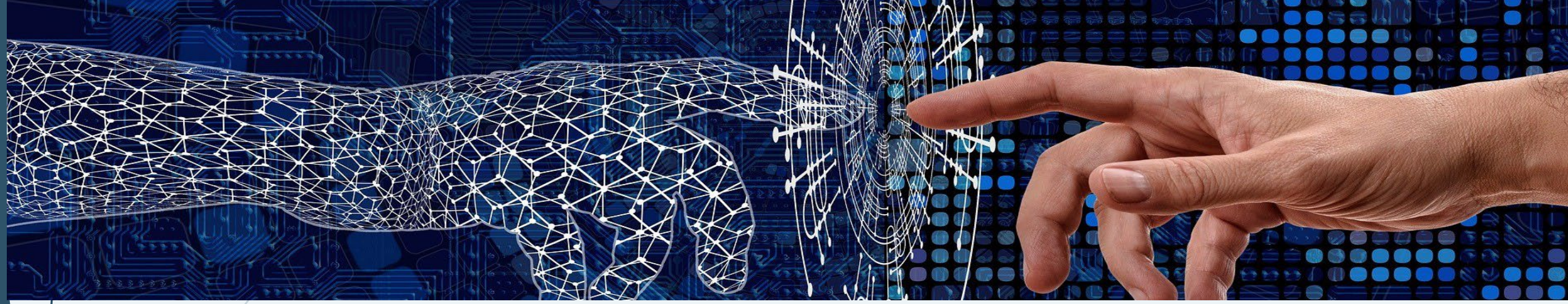

A path toward a metaverse standard

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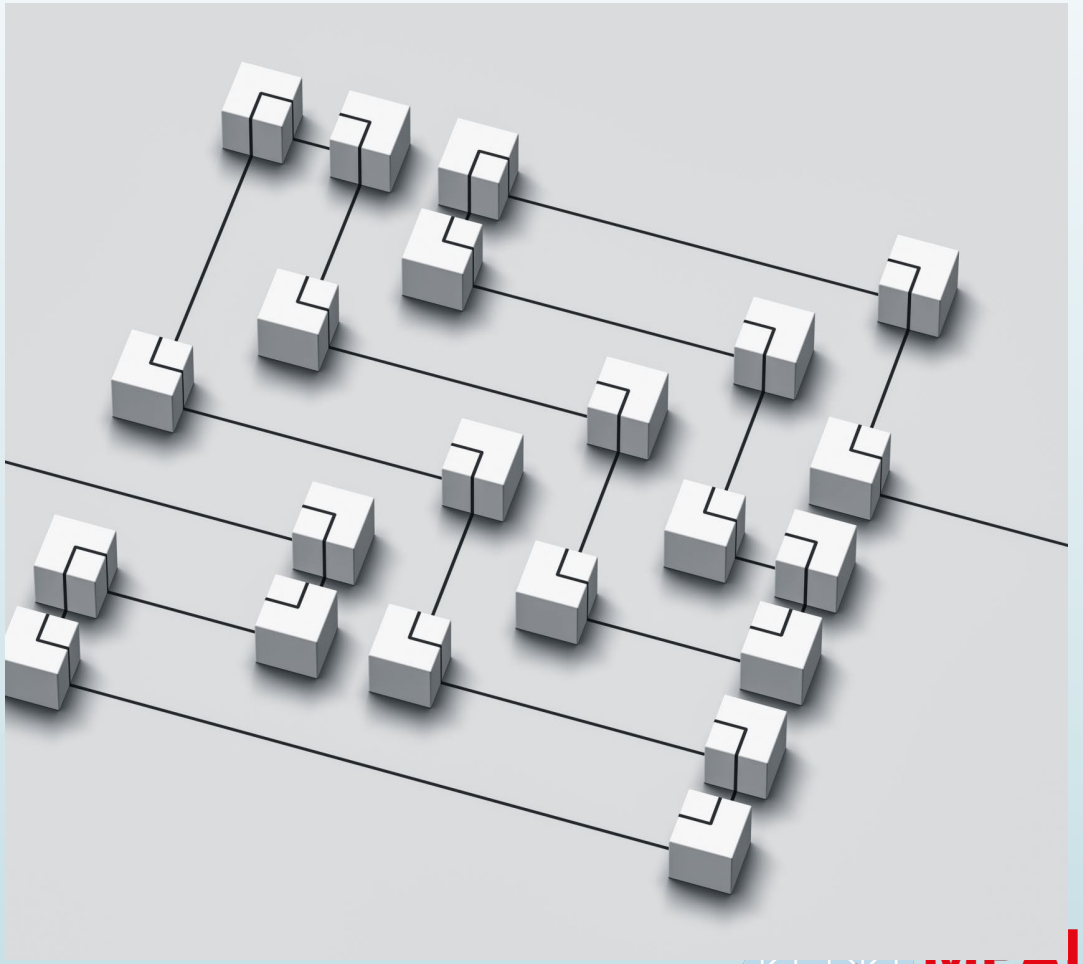
What is “metaverse”?

