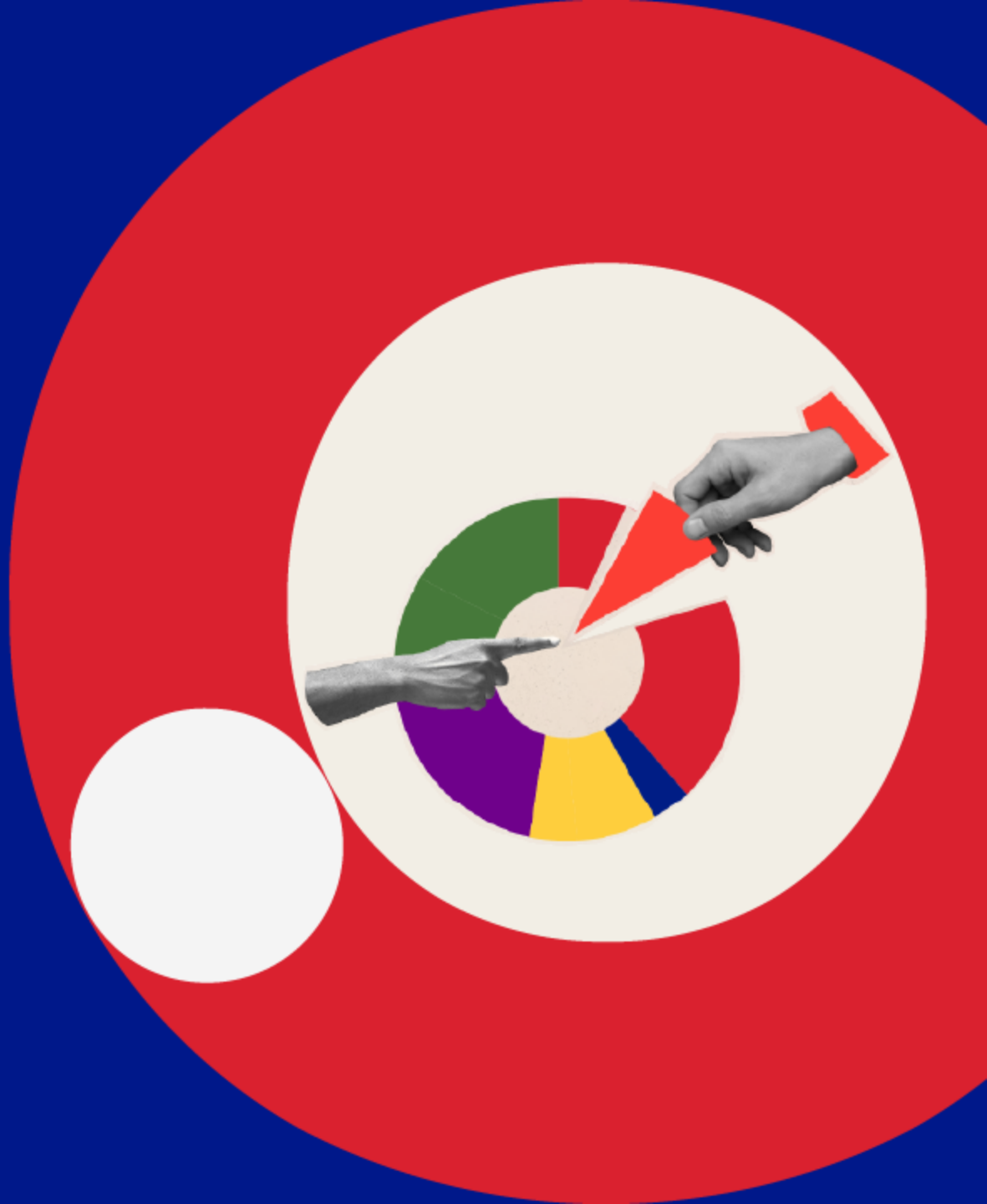
WEBINAR

Smart cities and digital twin technology: the case of Dublin



data europa academy

14 March 2025

10:00 – 11:00 CET

Rules of the game

The webinar will be recorded and published on the data.europa academy

For questions, please use the ClickMeeting chat

Please reserve 3 min after the webinar to help us improve by filling in our feedback form

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Agenda

10.00 – 10.05	Opening and introduction – *Flora Kopelou*
10.05 – 10.45	Smart Dublin: Deep-dive into Dublin's digital twin – *Mani Dhingra, Evan Smyth*
10:45 – 11:00	Q&A session & closing remarks – *Flora Kopelou*

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Introduction

Flora Kopelou
data.europa.eu,
Publications Office of the EU

Mani Dhingra
Smart City Digital Twin Manager,
Dublin City Council

Evan Smyth
Chief Software Architect,
Irish Centre for High-End Computing (ICHEC)

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SMART CITIES & DIGITAL TWIN TECHNOLOGY

THE CASE OF DUBLIN

Presented by

Dr. Mani Dhingra (She/Her)

Digital Twin Programme Lead

Smart Cities, Dublin City Council

E: mani.dhingra@dublincity.ie

Comhairle Cathrach Bhaile Átha Cliath
Dublin City Council

SMART DUBLIN

Overview

- Smart City unit at Dublin City Council
- Timeline of Digital Twin Programme
- Open 3D models supporting Innovation
- Proof of Concepts and examples
- Challenges and Opportunities

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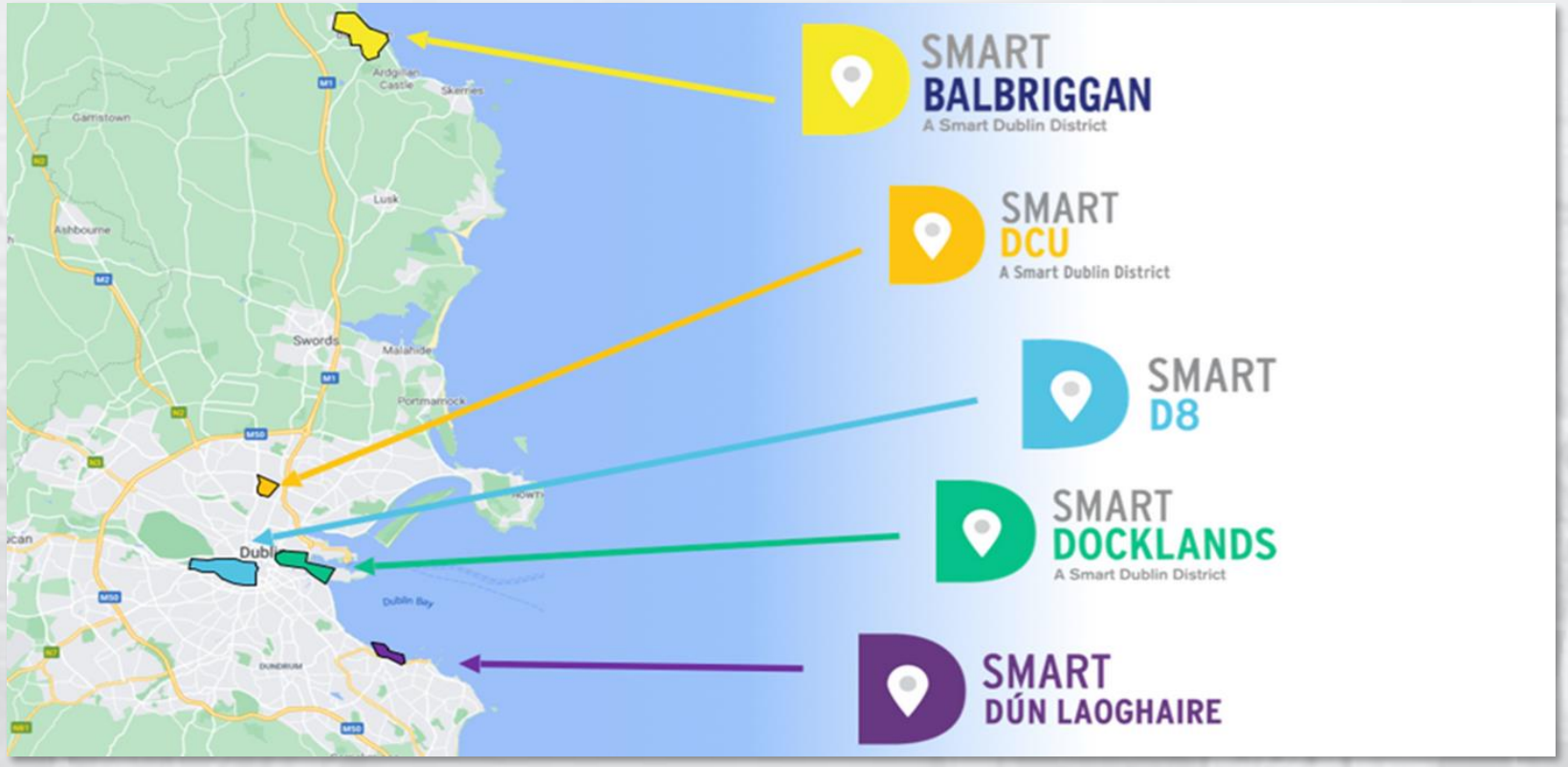
- Smart City unit at Dublin City Council
- Timeline of Digital Twin Programme
- Open 3D models supporting Innovation
- Proof of Concepts and examples
- Challenges and Opportunities

- Rethinking our Approach
- Building Local Stakeholder Network
- Transnational EU project Twin4Resilience
- Digital Twin for Engagement – ICHEC project
- Collective Effort to Dublin Digital Twins

