MEET THE EXPERTS

5TH EPISODE

XR5.0

LIVE WEBINAR

5th BeyondXR Projects Cluster Webinar

PRESENTERS:

Breaking Barriers: How Open XR Standards Unlock Interoperability and Compliance

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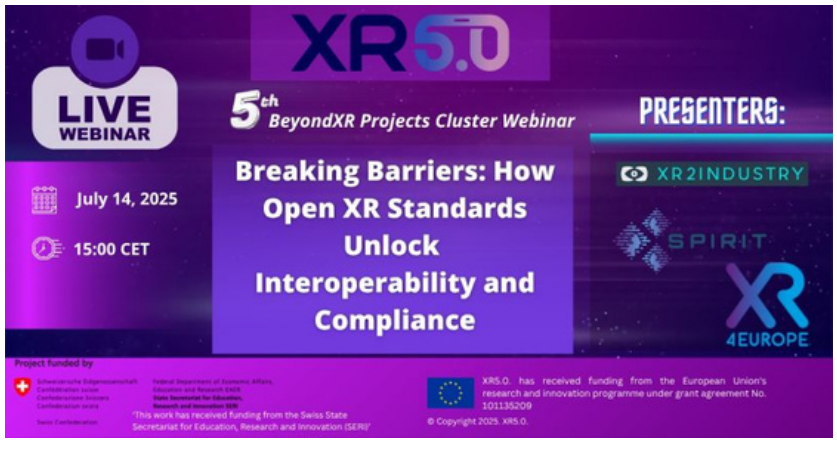
Dear Prof. Dr. Hellwagner,
"Given SPIRIT's focus on advancing XR standardization, what are the key challenges and opportunities in enabling real-time immersive telepresence, adaptive point cloud streaming, and cross-platform interoperability? How is SPIRIT addressing these aspects to enhance the user experience and ensure seamless integration across diverse XR platforms?"



SPIRIT' ambition has been (and still is) to provide a multi-site, interconnected platform dedicated to collaborative immersive telepresence applications at scale. The platform is intended to support the core SPIRIT use cases, including volumetric video streaming (point clouds), realistic avatar animation and streaming, and remote steering of mobile robots, as well as use cases and applications brought by 27 Open Call projects. In addition, the platform is hosted on cloud-style, interconnected testbeds at a Deutsche Telekom site in Berlin and at the University of Bristol (formerly, at the University of Surrey), which represents a real-world, wide-area deployment of the SPIRIT system.

Making such a platform usable and useful for the SPIRIT use cases and the Open Call experiments requires to heavily build upon standards, including both formal standards and de-facto/industry standards. This includes:
- source-side immersive media processing (in particular compression using standard video encoding tools, Google's Draco, and MPEG's point cloud compression techniques);
- receiver-side media processing, rendering (with edge computing support) and playout (which SPIRIT decided to be based on Unity, due to support by and compatibility with many headset models);
- connectivity and media communication protocols (with the main vehicle being WebRTC);
- wide-spread cloud technologies in the testbeds (for virtual machines, containers, resource management, among others);
- adherence to standard Quality of Experience (QoE) study recommendations and models (mainly by the ITU); and
- security, authentication and authorisation standards that should be adhered to over the entire system.

This does not preclude innovations to be made
The key challenges in setting up such a multi-site platform are to make the use cases and applications work (1) in (near) real time, (2) with high quality, and (3) in a scalable manner on today's systems and networks, since many of the standard-based immersive technologies are still in their early stages or require immense resources, for instance real-time point cloud compression. Another challenge -- at the same time being an opportunity -- is to set up the system in a way that makes (4) components/parts useful for and compatible with other applications/use cases not anticipated at development time. The Open Call projects provided some evidence that SPIRIT components could -- with moderate efforts -- be utilised by and integrated into other systems/platforms or, vice versa, that other applications and devices could be ported onto and integrated into the SPIRIT testbeds.

Immersive telepresence and "seamless cross-platform integration" have still a long way to go. The use of standards, as done in SPIRIT, is encouraging, but there are still many competing standards around, and many of them still lack effective hardware and/or software implementations, at least in the immersive media (XR) domain. Intense efforts need to be invested in consolidating these standards and creating useable, highly effective implementations for them.

Prof. Dr. Hellwagner,

Dear Mr BARNGROVER

How are open standards and collaborative European initiatives supporting the development of a cohesive, pan-European XR ecosystem that promotes interoperability, digital sovereignty, and innovation?

From my perspective, open standards are one of the most important ways we can lower barriers to entry in the XR space.
They make it easier to build sustainable, reliable solutions that work across devices and platforms—and that opens the door for more specialised offerings. That kind of diversity fuels real competition and gives users and organisations across Europe more choice and better value, which is essential for wider and faster adoption of immersive technologies.

With projects like OPENVERSE and XR4HUMAN, we're seeing the EU invest not just in the development of immersive technologies, but in the ecosystems that support them. These initiatives help identify gaps, raise awareness of existing standards, and promote adoption through workshops, community-building, and collaboration across sectors. It's grassroots, and it's strategic—and it's exactly what we need more of to grow a strong, cohesive XR landscape in Europe.