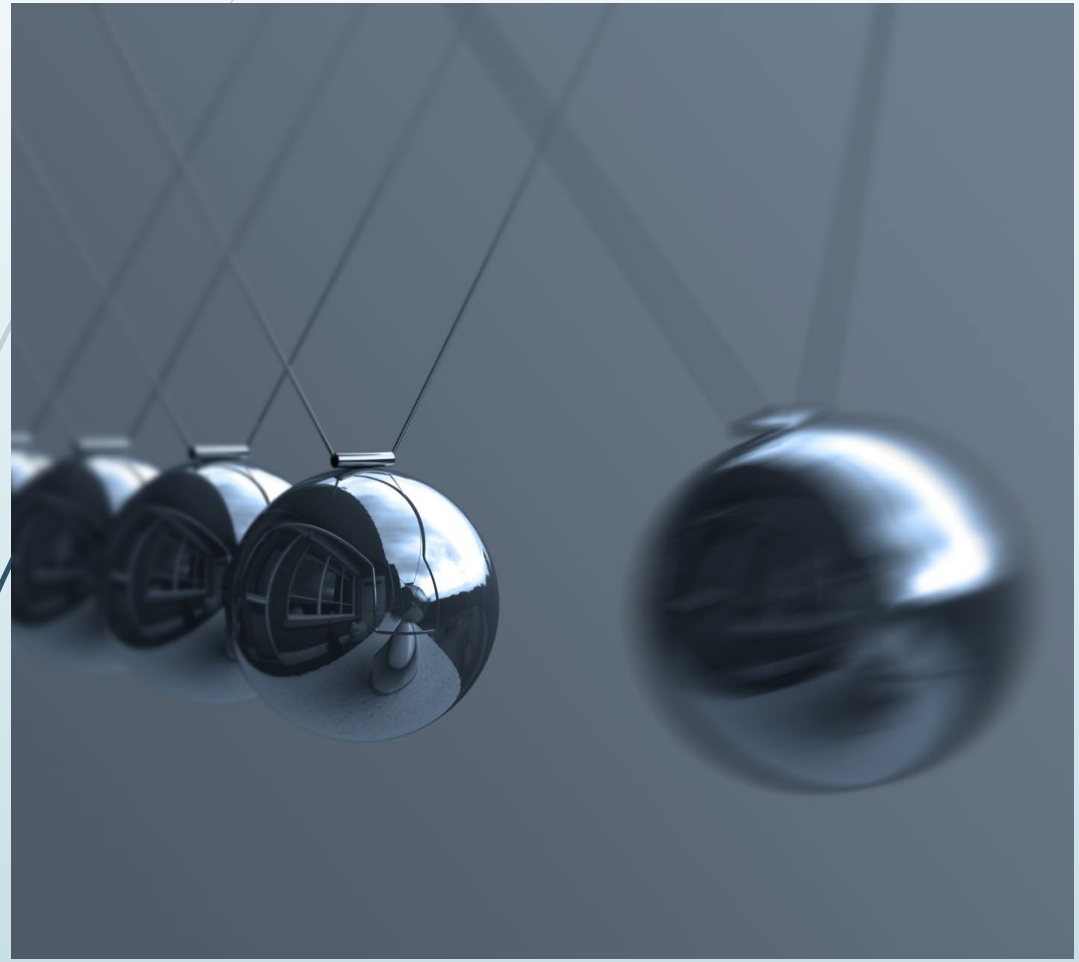
- Simple definition: a computing platform-enabled virtual space whose evolution:
  - Is influenced by:
    - The real world
    - Its own and other virtual spaces
  - Influences the real world and/or other entities in virtual spaces.