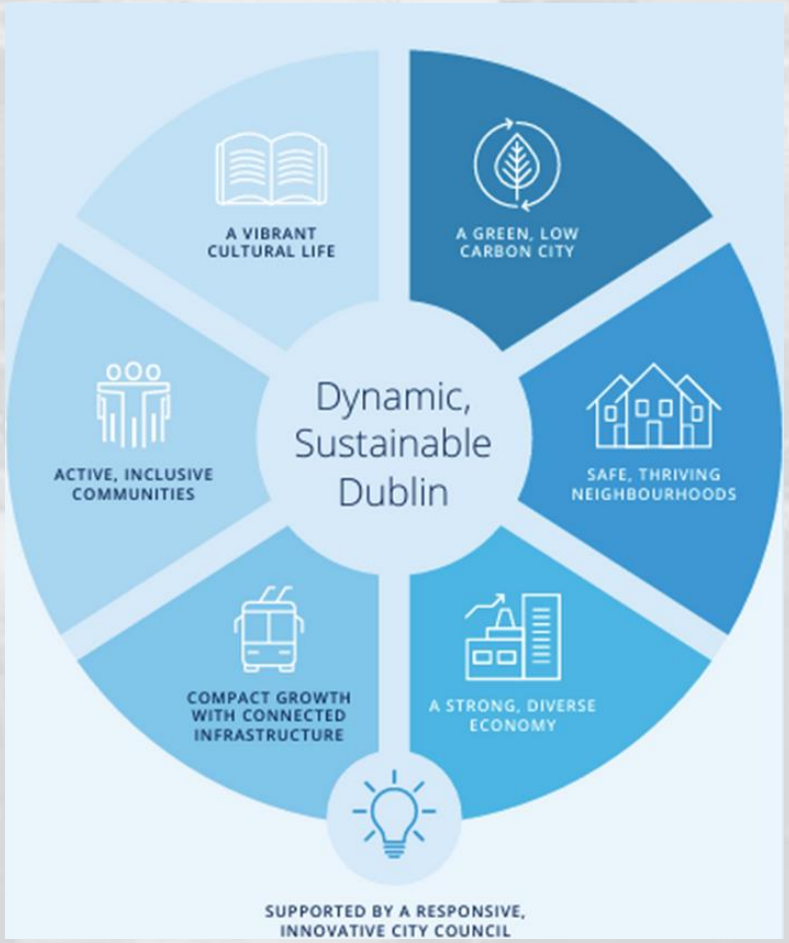
SMART DUBLIN

SMART DUBLIN



An initiative of the **FOUR DUBLIN LOCAL AUTHORITIES** to engage with technology providers, researchers and citizens for solving local urban challenges by leveraging smart districts programme.

DUBLIN CITY COUNCIL



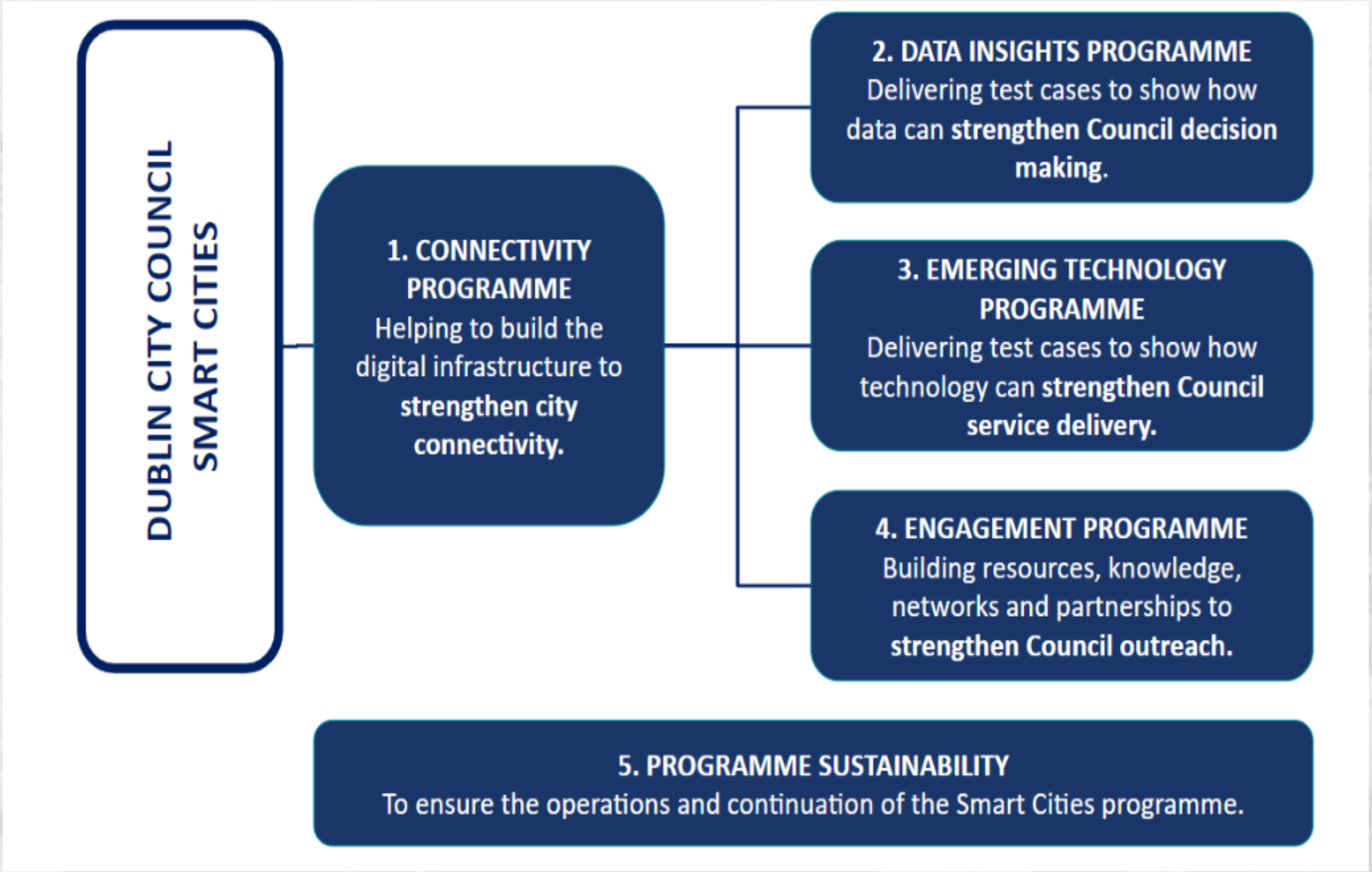
Vision:

Make Dublin a Dynamic and Sustainable City

6 PRINCIPLES

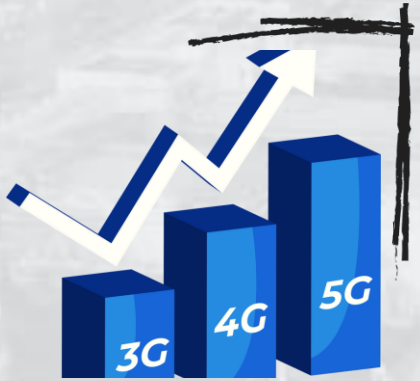
- Commitment to excellent Public service
- Sustainability
- Leadership
- Ambition
- Fairness
- Accountability

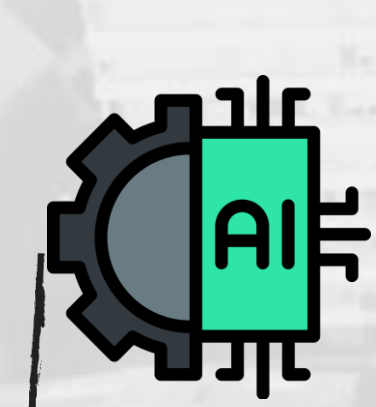
Corporate Services and Transformation Department



3. EMERGING TECHNOLOGY PROGRAMME

Delivering test cases to show how technology can **strengthen Council service delivery.**





TRIAL

EVALUATE

SCALE

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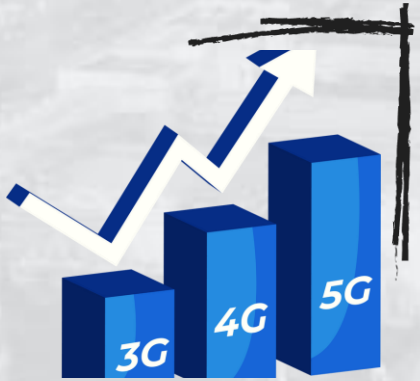

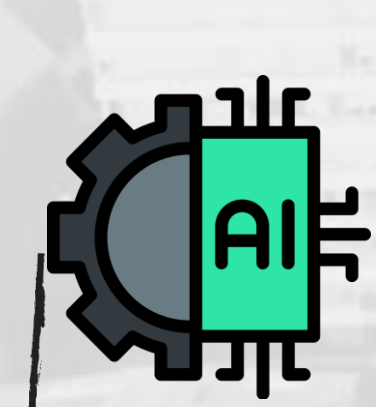

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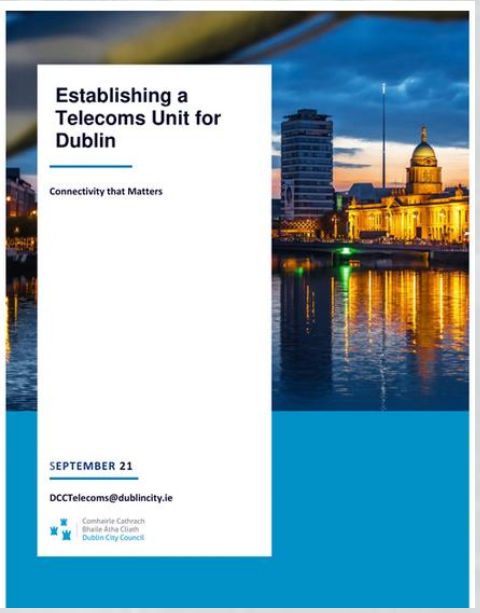
EVALUATE

SCALE



DUBLIN'S TIMELINE

from 3D modeling to Digital Twins

2018

3D model of Docklands area procured

2019

3D Hackathon using open 3D model

2020 – 2021

Data Capture

Drone surveys and mapping of selected Dublin areas

2021-2022

Proof of Concepts:

- *Smart DCU*
- *Dublin Fire Brigade*
- *Docklands Twin*

2023

Smart City Digital Twin Programme

Explore internal engagement use cases - 3D visualization and geo-animations for public engagement

2024

Digital Twin Projects

- Twin4Resilience
- Data Insights for Active Travel
- ICHEC DIF project

2025

DCC Digital Twin Strategic Roadmap

- BIM Strategy
- GIS Strategy
- Common Data Environment
- Multistakeholder collaboration

