

Next Generation Virtual Worlds: *Opportunities and Policy Challenges for the EU*

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The Industrial Metaverse Revolution: shaping future Business Models and Policies in manufacturing

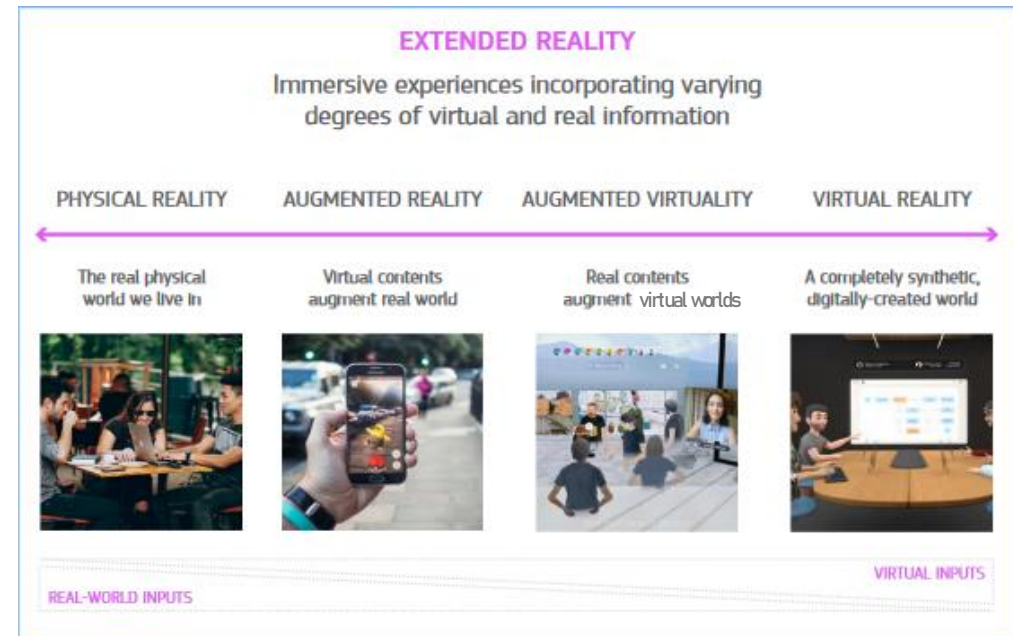
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World Manufacturing Forum

Next Generation Virtual Worlds: What are we talking about?

- From Web 1.0 to **Next Generation Virtual Worlds**

- Web 1.0: The Read-Only Web
- Web 2.0: The Social Web
- Web 3.0: The Semantic Web
- **Web 4.0: The Immersive Web**



- Web 4.0** as a **ground-breaking technological transition** towards a world where everything is seamlessly interconnected and integration, blending the physical and digital worlds

Next Generation Virtual Worlds: What are we talking about?

Next Generation Virtual Worlds play an important part in the **transition to Web 4.0**

- **Virtual Worlds** are characterized by **technological convergence** that enables the seamless integration between web, virtual and real objects
- By incorporating varying degrees of virtual and real information, it allows accessing different levels of **immersiveness** and **interaction**

***Virtual worlds** are persistent, immersive environments, based on technologies including 3D and extended reality (XR), which make it possible to blend physical and digital worlds in real-time, for a variety of purposes such as designing, making simulations, collaborating, learning, socialising, carrying out transactions or providing entertainment.*

(COM(2023) 442/final (July 2023))

Why Now?

- Convergence of **key technological enablers** and technological advances that enhance user experience

AI, IoT, innovative Human-Machine Interfaces (HMI), computer graphics, blockchain, HPC, high speed networks

- **Societal and economic factors** driving adoption and growing demand and engagement (social media)

Why Important?

- New types of data and contents

emotional data, extended social network data, spatial/movement data, virtual content, avatar data

- New opportunities for economies and societies

enhanced user input and interaction, immersive and collaborative experiences, sense of presence and self-representation, transformation of socialization and identity, fight climate change

- Transforming key sectors

*Education, health, public sector, **industry***

Industrial Virtual Worlds

A range of **new industrial applications** that unlocks new possibilities

- Products, services and high-value content catering to the needs of different users
- Innovative business models
- Innovative industrial processes: optimizing, redesigning, sustainability
- Different areas of production: quality testing, engineering, manufacturing, maintenance and training

Manufacturing: digital twins, immersive worlds for enhanced human-machine interaction