Is the metaverse “useful”?

- The notion of metaverse can be applied to most areas of human endeavour:
  - To connect two remote physical places
  - To reproduce and monitor complex phenomena in a simplified and controlled environment
  - To create fictitious but attractive virtual environments
  - To merge virtual and real environments
  - …



Is the metaverse a sure bet?

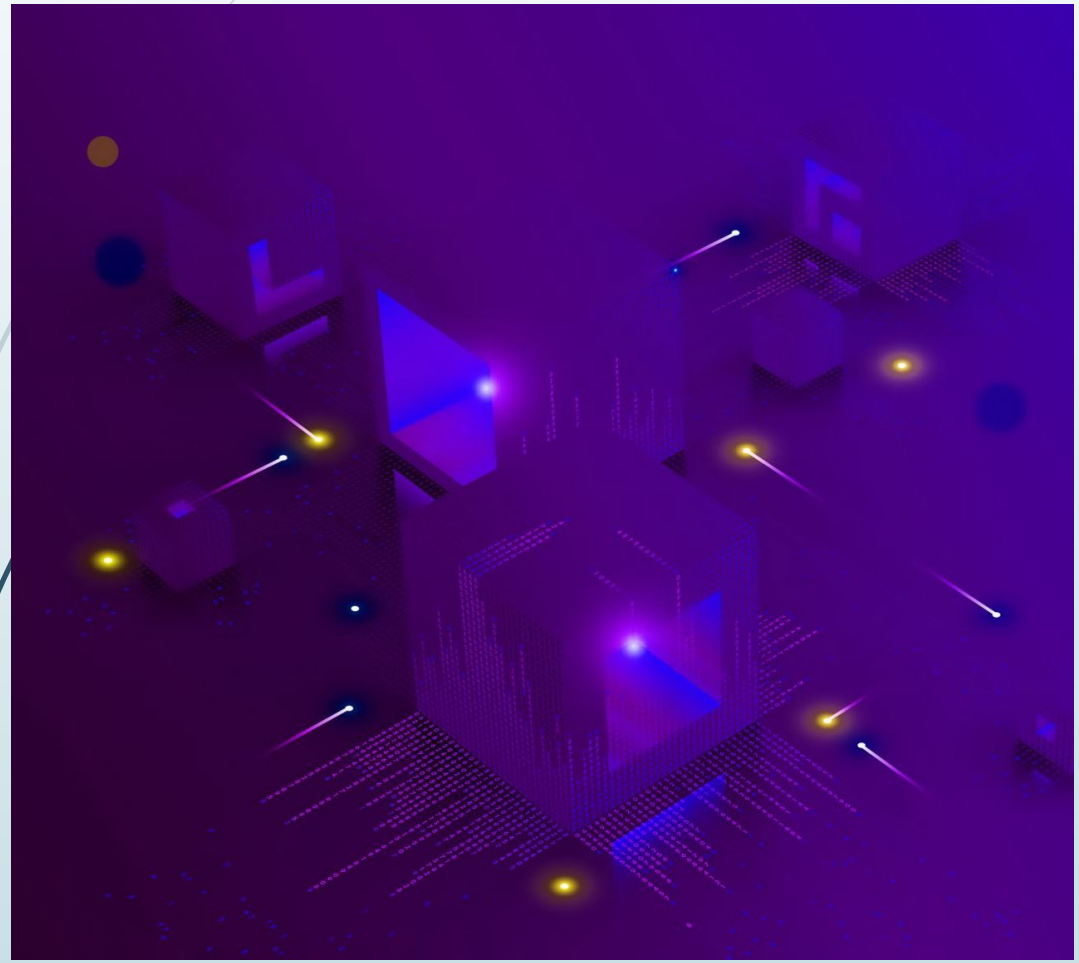


- Successful implementations in some areas.
- Latent needs in other areas but no good solution yet.
- Technologies not mature enough to satisfy other needs.
- Two main approaches:
  - Industry players design and implement metaverses that suit their own needs.
  - Standards body(ies) specifies(y) metaverse for many uses.

