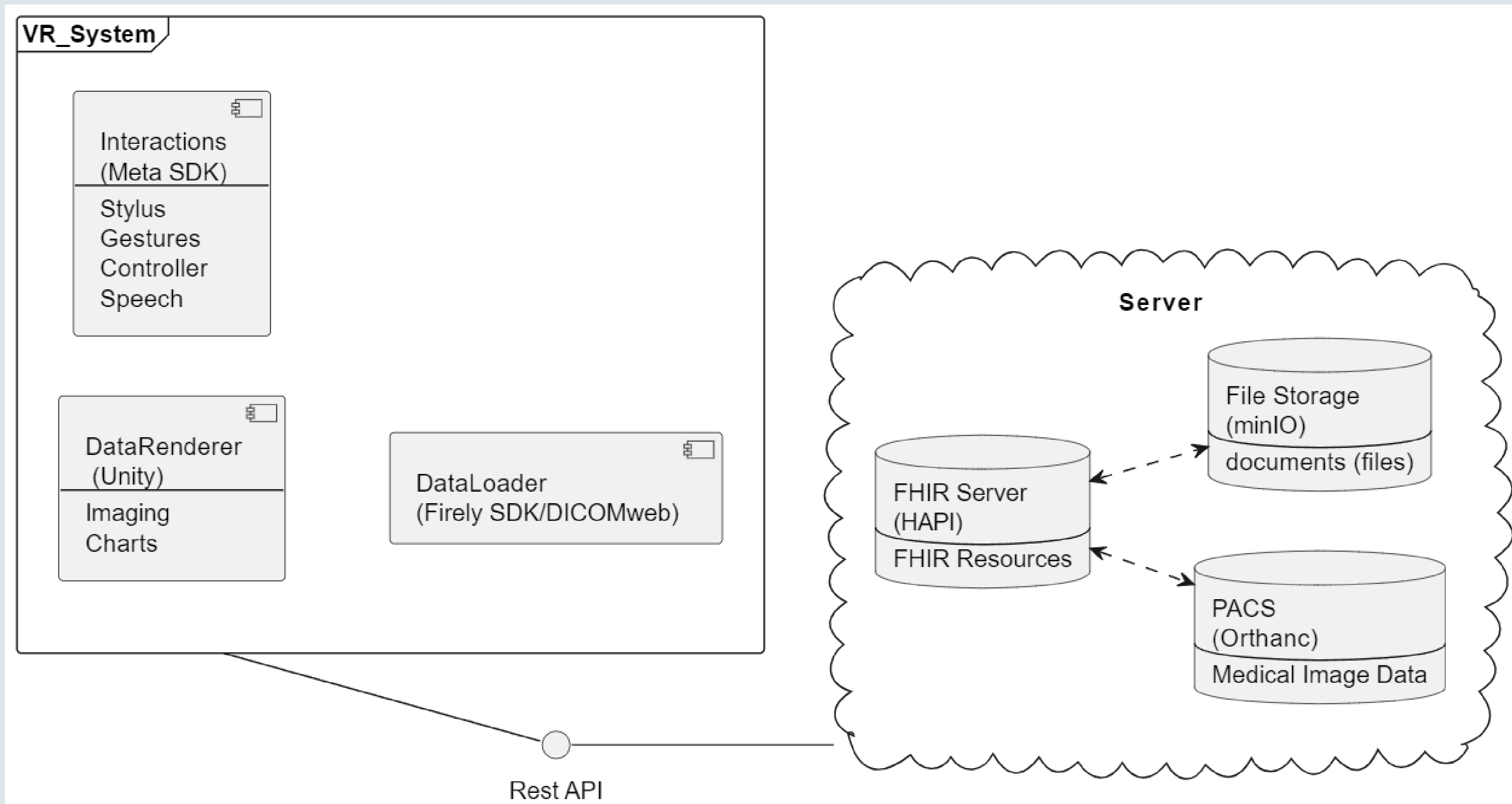


Integrating FHIR-driven radiology infrastructure with cutting-edge Virtual Reality for enhanced clinical workflows and education



Simplified architecture overview which shows the standardized interface between the VR system and the server

Purpose

- Combine FHIR standard with VR to enhance visualization and interaction with complex medical data.

