OpenVerse

WORKSHOP

Regulatory Sandboxes for Virtual Worlds Innovation

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About OPENVERSE

OPEN AND CO-CREATED VIRTUAL WORLDS FOR EUROPE

Laying the foundations of open, transparent, inclusive and human-centric European virtual worlds, while strengthening Europe's technological sovereignty.

36 months
November 2023 – October 2026

12 partners, 5 countries
Coordinated by the Lisbon Council

CSA Horizon Europe
Coordination and Support Action · GA 101135701

What we do

01

Knowledge base and Observatory

One reference point for virtual-worlds technologies, companies and case studies, including regulatory sandboxes

02

Co-creation in real cases

User co-creation combined with XR, tested in use cases of industrial and societal relevance

03

Ethics, law and the Single Market

Ethical, legal and IPR challenges, especially for start-ups and SMEs

04

Roadmap, standards and policy

A technology and policy roadmap, input to industry standards, and policy briefs with recommendations

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Today’s theme: regulatory sandboxes for virtual worlds

Rigid regulation
risks stifling innovation before it matures

A THIRD WAY

Regulatory sandboxes

Supervised testing of products and business models that produces real-world evidence for better, more adaptive EU rules

Unregulated innovation
can harm users and erode trust

Why virtual worlds are different: continuous biometric and behavioural data · siloed platforms · a wider cyber attack surface · the GDPR in immersive spaces

Five angles for today’s discussion

1
Experimental governance
Sandboxes as evidence generators for EU law
Francesco Molinari

2
Lessons from the Observatory
International sandbox case studies
John Favaro

3
Virtual Innovation Districts
A pan-European layer for scaling start-ups
Graham Colclough

4
The local and the European
Cities and universities as sandbox hosts
Anna Aseeva

5
The real and the virtual
Digital twins of European cities
Open discussion

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Regulatory Sandboxes for Virtual Worlds Innovation

Setting the scene: from the OPENVERSE policy brief to a European testing environment

Francesco Molinari

The Lisbon Council

OPENVERSE webinar · Setting the Scene

Online, 26 October 2026, 14:05–14:15 CET

Why virtual worlds need experimental governance

From entertainment to infrastructure

Persistent, immersive, networked environments for work, education, healthcare, industry, culture and public services. The Commission links them to ~€800 bn of economic potential by 2030.

Regulatory convergence

A single virtual hospital, classroom, marketplace or city twin simultaneously invokes GDPR, AI Act, DSA/DMA, Data Act, NIS2/CRA, eIDAS, consumer, IP and sectoral rules.

The governance dilemma

Traditional regulation is too slow, fragmented and sector-specific - yet no oversight repeats the platform-economy failures: concentration, privacy erosion, opaque algorithmic governance.

Core proposition

The governance of virtual worlds requires institutions that can learn while the technology is still being shaped.

Regulatory sandboxes are one such institution: supervised, time-bound, evidence-generating.

OPENVERSE D7.5 (2025) ·

Molinari et al., Springer, in press

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A regulatory sandbox is not deregulation

A supervised, time-bound, evidence-generating environment in which innovators and regulators test technologies, business models and compliance pathways under controlled conditions - sitting between premature rigidity and laissez-faire.

What sandboxes can do

- Generate evidence on how an innovation works and what it produces
- Reduce legal uncertainty, support responsible innovation
- Turn regulators into supervised learning partners
- Clarify compliance expectations for innovators
- Feed lessons into standards, guidance and legislative reform

What they cannot do

- Replace regulation - they are a complement, not a shortcut
- Guarantee fairness - entry may favour well-funded incumbents
- Escape capture without transparent criteria and independent oversight
- Absorb unlimited cost - US$25,000 to US$1 million per year (CGAP / World Bank)
- Deliver value without time limits, public reporting and exit pathways

The evidence gap: few documented virtual-world sandboxes, almost no documented failures - a governance problem in itself, and the reason the OPENVERSE Observatory curates real cases.

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Sandboxes are already part of EU law

2020

Council Conclusions on regulatory sandboxes

Sandboxes and experimentation clauses recognised as instruments of better regulation and of an innovation-friendly legal framework.

2022

DLT Pilot Regime - Reg. (EU) 2022/858

The first EU-level, sector-specific sandbox: temporary exemptions for market infrastructures using distributed ledgers, under supervisory oversight.

2023

EU Strategy on Web 4.0 and Virtual Worlds

Frames the object: an open, secure, trustworthy, fair and inclusive next technological transition - the Citiverse and local digital twins included.

