Ireland's Destination Earth Workshop
4th October 2023

Local Digital Twins for Engagement and Evidence-based Decision Making

Presented by

Dr. Mani Dhingra, Smart Cities Digital Twin Manager, Dublin City Council

Ms. Aleksandra Kocon, Smart Cities Technician, Dublin City Council

Ms. Grace D'Arcy, Engagement Programme Manager, Smart Docklands

Comhairle Cathrach
Bhaile Átha Cliath
Dublin City Council

SMART DUBLIN

SMART DUBLIN

An initiative of the FOUR DUBLIN LOCAL AUTHORITIES to engage with smart technology providers, researchers and citizens to solve challenges and improve city life.

SMART DUBLIN

Comhairle Cathrach
Bhaile Átha Cliath
Dublin City Council

Comhairle Contae
Átha Cliath Theas
South Dublin County Council

Comhairle Contae
Fhine Gall
Fingal County
Council

dlr
Comhairle Contae County Council

Future is happening now!!

Smart Office Optimisation

5G Mobile Indoor

3D AR VR Model

Smart Bike Stands

Smart Bench

Cyclist Prioritisation at Junctions

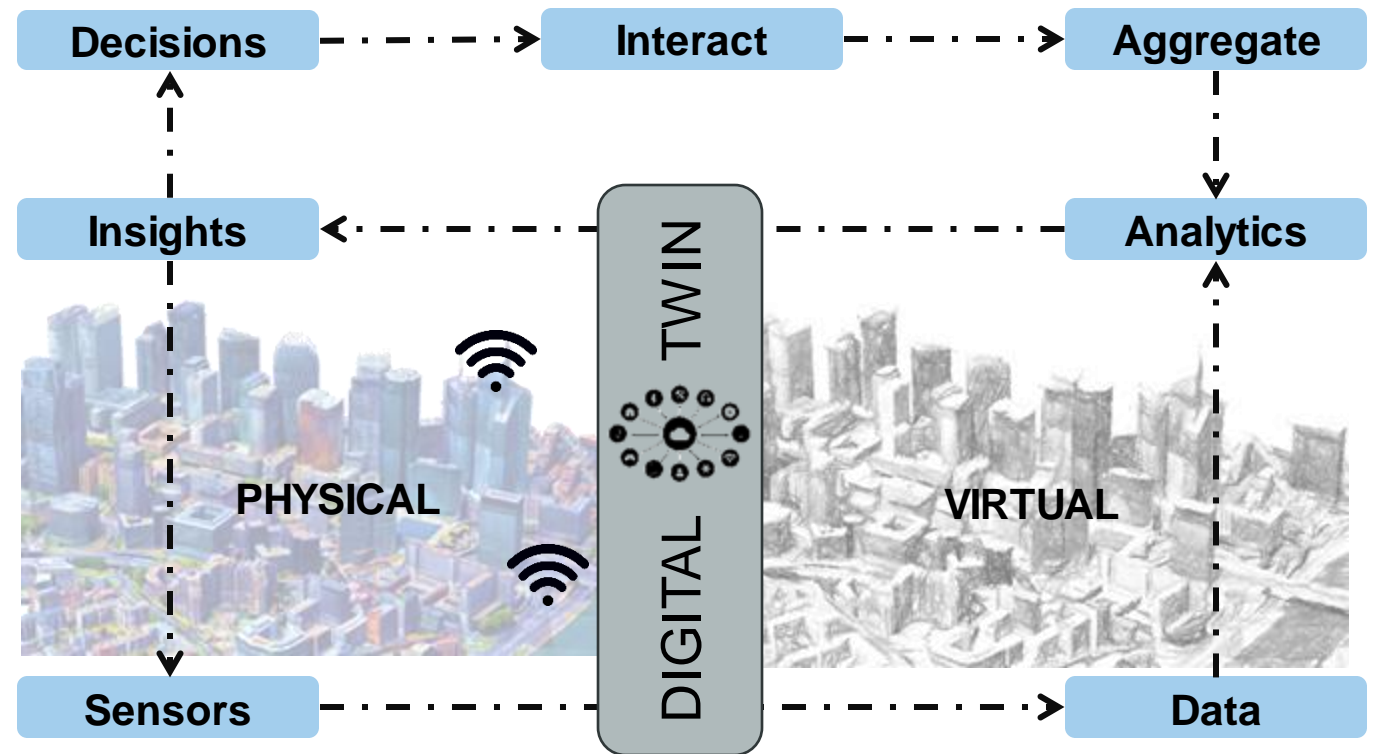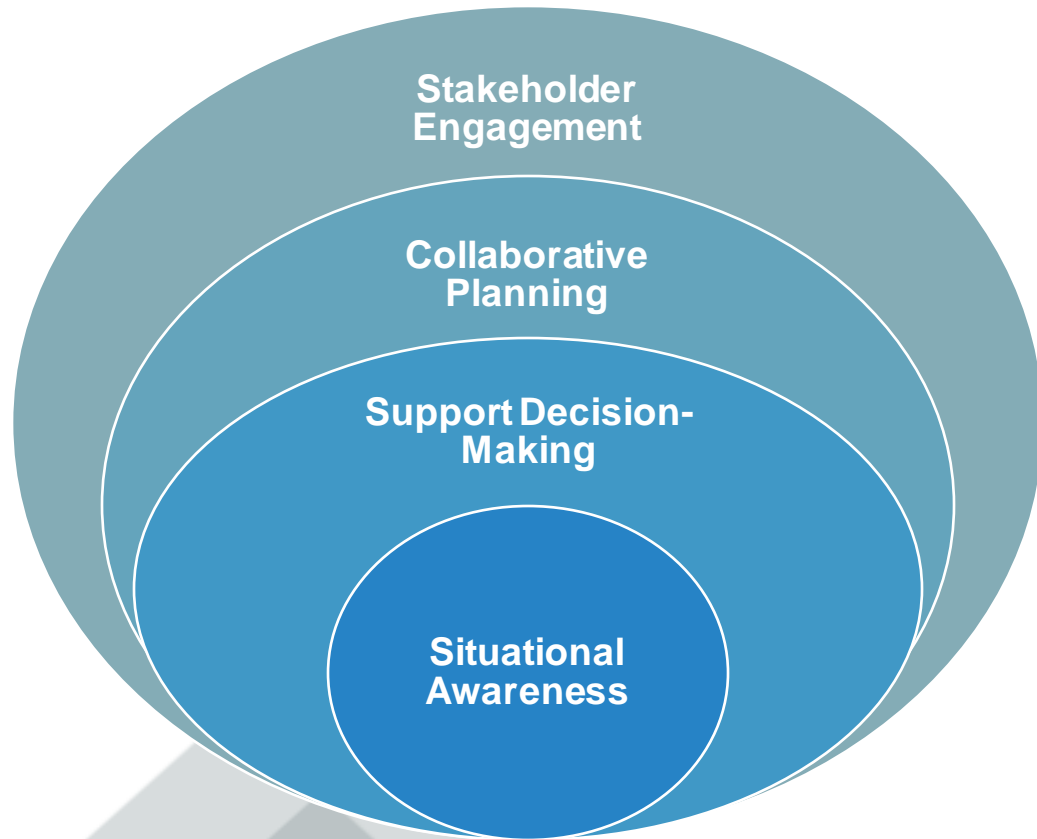5G Mobile Outdoor