Docklands 3D model

Exploring innovation

Dublinked
Open Data Store

3D DATA HACK DUBLIN

Docklands 3D model

Exploring innovation

Cities 110 (2021) 103064

Contents lists available at ScienceDirect

Cities

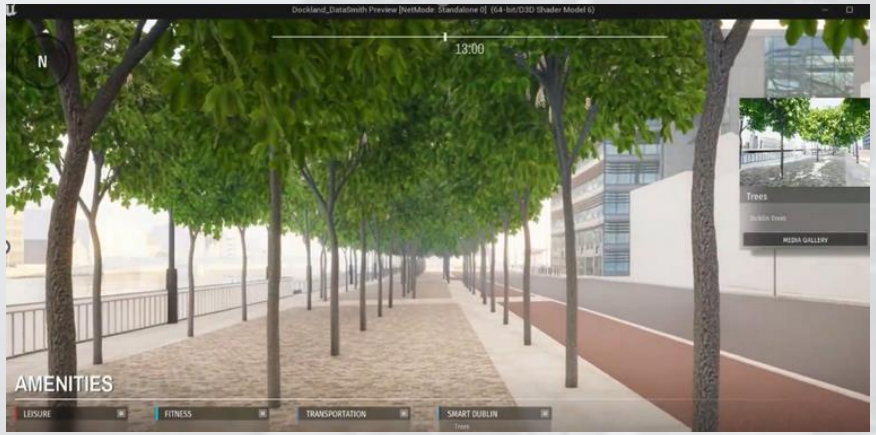
journal homepage: www.elsevier.com/locate/cities

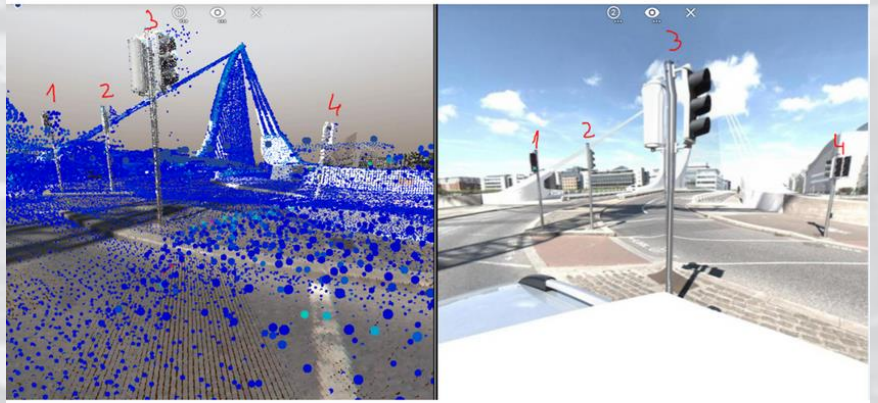
A digital twin smart city for citizen feedback

Gary White *, Anna Zink, Lara Codecá, Siobhán Clarke

Trinity College Dublin, College Green, Dublin 2, Ireland

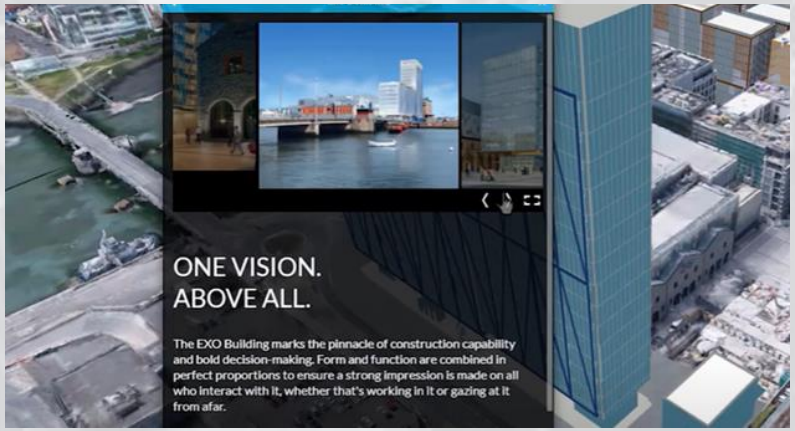
ARTICLE INFO ABSTRACT





PROOF OF CONCEPTS

Docklands



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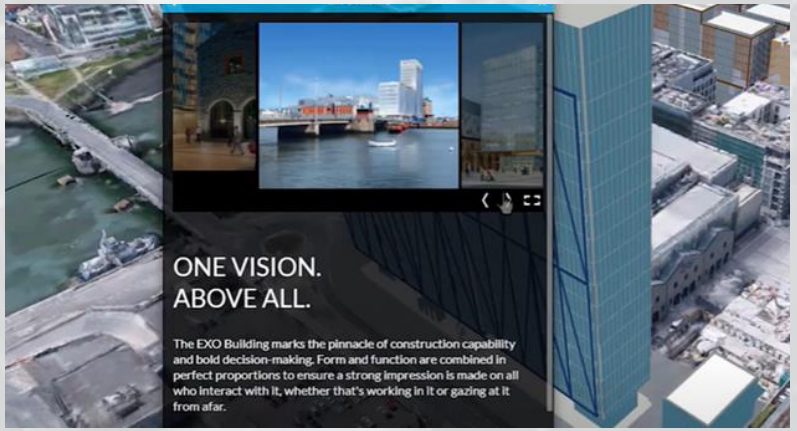
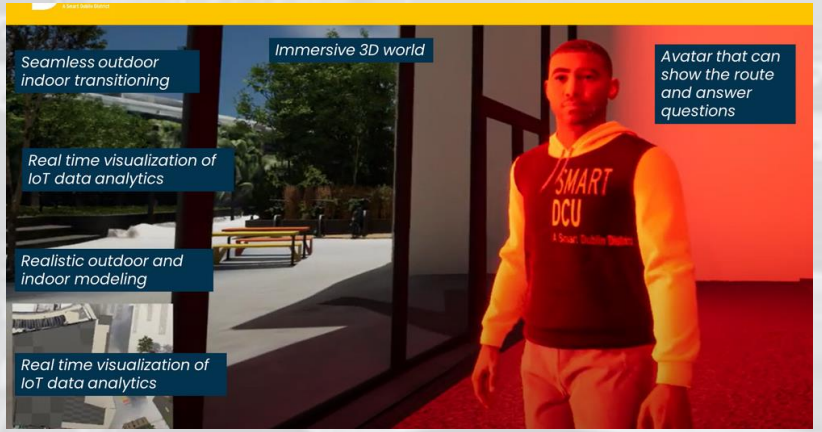


Smart DCU



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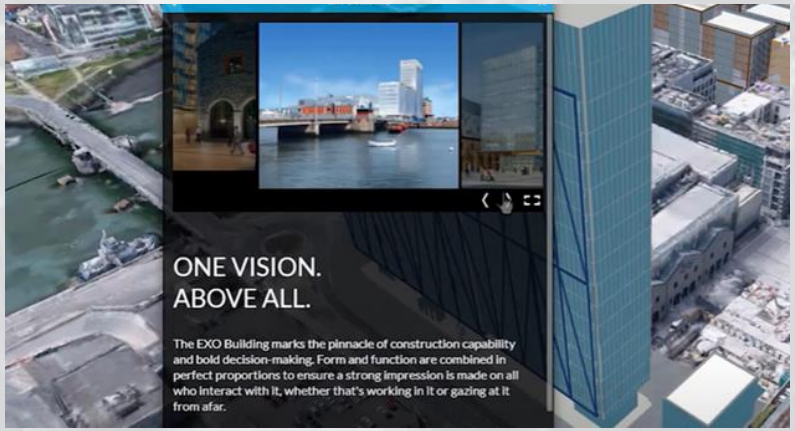
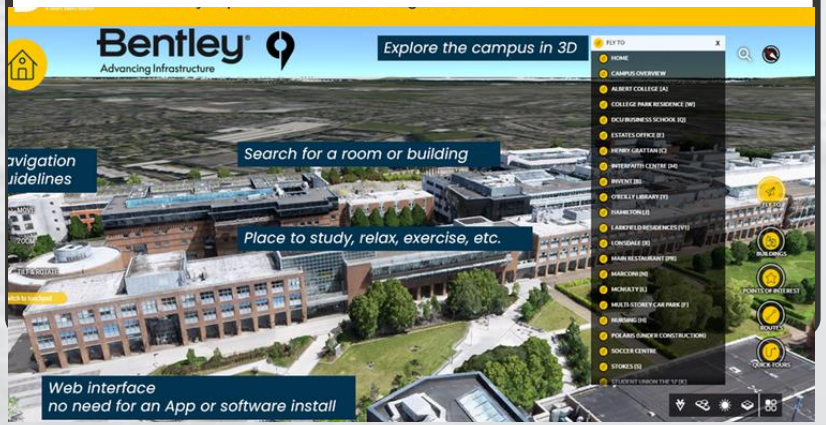
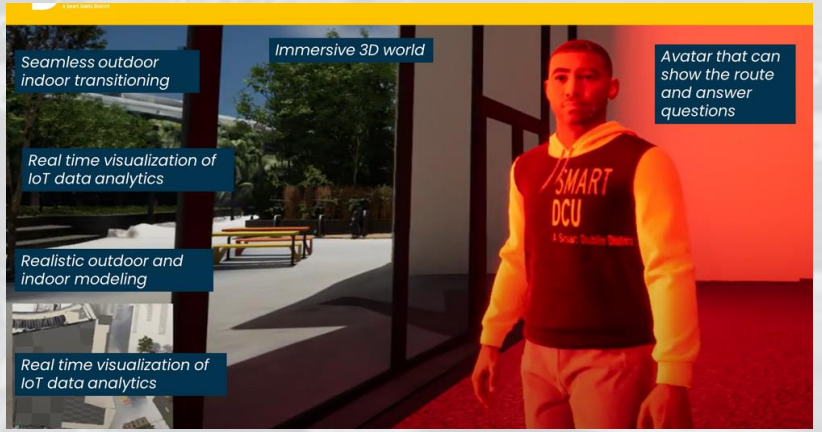
Docklands