2024-26

AI Act - Art. 57-59, Reg. (EU) 2024/1689

Every Member State must establish or join at least one AI regulatory sandbox by 2 August 2026: legal certainty, priority access for SMEs and start-ups, exit reports usable as evidence of compliance.

AI Act sandboxes cover AI systems, not platform governance, consumer rights, identity portability, interoperability or XR safety. A virtual-world sandbox must integrate them into a broader, multi-regulator framework.

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Four challenges distinctive to virtual worlds

Challenge	Why it is distinctive in virtual worlds	What a sandbox can test
Data governance & consent	Continuous biometric, behavioural, spatial and social data; one user's action generates data about others; profiles accumulate over time	Contextual consent interfaces, data minimisation, privacy-by-design, audit logs, rights-exercise mechanisms
Interoperability & portability	Users expect portable avatars, identities, assets and credentials; dominant platforms rely on closed standards	Open APIs, verifiable credentials, digital wallets, cross-platform liability arrangements
Cybersecurity & safety	Layered attack surfaces across hardware, software, identity, payments; attacks affect embodied experience, not only data	Simulated attacks, incident response, avatar impersonation, manipulated digital twins, security controls
Cross-border compliance	Inherently transnational services vs. nationally organised regulators, liability rules and enforcement	Supervised multi-country protocols, mutual recognition, evidence for harmonised guidance

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Designing an EU sandbox: seven principles, one lifecycle

01 **Risk-based & use-case-specific**

02 **Rights-preserving by design**

03 **Interoperability-oriented**

04 **Secure & resilient**

05 **Inclusive & accessible**

06 **Competition-aware**

07 **Learning-driven**

Together they turn a sandbox from an innovation label into an evidence engine.

Lifecycle of a virtual-world sandbox

1. Admission - Is the experiment innovative, necessary and suitable for supervised testing?
Transparent eligibility, conflict-of-interest checks, risk screening → testing plan

2. Experimentation - Can the innovation operate safely under defined conditions?
Supervision, user safeguards, data controls, cybersecurity testing → evidence logs

3. Evaluation - What did regulators and innovators learn?
Independent review, rights assessment, technical validation → lessons learned

4. Transition - Should the innovation scale, change, stop - or inform reform?
Exit rules, compliance roadmap, authorisation or policy translation

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One picture: rules, playing field, players

A European testing environment in which regulators, cities and innovators learn together - three layers of one concept

THE RULES
Sandbox framework

- EU-level framework for virtual-world sandboxes: single entry point, shared criteria, multi-regulator coordination
- Seven design principles · four-stage lifecycle
- Evidence flows back into regulation, standards and guidance

Source: OPENVERSE policy brief D7.5 · Springer chapter

THE PLAYING FIELD
VIRTUOPOLIS architecture

- A human-centric Web 4.0 reference architecture for urban virtual worlds: Things · Flows · Experiences
- A cascade-testing sandbox built into the architecture, feeding a Web 4.0 Commons Catalogue
- Digital twins that model not only the physical city but its cultural and experiential evolution

Source: Molinari, Rausell-Köster, Faubell - Virtual Worlds (MDPI), forthcoming

THE PLAYERS
Pan-European innovators

- Startups and micro-enterprises that need the Single Market as home market from day one
- A voluntary, 28th-Regime-like pathway: test once under one rulebook, scale across 27
- Place-based support through innovation districts - EABID's Virtual Innovation District

Source: EABID policy brief (Molinari & Colclough, unpublished)

THE GROUND: cities and districts - where the real and the virtual meet, where municipalities and universities host the experiments, and where the evidence is generated

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A voluntary 28th-Regime-like sandbox for virtual worlds

Why

- Letta report (2024): a 28th Regime against Single-Market fragmentation; now the Commission's 'EU Inc.'
- Virtual-world start-ups need cross-border scale from day one; 27 national procedures are prohibitive for micro-enterprises
- Voluntary: firms opt in for defined activities, national rules otherwise apply

One rulebook, four areas

- Data protection - avatar, biometric, behavioural and spatial data
- Consumer rights - virtual purchases, refunds, children's spending, status of digital assets
- Content moderation and safety - a DSA baseline adapted to presence, voice, gesture, embodiment
- Liability - allocation among platforms, creators, AI agents, users

How it would run

- Admission: EU-established start-ups and micro-enterprises first
- Supervision: one-stop-shop lead authority in the Member State of establishment + EU-level virtual-world board
- Duration: 12-24 months, extension only under strict conditions
- Safeguards: consent, user/transaction caps, complaints, audits, termination triggers

Not deregulation: a clarification of existing EU principles for immersive contexts - to be piloted first through a voluntary sandbox. The legal regime simplifies the shell of the firm; place-based innovation districts (EABID) can supply the services the shell alone cannot.

