**, en concreto el "crear una réplica virtual de la capital para realizar simulaciones y analizar el impacto y la afección en la vida de los ciudadanos ante cualquier obra, infraestructura o nuevo servicio, previa a su puesta en marcha.



Govtech 4 Impact

Round-table on
Digital twins for
cities



Digital Twins for...

logistics

railway technologies

road technologies

tunnel engineering

mobility ...



Muévete verde awards 2024



THE CENTRE OF EXCELLENCE

In May 2024 the Escuela de Ingenieros de Caminos, Canales y Puertos de Madrid (UPM) was awarded with the Muévete Verde 2024 prize, organised by the Madrid City Council as part of the activities of the European Mobility Week 2024 (SEM24).

The prize recognised the initiative that contributes to improving mobility in the city of Madrid in the Digitalisation category.

The Escuela de Ingenieros de Caminos, Canales y Puertos de Madrid (UPM) won the award for its project focused on the digital twins Digital Twins for Infrastructures and Cities. The award was collected by the deputy director, Vicente Alcaraz.

Other European activities



Symposium.
Transforming the Built Environment:
Accelerating Circular and Digital Transition
(Istanbul, November 23')

BIM World Paris 2023 & 2024
Twin+ Trophies



Hackaton:
European Engineering
Projectwork course
(Istanbul, June 24')
Organizers ITU-BME



45th FNAU Annual Meeting of Urban Planning
(Paris, October 24')



STRATEGIC PARTNERS AND COLLABORATING COMPANIES