Smart Bins

Flood Prediction

Smart Gully Monitoring

Smart Bike Light

Air Quality Sensing
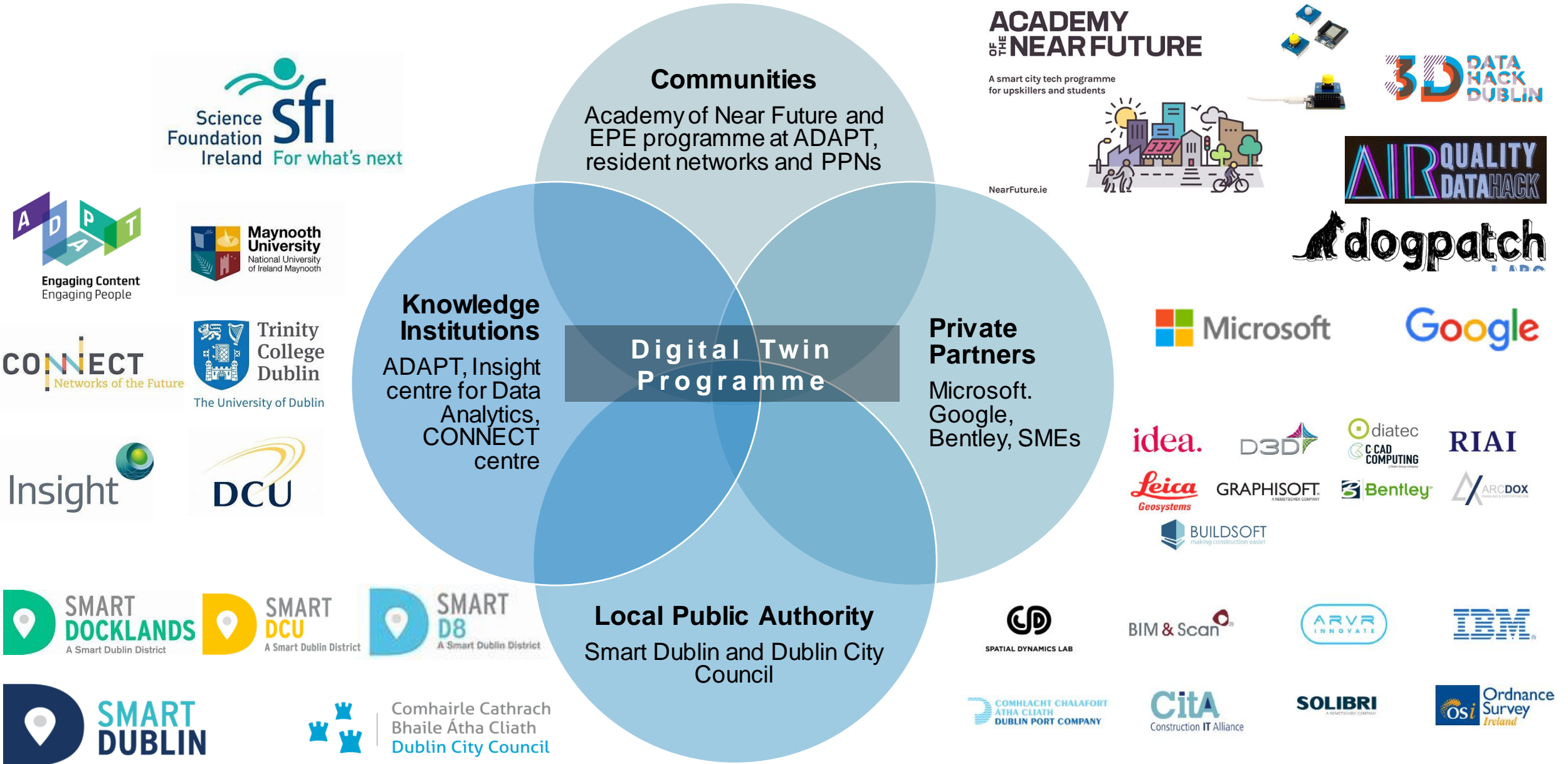
Digital Twin Programme @ DCC

"Unlocking Tomorrow's Possibilities with Digital Twins"

Quadruple Helix of Innovation

Digital Twin projects at DCC

Smart DCU Digital Twin

Dublin Fire Brigade models

Docklands SDZ models

Smart Tourism using AR for engagement

1. Smart DCU Digital Twin

- Smart DCU (Dublin City University) – a university campus as a microcosm of the city, ideal for piloting smart city innovations

- Smart DCU Digital Twin project launched in 2021 as a collaboration between Insight SFI Research Centre for Data Analytics at DCU, DCC, Bentley Systems, KTU

- **Phase 1** funding ensured that **all campuses had 3D models** built and some very **light IoT data** overlaid.