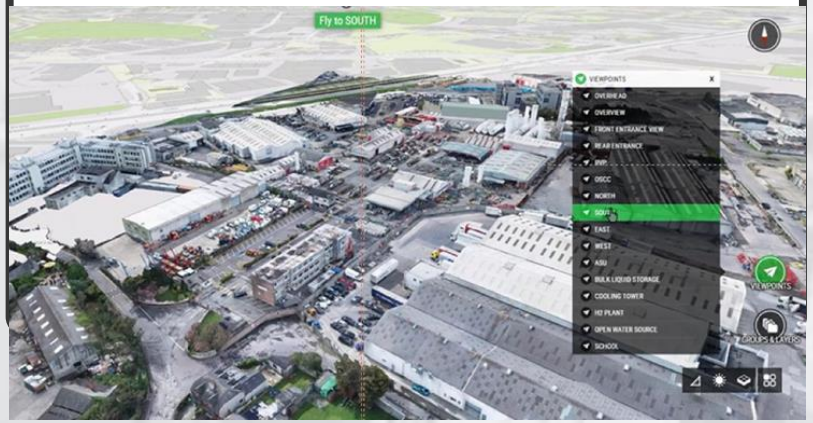


Smart DCU





Dublin Fire Brigade



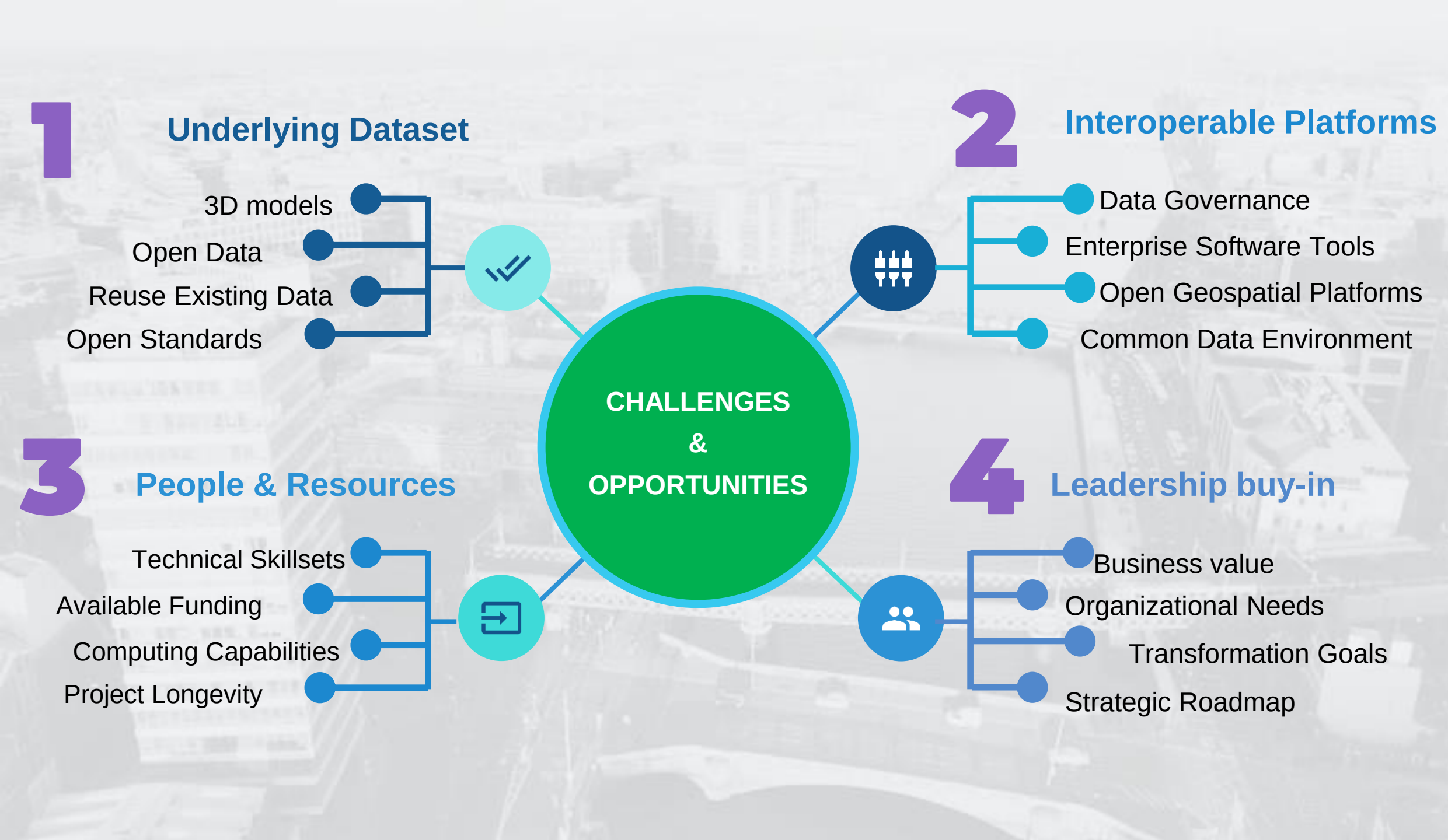
CHALLENGES
&
OPPORTUNITIES

1 Underlying Dataset

2 Interoperable Platforms

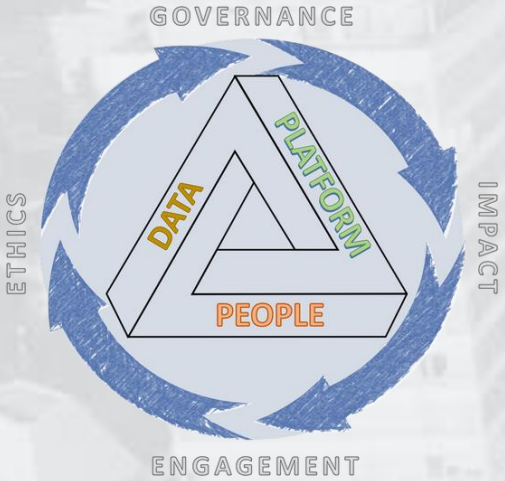
3 People & Resources

4 Leadership buy-in

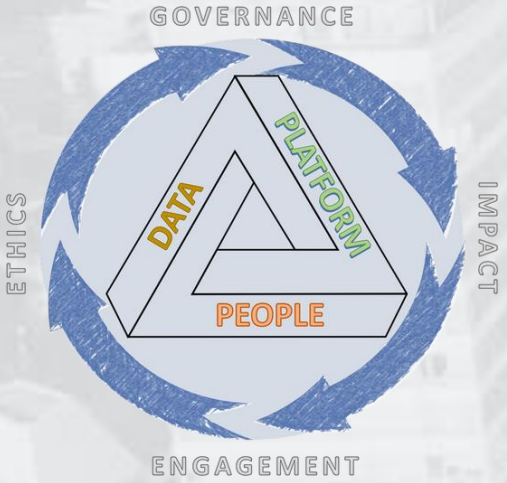

1
Underlying Dataset
3D models
Open Data
Reuse Existing Data
Open Standards
2
Interoperable Platforms
Data Governance
Enterprise Software Tools
Open Geospatial Platforms
Common Data Environment
CHALLENGES
&
OPPORTUNITIES
3
People & Resources
Technical Skillsets
Available Funding
Computing Capabilities
Project Longevity
4
Leadership buy-in
Business value
Organizational Needs
Transformation Goals
Strategic Roadmap

'RETHINKING'....

Our
Digital
Transformation
Strategy
2025 - 2030


GOVERNANCE
ETHICS
IMPACT
ENGAGEMENT
DATA
PLATFORM
PEOPLE

‘RETHINKING’….



1

DATA GOVERNANCE

- Identify good quality available data for developing DT model.
- Understand data and their format requirements.
- Saving, storing and dealing with large and heavy datasets underpinning these models.
- Keeping data up-to-date.
- Ownership, hosting and sharing of data.
- Making data available for different users while ensuring interoperability.
- Check how other cities are doing it.

2

INTEGRATION PLATFORM

- Integrate historical data, layer-wise information, and real-time sensor data to base model.
- Develop an accessible (web/app-based user interface on PC/laptop, mobile phone), open-source, and interactive digital twin model.
- Use of data analytics and AI to generate insights/scenarios for decision-making.
- Access data internally by various city departments, understanding where DT can be hosted, its security and cyber concerns, and how to scale solutions.

3

USE CASES

- Identify potential use cases and thematic challenges for trail and test initial digital twin framework
- Identify best visualization tools for a higher level of engagement with communities and stakeholders.
- Evaluate outcomes of use cases and revise digital twin framework.
- Trial and test immersive technologies such as VR/AR.
- Assess impact of using different models of engagement with community and stakeholders.

4

DIGITAL RIGHTS

- Identify ethical challenges and concerns in using digital twin technologies.
- Develop general framework of digital ethics and align with digital rights framework and practices at DCC.
- Mitigate digital rights and ethical issues using a data governance framework.

