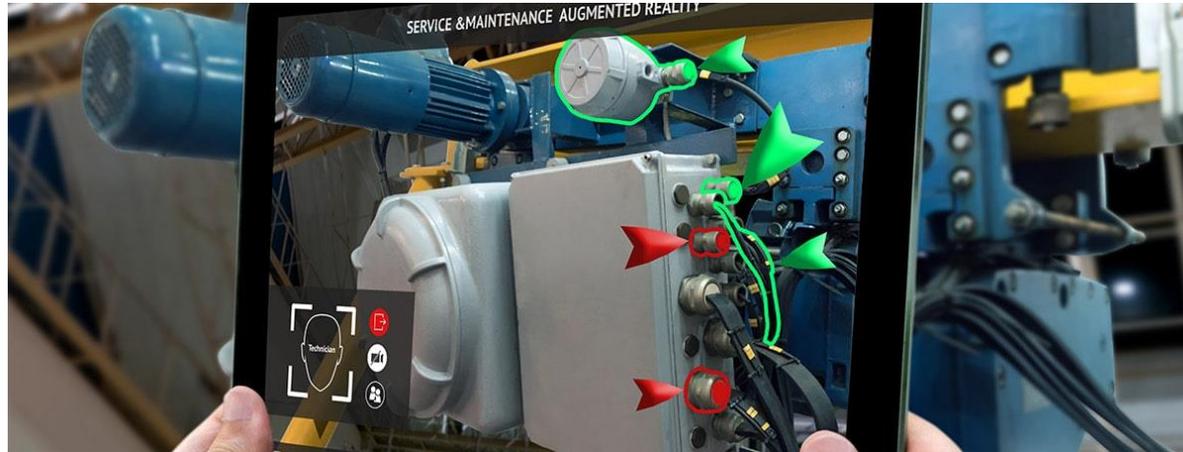# Towards the Real World Metaverse:
Standardization Activities at ETSI

Jérémy Lacoche
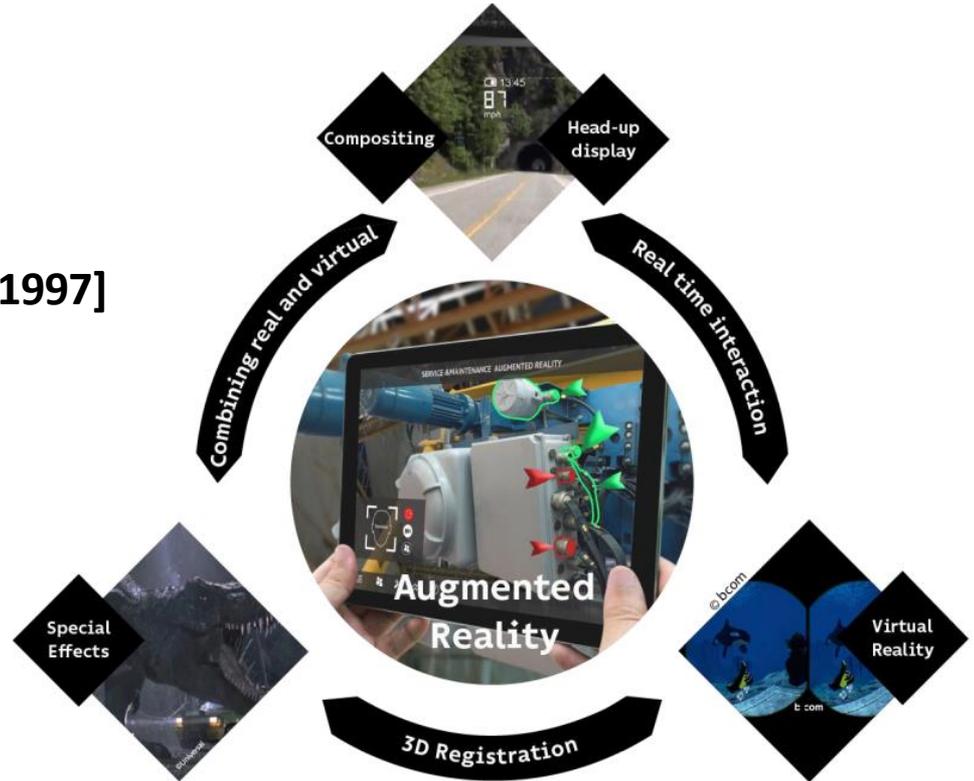
AR/VR Research Scientist @ Orange