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Bridging the real and the virtual: VIRTUOPOLIS

EXPERIENCES
Application & Experience · Governance & Observability

FLOWS
Trust & Identity · Web 4.0 Interoperability & Open Internet · AI Agents

THINGS
Open Hardware & Edge · Web Layer & Protocols

Cross-cutting: cascade-testing sandbox · Web 4.0 Commons Catalogue

Three layers, seven functional stacks - a human-centric Web 4.0 reference architecture for a European Digital Commons

From concept to reference architecture

- Virtuopolis (2024, with Pau Rausell-Köster): urban digital twins should replicate not only the physical city but its cultural, emotional, symbolic and experiential dimensions
- VIRTUOPOLIS (2026): the concept operationalised as a reference architecture - Things, Flows, Experiences - oriented to a European Digital Commons

Why it matters for sandboxing

- The sandbox is part of the architecture: open contributions are cascade-tested before reaching city pilots - a technical testbed with rights-based oversight built in
- Eight Resonance indicators give regulators and cities evidence on what immersion does to people and places, not only on whether the code runs
- Modelling how European city cultures evolve becomes a testable hypothesis rather than a slogan

Status: conceptual reference architecture and research agenda - Technical Note accepted for Virtual Worlds (MDPI). No pilot results yet: the claims are hypotheses for empirical testing.

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Bridging the local and the European: sandboxes on the ground

Cities, regions and living labs

JRC Playbook (2022) on local data-ecosystem sandboxing

• Organisational vs technical sandboxing; self-assessment first; MIMs for replicability

ENoLL + JRC - Living Labs to support regulatory learning

• The local habitat where regulatory experimentation meets real users - Koen Vervoort, with us today

Citiverse EDIC

The European Digital Infrastructure Consortium for local digital twins and virtual worlds

• A sandbox already in operation: shared European infrastructure where cities and suppliers test interoperable virtual-world services

• The institutional home for the 'playing field' - Jan Wester (Citiverse EDIC) will describe it

ITU Global Initiative on AI and Virtual Worlds

Pillar 2 - Connecting cities with the virtual and real worlds

• Use-case identification · security and trust · interoperable Citiverse · Sandbox Experiment Facility · Citiverse on the ground

• The global standards layer for the same question - chaired by Ernesto Faubell (Universitat de València)

Local digital ecosystems and the Single Market are not alternatives: the first produces the evidence, the second the scale - and global standards make the two portable.

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What to listen for in the open floor

John Favaro Trust-IT Services	The evidence: insights from the OPENVERSE Observatory's collection of sandbox use cases - including what did not work
Jan Wester Citiverse EDIC	The playing field in operation: the existing Citiverse EDIC sandbox for local digital twins and virtual worlds
Ernesto Faubell Cubells City of València · ITU	The global standards layer: Pillar 2 of the ITU Global Initiative on AI and Virtual Worlds - connecting cities with the virtual and real worlds
Graham Colclough UrbanDNA · EABID	The players: EABID as a newly founded association, its plans - and a first glimpse of the Virtual Innovation District idea
Anna Aseeva Digital For Planet	The behavioural layer: nudging sufficiency in the spatial web - choice architecture in municipal virtual sandboxes

Sandboxes are democratic innovation infrastructure: not sufficient on their own, but a powerful place to begin.

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Thanks for your attention

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Education and Research EAER
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Research and Innovation SERI**