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 Steering Group @ DCC

-Local Stakeholder Groups

3

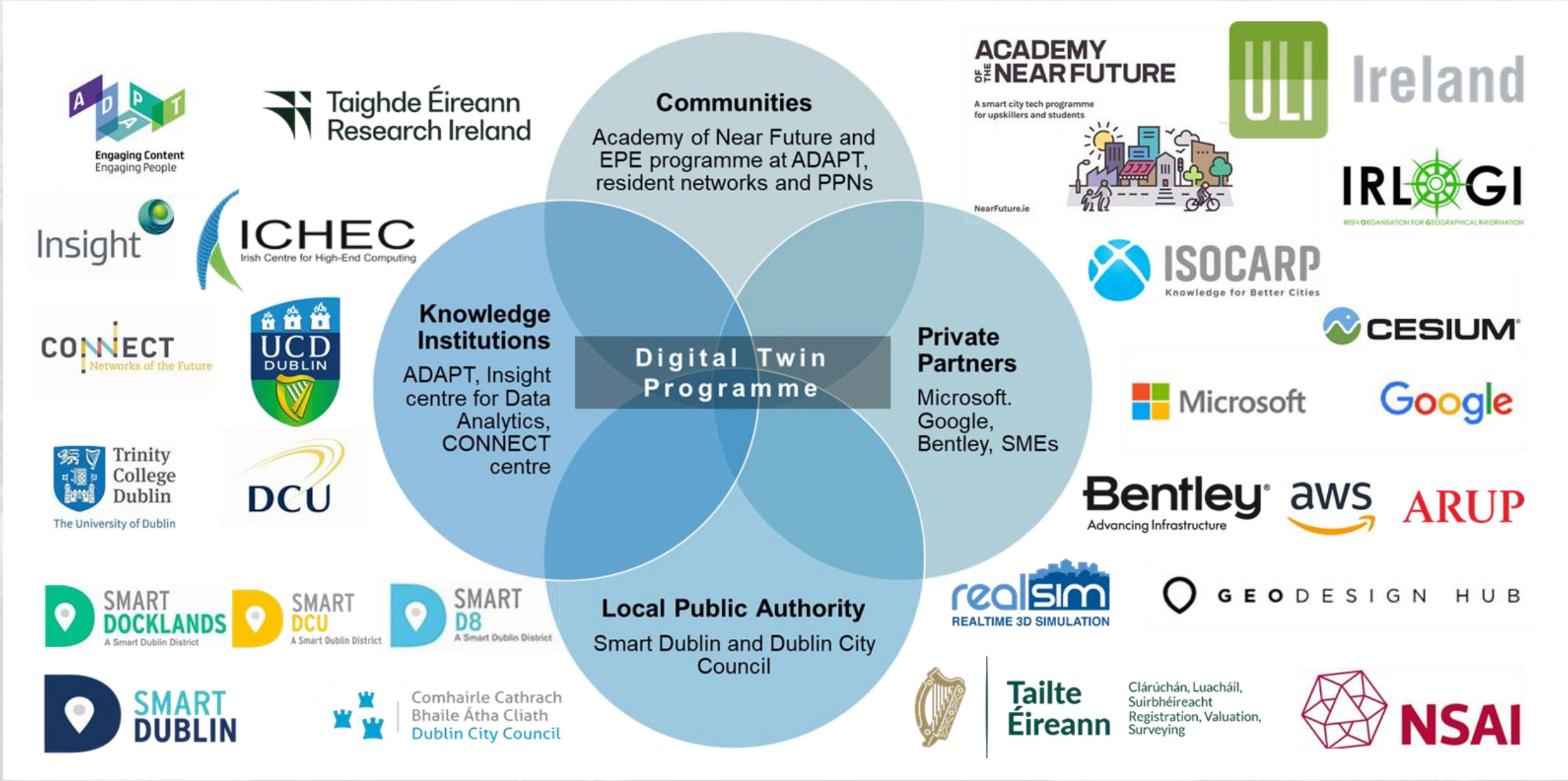
New Opportunities

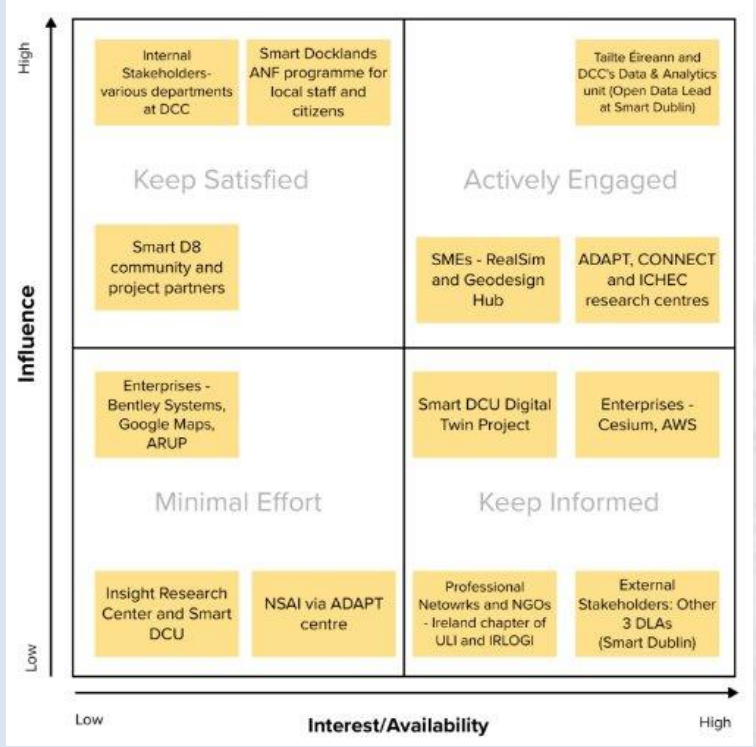
- Partnership for Healthy Cities

- INTERREG NWE Twin4Resilience project

- EuroCC’s DIF call

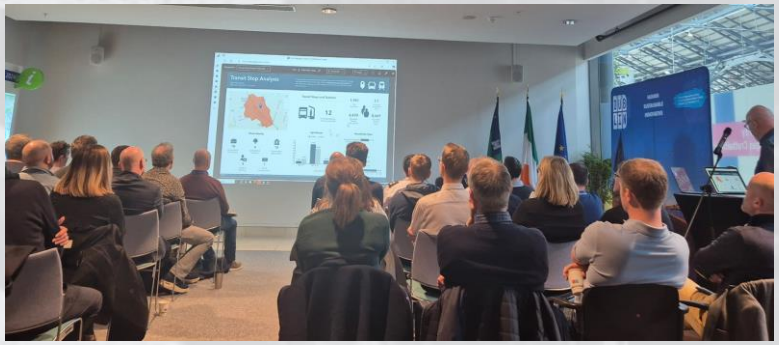
Local Stakeholder Network - Dublin

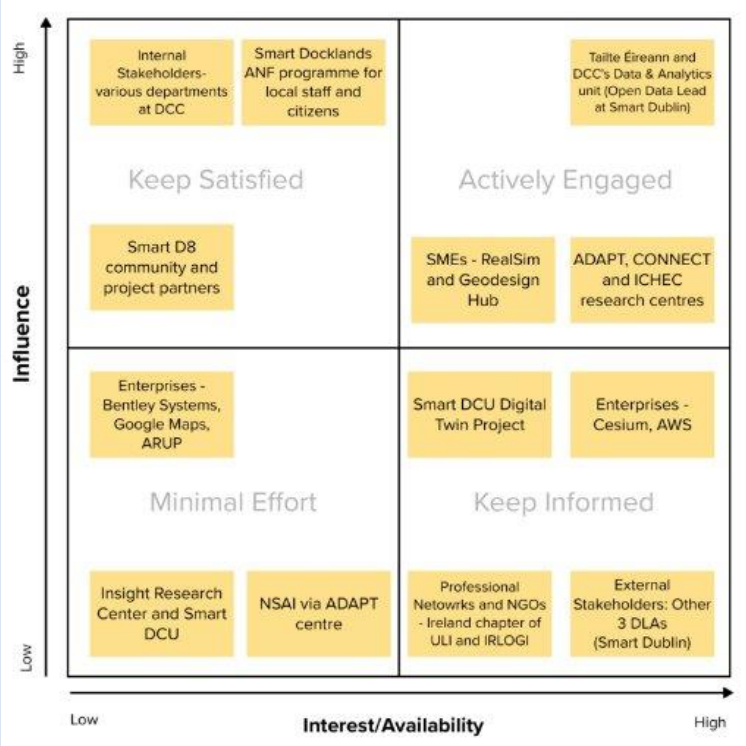




DCC Engagement Strategy:

- Digital Twin Advisory Group
- DCC Steering Group
- Smart City Digital Twin Team





DCC Engagement Strategy:

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Traffic Unit - Digital kerbside management; Accessibility management; Bike Sharing in Real time

Active Travel Data Insights

Protection of Water Bodies - Flood management & response

Sustainable Urban Drainage System

Emergency Response and Pre-incident planning by Dublin Fire Brigade

Urban Mobility and Transportation

BIM as common data environment

Planning - Development Plan & Urban Policymaking

Situational Awareness and Data Insights

Emerging Digital Twin use-cases at DCC

Building Information Modelling (BIM) and Planning

Collaboration and Engagement

Comms with Active Travel users through data

Engagement through Docklands model

Citizen engagement for planning

Urban Development

Drone Unit – Urban Air Mobility

Adaptive Reuse & Housing - Vacant Commercial Properties management and regeneration; Targeted Area Planning