Vice Chair @ ETSI ARF ISG

Definition of Augmented Reality

- **Augmented Reality (AR) is the ability to mix real-time spatially-registered digital content with the real world**
  - Combines real and virtual world
  - Interactive in real time
  - Registered in 3D

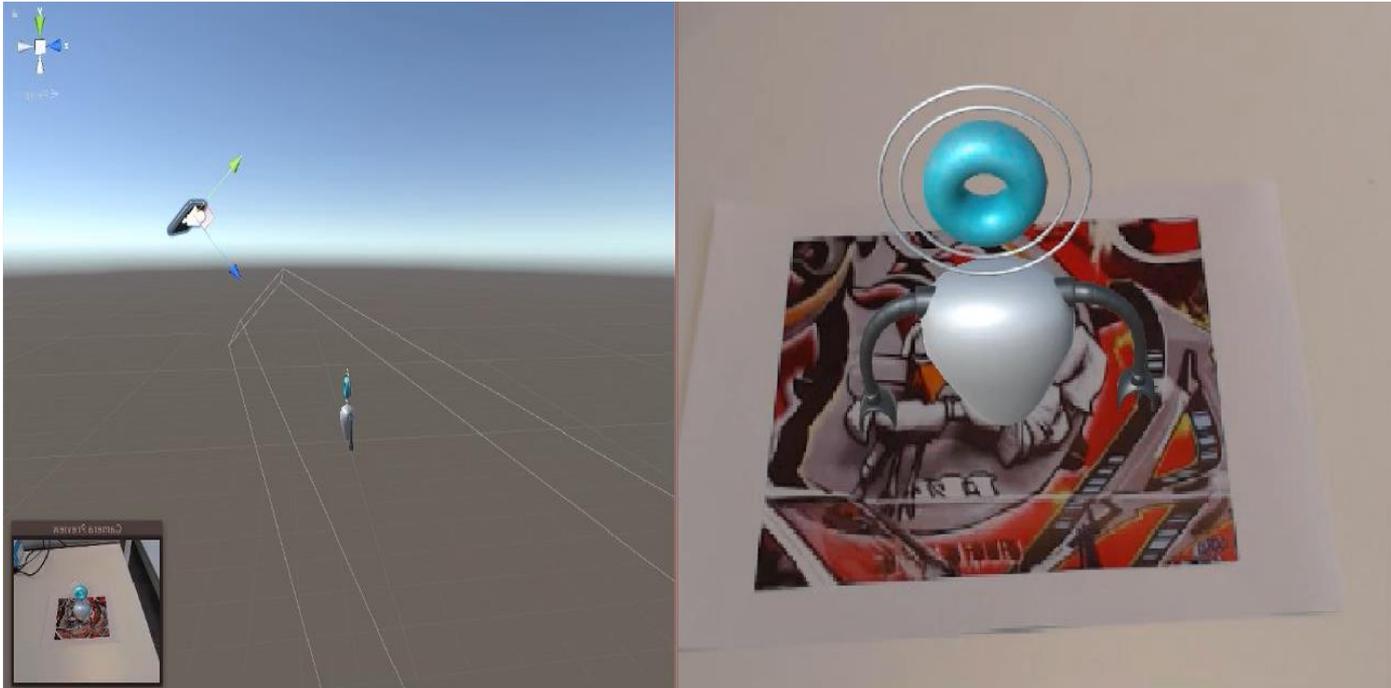   **[Augmented Reality – Azuma, 1997]**

3D registration

Align virtual and real viewpoints

=

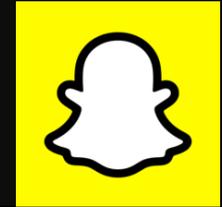**Estimate the pose (Position and Orientation) of the AR device**

3

Real World Metaverse : AR at scale

Credit : Google Space invaders (geospatial api)
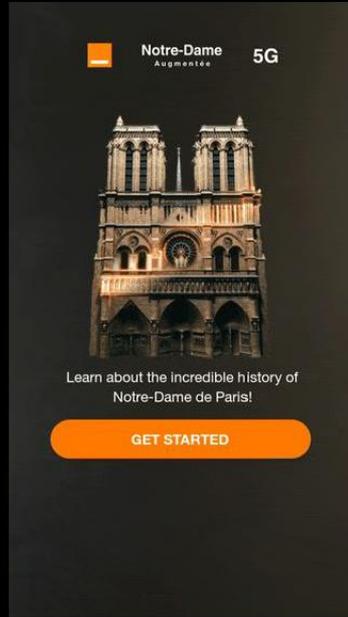
Real World Metaverse : Orange x Snap

