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FINLAND

ROAD TO CITIVERSE

Next phase of travel to Citiverse

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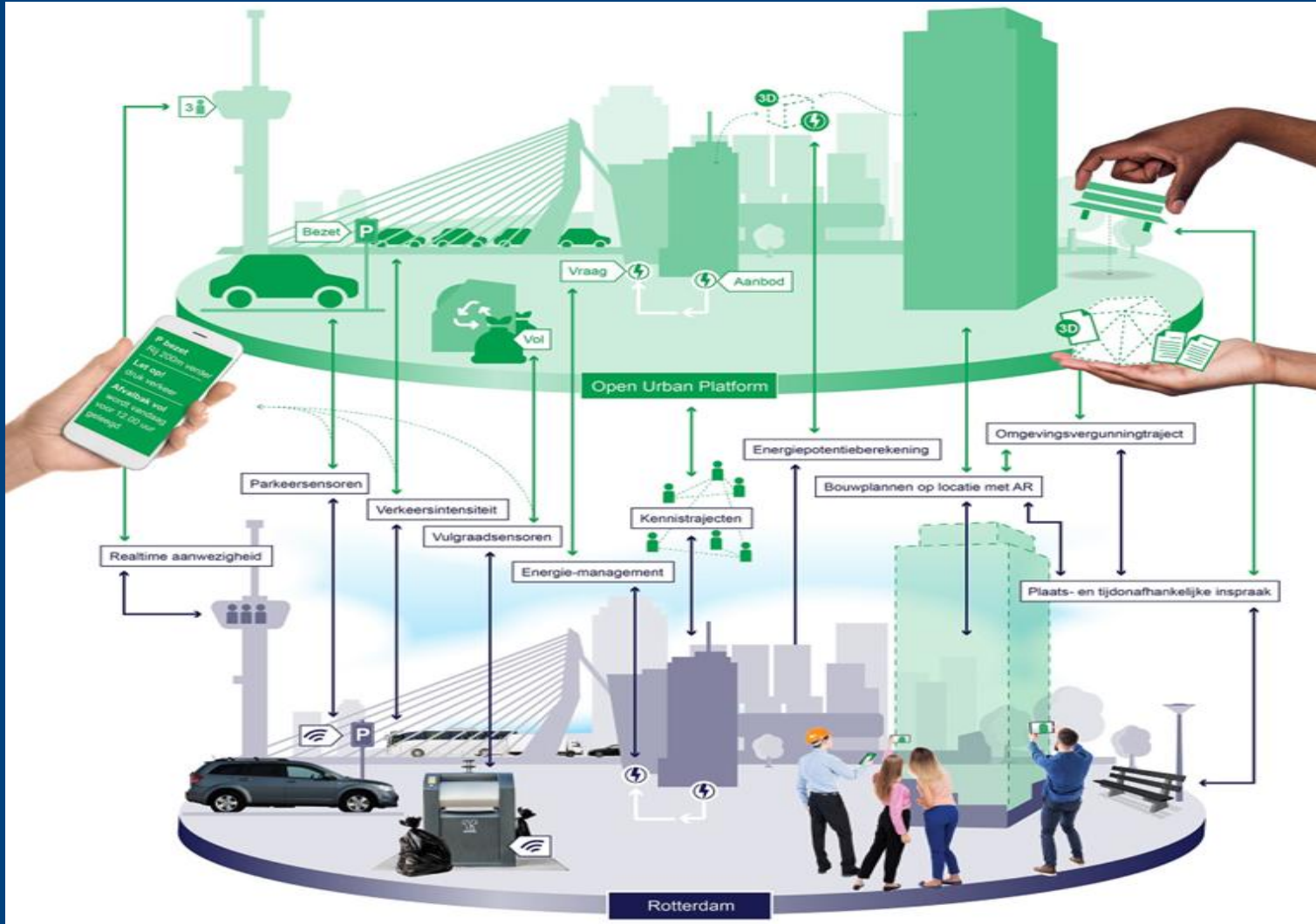


Definitions of Citiverse

- Multiple definitions
- It is not a metaverse in the city
- A fusion of physical, digital and social worlds
- Roadmap for implementation goals
- Must be entirely centered around the inclusivity of citizens
- Case Rotterdam

The citiverse is an emerging, human-centred digital ecosystem that combines digital twins, virtual reality and AI to create interconnected 3D models of real-world cities.