Pros and cons of two approaches

- Approach 1: Costly, risky, but big gains if it succeeds
  - Competitive solutions may create confusion, delay acceptance
- Approach 2: Doable, but what should be done first and for what?
  - A metaverse standard is uniquely multi-stakeholder
- Good luck to those engaged in Approach 1! We go for Approach 2

Before anything else



- We should analyse
  - *Applications* served by the metaverse
  - *Technologies* required for the metaverse
  - *Business Players* with a role in the metaverse
- A metaverse standard is primarily a communication standard.

What should the metaverse do?

- A metaverse:
  - Holds dialogues with **clients** and **other metaverses** about things related to the business of the metaverse.
  - Acts as replicas of the complex thing called the real world.
- A metaverse should:
  - Understand what other metaverses are asking it to do.
  - Request other metaverses to do things in an understandable way.

Metaverses should understand each other about…

- … a subset of what humans talk about.
- Human sentences contain Verb – Noun – Complement.
- The metaverse's Verbs, Nouns, and Complements should primarily be driven by relevanr human dialogues.
- The meaning of Verbs, Nouns, and Complements must be specified for metaverses to be able to communicate.

Selecting Verbs, Nouns, and Complements

- We need to specify the functional requirements of each **Verb**, e.g.:
  - Capture an object or a scene in the real world and place it somewhere in the metaverse.
  - Animate a model with a stream and place it somewhere in the metaverse.
  - Render an object located somewhere in the metaverse to somewhere in the real world.
- We need to specify the functional requirements of the **Nouns** representing the entities that populate a metaverse and the real world for which a Verb can be applied.
- We need to select a minimal set of **Complements**.
- We need to verify selection's adequacy for the intended metaverse needs.

Achieving that would already be a significant goal

- An independently buildtmetaverse can express Actions using the same Verbs, Nouns, and Complements.
- But, for a metaverse$_A$ to *communicate* its intentions to a metaverse$_B$ we need a common "language".
- If that is not available, an interpreter is needed.
- But the intentions may refer to technologies.

The issue of “formats”

- To *Capture an object in the UV, place it the MV, and render it in the UV*” we need to know the format of he captured object.
- A standard should select technologies but: is this the right time to make such choices?
- It is more prudent only to indicate the choices made to enable “mediated” interoperability.

One size does not fit all

- Metaverses for different application domains may have partially different needs (i.e., of technologies).
- Supporting some needs may be “costly” (in terms of technology)
  - Some metaverses do not need avatars – why use them?
- “Profiles” – defined as sets of technologies – solve the problem

Five Reasonably specifiable things

1. Functional requirements of Verbs, Nouns, and Complements needed by the metaverse.
2. Verification that Verbs, Nouns, and Complements represent do the required job in the metaverse.
3. Common language to convey intentions between metaverses.
4. Mechanism to convey technology choices related to Nouns.
5. Profiles for a set of application domains.

MPAI. community

Someone has already done all five things!

MPAI - Moving Picture, Audio, and Data Coding by Artificial Intelligence.

International, unaffiliated, non-profit SDO.

Developing AI-based data coding standards.

With clear Intellectual Property Rights licensing frameworks.

MPAI. community

The MPAI Metaverse Model (MPAI-MMM) about

- Developed: informative operation model:
  - An M-Instance behaves as if it were made of interacting Processes.
  - A Process can be a Device, a User, a Service, or an App.
- Specified:
  - Functional requirements of 30 Actions
  - JSON syntax and semantics of 65 Items.
  - Qualifiers conveying info on technology used by Items.
  - Human readable MMM- Script
  - Backus-Naur form of MMM for inter-Process communication.
  - 4 MMM Profiles.
- Described 9 use cases with MMM Script to validate specification.