5G Lens

SELFIE   INTRO   13TH CENTURY   19TH CENTURY   21ST CENTURY

Real World Metaverse : Industry and Digital Twin

Credit : PTC Vuforia
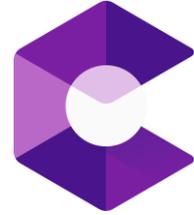
Many Stakeholders

Apple : ARKit
(AR headset for 2023?)

Microsoft : Hololens
and Azure

Google : ARCore, Geospatial
API (fresh annoucements at
I/O 2023)

NIANTIC
LIGHTSHIP

Niantic : Lightship SDK
(Pokemon Go)

PTC : Vuforia
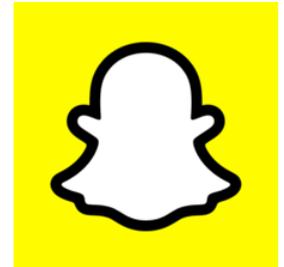
Snap

Magic Leap

Observations

- **Lack of Interoperability**

- **Lack of sharing between applications**

- **Data sovereignty, privacy and security issues**

- **System dependency**

World representation Ecosystem 1

World representation Ecosystem 2

Without interoperability

Unique world representation

With interoperability

ETSI ARF :
Tackling interoperability issues of the Real World Metaverse

ETSI ARF ISG

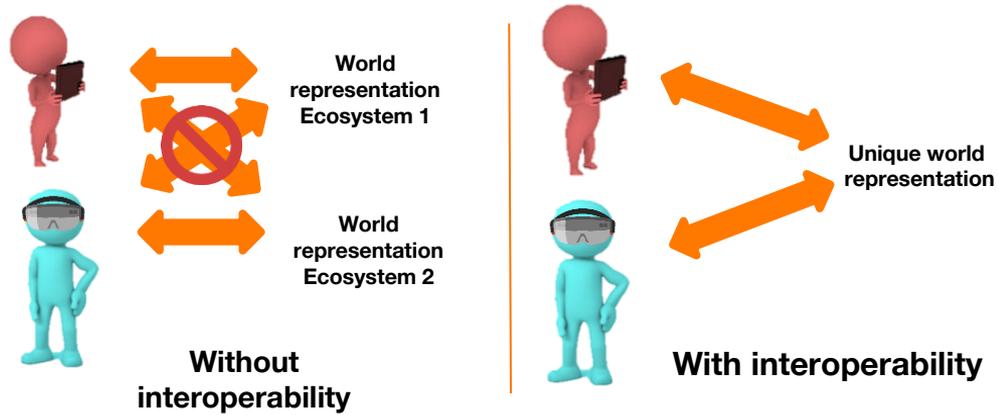- To **define a framework for the interoperability of AR components**, systems and services, in order to reduce market fragmentation

- To encourage an ecosystem with a **diverse range of solution providers** including smaller players, new entrants and academics

- Publication of a **modular functional reference architecture** for AR solutions

→ **The focus is on interfaces,** defining requirements enabling interoperability between building blocks and APIs

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ETSI ARF ISG Members: February 2023