(Source: UN Executive Briefing: AI, Spatial Intelligence and the AI Enabled Citiverse)



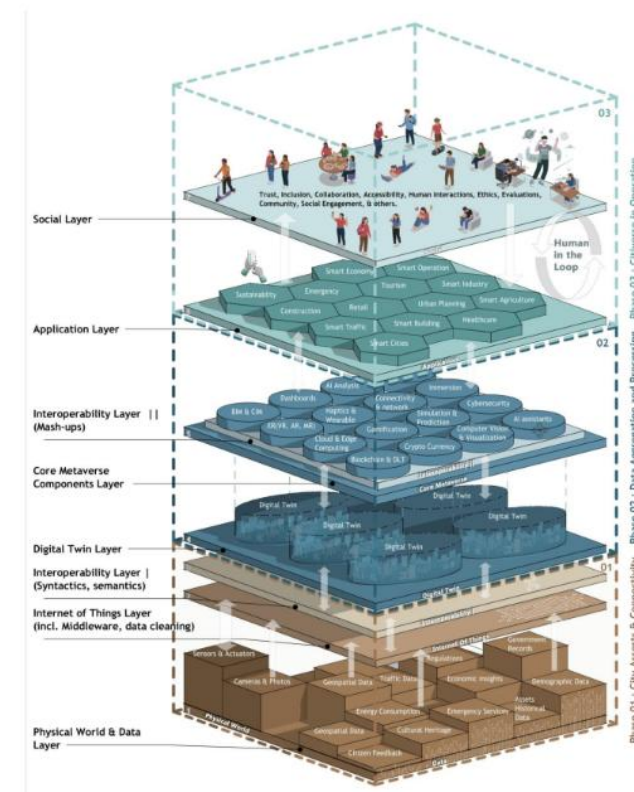
Rotterdam has started to view layers of Citiverse from digital twin perspective