Corporate property management

Environmental & Climate Action

Climate Scenario Modelling

Climate Action through Planning Proposals

Climate Action and Retrofit Targets

Adaptation and Risk Mitigation

Data Management through AI

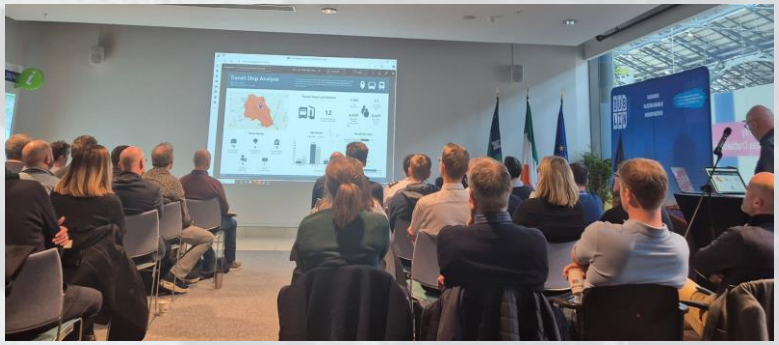
Data Management and Governance

Geospatial management & 3D data capture

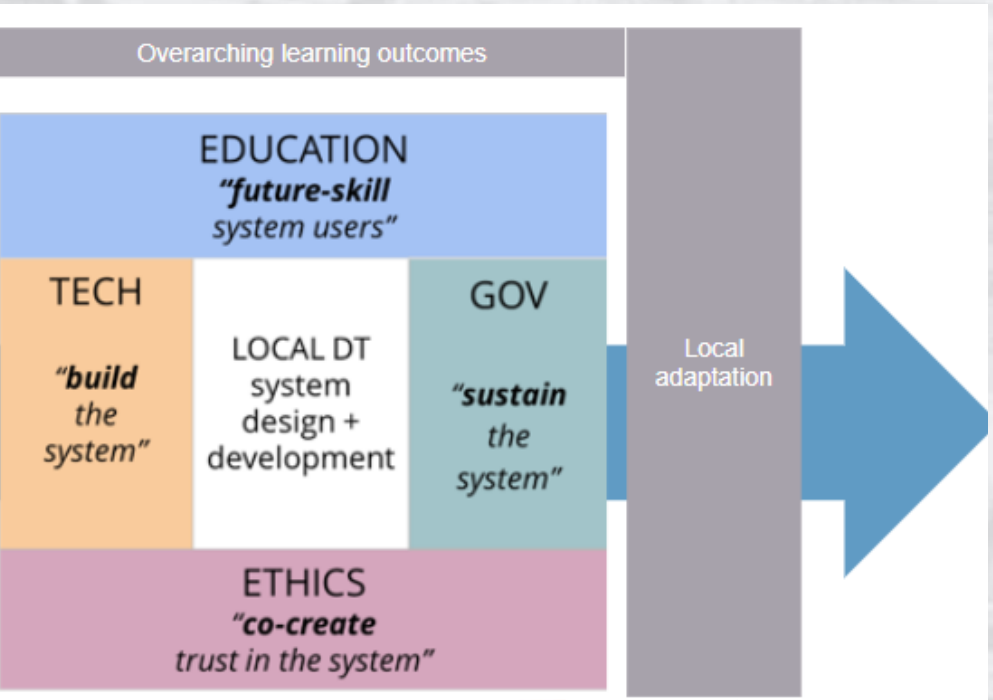
Data harmonisation & standardisation

Safe Contracts & business resourcing for software solutions

Open & high Value Datasets

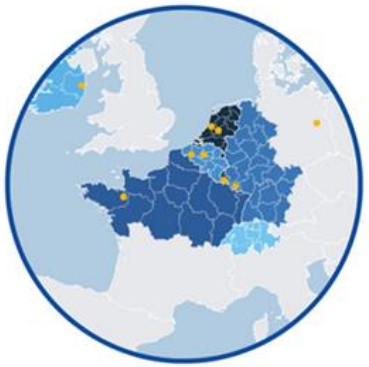


Transnational European Cooperation Twin4Resilience (T4R) project 2024 to 2027



Joint Implementation — **Resilient Pilot Actions** — **Resilient People**

- Improve understanding and capacity: Providing civil servants, planning companies, and citizens with comprehensive knowledge about the benefits and limitations of using LDTs.
- Support inclusive deployment: Making sure that LDTs are integrated democratically, affordably, and sustainably into decision-making processes across various public authorities.
- Close the gap: Bridging the divide between cities already using LDTs, those considering them, and those unaware of their potential.

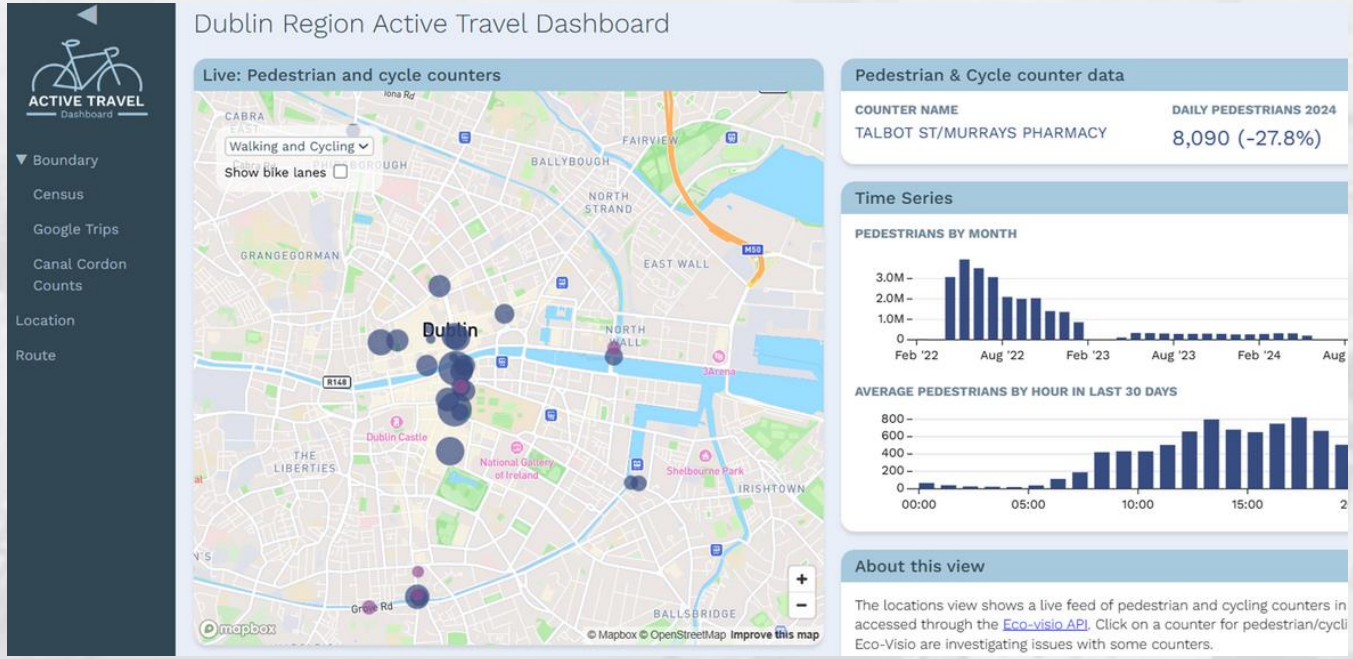


Resilient Pilot Actions

Docklands 4D Planning

Integrating historical data, real-time developments and future proposals into an updated 3D model to serve as an essential resource for decision makers, urban planners, developers and businesses.

Resilient Pilot Actions



Docklands 4D Planning

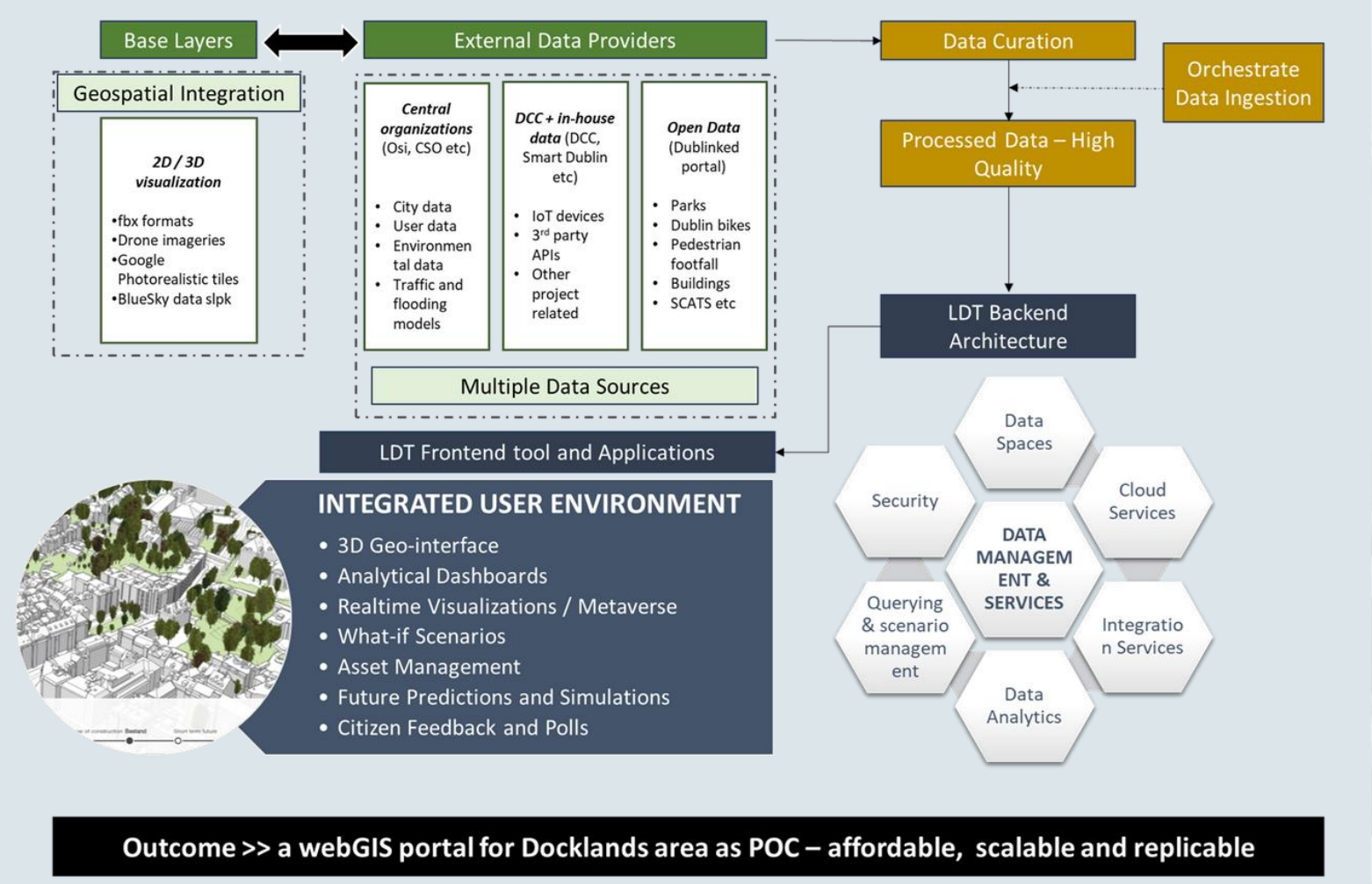
Integrating historical data, real-time developments and future proposals into an updated 3D model to serve as an essential resource for decision makers, urban planners, developers and businesses.

Active Travel Data Insights

Creating an Active Travel Digital Twin to assess impact of new cycling and walking routes for pre and post construction phases along with other environmental and health indicators.

Digital Twin for Engagement (DT4E)

- Partnership with Irish Centre for High End Computing (ICHEC) under Digital Innovation Flagship call 2023
- DT4E intends to explore use-cases to innovate, trial and test digital twin solutions for better public engagement.