Coordination and collaboration with other SDOs

KHRONOS GROUP
MoU in place

OPEN AR CLOUD
MoU in place

Metaverse STANDARDS FORUM™
By individual membership of participants

ETSI
The Standards People

ISO JTC1 IEC
INFORMATION TECHNOLOGY STANDARDS
MoU in place

AREA
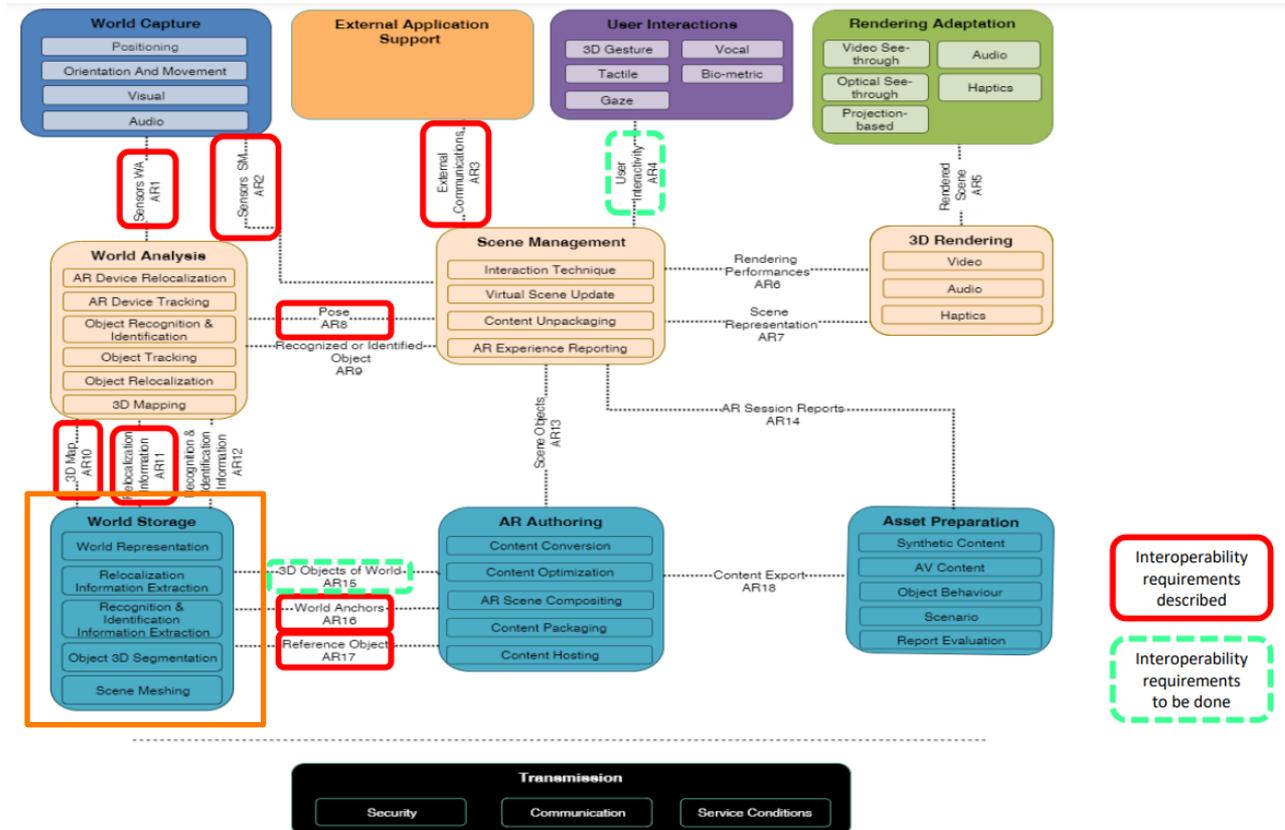Augmented Reality for Enterprise Alliance
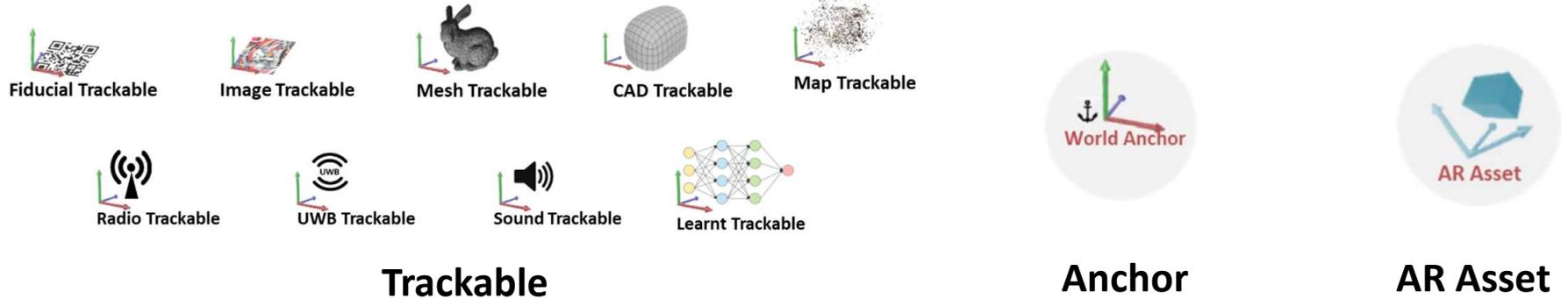MoU in place