- Physical
- Digital
- Social

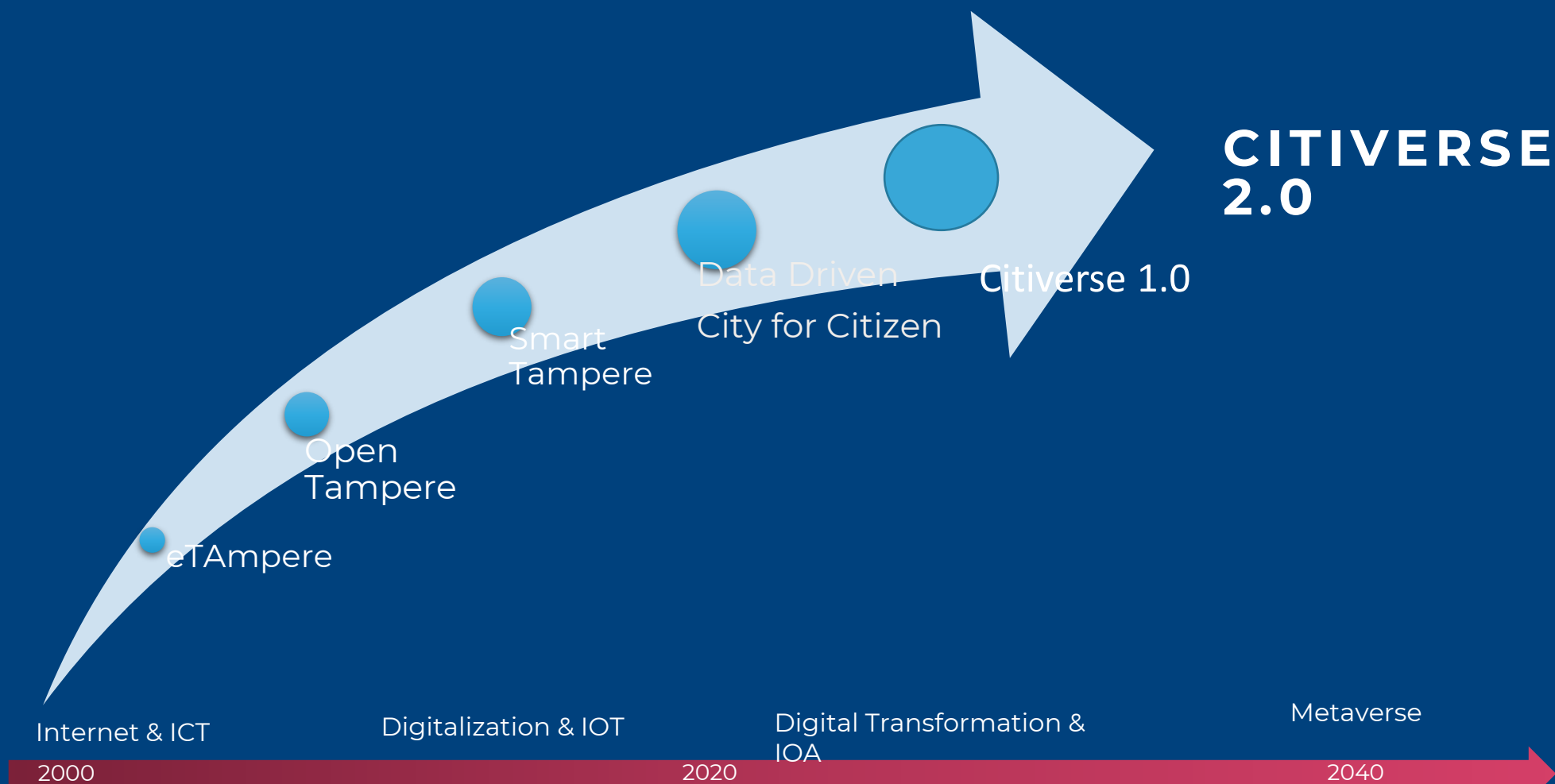
City of Rotterdam

Citiverse consists of different layers

- From physical layer to data layer
- IoT layer, interoperability layer
- Digital twin layer
- Core components layer, interoperability layer
- Application layer
- Social layer



The evolution of smart city development in Tampere



Data-Driven City

Benefits

Possibilities

Marketplace
for safe data
sharing

Smarter
resource
allocation

Attractive &
Sustainable City

Insights
based decision
making

Placing citizens as co-
creators of urban
interventions

Improving social, urban,
and ethical services
based on actual needs

Breaking siloes &
bringing different
actors together

Analytics &
predictive urban
services

Tampere Metaverse Vision 2040

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The goal of the vision is to promote discussion and increase understanding of the possibilities and risks of the Metaverse.

Building a responsible, sustainable and ethical city and governance

Unleashing the potential of combining the physical and virtual worlds

New technologies - centered around people and well-being

What will the future city in 2040 look like as technology advances?

Which technologies are likely to have become established by 2040?



INFRASTRUCTURE MEETS IMMERSION

Reimagining the City Center Through XR

The Citiverse solution transforms the city from a static environment into an interactive, multi-dimensional experience – by layering:

- **Physical space** – Tampere's buildings, streets, and landmarks
- **Digital content** – AR visuals, data, stories, offers
- **Social interaction** – co-created content, shared experiences
- **Temporal dynamics** – events, time-of-day, seasonality

Together, these layers turn everyday moments into immersive encounters – personalized, contextual, and evolving in real time



City Venue Assistant VIP Tampere

- AI driven new experience how to come to an event , experience an event in an immersive way, and also be part of the experience outside the Venue
- Co-developed by Microsoft, Tampere, Younite and VTT
- A prototype that uses Digital Twin technology and Copilot AI to enhance the visitor experience across Tampere's event venues, starting with Nokia Arena.



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City of Doing – Intelligently Digital, Digitally Equal

Progress towards Vision 2035 with stakeholder-specific targets

People living and moving around in Tampere

Tampere

- Interaction with the city is humane and intelligent
- The services are proactive and help with a wide range of life events
- In the living environment, the physical and the digital combine seamlessly.

Tampere companies and communities

City of Tampere

- is an attractive collaboration platform for business, research and the public sector
- Creates vitality with knowledge
- supports the success of companies and communities with data-driven and predictive services.