An EU initiative on virtual worlds

European Union stays at the forefront of **Web 4.0** development and **Next Generation of Virtual Worlds** (COM(2023) 442/final, July 2023)

- Fostering **competitiveness**
- Important aspect of **Europe's Digital Decade** and **digital transition**
- Strengthening the **EU Single Market**
- **Governance model** and implications for existing policies and regulations

The EU has already a robust, **future-oriented legislative framework**

Digital Services Act (DSA), Digital Markets Act (DMA), proposed AI Act, General Data Protection Regulation, EU consumer law, newly adopted Markets in Crypto-Assets (MiCA) Regulation, European Digital Identity, EU legal framework for protection of IP rights (Directive on Copyright in the Digital Single Market, the Regulation on the EU Trade Mark and the Directive on the Protection of Trade Secrets), EU labor standards

An EU initiative on virtual worlds

Great potential, but great challenges for **future-shaping policies**

- Understanding **risks** for societies and economies
- Dealing with and mitigating **challenges**
- Supporting **uptake**:
 - *New business models and solutions*
 - *Supportive business environment*
 - *Regulation (**standardisation and interoperability**)*

Reflect EU values and principles

privacy and security (authentication, digital identity)
fundamental rights (right of child)
consumer protection
trust issues
contractual rules (employment)
IP rights
taxation

Next Generation of Virtual Worlds: EU strategy

What is needed to support the development of virtual worlds?

- **EU strategy** and **proposed actions** on virtual worlds and Web 4.0 to build the foundation for the long-term transition towards Web 4.0 and the development of virtual worlds (*COM(2023) 442/final (July 2023)*)
- The actions are structured around the objectives of the **Digital Decade** policy programme - **3 pillars**
 - Skills** – digital skills
 - Government** - support flagship projects of public interest
 - Business** – support a **Virtual Worlds industrial ecosystem**: boost technological capabilities, accelerate uptake of innovative solutions, enable a supportive business environment

The work of the JRC

Emerging phenomenon: understand not only the **potential** but also the **risks** that **Next Generation Virtual Worlds** will pose as early as possible so to properly steer its development

- Analyzing opportunity and challenges for the EU through a multidisciplinary and multi-sectoral perspective
- Informing EU policies on regulatory framework
- Contributing to the discussion of standard and interoperability
- Measuring and analysing the techno-economic ecosystem of next generation virtual worlds with DGTES



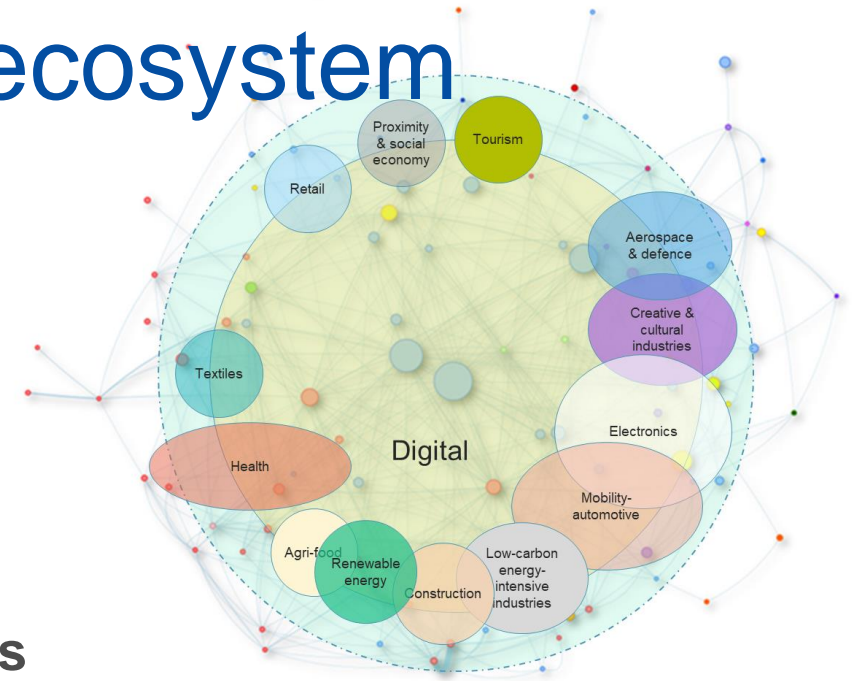
DGTES - Measuring the digital ecosystem

Why & How

Policy need (and scientific challenge)

- **new tools** to map **industrial ecosystems**
- accounting for their dynamics & **complex interlinkages**