3GPP
A GLOBAL INITIATIVE

ISG ARF functional reference architecture

World Storage : anchoring virtual content to the real world

- As part of the **digital twin** : a **hierarchy of what can be tracked** in the real world

- AR assets are positioned according to the graph to match the real world
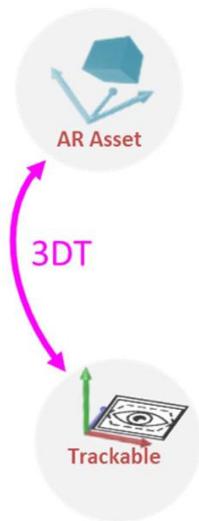

Fiducial Trackable · Image Trackable · Mesh Trackable · CAD Trackable · Map Trackable

Radio Trackable · UWB Trackable · Sound Trackable · Learnt Trackable

Trackable

World Anchor

Anchor

AR Asset

AR Asset

Simple examples : indoor and outdoor use-cases

Image-tracking based

Real World	World graph

Leveraging Visual Positioning Systems

Real World	World graph

Addressing advanced uses cases : industry 4.0

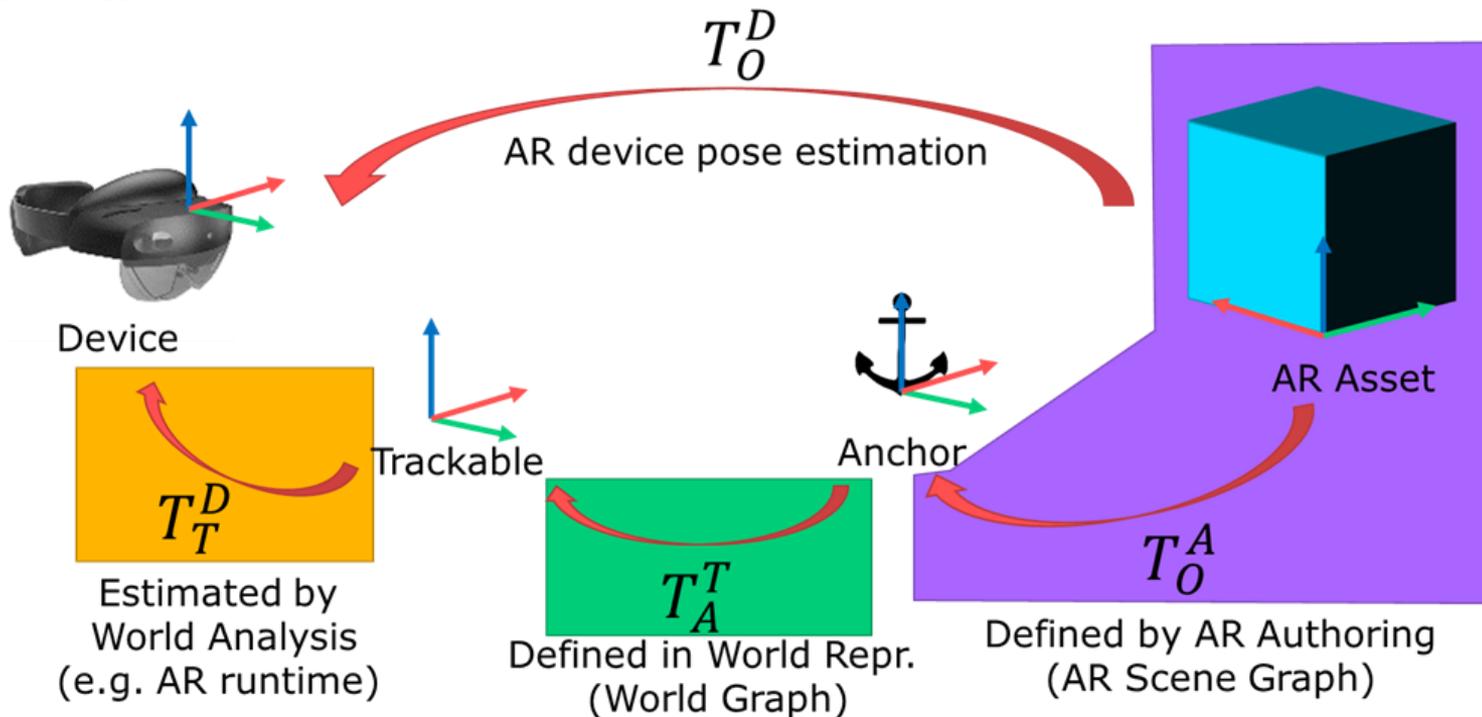- Possibility to combine **cartesian poses** and **georeferenced poses** to address large scale environments (including **outdoor** and **indoor** spaces)
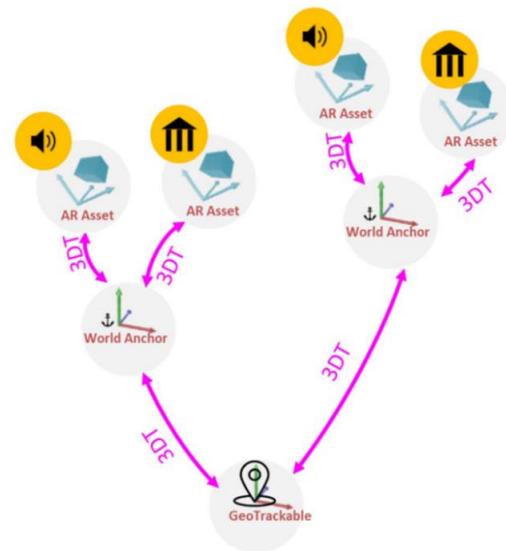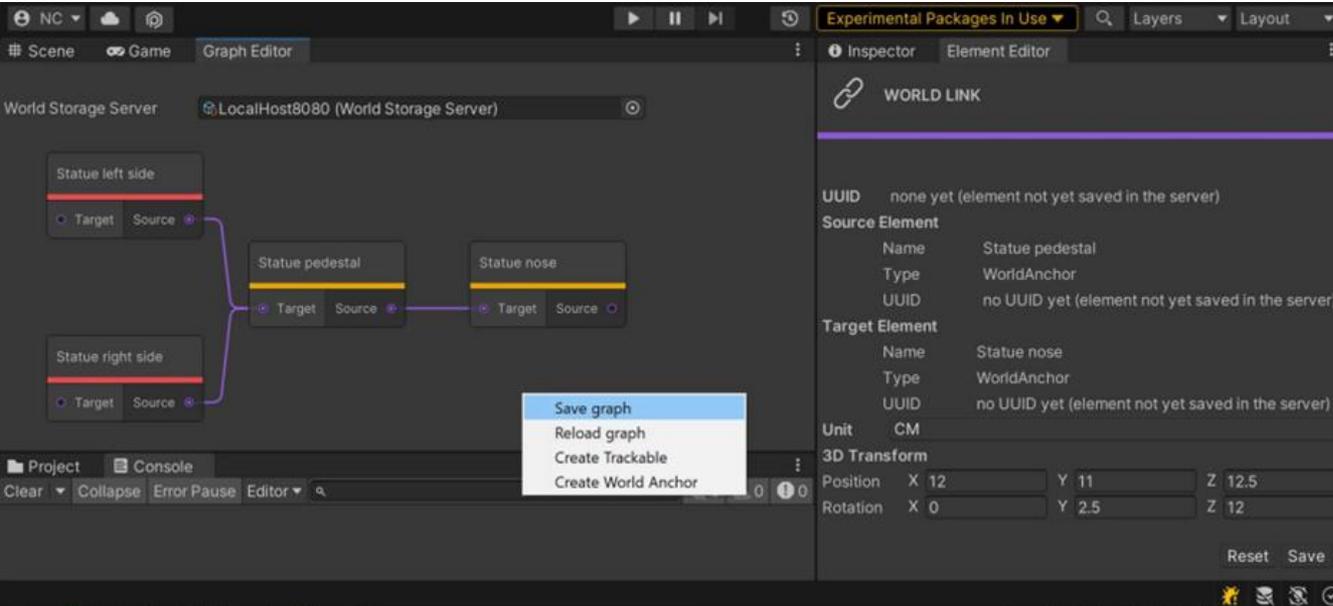
World Graph and Scene Graph