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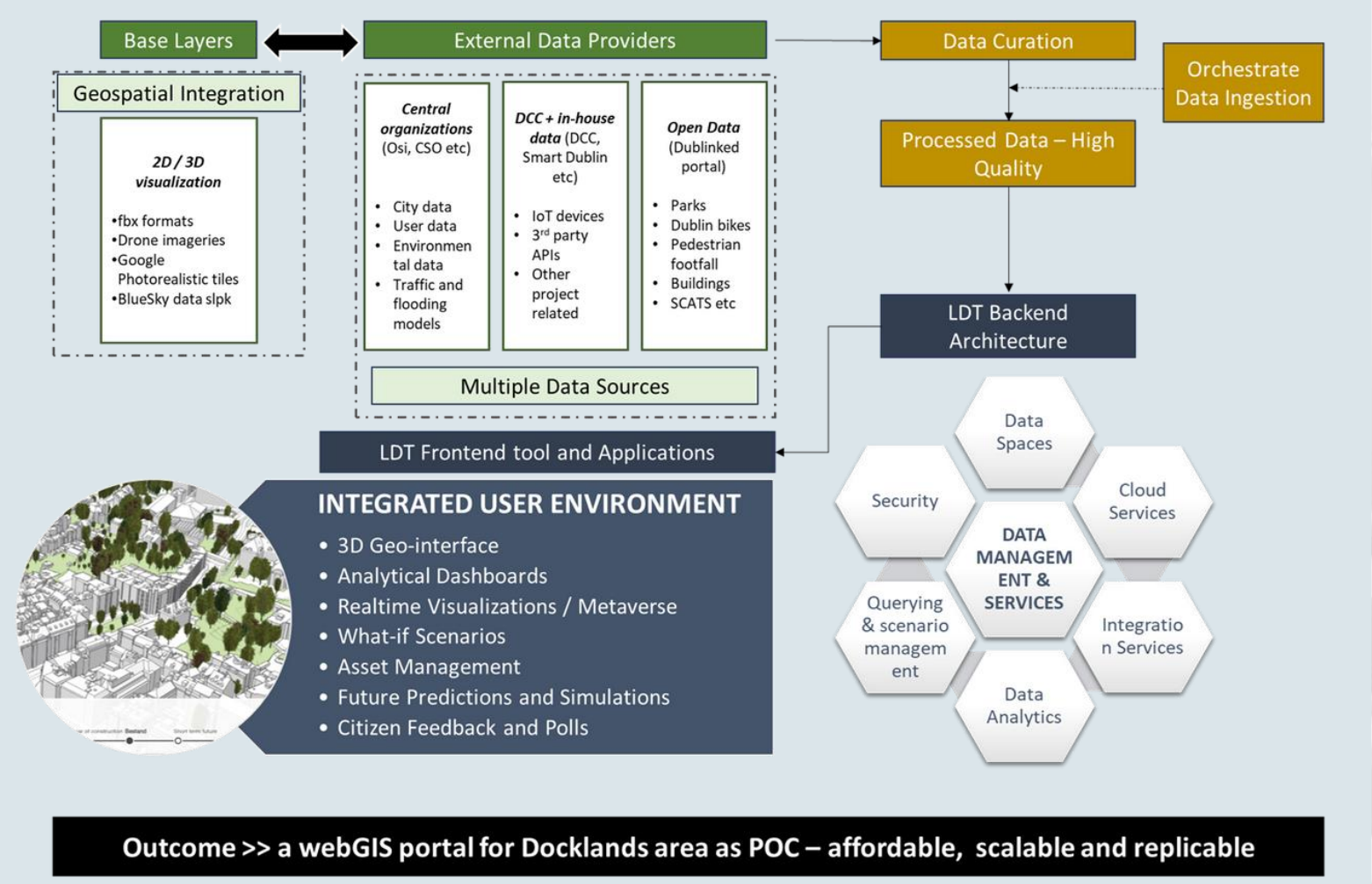
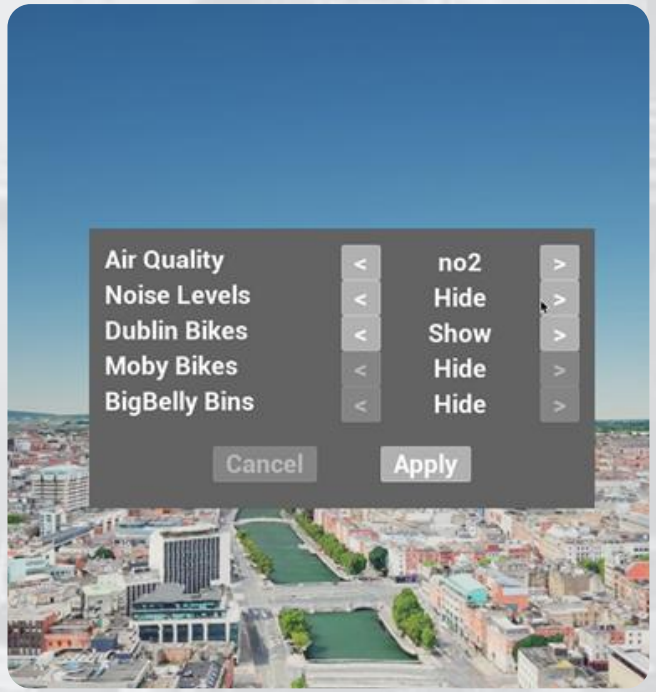
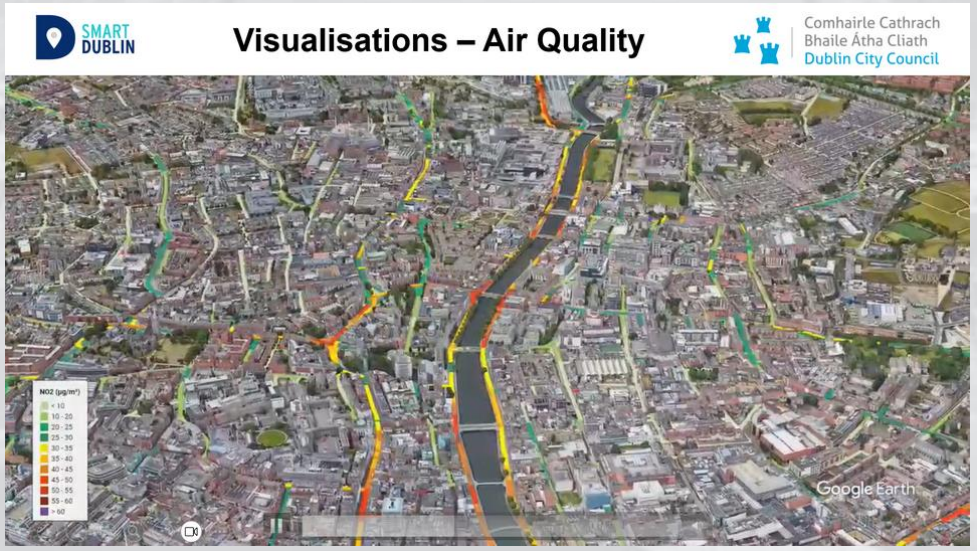




Our Challenges

- Lack of city scale 3D model
- Data quality and availability
- Online interoperable platform
- In-house technical skills

Levels of Detail (LOD)	Description	Pros, Cons, Use cases		Engagement Level				
				Inform	Consult	Involve	Collaborate	Empower
LOD 1 - 2: Prosmatic models		Pros	Lightweight and computationally efficient.					
		Cons	Users might get lost in the twin because no enough spatial details; the lack of accuracy may not satisfy in-depth analysis.					
		Use cases	**General planning; basic-level public engagement; base layer for visualization; initial project assessments; basic simulation; early stakeholder engagement.**					
LOD 3: Complex polyhedral models		Pros	Detailed representation allows for more accurate analysis. Balances realism and computational efficiency.					
		Cons	Increased computational requirements					
		Use cases	**Advanced urban analysis; lower-level public engagement; detailed simulations; stakeholder engagement.**					
LOD 4: Photorealistc textured models		Pros	Highly realistic representation for immersive experiences.					
		Cons	High computational demands may limit accessibility.					
		Use cases	**Detailed simulations; high-level public engagement; marketing; decision-maker presentations.**					



Resolving issue of city scale 3D model

- *LOD - Engagement Matrix*
- *Geo-animations & Visualization using Google Earth*

A Collective Approach to Dublin Digital Twins

A Collective Approach to Dublin Digital Twins

DATA

Common Data Resources and Management

A Collective Approach to Dublin Digital Twins

DATA

Common Data Resources and Management

DIGITAL

Leveraging Existing Tools, Licenses and Partnerships

A Collective Approach to Dublin Digital Twins

DATA

Common Data Resources and Management

DIGITAL

Leveraging Existing Tools, Licenses and Partnerships

TECHNOLOGY

Integrating city IoT network, cloud services and AI with geospatial platform

A Collective Approach to Dublin Digital Twins

DATA

Common Data Resources and Management

DIGITAL

Leveraging Existing Tools, Licenses and Partnerships

TECHNOLOGY

Integrating city IoT network, cloud services and AI with geospatial platform

TRANSFORMATION

Bringing Staff and People on a Strategic Digital Transformation Journey

Thank you!

For more info –
Homepage - Smart Dublin

Email -
smartcity@dublincity.ie
mani.dhingra@dublincity.ie

Publications | *Google Scholar* | *ORCID*

Thank you!

For more info –
Homepage - Smart Dublin

Email -
smartcity@dublincity.ie
mani.dhingra@dublincity.ie

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DT4E - Smart City Digital Twin for Engagement

** EuroCC2 Digital Innovation Flagship 2023*

- *Co-develop EU-compliant digital twin platform for Dublin City Council*
- *Integrate diverse data sources into a geospatial interface*
- *Evidence-based decision-making*
- *Improved communication with citizens*

Partners: *Dublin City Council (DCC), ADAPT (SFI Research Centre)*

* The EuroHPC National Competence Centre (EuroCC) in Ireland run by ICHEC provides high-performance computing and data platforms, technologies and expert support to academic researchers, enterprises and public sector organisations. Under EuroCC, the Digital Innovation Flagship (DIF) Programme implements a number of lighthouse projects with complex computational workflow and data-centric focus.