- **Phase 2** collaboration to ensure **integration of 4D analytics, real-time sensors, internal models and immersive technologies** for engagement to create DCU Immersive Real-Time Digital Twin

- Autism Friendly routing planned

*Project's vision: create a **cognitive Digital Twin** that can make decisions to improve the operational efficiency and the experience of people who live, work or visit the campus.*
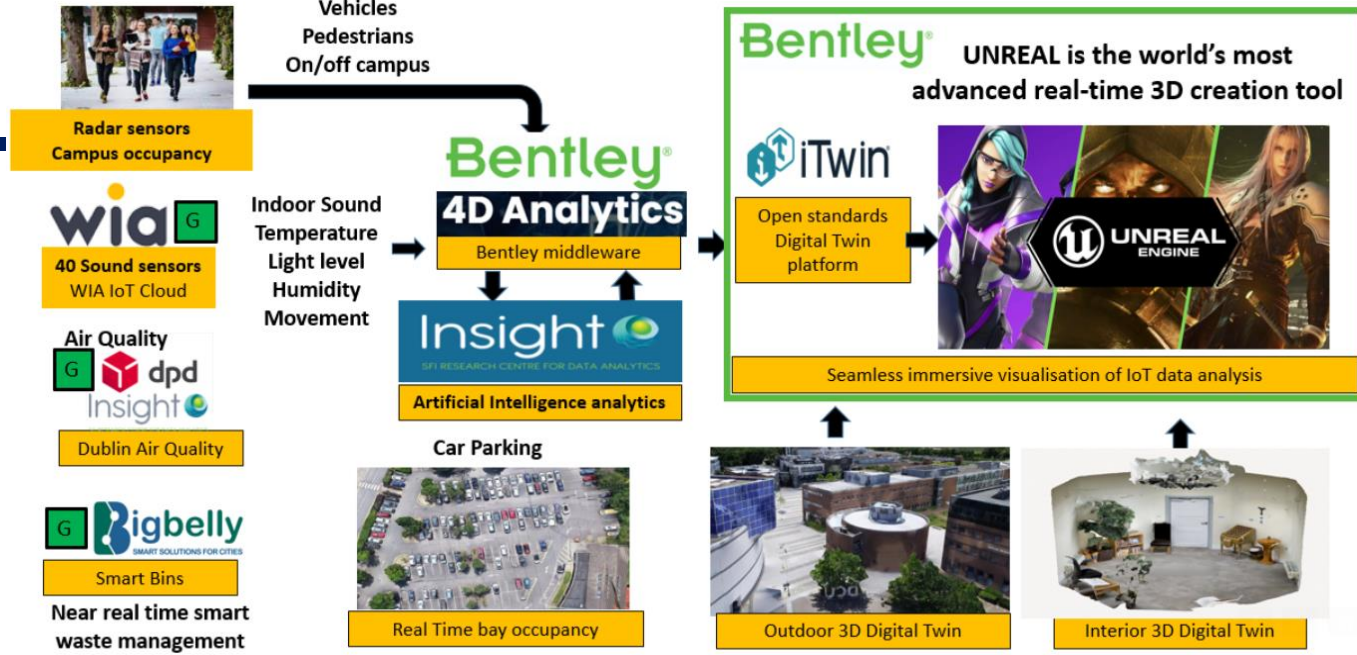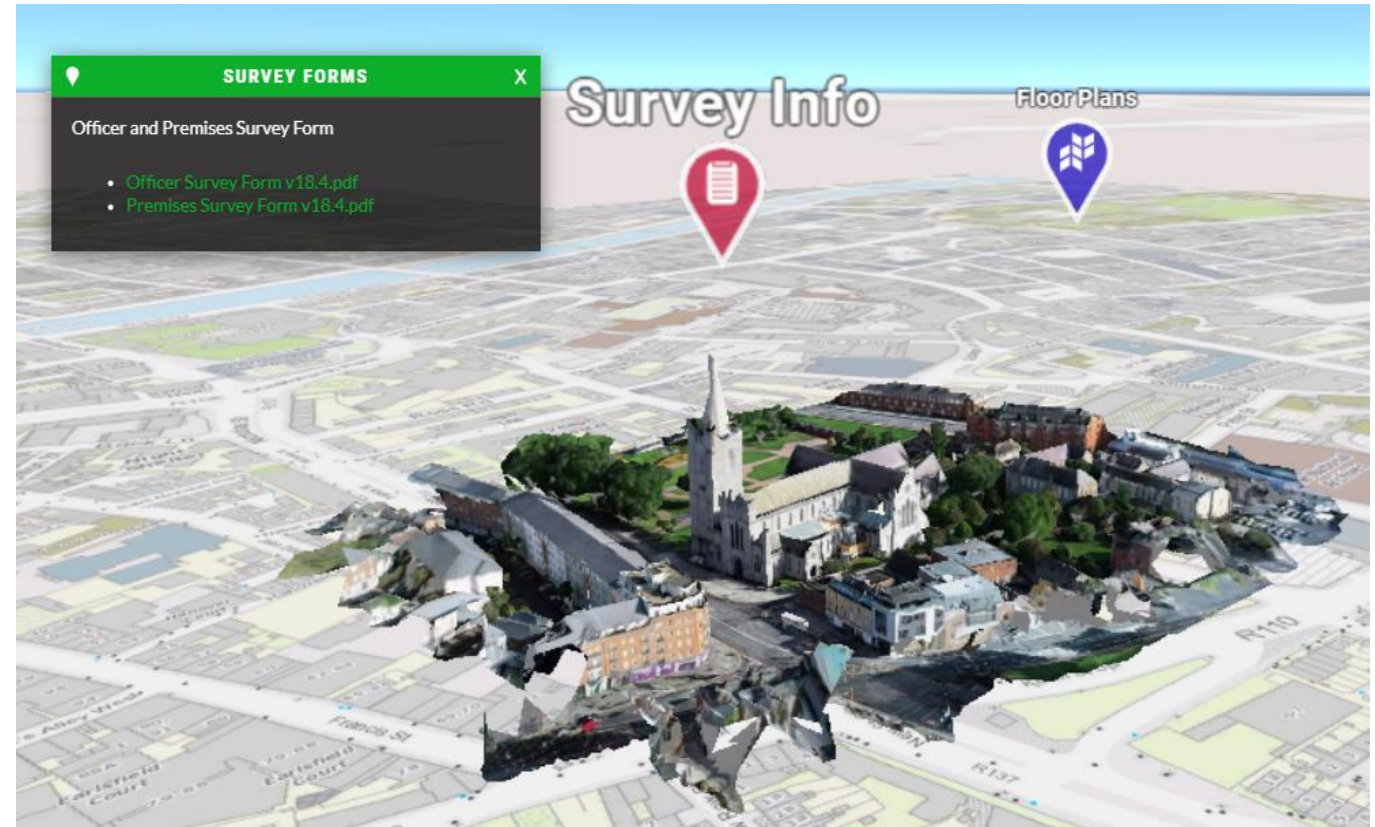