The City of Tampere's own operations

The City of Tampere

- Productivity develops with digital intelligence
- For employees, technology is a natural and value-adding co-worker
- The operations are digitally renewable and cross organisational boundaries.

From Smart Tampere to the Global Citiverse

Scaling Urban Innovation Worldwide



LOCAL SOLUTIONS



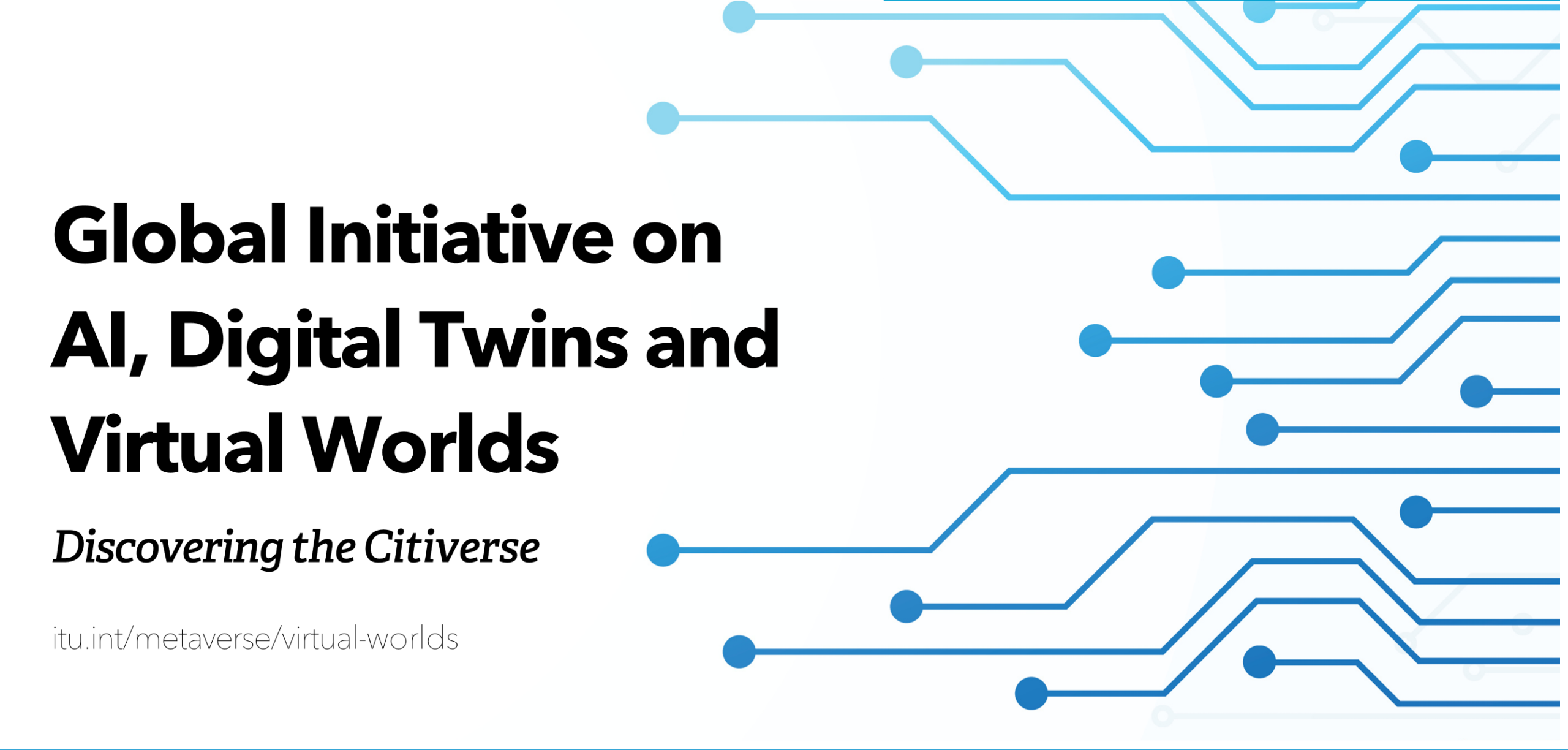
SHARED KNOWLEDGE



SCALABLE IMPACT



STRONGER, MORE INCLUSIVE
AND SUSTAINABLE CITIES



Global Initiative on AI, Digital Twins and Virtual Worlds

Discovering the Citiverse

itu.int/metaverse/virtual-worlds

A growing multistakeholder coalition of 70+ partners



70+ Partners. One Mission. Real-World Impact.