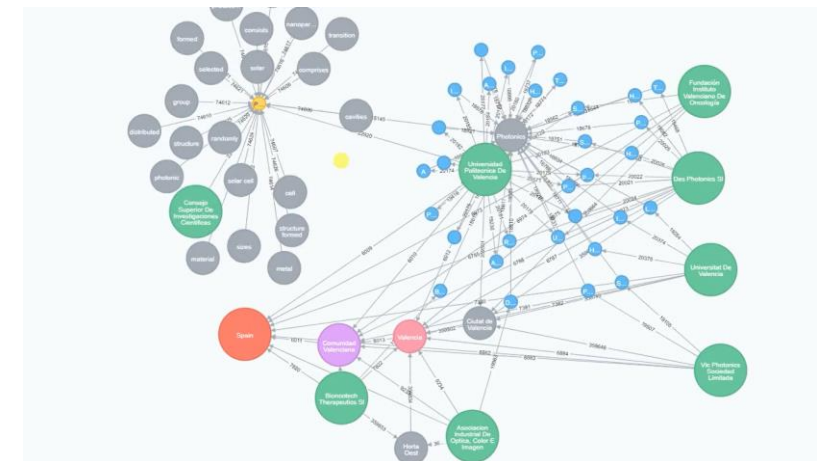
Digital ecosystem: horizontal to the economy, intersections



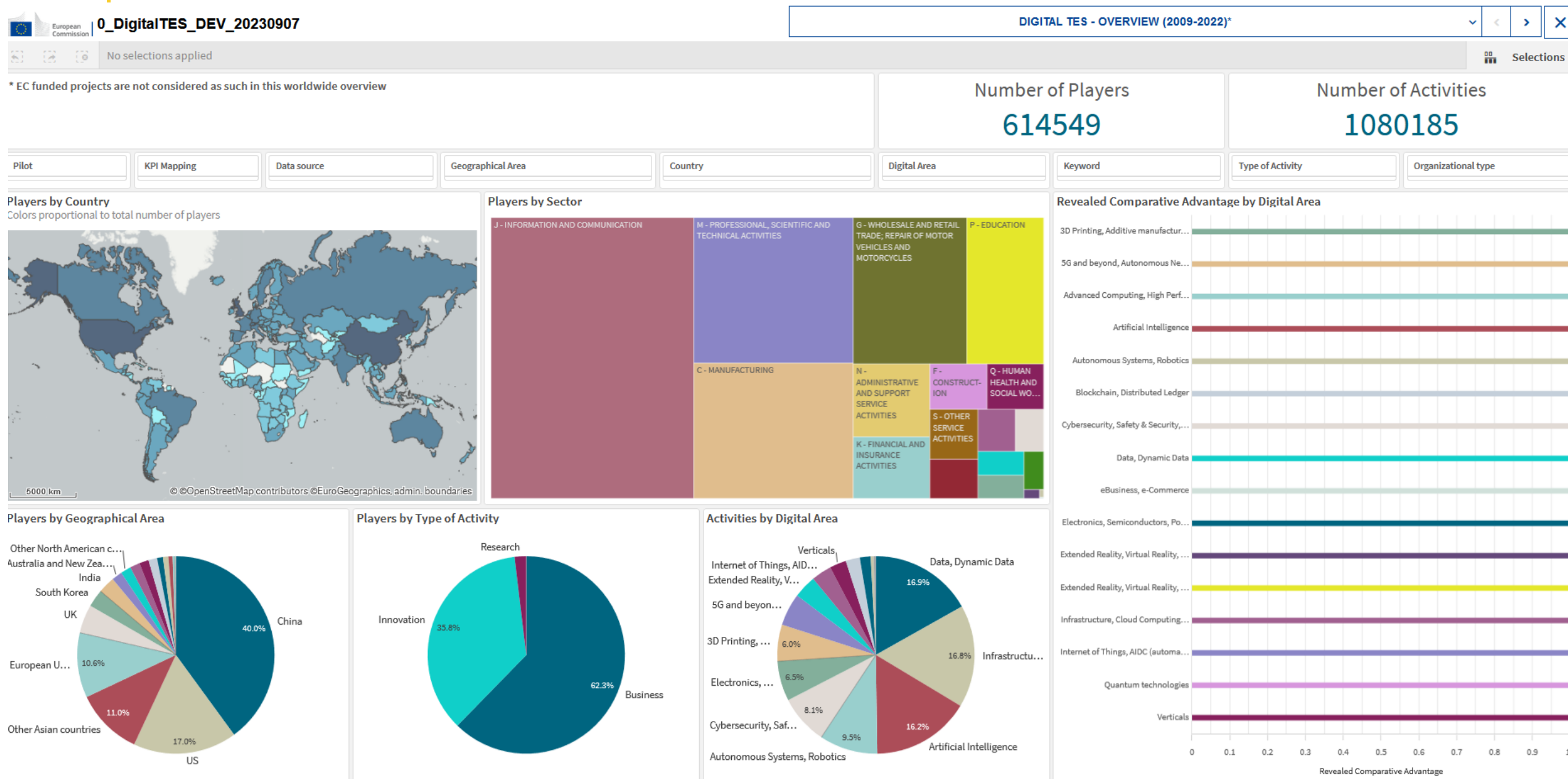
The Techno-Economic Ecosystem Analytical Approach

