



# PAVING THE WAY TO A TRUSTWORTHY, OPEN AND SAFE METAVERSE

*EBDVF 2022, 22<sup>nd</sup> November 2022*

**Dr Monique Calisti**

Chief Executive Officer [Martel Innovate](#)

Director [Next Generation Internet](#) Outreach Office

[monique.calisti@martel-innovate.com](mailto:monique.calisti@martel-innovate.com)

# THE METAVERSE AS THE NEXT GENERATION OF THE INTERNET



Illustration: Sean McCabe – RobbReport, Feb 2022

# A DEFINITION FOR EVERYONE...

## A PERSISTENT NETWORK OF INTERCONNECTED VIRTUAL WORLDS

WHERE THE PHYSICAL AND DIGITAL WORLDS MEET, OFFERING IMMERSIVE EXPERIENCES

Requirements:

- + Scalability
- + Hardware & Networking latency
- + Accessibility
- + Interoperability
- + Security and privacy
- + Business policies
- + Policy, Regulatory and legal issues

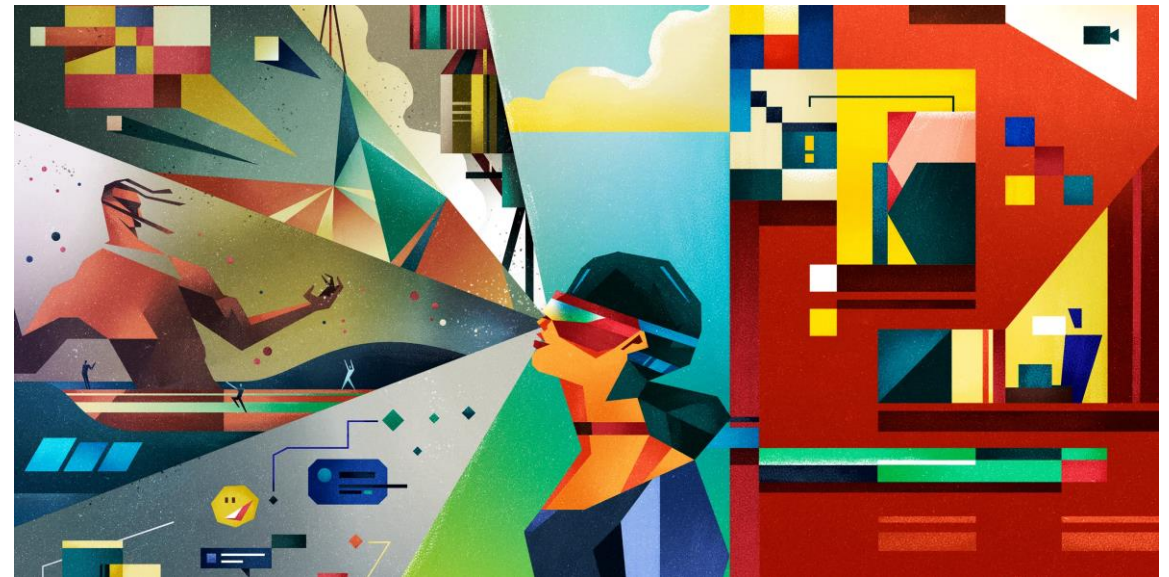


Illustration: Dan Matutina – WIRED Nov 4. 2021

## TECHNICAL ADVANCEMENTS – STILL LOADING

- + **At infrastructure level – network and hardware**
  - High bandwidth, low latency, high performance and miniature hardware...
- + **In terms of virtualisation engines**
  - Computing (cloud, edge, blockchain), 3D engines, geospatial mapping, virtualisation of users (goal-driven software agents), tools for virtual assets creation (e.g., NTFs)
- + **At interface and access level**
  - Mobile devices, displays, VR/AR/XR, Haptic Tech, smart glasses....
- + **User experiences and use cases**
  - Contents, asset marketplace, payments, digital currencies, financial services...



# HOW TO ENSURE A HUMAN-CENTRIC METAVERSE

## TOWARDS AN INTERNET OF SENSES - A MAJOR ROLE WILL BE PLAYED BY...

**Big Data, AI, VR/AR/XR, HPC, crowdsensing, social analytics** and other inter-disciplinary techniques - the data will continue to grow, thus **forming a big data network**, bringing **huge data processing pressure**.

Several research directions:

- Human-attention-aware content delivery
- Crowdsensing and analytics of user behaviour data
- Novel sensing and cognition for human-centric metaverse
- Artificial intelligence for user behaviour modelling and prediction
- Human-aware dynamic and predictive network control
- Incentive, reputation, trust mechanisms
- Secure data ownership and self-sovereign identities
- Semantic modelling and ontologies



# MAJOR EUROPEAN PLANS ON THE METAVERSE

*“We will continue looking at new digital opportunities and trends, such as the **metaverse**.”*

President of the European Commission U. von der Leyen, SOTE 2022

*“Our European way to foster the virtual worlds is threefold: people, technologies and infrastructure.”*

Blog Commissioner T. Breton, September 2022

- + **Digital Services Act and Digital Market Act**
- + **The Virtual and Augmented Reality Industrial Coalition**
- + **No one left behind** – benefits for all European