Global Initiative on AI, Digital Twins and Virtual Worlds – *Discovering the Citiverse* is a global multistakeholder platform where AI, spatial intelligence and digital twins converge to deliver measurable change in cities and communities.

Founding partners:



UNICC

دبي الرقمية
DIGITAL DUBAI



Champions:



Ministry of Internal Affairs
and Communications

دبي الرقمية
DIGITAL DUBAI



Supported by :



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SANDBOX

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CITIES HUB
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WeG

Fraunhofer
IAO

libelium

Gemeente
Rotterdam



Center on the Legal Profession
HARVARD LAW SCHOOL

UAB
Universitat Autònoma
de Barcelona

OPEN & AGILE SMART CITIES & COMMUNITIES

Smart City
Institute Japan



TAMPERE

STUTTGART
TECHNICAL
UNIVERSITY
OF APPLIED
SCIENCES

Smart
Cities
Council

SHARING CITIES ALLIANCE

a.r.u. | Anglia Ruskin
University

bizztech



城市创新
Guangzhou Institute for
Urban Innovation

S2GRUPO

U LISBOA | UNIVERSIDADE
DE LISBOA

FC Ciências
Ulisboa

LASIGE
driven by
excellence

University of
Salford
MANCHESTER

ICT TECHNOLOGY CENTRE

AJUNTAMENT DE VALÈNCIA



SWPS University



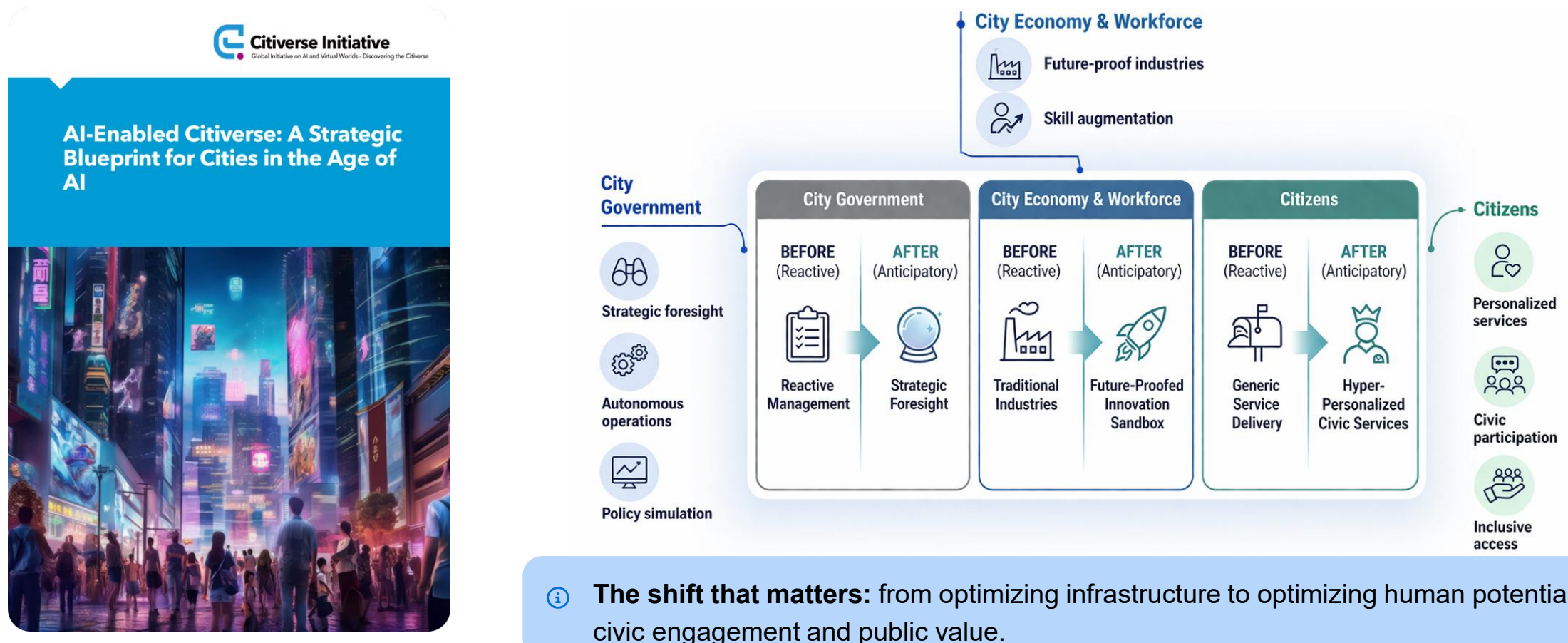
CMAD
Centro de
Ciberseguridad
Ayuntamiento
de Madrid