- Building a network of players, activities, technologies, locations, interactions
- Based on multiple micro-data sources (innovation, research, business)
- Applicable to virtually any ecosystem

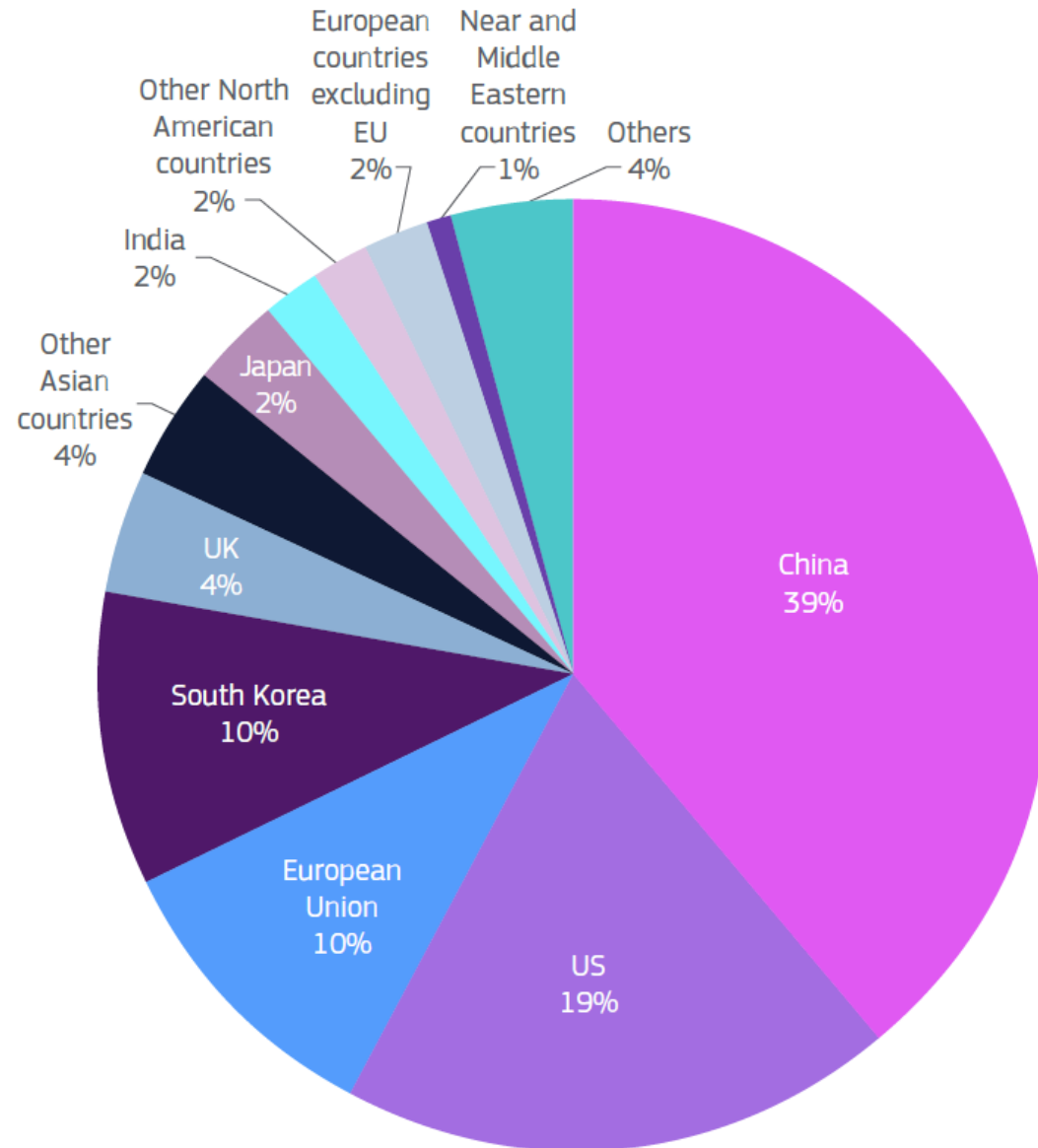
➡ Ecosystem by design



Who does what, with whom, when, where...