DT4E
Digital Twin for Engagement

evan DOT smyth AT ichec DOT ie

DT4E: Proof of Concept

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- Desired Characteristics

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  - Low-barrier to entry

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Play Video…

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Ollscoil na Gaillimhe
University of Galway

ICHEC
Irish Centre for High-end Computing

EURO
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Q&A

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Publications Office of the EU

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Dublin City Council

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Chief Software Architect,
Irish Centre for High-End Computing (ICHEC)

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Target audience: Civil servants

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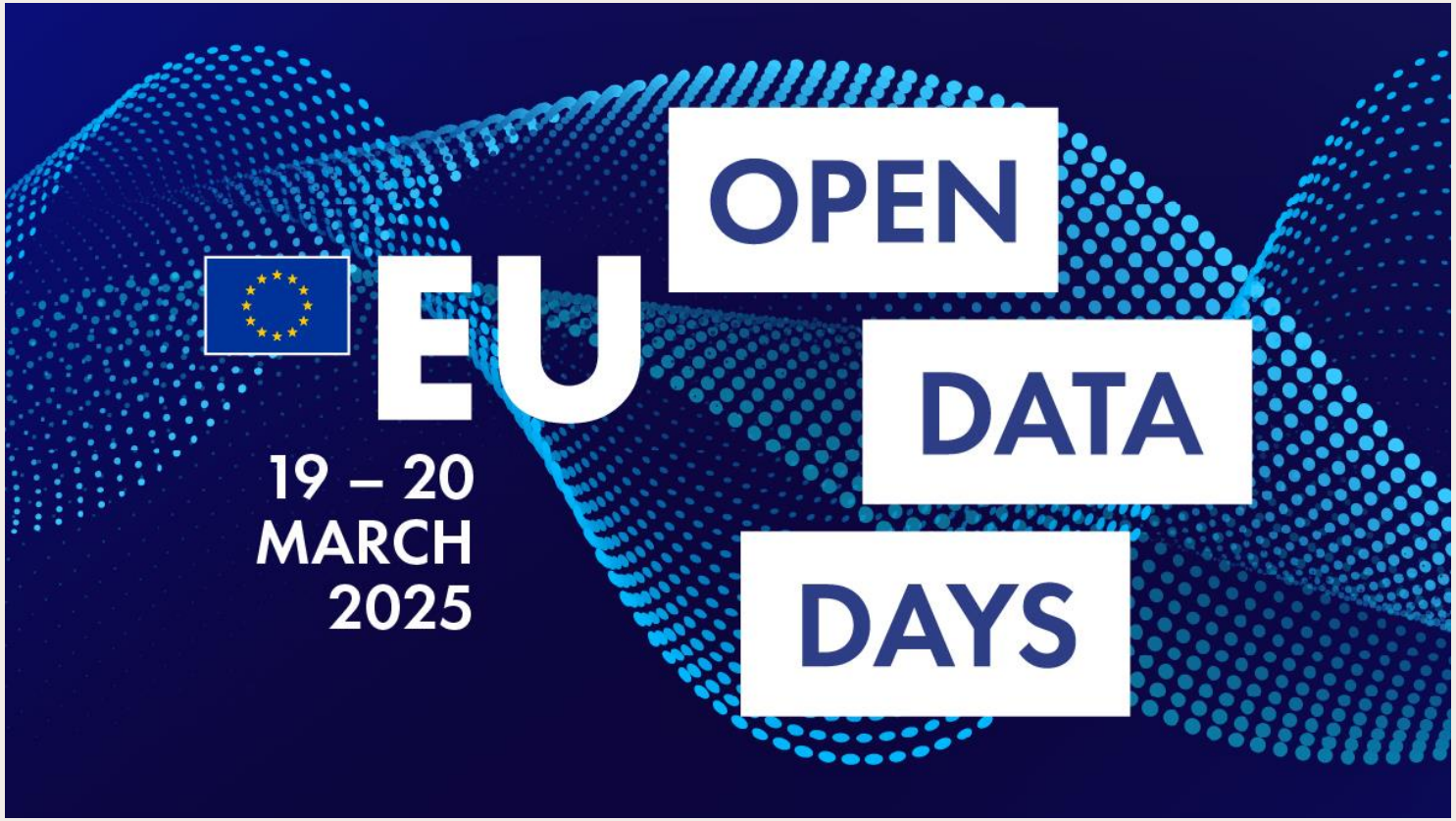

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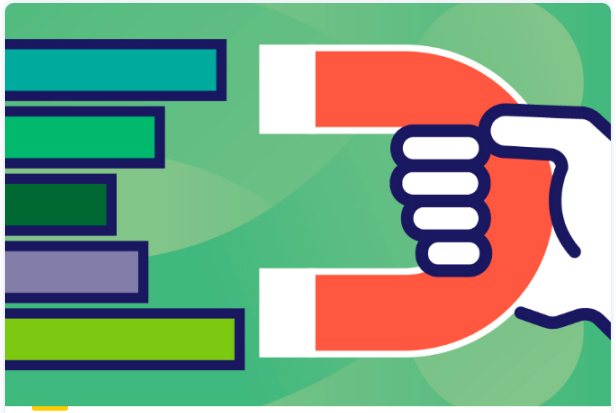
Connect with a vibrant community of data enthusiasts!

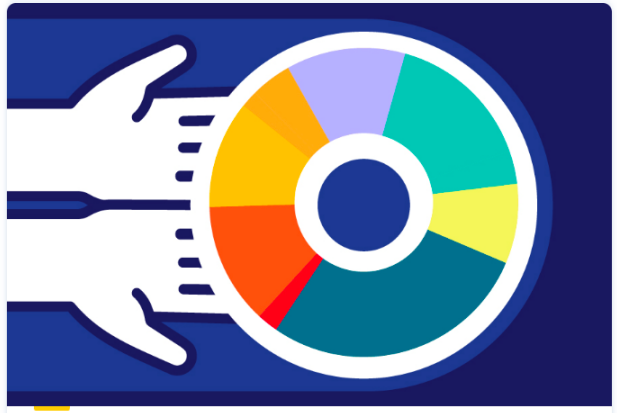
This space is designed for users to share ideas and exchange challenges and opportunities in the scope of the constantly evolving data landscape. You can join the group and topic you prefer, follow and be updated on ongoing conversations and participate in discussions on topics that matter to you.

Whether you are a data provider or a data reuser, you will find a dedicated space for collaboration where you can foster meaningful discussions.

If you are an official data provider, you can request access to this restricted forum, and we will carefully analyse your request. If you are a data reuser, you can join and will have direct access to this community to connect and engage with other members.



Data reusers



Data providers

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Your opinion is important to us!

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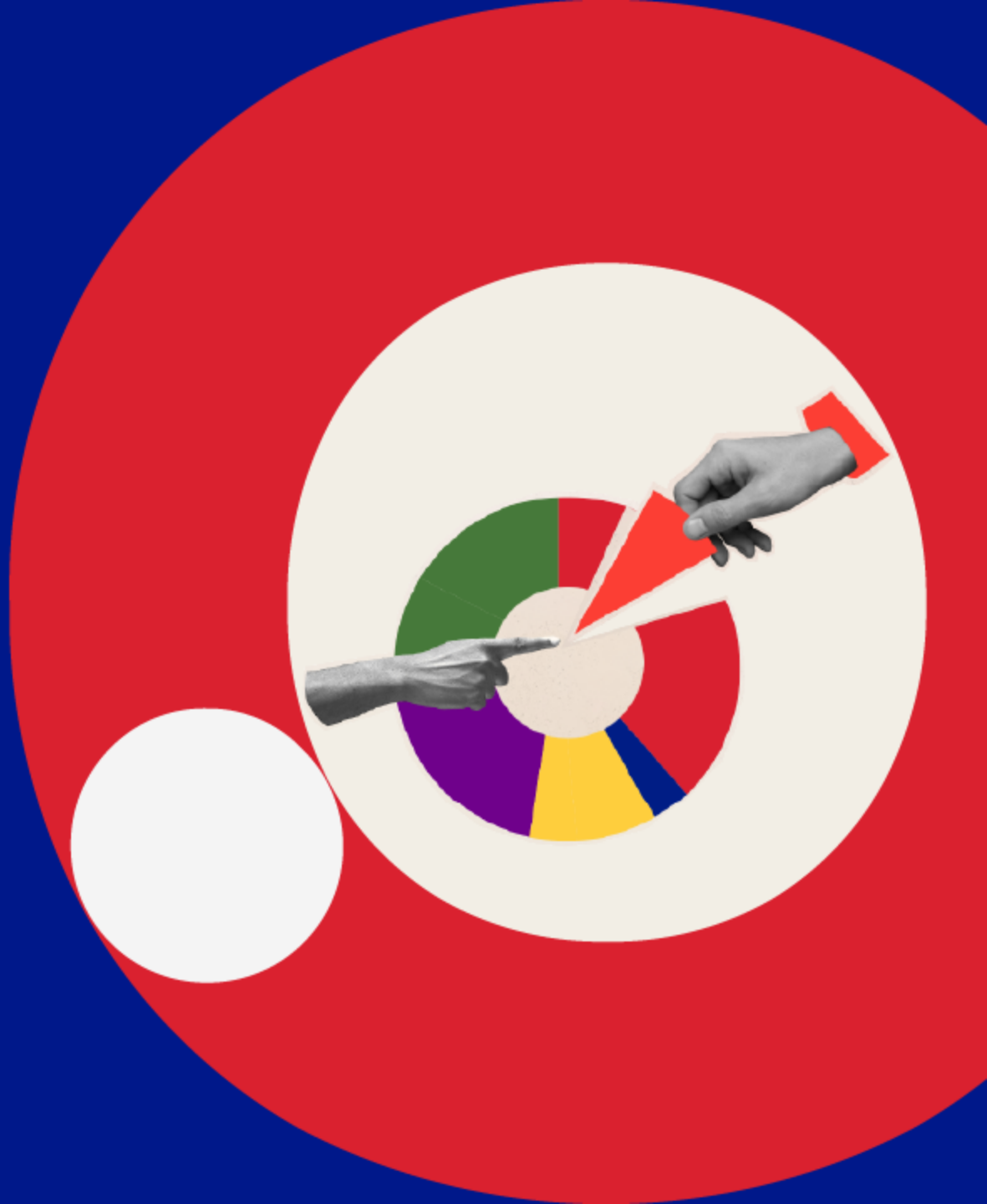
Thank you!



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