University of
Staffordshire

And more...

A Ready-to-Use Blueprint for Cities: Turning AI Convergence into Civic Impact

The Strategic Blueprint gives urban decision-makers a clear map through the convergence of AI, spatial computing, digital twins and immersive environments, translated into practical civic capabilities.



A Playbook, Not a Blueprint

Citiverse solutions don't require one form of governance. They work across decentralized democracies and more centralized systems alike — what they need instead is systemic stability, predictability, and trust.

Four conditions every Citiverse ecosystem must meet:

- 1 Shared understanding** of roles and responsibilities
- 2 Coordination mechanisms** for collaboration across actors
- 3 Transparent data governance** and ethical oversight
- 4 Citizen engagement** responsive to local values

“
Unlike fragmented smart-city projects, the Citiverse blends physical infrastructure, social systems, and virtual environments into one holistic, human-centred framework.”

Strategic Vision & Ecosystem Architecture

V Strategic Vision

- A persistent digital layer — twins, AI, XR, IoT, open APIs — synced with the physical city
- Inclusivity by design: accessible interfaces, data agency, human-in-the-loop oversight
- Intelligence in service of public value: climate resilience, mobility, energy, safety
- Directly advances SDG 11, 9 & 13 and the UN Digital Development Goals

A Ecosystem Architecture

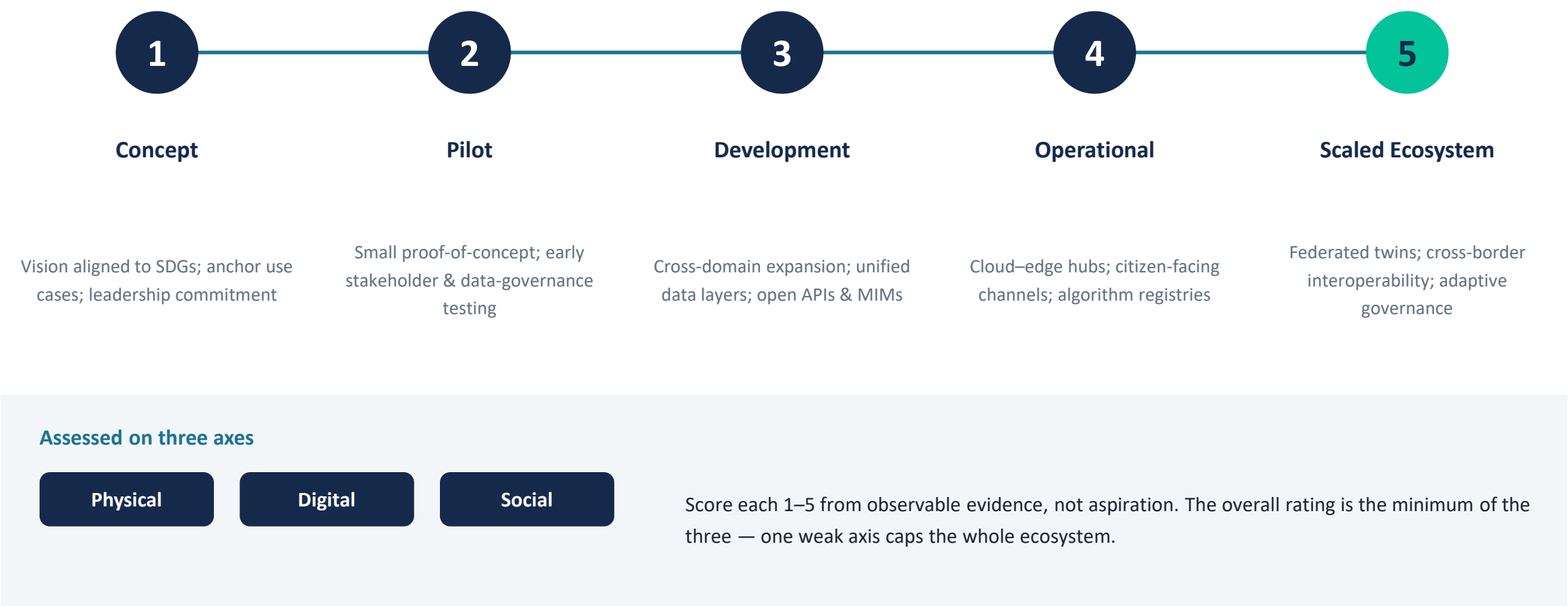
A complex adaptive system — not a monolithic stack — spanning seven logical layers, from physical assets to social governance.