DIGITAL FOR PLANET

Cognitive regulatory sandboxes: new pre-market legal infrastructure

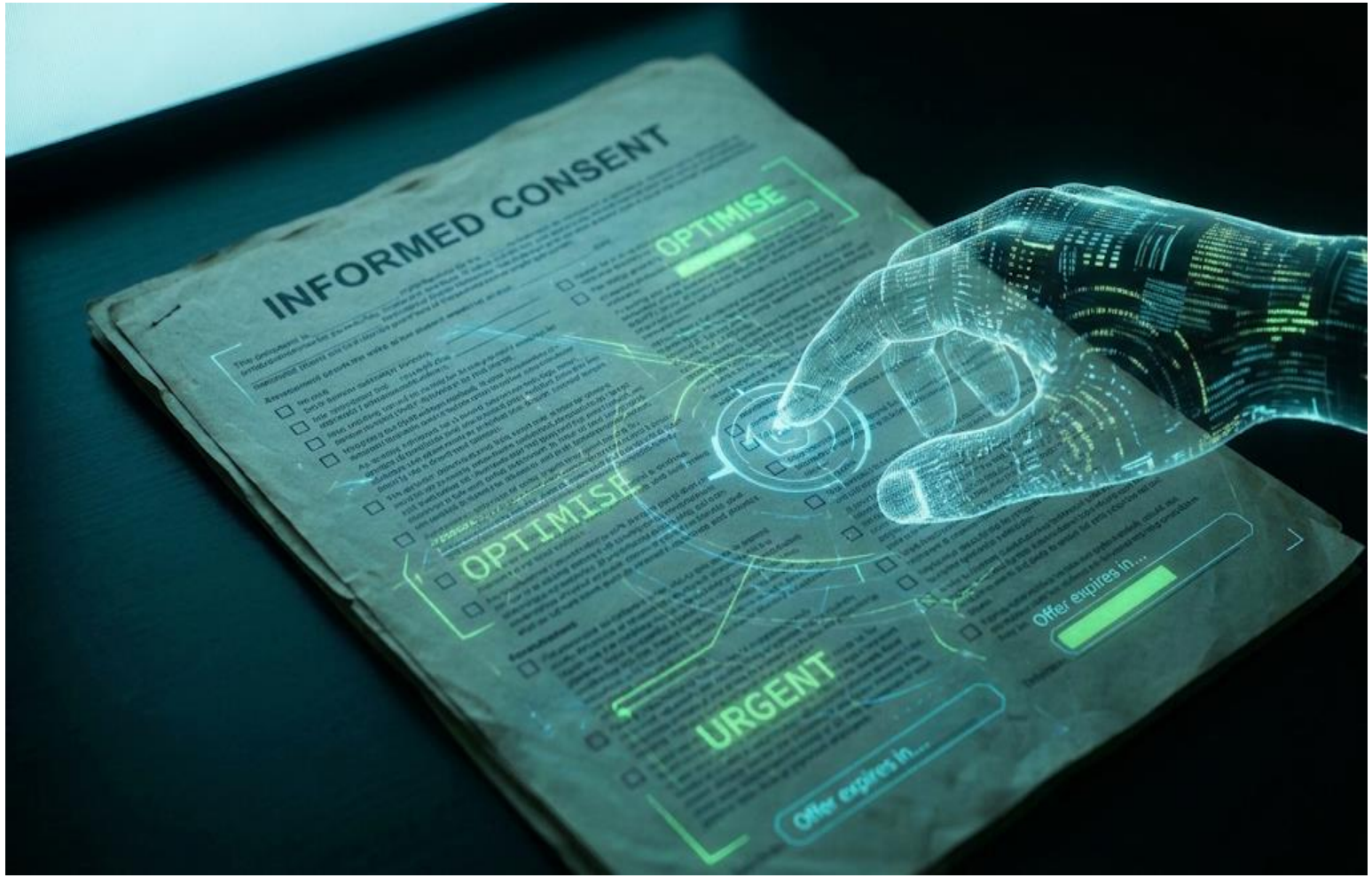


Dr. Anna ASEEVA, D4P
Policy and Sustainability Expert

OPENVERSE Workshop 'Regulatory Sandboxes for Virtual Worlds Innovation'
26 October 2026

digital4planet.org

Whither cognitive regulatory sandboxes?



Building ex-ante, empirical infrastructure:

The central question of **today's digital law** is not anymore

Whether terms of service were made available & consent recorded?

but

*Was the platform designed to **bypass the consumer's cognitive agency** before recording consent?*

Note: Arts 57 and 58 of the EU AI Act mandate that MSs establish at least one operational national AI regulatory sandbox!

From burden of proof to cognitive capture

The legal challenge: proving distortion under EU AI Act Art 5

- How does one prove, prior to market deployment, that an adaptive algorithm materially distorts human behaviour?
- How is **significant psychological harm** differentiated from **aggressive marketing**?