Immersive experience

Brief:

- Dublin Fire Brigade (DFB) has generated **reality mesh models of multiple sites** in the city using drones. Some of these sites include **Trinity College, Christchurch, St. Patrick's Cathedral, Poolbeg, Hugh Lane** etc.

- The models are used for **emergency pre-incident planning and personnel training** by the DFB officials especially for the ones which are considered as **high-risk zones.**
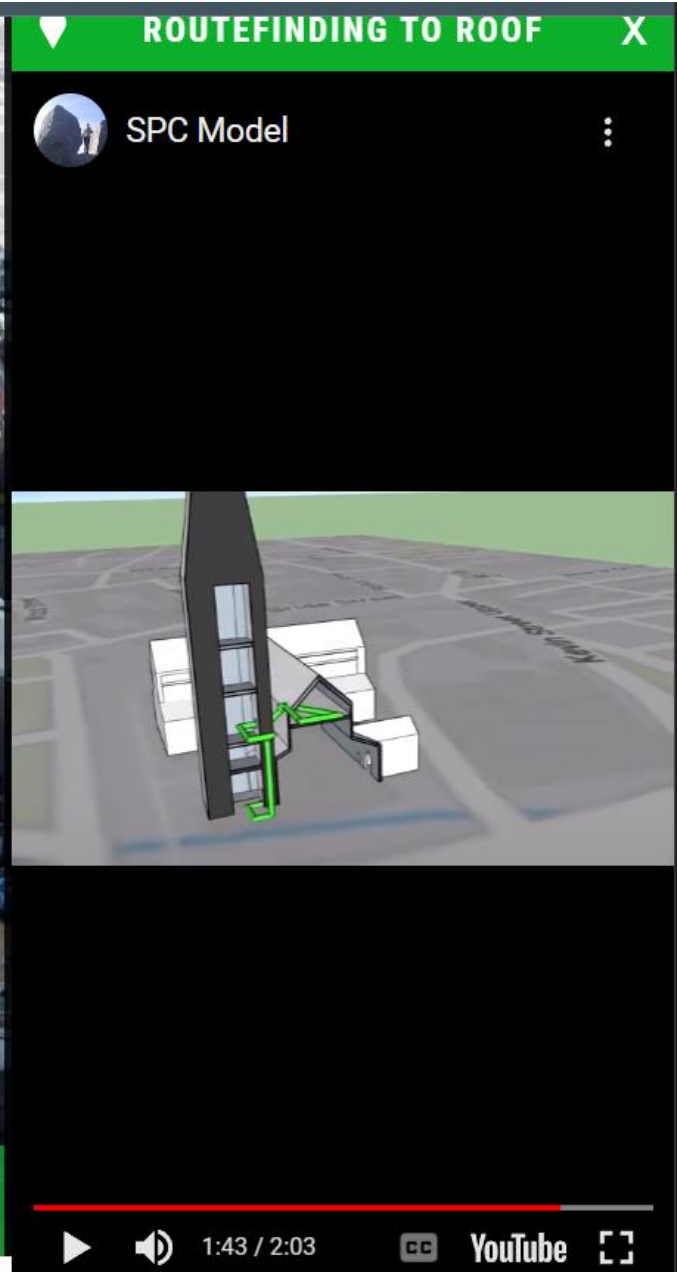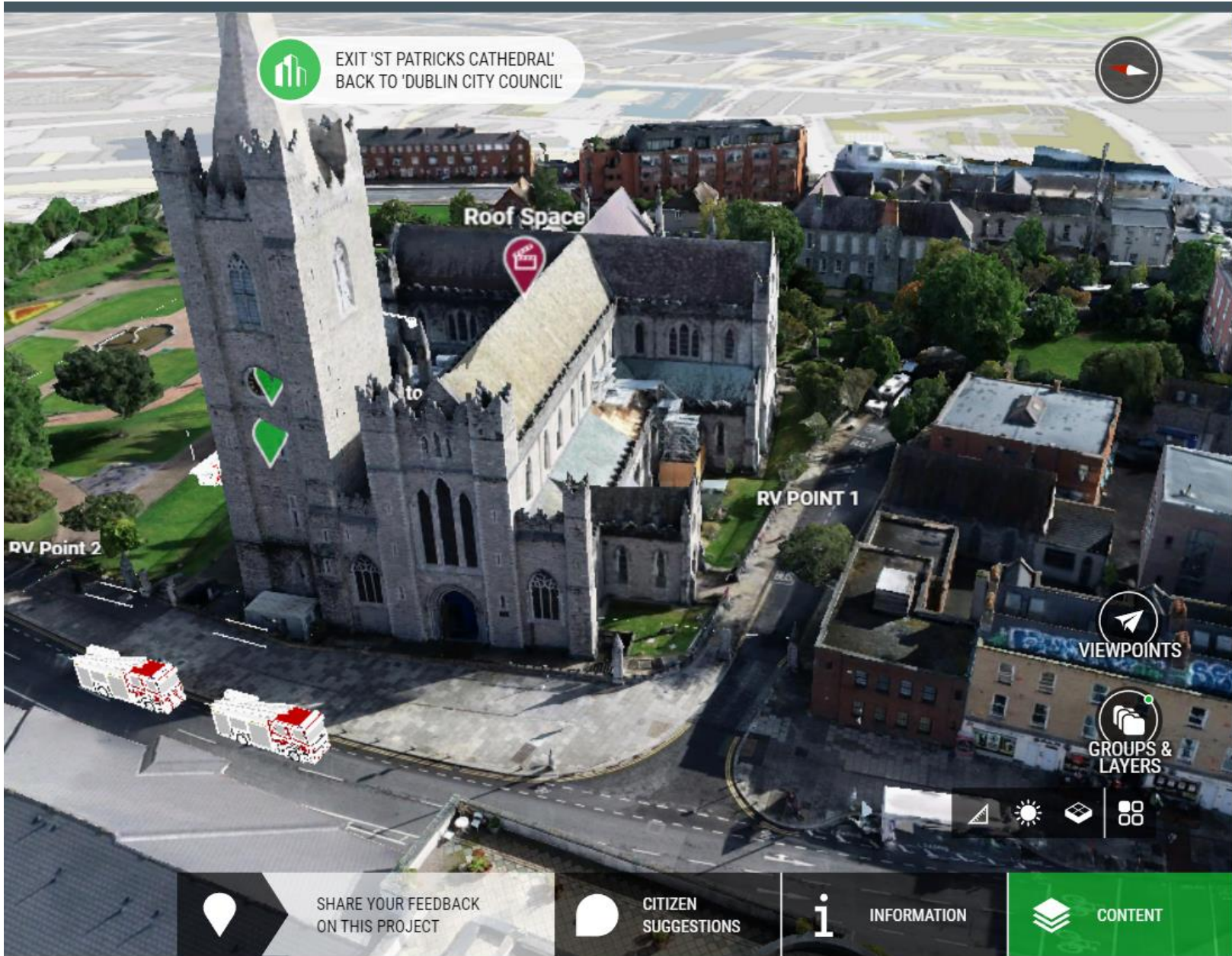
Implementation:

Drone surveys were used to develop photogrammetric models of selected sites and **Bentley's OpenCities planner** is used to visualize 3D models and few GIS spatial layers.

i. BOC Gas project

ii. St.Patrick's Cathedral project

DFB projects screenshots from Bentley OpenCities Planner

EXIT 'ST PATRICKS CATHEDRAL'
BACK TO 'DUBLIN CITY COUNCIL'

Roof Space

RV POINT 1

RV Point 2

VIEWPOINTS

GROUPS &
LAYERS

SHARE YOUR FEEDBACK
ON THIS PROJECT

CITIZEN
SUGGESTIONS

INFORMATION

CONTENT

ROUTEFINDING TO ROOF   X

SPC Model

1:43 / 2:03   YouTube

www.3ddatahack.ie

Docklands Strategic Development Zone has **multiple 3D models** created for different purposes -

1. **Block model** - Approx. **5 sq.km block 3D model** with varying level of details in fbx format (LOD2 using facemapping, few buildings with LOD 3 and BIM level details) – subset of this model was released on Dublinked for 2019 3D hackathon event (many researchers have used it for **digital twin work at TCD**)
2. **VR model** operable in **Unreal's Twinmotion** for immersive experience
3. **Reality mesh model** available in OpenCities Planner (**drone capturing and mobile mapping utilizing LIDAR technology)**
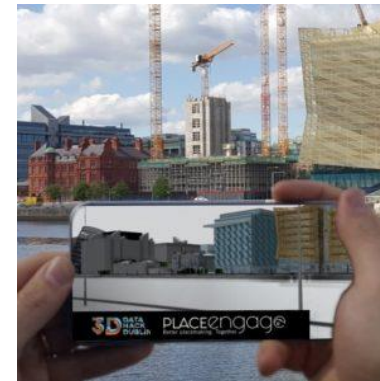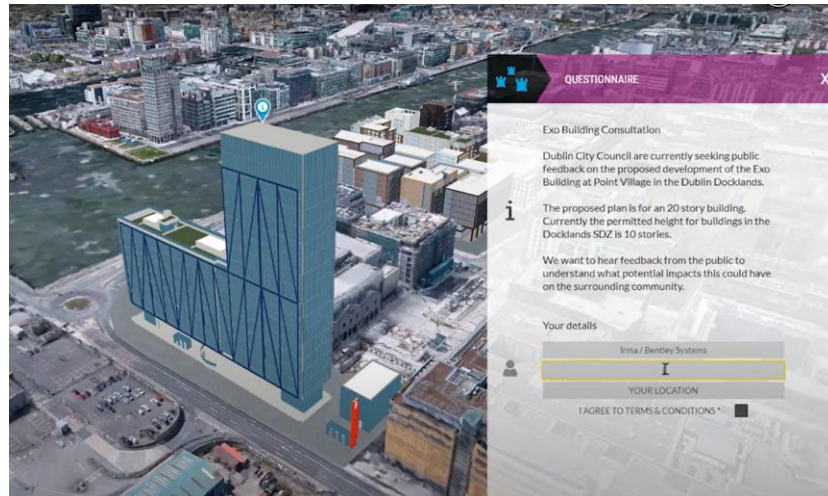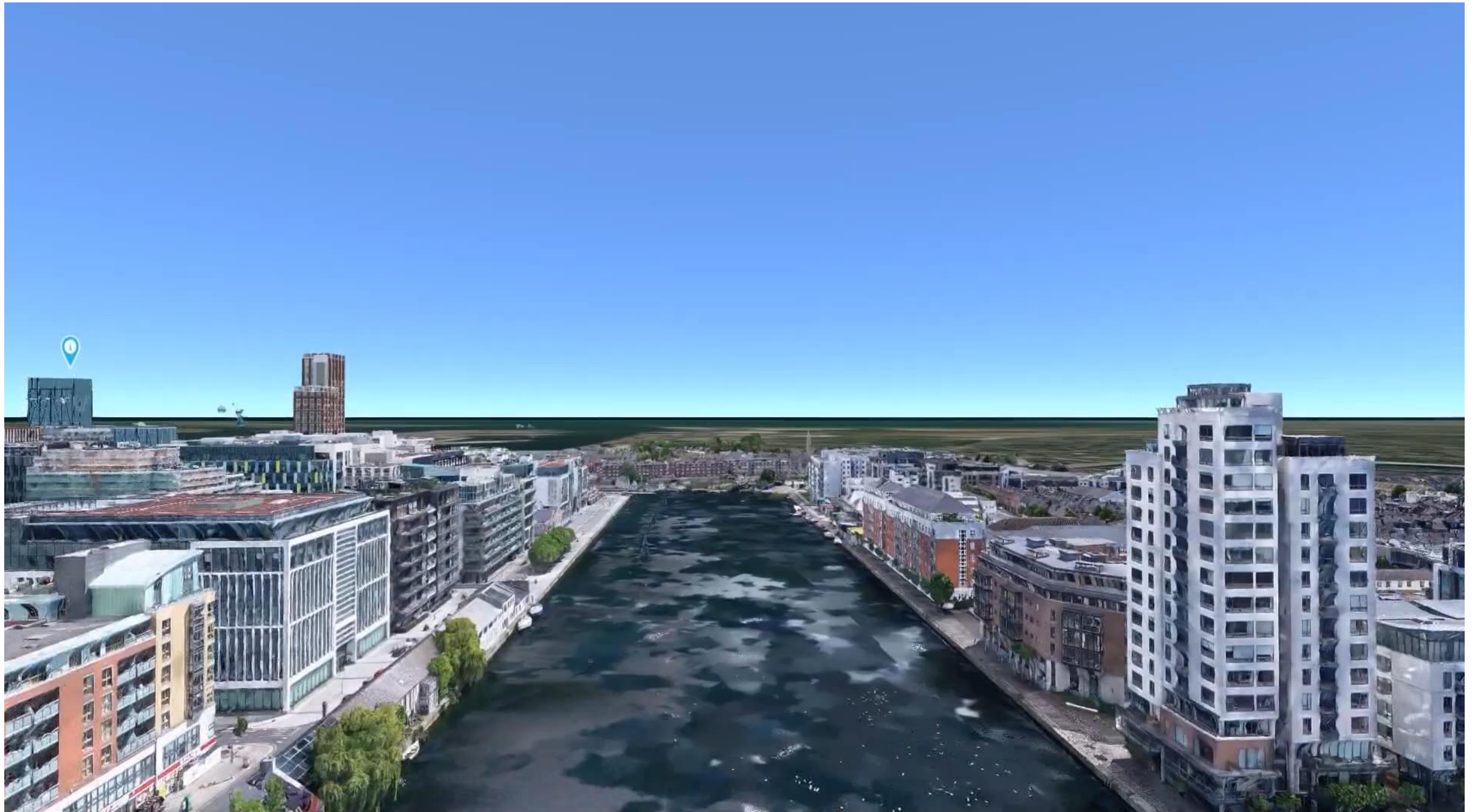
- **DCC Smart Tourism Programme, supported by Failte Ireland,** develops solutions based on Augmented and Virtual Reality for **immersive engagement**.

- Dublin Discovery Trails hosts *'Doors into the Docklands' and 'DiscovAR' apps for DCC area*

- *'DiscovAR'* – utilising 3D Google tiles the app allow users explore Dublin from anywhere in a word, learn about interesting places and take a part in a quest.
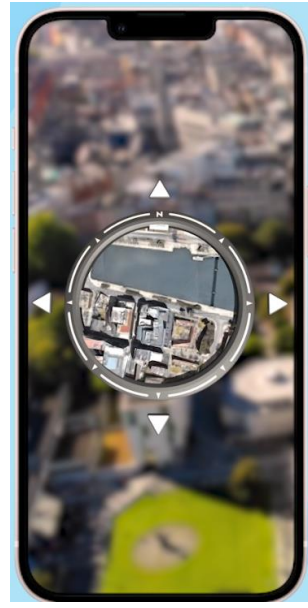
- *'Doors into the Docklands'* app - visitors to the Docklands are brought on a **tour of the historic areas via GPS-enabled walking trails enhanced with AR/VR experiences** that users can undertake at their own pace.

Discover portals to the past

DOCKLANDS
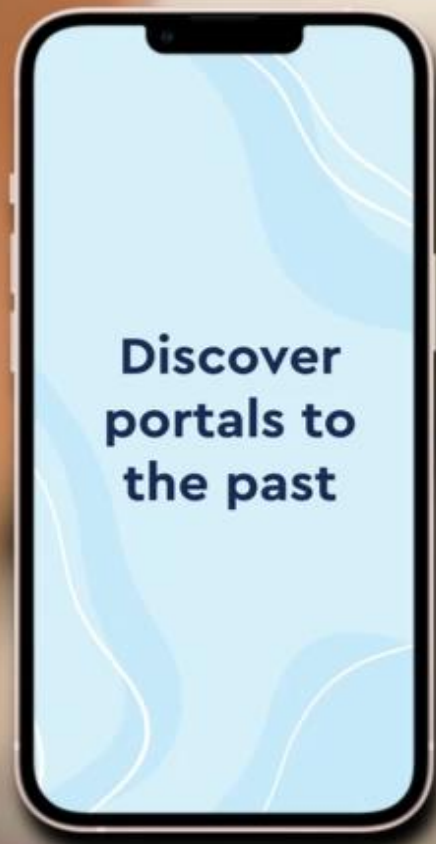
ACADEMY OF THE NEAR FUTURE

Empowering young people to tackle 21st-century city challenges

Over 1500 students reached nationally!