# THE NEXT GENERATION INTERNET



NGI.EU

**A GROWING  
COMMUNITY  
AT WORK  
TO BUILD  
AN INTERNET  
OF HUMANS**

**NGI**

# PAVING THE WAY TO A TRUSTWORTHY, OPEN AND SAFE NGI

## CHALLENGES AND AMBITION

- Protect personal data
- Ensure privacy and security
- Combat disinformation online
- Guarantee access and freedom of choice
- Respect fundamental rights
- Enforce ethics and sustainability by design

**More than 700 NGI solutions delivered!**

<https://www.ngi.eu/discover-ngi-solutions/>

**Discover the running Open Calls:**

<https://www.ngi.eu/opencalls/>

## TECHNOLOGICAL SPAN

**OPEN SOURCE**, BLOCKCHAIN, DISTRIBUTED LEDGER TECHNOLOGIES, WEB DISCOVERY, **DECENTRALISED ARCHITECTURES** AND PROTOCOLS, DATA PORTABILITY, **FEDIVERSE**, COLLECTIVE INTELLIGENCE, PERSONALISED LEARNING, **WEB 3.0**, **3D IMMERSIVE TECHNOLOGIES**, DATA PRIVACY, ACCESSIBILITY AND INCLUSIVE DESIGN, TRUSTWORTHY CROWDSENSING, **SEMANTIC WEB**, LINKED DATA, ONTOLOGY ENGINEERING, **AI/ML**, XR/AR



# COUPLE OF EXAMPLES

## PiSwap by Bull-Bear-Token

### Crowdsensed Market-Enabling

PiSwap solves the lack of potential buyers on primary market and the price fluctuations on secondary market by completing and enabling it to a wider audience.

### Decentralized Price-Building

Traded on exchanges Bull-Bear-Concepts (opened long/short) offer a crowdsensed and transparent price-building mechanism to determine the value of the underlying asset, i.e., NFT

### Automated Liquidity-Providing

By minting bull-bear-token any user can provide liquidity to the system for any NFT (see UniSwap) acting as market maker.

<https://ontochain.ngi.eu/content/piswap>

## PRINGO

### Private Incentives for Common Goods

- The project exploits recent advances in **blockchain technology that allow NFTs to evolve as a function of how they are used by their owners**, yet scale to large numbers of Daily Active Users, as provided by the layer-2 technology that **Freeverse** develops
- Focus area: video gaming

<https://ontochain.ngi.eu/content/pringo>

# AT THE POLICY LEVEL – MAIN CHALLENGES AND FOCUS

## GOVERNANCE - BEYOND HOW WE WILL INTERACT WITH THE METAVERSE

### + **Competition – avoid big tech monopolies**

- Standardisation and interoperability – avoid vendors lock in and limitation of users' choice
- Anti-trust issues (sensitive data sharing) – moving beyond the Digital Market Act
- Merger regulation – EU parliament is discussing amendments

### + **Revision of the data protection framework**

- Blurred roles in the metaverse – a web of relationships where it is difficult to identify responsibility and liability – even more difficult determining jurisdiction in the metaverse
- Regulatory solutions for storage, handling and safeguarding of data are needed – e.g., how to deal with GDPR versus subliminal advertisement
- Intrusive profiling – loss of control (voter manipulation and state surveillance)

### + **Cybersecurity - fake NFTs, illicit use of crypto-currencies and malicious smart contracts**

- Legal framework for blockchain and smart contracts
- Cybersecurity Resilience Act forthcoming + draft regulations on Markets in cryptoassets



# AT THE POLICY LEVEL – SOME MORE TO ACT UPON

## RISKS AND POLICIES IMPLICATIONS

### + Liabilities

- Content moderation – Digital Services Act / Artificial Intelligence Act
- Intellectual Property Rights protection – complexity increases
- Advertising practices – avoid consumer manipulation

### + Accessibility, inclusiveness and health

- XR accessibility user requirements (WWW Consortium)
- European Disability Forum criticism the Digital Service Act – more is needed
- Impact on children as well as on mental and physical health
  - European Digital Identity Wallet
  - European strategy for a better internet for children
  - European digital rights and principles – EU code on appropriate design



# METaverse - WHAT ABOUT SUSTAINABILITY?

## ON THE NEGATIVE SIDE...

- + **Energy consumption, one of the greatest unknowns**
  - Powerful data centers will be needed – digital twins/simulated worlds
  - Networking and connectivity
  - Cryptocurrencies / NFTs / blockchains are energy intensive
- + **Damages to the environment**
  - Devices and sensors for an immersive metaverse
  - Rare materials mining and e-Waste growth
  - Inducing overconsumption behaviour



# METaverse – NEW SUSTAINABILITY DIMENSIONS

## ON THE POSITIVE SIDE...

- + Dematerialisation – moving consumption towards the virtual**
  - Saving potential across many vertical sectors – virtual resources
  - Replacing real-world-presence with virtual interactions
- + Digital twins – optimising physical with virtual**
  - It can help simulate and anticipate corrective measures
  - It can help improve space utilisation and operational and maintenance efficiency
- + Immersive nature of metaverse experiences can have more impact**
  - On social behaviour and dynamics - one of the biggest barriers to addressing climate change is behavioural
  - Ensure more democratic access to essential services and resources – education in primis



# THE METAVERSE WE WANT...



**EMPOWER PEOPLE**

**AND PROTECT OUR PLANET**



**THANK YOU FOR YOUR ATTENTION**

[martel-innovate.com](https://martel-innovate.com)