→ The answer is currently neither in EU legislation nor in ECJ case law

→ It requires **live, supervised, empirical** testing before software reaches the single market

Surrendering sensitive personal data is not autonomous deliberation

With the fatigue, **System 1** replaces **System 2**!
Within a **cognitive regulatory sandbox**, this behavioural distortion is operationalised through empirical metrics:

- **Decision latency distributions**, determining whether transactions occur below the cognitive threshold required for comprehension
- **Longitudinal choice divergence**, comparing consumer paths against neutral control interfaces
- **Psychophysiological indicators of stress**, including gaze fixation and cognitive strain metrics

→ These are not subjective speculations; they are **empirical proofs of cognitive distortion**

THANK YOU FOR YOUR ATTENTION



IN SUM, ensure that **digital innovation** respects the **COGNITIVE SOVEREIGNTY** of the human mind

HOW?

Regulatory sandboxes must evolve **beyond general testing** environments for software functionality

into

rigorous behavioural laboratories

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THANK YOU FOR YOUR ATTENTION

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EABID

STRONGER TOGETHER

The European Association of Busines & Innovation Districs



Ambition

- Draghi told us plainly – the 'European disease' of apathy must be expunged
- Letta pointed to de-fragmentation / a more common way – whilst respecting our delightful diversity

- How can we separate what drives the economy (and make it more harmonious and streamlined) – from what makes Europe so wonderful, so relevant as the global conscience – and make both work best?!

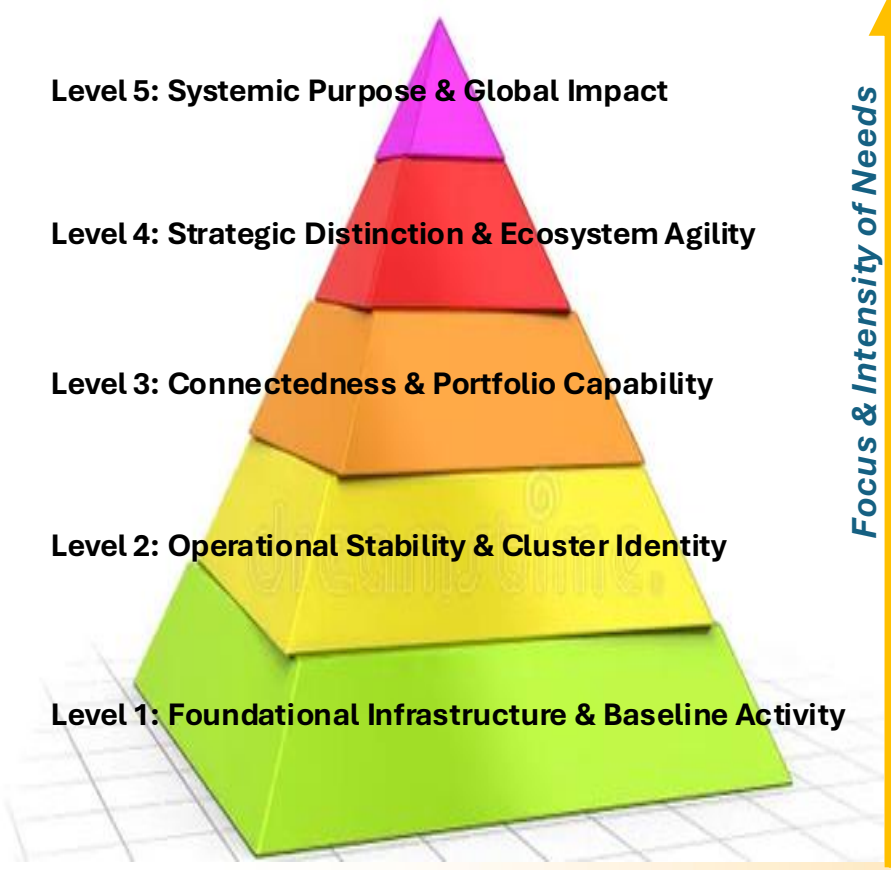
- EABID is incorporated to *deliver* EU economic competitiveness – the 'European way' – economically prosperous, societally just, respectful of sovereignty, and planetarily responsible
  - European focused, and globally connected
  - Policy led, though delivery and outcomes focused