CONNECT
Centre for Future Networks

Comhairle Cathrach
Bhaile Átha Cliath
Dublin City Council

SMART DOCKLANDS
A Smart Dublin District

sfi
Fondúireacht Eolaíochta Éireann
Dá bhfuil romhainn
Science Foundation Ireland
For what's next

50% DEIS
50% female

ACADEMY OF THE NEAR FUTURE

CON ECT

SFI Research Centre for
Future Networks

Dublin City Council
Comhairle Cathrach Bhaile Átha Cliath

Action Projects

Marino College - Fairview Park Report

Planting initiative in St Wolstans Secondary School

CBS Westland Row - Letter to Leadership

Active Travel initiatives in Assumption Secondary School

ACADEMY OF THE NEAR FUTURE

DESIGN YOUR FUTURE CITY

DESIGN YOUR FUTURE CITY

Interactive workshops & tech demos

Prototyping ideas & presenting to city leaders

Future Directions

Foster cross-departmental collaboration between various planning agencies

Explore innovative solutions for urban planning activities in a controlled environment that mimics the real city

Allow scenario planning before implementation, reducing the risk and increasing the public trust

Viable tool for storytelling and communicating plans, policies, and outcomes to citizens
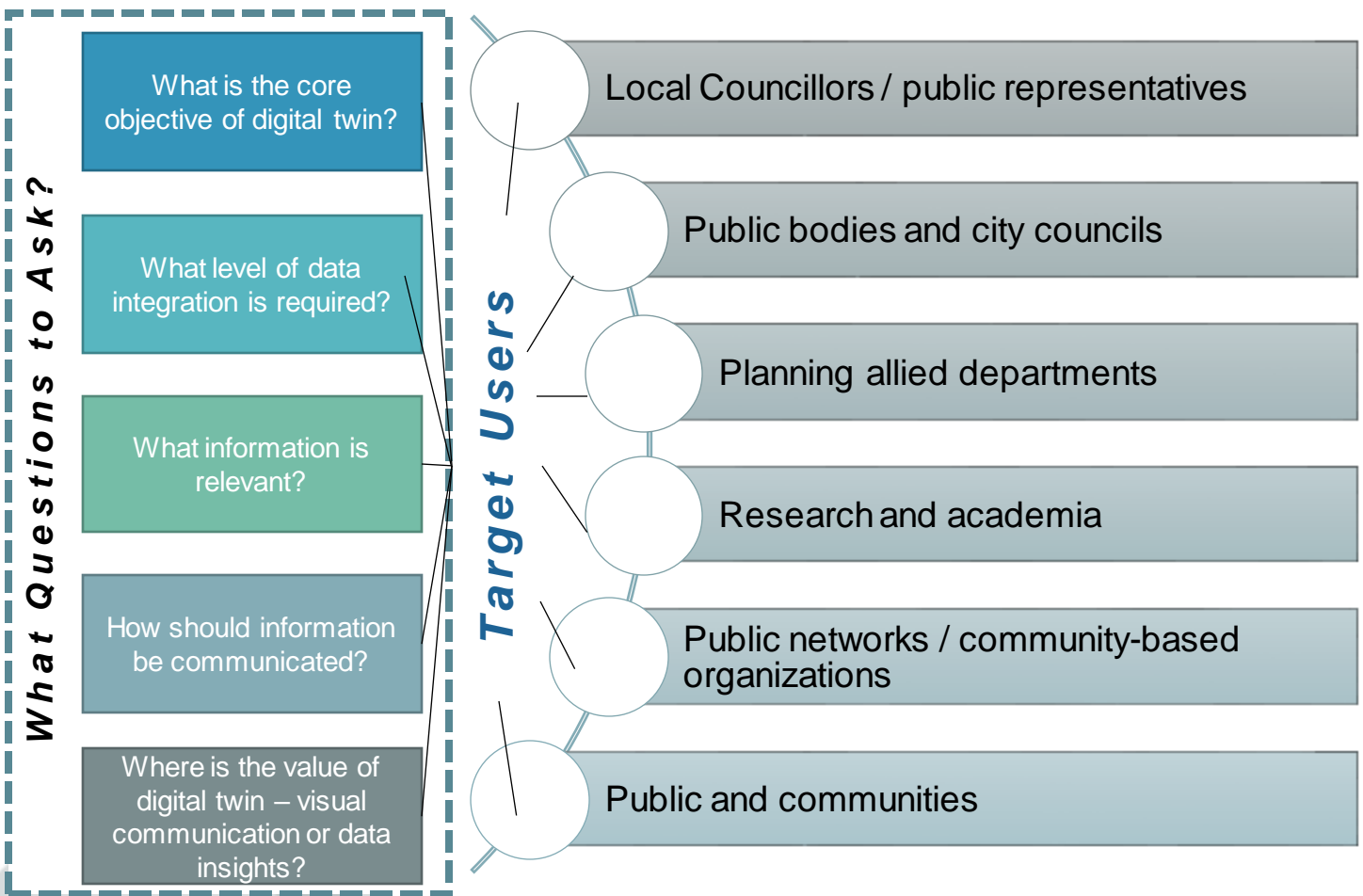
Provide accelerated feedback loops to make designs and construction more precise

Equips consultation team with more tools to answer and demonstrate solutions to public through **interactive and immersive simulations**

Include people with diverse digital literacy levels in decision-making using visual learning, less complicated and more relatable data

Reality captured raw data → 2D / 3D model systems → Connected to static data, metadata and BIM systems → Enrich model with real-time data → Two-way integration with physical twin → AI driven decision-making
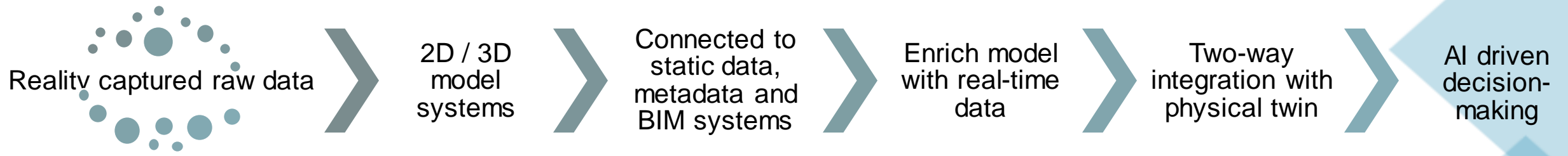
Mapping Target Users and Types of Digital Twins

What Questions to Ask?