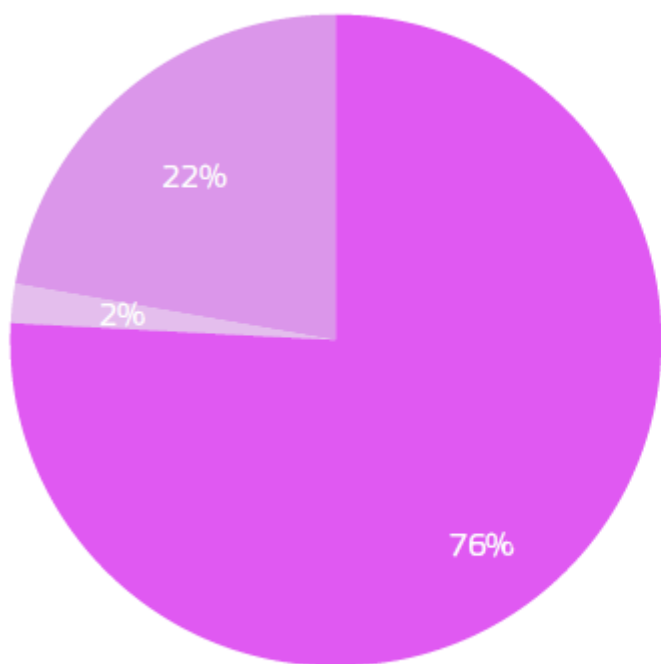
Next Generation Virtual Worlds: players in the global ecosystem



2009-2022
215 keywords
~27k activities
4% of the digital ecosystem
~15k players worldwide
+~3k players involved in EU funded activities

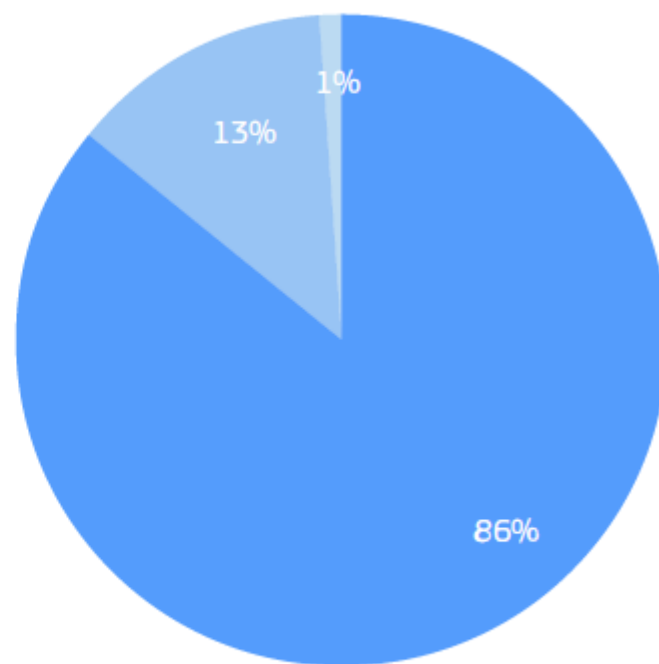
Activities and players in the global ecosystem