Top-down orchestration — global standards (ISO, ITU, OASC), governance boards, SDG/DDG alignment

Emergent pathways — local pilots, community innovation, sandboxes for rapid iteration

A resilient ecosystem blends both: structure for coherence, agility for innovation.

The Maturity Framework — A Lifecycle, Not a Leap



Governance & Public Service Logic

Governance models



Centralized

Fast decisions, simple compliance — but concentration & surveillance risk



Distributed

Resilient, reduces concentration risk — but harder to coordinate



Hybrid

Central standards + local autonomy — increasingly favoured model

Governance evolves from tight top-down control in pilots toward distributed, horizontal coordination as ecosystems mature.

Public service logic vs. business logic

Business logic	Public service logic
Transactional, profit-driven	Relational, value-driven
Success = ROI, market share	Success = trust, equity, impact

Citizens must be able to access, correct, and question their own data — GDPR is treated as a blueprint for ethical design, not an obstacle to it.

Leaders in data governance

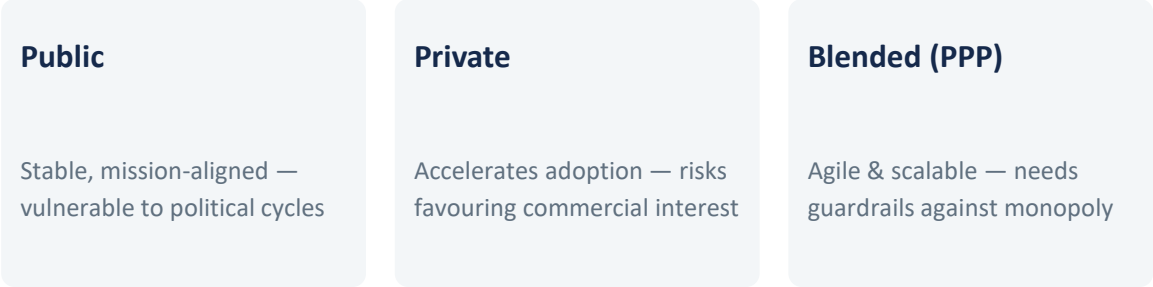
Estonia — X-Road secure data exchange & digital ID

Denmark — consent & transparency in public services

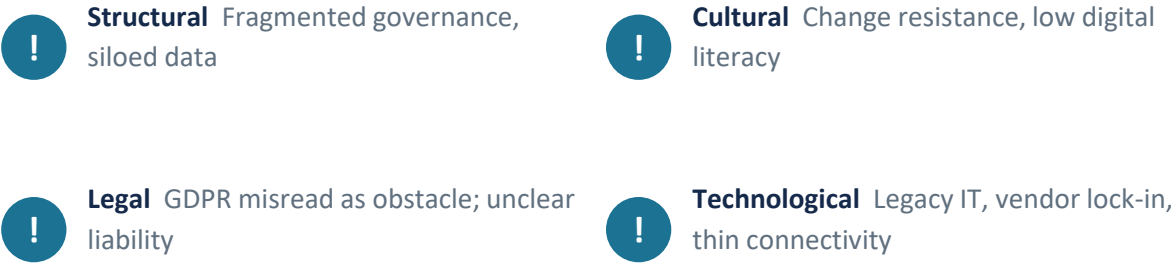
Netherlands — open data & algorithmic transparency