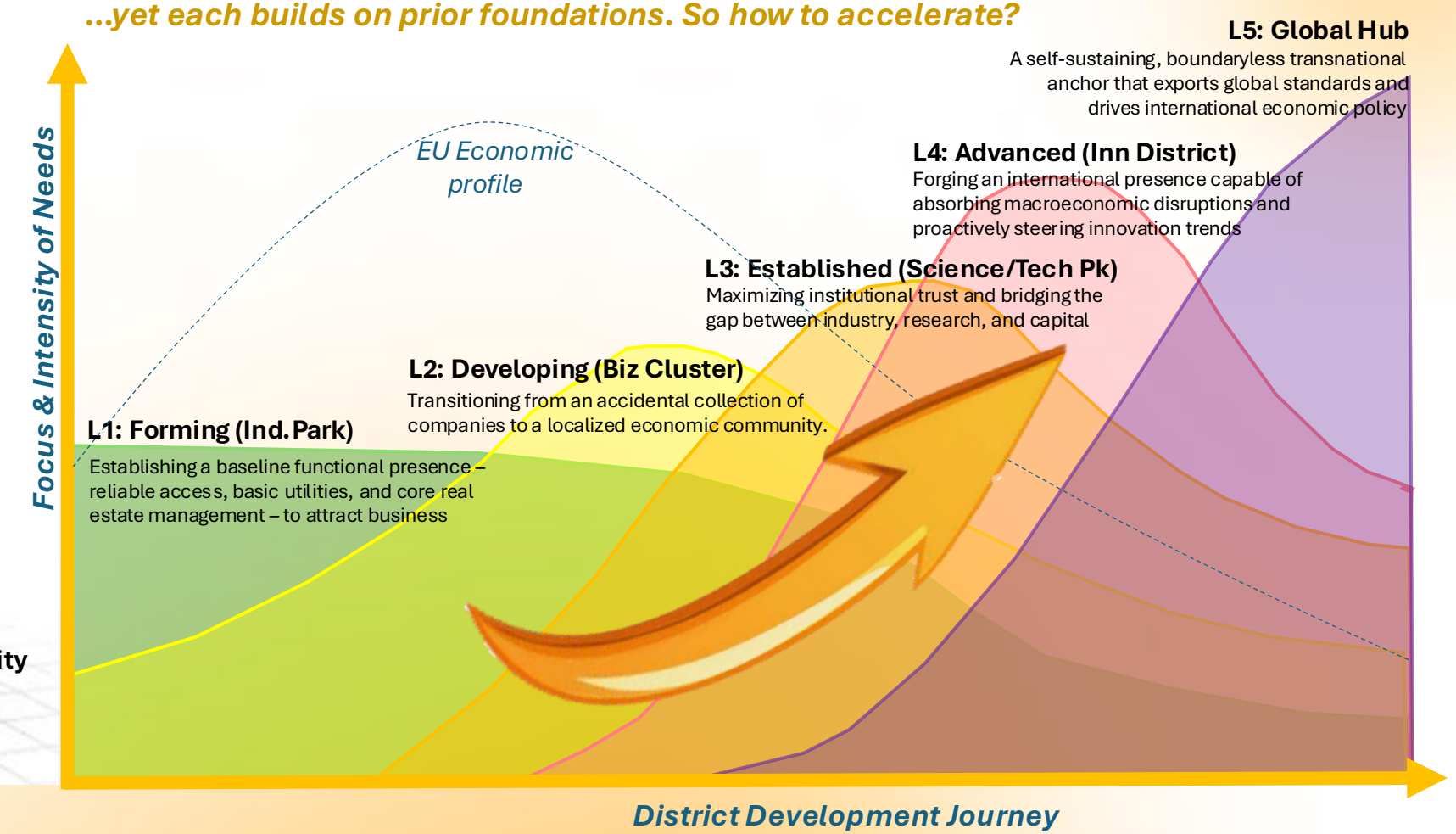
...helping to speed the development of *all* EU Districts, irrespective of geography or development maturity

Vital for the liveability of European places, sustenance of the European economy, global influence & competitiveness

Traditional Maslowian view...



...yet each builds on prior foundations. So how to accelerate?



https://www.holisticequity.org/maslows-hierarchy-of-needs.html
"Maslow's Hierarchy of Needs" is Wrong—NOW Stop Using It

A **Roadmap** with practical policy-driven, delivery-focused initiatives

"Task & Finish Teams" as focused vehicles for collaborative action

- **28th Regime**
  - Policy Delivery opinion
  - 4 practical Demonstrators

  (RES storage; **Virtual Worlds**; Digi10xHealth; Drones)
- **Revitalising Industrial Parks**
- **Place-Based Innovation**
- **Stimulating Investment**
- **National Innovation Blueprint**