Activities



■ Innovation ■ Business ■ Research

Players



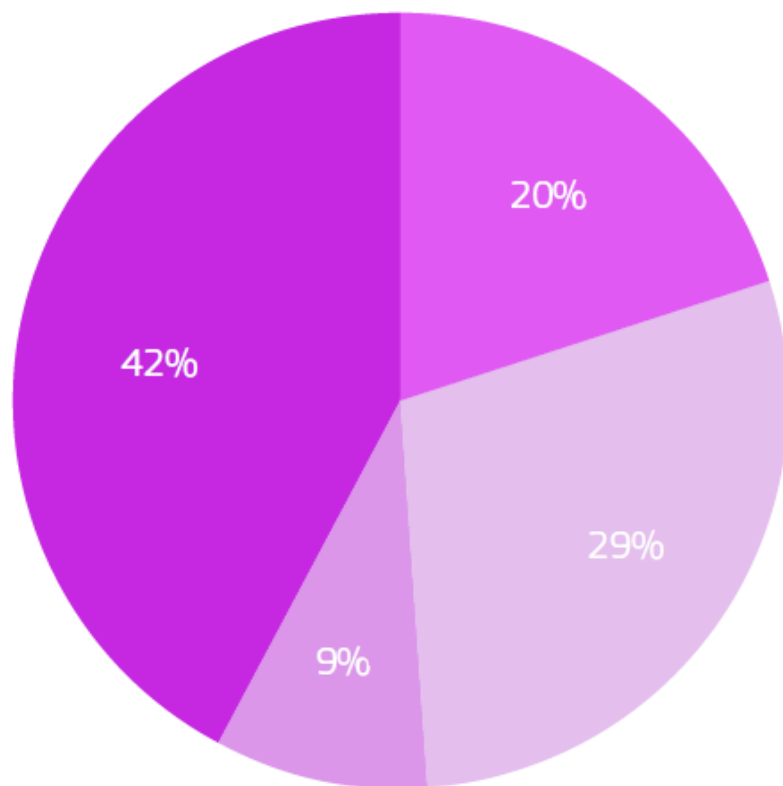
■ Companies, Firms ■ Research Institutions, Universities ■ Government Institutions

86% firms
larger share of research
institutions and universities

80% R&I activities
larger share than in digital (71%)

