ETSI Industry Specification Group ARF: Building interoperability for AR systems

ISG ARF Leadership Team
Objectives and results

✓ To define a framework for the interoperability of AR components, systems and services, in order to reduce market fragmentation and enable providers to offer components of complete AR solutions

✓ 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 with interoperability provided at the interfaces between building blocks
  ✓ An important step towards greater interoperability for AR (and more generally XR)
  ✓ The focus is on interfaces, defining requirements enabling interoperability between building blocks and APIs
ISG ARF membership - February 2023
Definition of Augmented Reality

✔ Augmented Reality (AR) is the ability to mix in 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]
Scope of xReality

 år eXtended Reality (XR) is the umbrella term used for Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR), as well as all future immersive technologies.

[Reality-Virtuality Continuum - Milgram, 1994]

Source of diagram: XR4ALL Landscape Report – available from xr4all.eu/resources, 2020
Global overview of the architecture of an AR system

- **Tracking Sensors**
  - Vision
  - Proprioceptive
  - Exteroceptive

- **Processing Units**
  - Central Processing Unit
  - Graphics Processing Unit
  - Vision Processing Unit

- **Rendering Interface**
  - Video see-through AR
  - Optical see-through AR
  - Spatial AR

- **Interaction Interfaces**
  - Gesture
  - Vocal
  - Eye Tracking
  - Emotion

- **Vision Engine**
  - Localization, Mapping, Scene analysis, etc.

- **3D Rendering Engine**
  - Pose Estimation

- **World knowledge**
  - Planes, occlusion meshes, lights, etc.

- **Interactive Contents**
  - Content Simplification, Interaction, Fusion, etc.

- **Interactive Scenario**

- **Non interactive contents**

**Cloudification**
- Possibly distant
- Distant with difficulty (very low latency)
- Local
ISG ARF functional reference architecture

For more information see the webinar:
"Overview of ETSI reference architecture for Augmented Reality solutions"
Development of interoperability requirements

For more information see the webinar: “Overview of ETSI reference architecture for Augmented Reality solutions”
Published Deliverables

✔ Standards Landscape: the role of existing standards relevant to AR  ETSI GR ARF 001 v1.1.1
✔ Industrial use cases for AR applications and services  ETSI GR ARF 002 v1.1.1
✔ Reference architecture for AR solutions  ETSI GS ARF 003 v1.1.1
✔ Interoperability Requirements; Overview  ETSI GR ARF 004-1 v1.2.1
✔ Interoperability Requirements for World Storage and AR Authoring functions  ETSI GS ARF 004-2 v1.1.1
✔ Interoperability Requirements for World Capture, World Analysis and Scene Management  ETSI GS ARF 004-3 v1.1.1
✔ Interoperability Requirements for World Analysis, World Storage and Scene Management functions  ETSI GS ARF 004-4 v1.1.1
✔ Interoperability Requirements for External Communications  ETSI GS ARF 004-5 v1.1.1
✔ Open APIs for the Creation and Management of the World Representation  ETSI GS ARF 005 v1.1.1
World Representation APIs - Implementation Driven Standards Development

- Iterative process
- Initial specification of the APIs
- Implementation of the APIs as Open Source
- Testing/validation on existing implementations through the development of dedicated wrappers and use cases
- Publication of an implementation-independent specification (see ARF GS 005 v1.1.1)

For more information see the webinar: "Towards an interoperable world representation for XR"
Coordination and collaboration are key

✔ Partnering with a range of organisations to coordinate efforts for the benefit of the XR ecosystem

MoU in place

By individual membership of participants
Do get involved!

- More information: https://www.etsi.org/committee/1420-arf
- ISG ToR: Terms of Reference
- If your company is an ETSI member just register to any ISG ARF meeting
- 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)
THANK YOU