- What is the core objective of digital twin?
- What level of data integration is required?
- What information is relevant?
- How should information be communicated?
- Where is the value of digital twin – visual communication or data insights?

Target Users

- Local Councillors / public representatives
- Public bodies and city councils
- Planning allied departments
- Research and academia
- Public networks / community-based organizations
- Public and communities

Geo-referenced and navigable platform (e.g., 3D Web-GIS)

Interactive and hyper-connected GIS-based environment
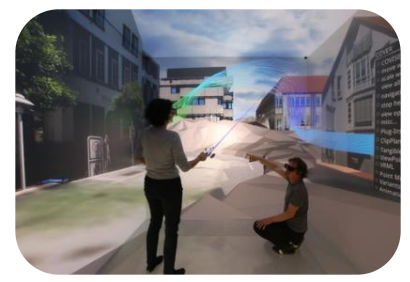
Immersive technologies (AR/VR) using communicative simulations

Geo-animations and simulation environment

Use Case Type I : Visual and Interactive Twins

Target Audience- Public/Citizens

Purpose - to engage with non-technical target groups

Examples

✓ *Smart DCU digital twin for autism-friendly navigation*

✓ *Prototypes of Docklands digital twin for community engagement*

✓ *Complementing the process of public consultation for DCC projects*
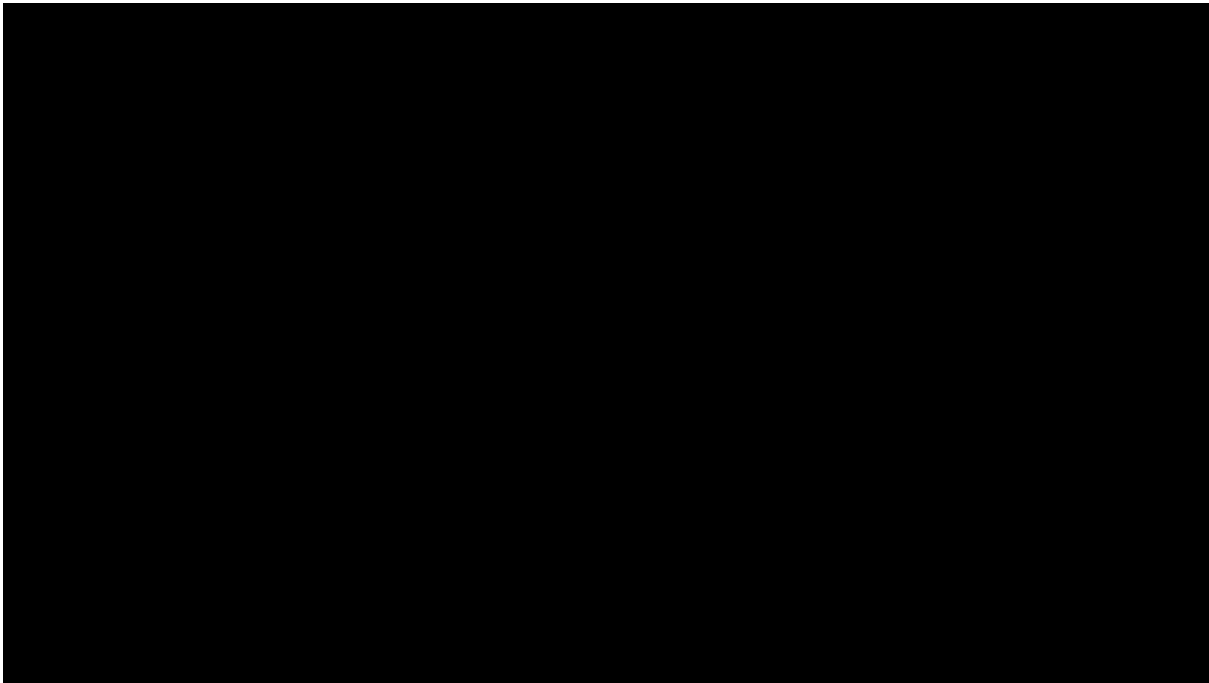
Geo-animation for Santry River Restoration and Greenway

Docklands model for citizen feedback

Use Case Type II : Dynamic and Intelligent Twins

Target Audience –technical or semi-skilled stakeholders

Purpose – informed planning decisions and situational awareness

Potential Partnerships

- ✓ *Digital Twin for Engagement (Dublin City Council's Smart City approach) with ICHEC under EuroCC2 Digital Innovation Flagship using Open Data and Docklands 3D model*
- ✓ *Multi-thematic planning use case for Smart D8 (a health and wellness district) by identifying planning relationships between different datasets such as air quality, parks and green area density, health and social services, active travel routes, housing, noise, community initiatives and other infrastructures*
- ✓ *Digital twin for emergency response by Dublin Fire Brigade for personnel training*
- ✓ *Exploring Citizen Science and Feedback for Digital Twins*

Broader Impact

"**JUST** and **GREEN** transition **LEAVING-NO-ONE-BEHIND** in **Digital Age**"

LEAVE NO ONE BEHIND

1 Proof of Concept

Trial and Test LDT use-cases

-Ethical and Governance Framework for design and deployment phases + Evaluate

2 Capacity Building

Build a Collaborative Ecosystem

-DT Interest Group @ DCC
-Local Stakeholder Groups

3 New Opportunities

Future partnerships

- EU funding calls and work with private enterprises
-EuroCC's DIF call

Community of Practice

EUROPEAN UNION
EU MISSIONS
100 CLIMATE-NEUTRAL AND SMART CITIES

LIVING-IN.EU

CITY INNOVATORS
by The Innovators Forum

EURO CITIES

OPEN & AGILE SMART CITIES

CITIES COALITION FOR DIGITAL RIGHTS

CitiesToday Institute

Bloomberg Philanthropies

Thank you!

Visit Homepage - Smart Dublin to know more.