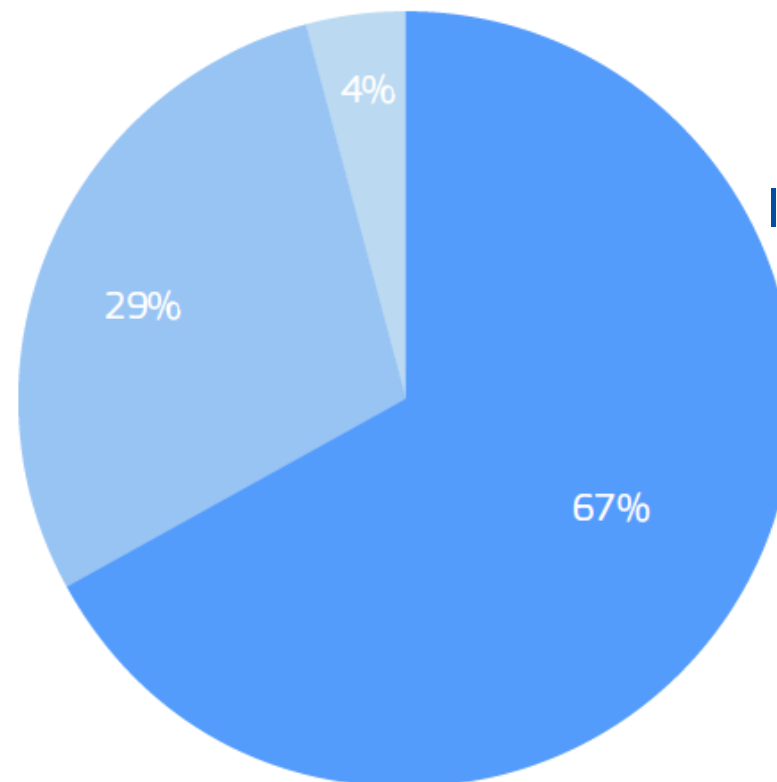
European activities and players

Activities



■ EU funds ■ Innovation
■ Business ■ Research

Players

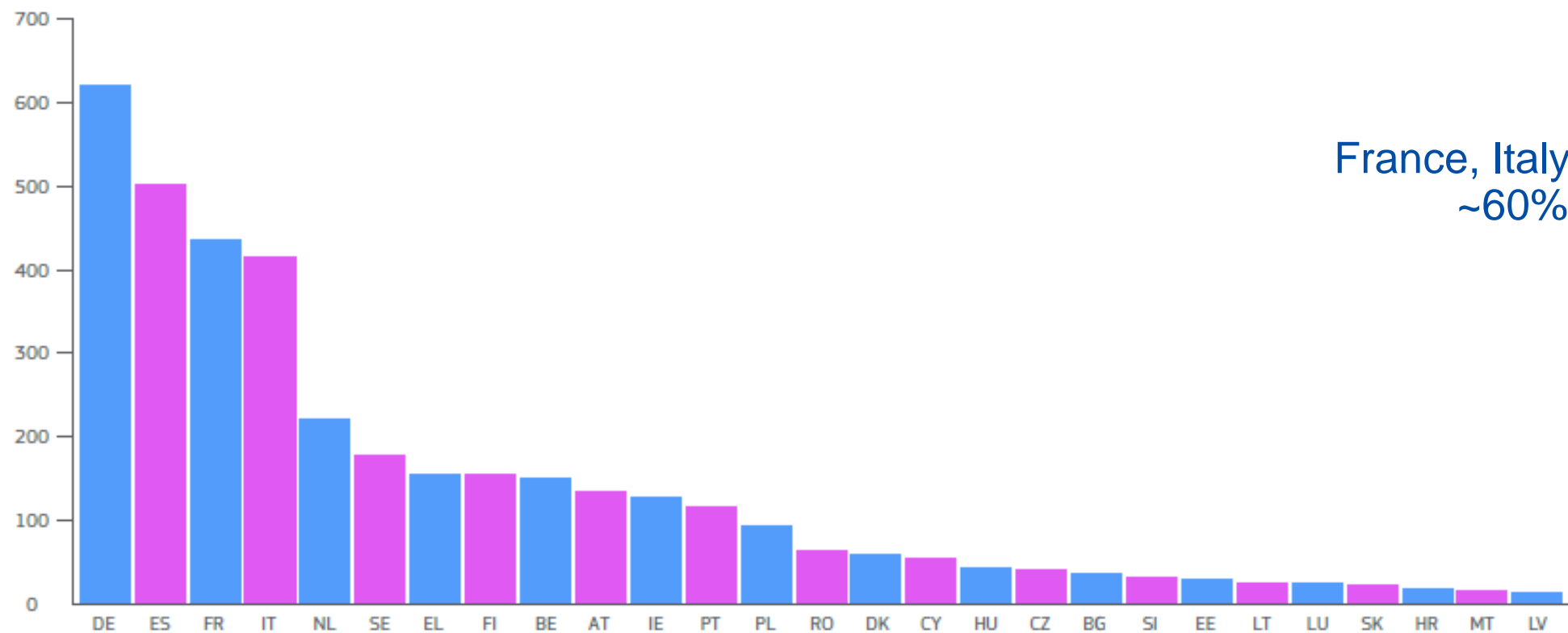


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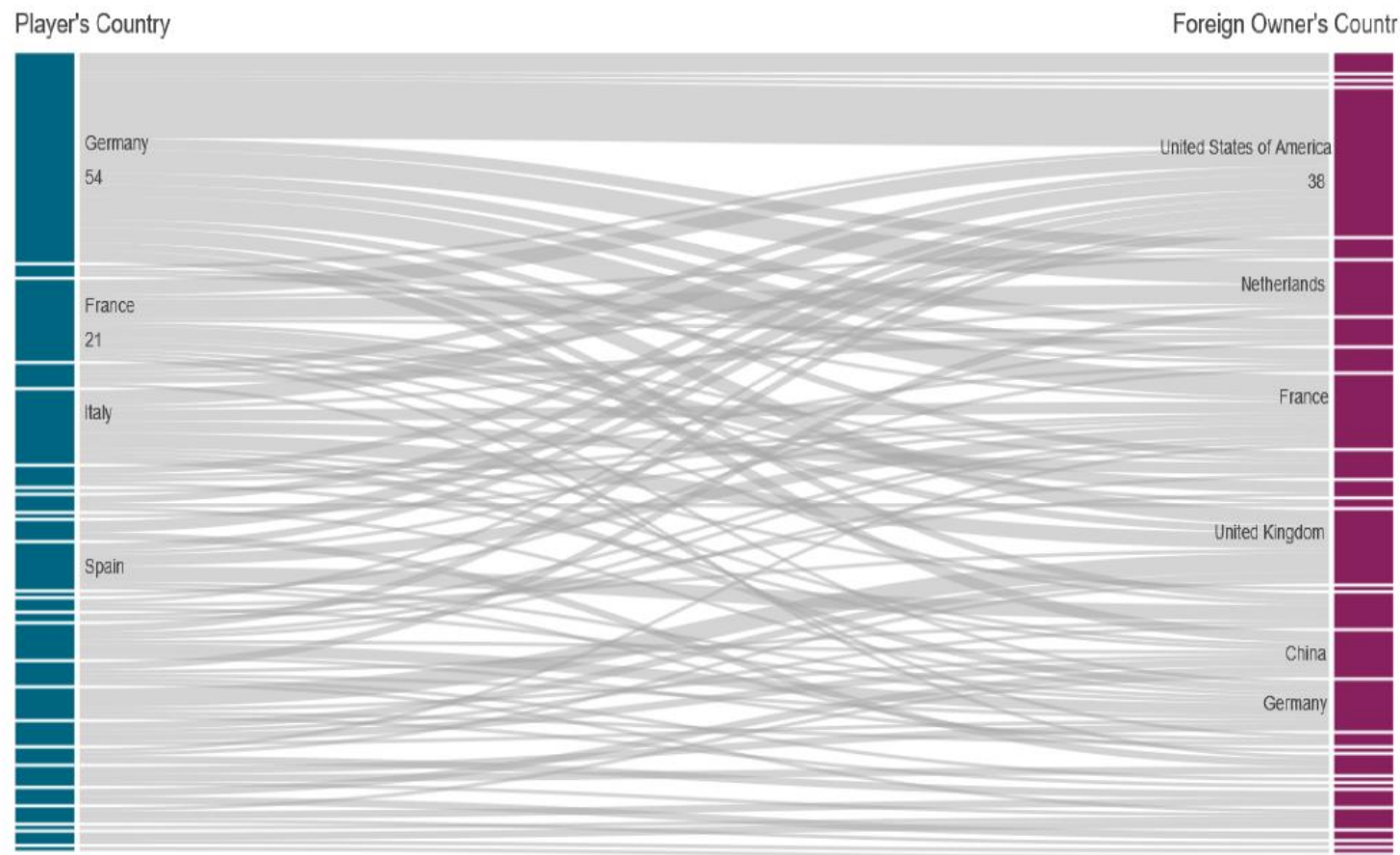
European players – EU 27