Funding, Barriers & Ethical Oversight

Funding runs on a spectrum



Four families of barriers



Ethics & Human Oversight

Algorithms optimize — they cannot weigh values. High-stakes decisions keep a human in the loop.

- Transparency — clear data & algorithmic logic
- Accountability — defined roles, audit trails
- Proportionality — no excessive data collection
- Inclusivity — accessible, culturally diverse design

Transition risks: governance drift, over-centralization, under-regulation, resource misalignment — mitigated by sandboxes and adaptive governance boards.

Global Case Studies & the Practical Toolkit

T

Tampere

Life-event services on a city-scale digital twin

R

Rotterdam

Flood resilience; hybrid, multi-actor governance

V

Valencia

XR heritage & tourism on an open-data twin

S

Singapore

National 3D platform; centralized standards at scale

D

Dubai

Top-down XR citizen services, culturally adapted

Lesson across every case: technology, governance, and participation co-evolve — global interoperability, local identity.

The playbook's practical toolkit

✓

Checklists

Governance readiness · technical backbone · citizen engagement

✓

Visual toolkit

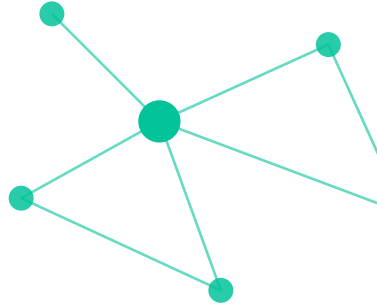
Maturity matrix · pathway diagram · risk matrix

✓

Contract templates

PPP/procurement clauses · citizen data-rights policy

CHAPTER 4



Not one planet-scale platform — a federation of interoperable city capabilities.

1 Data spaces

become the connective tissue — shared at the source, not copied

2 AI: analytics → orchestration

situational awareness & coordination, with auditing built in

3 Immersive tools as interface

XR used where it aids understanding — not as a destination

4 Trust-by-design

consent, algorithm registries & appeal routes, non-negotiable

5 Resilience as driver

operational twins for climate & crisis, not just planning

6 Reusable components

validated building blocks replace bespoke city builds

A Day in the Citiverse (2036–2041): Five Lives, One City

A grounded imagination exercise, not a prediction — the same networked city, seen through five ages.



Aino

AGE 8

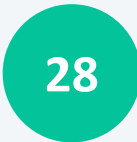
The city as a learning playground — consent explained simply; support given without ever being labelled.



Mika

AGE 16

Identity & autonomy — private mode, no-nudge zones, and the right to disappear from personalization.



Sara

AGE 28

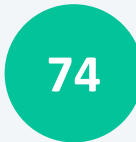
A personal digital twin that's actually hers — she negotiates access; the city never owns her data.



Jari

AGE 45

The city negotiates with time — automation proposes, a person decides on anything consequential.



Leena

AGE 74

Independence & dignity — low-tech backups, human support at the edges, care without humiliation.

A Planning Lens, Not a Forecast



Chapter 4's vignette turns abstract building blocks — networked twins, trusted data, ambient AI, spatial interfaces, governance-by-design — into ordinary moments, so leaders can stress-test strategy before committing resources.

What ties Chapters 3 & 4 together

- 1 Interoperability** open standards over vendor lock-in, from pilot to federation
- 2 Trust-by-design** consent, transparency & audit trails as defaults, not add-ons
- 3 Human-centred design** inclusion engineered into interfaces, for every age & ability
- 4 Governance-by-design** human oversight kept wherever decisions have real stakes

“The road to Citiverse is only in the beginning.”

— Teppo Rantanen

Thank you