- **3D registration requires to estimate the 3D transform between AR assets and the AR device**

T_O^D

AR device pose estimation

Device

Trackable

Anchor

AR Asset

T_T^D

Estimated by
World Analysis
(e.g. AR runtime)

T_A^T

Defined in World Repr.
(World Graph)

T_O^A

Defined by AR Authoring
(AR Scene Graph)

World Storage : a first implementation within Unity

Open source : https://labs.etsi.org/rep/arf/world-storage-api-helpers

Future work: AR devices compatibility

- **Implementation of multiple wrappers : Detect the trackables** and **Interpret the graph** to determine the pose of the AR assets relative to the device
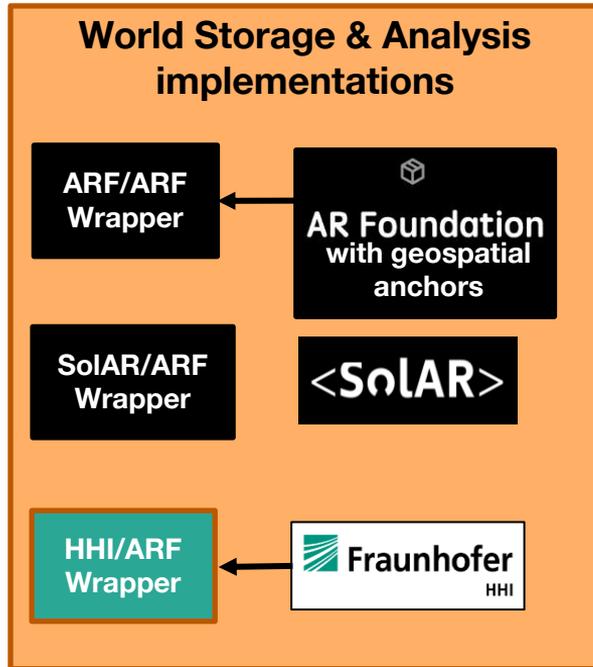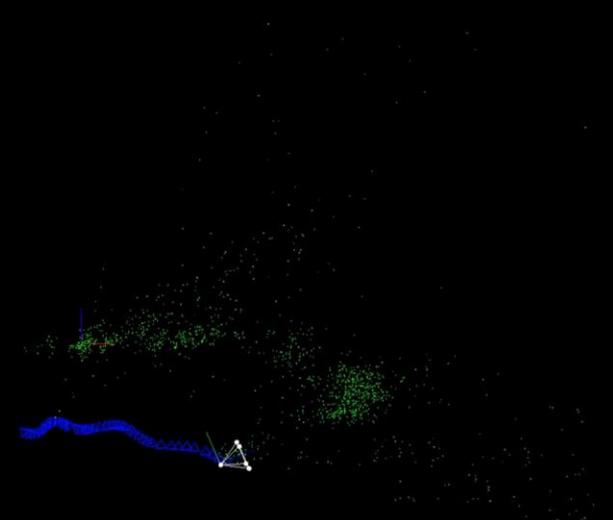
Some ETSI related Orange contributions

b<>com X Orange : SolAR ARCloud Solution

- **Open Source ARCloud (Collaborative Relocalization and Mapping)**

- **Compatible with the ETSI specifications**

- **Deployable on Cloud/Edge Infrastructure**

- **Powered by 5G**

https://solarframework.github.io/

Use case example @Orange

Conclusion

Perspectives

- **The Real World Metaverse will unlock a lot of use cases** : retail, entertainment, industry, education, tourism, health, social media, etc.

- Localization in the real world is one piece of the Metaverse : They are many more!
→ **The Metaverse Standards Forum gathers these needs**

- **The environnemental cost** of these solutions should be evaluated : move towards « frugal » AR/VR solution.

Do get involved!

- More information and deliverables : **https://www.etsi.org/committee/1420-arf**

- If your company is an ETSI member, you can join the ISG ARF by sending email to isg_agreements@esti.org

- If your company is not an ETSI member, you can participate after signing the ARF participant agreement
    - Access to ISG ARF documentation, subscription to mailing list and participation to online conference calls are free
    - There is a small fee per day per plenary meeting (F2F/online participation)

    → **Do not hesitate to contact me for more information!**

Thanks

Contact : jeremy.lacoche@orange.com

 @Jeremy_Lacoche