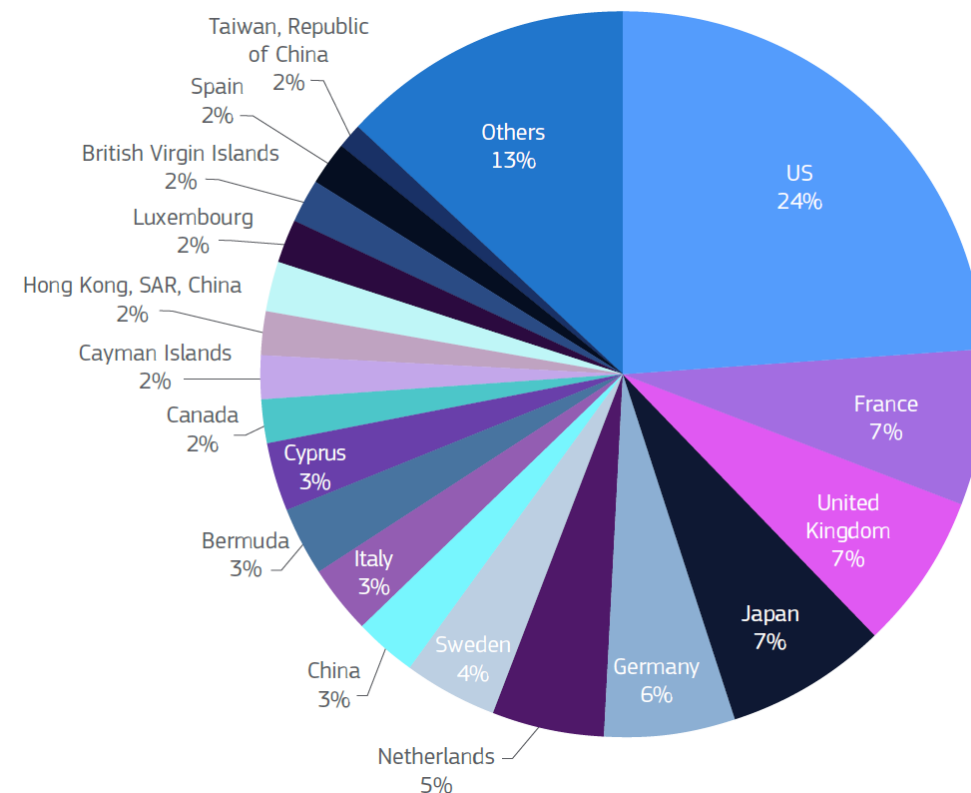
Germany, Spain,
France, Italy, the Netherlands:
~60% players in the EU

Next Generation Virtual Worlds – dependencies

Foreign ownership of local players



US 1st per nr of owned foreign firms



Foreign owners

Thank you !








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