A focus on:

OPENVERSE:

OpenVerse aims to establish inclusive, open, and ethically responsible European virtual worlds. The project seeks to enhance the European Union's technological sovereignty by promoting virtual environments characterized by openness, transparency, inclusivity, ethical and environmental responsibility

A focus on:

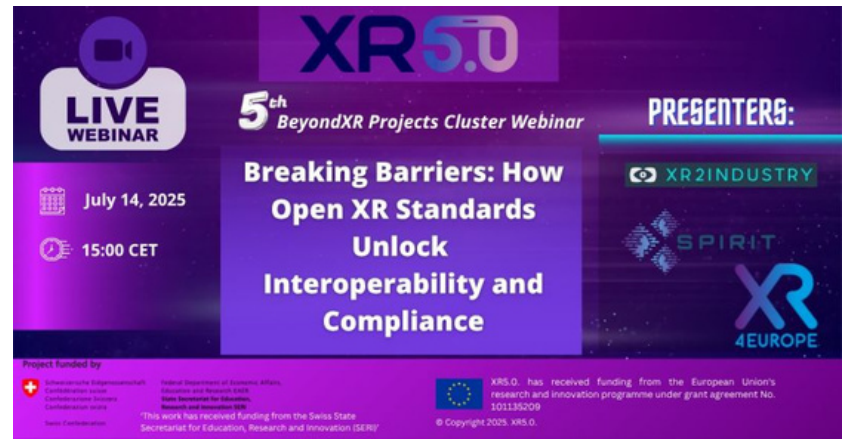
XR4HUMAN:

XR4Human is a European project focused on developing Extended Reality (XR) technologies—such as Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR)—with a strong emphasis on human-centric design. The project aims to create immersive XR solutions that improve quality of life, promote inclusivity, and support sustainability

Michael Barngrover

"Dear Mr Erwin de Ley,

Given the federated architecture of DataSpaces, how do you envision balancing the need for interoperability across platforms and organizations with end-to-end data governance, especially in industrial settings where trust and sovereignty are critical?
Specifically, what mechanisms or standards—technical, semantic, or legal—are being employed to ensure secure, compliant content sharing across XR ecosystems?"



The dataspaces paradigms and architecture are explicitly defined to support an ecosystem for trusted data exchanges.

The driving organizations (GAIA-X and IDSA) both have this as strong focus, as well on the level of technical components as on governance structures and policies. See e.g. [1].
Also the European Data spaces Support Centre defines a trust framework [2].

This is a quite complex matter and the linked documentation explains the building blocks in detail.
Below I'll try to summarize some main elements in an informal way.

Technically the DS specifications and reference implementation facilitate trusted exchanges while maintaining a level of sovereignty a.o. as follows:
- DS protocols include machine-readable verifiable credentials and policies.
These are fundamental elements of the data space specifications, providing the basic infrastructure but also allowing extensions as needed to cater for an ecosystems needs.

The use of decentralized identities and federated catalogues allows participants to maintain sovereignty / ownership of their identities and assets
- The Eclipse Dataspace Connector (EDC) facilitates a technical integration ensuring data sovereignty, interoperability and compliance with the DS protocol and security standards.

Semantically, the use of a common information model (catalogues, offers, contracts, participants, ...) and workflows, combined with shared metadata schemas and vocabularies support machine-readable asset metadata and interoperable data exchanges across platforms owned by the respective participants.

In our XR2Industry project this is the scope we want to tackle in a “minimum viable demonstrator”, combining technical building blocks with semantic schemas and vocabularies.

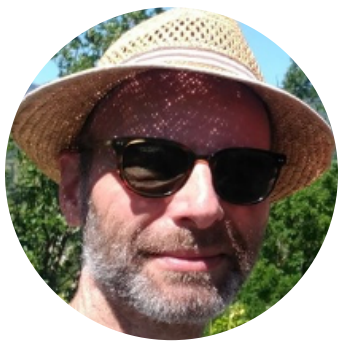
But in real industrial data space implementations (e.g. Catena-X for automobile [3]) there is an additional layer of governance and certification/verification.
A specific legal role is foreseen for a so-called “Clearing house” responsible for verifying candidate participant organisations and handing out a verified identity when all goes well.
Partners should still foresee legal contracts as needed, while the DS implementation can tie these to technical policy enforcement in the connectors according to the agreed terms.

See also :
[1] https://docs.gaia-x.eu/policy-rules-committee/trust-framework/22.10/
[2] https://dssc.eu/space/BVE/357075461/Trust+Framework
[3] https://catena-x.net/

A focus on:

XR2INDUSTRY

The creation of a European reference platform aiming to develop and prototype advanced interoperable XR solutions to solve common challenges encountered by the industry (in areas such as assembly, maintenance, remote operation, training, design, logistics, etc.), placing the wellbeing of workers at the centre of the production process.



Erwin De Ley

XR2INDUSTRY