System Architecture

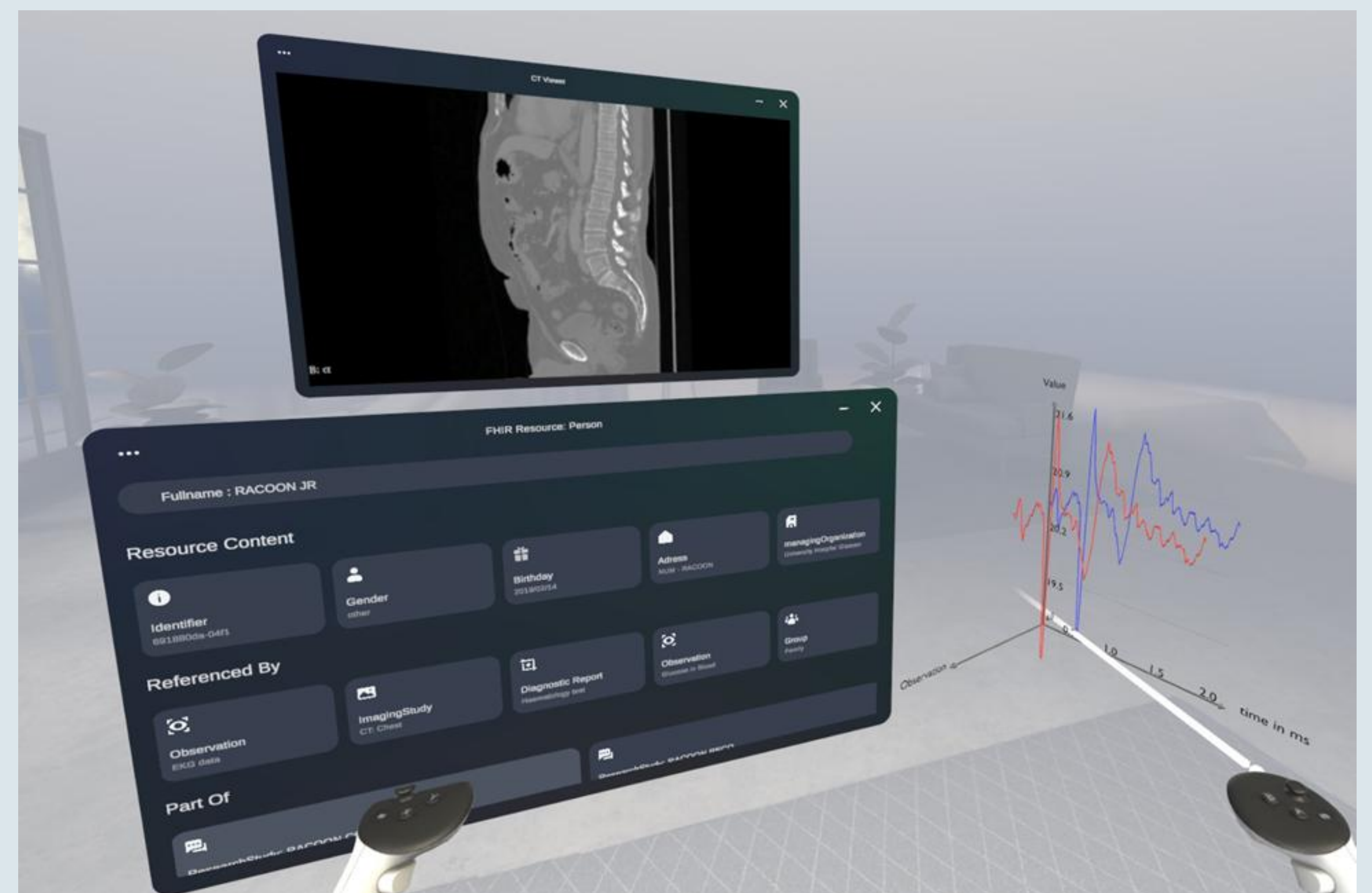
- Central FHIR server (HAPI) as Single Source of Truth (SSOT)
- Integration with DICOM server (Orthanc) and S3-compatible storage (MinIO)
- Containerized deployment using Docker and docker-compose

Data Integration

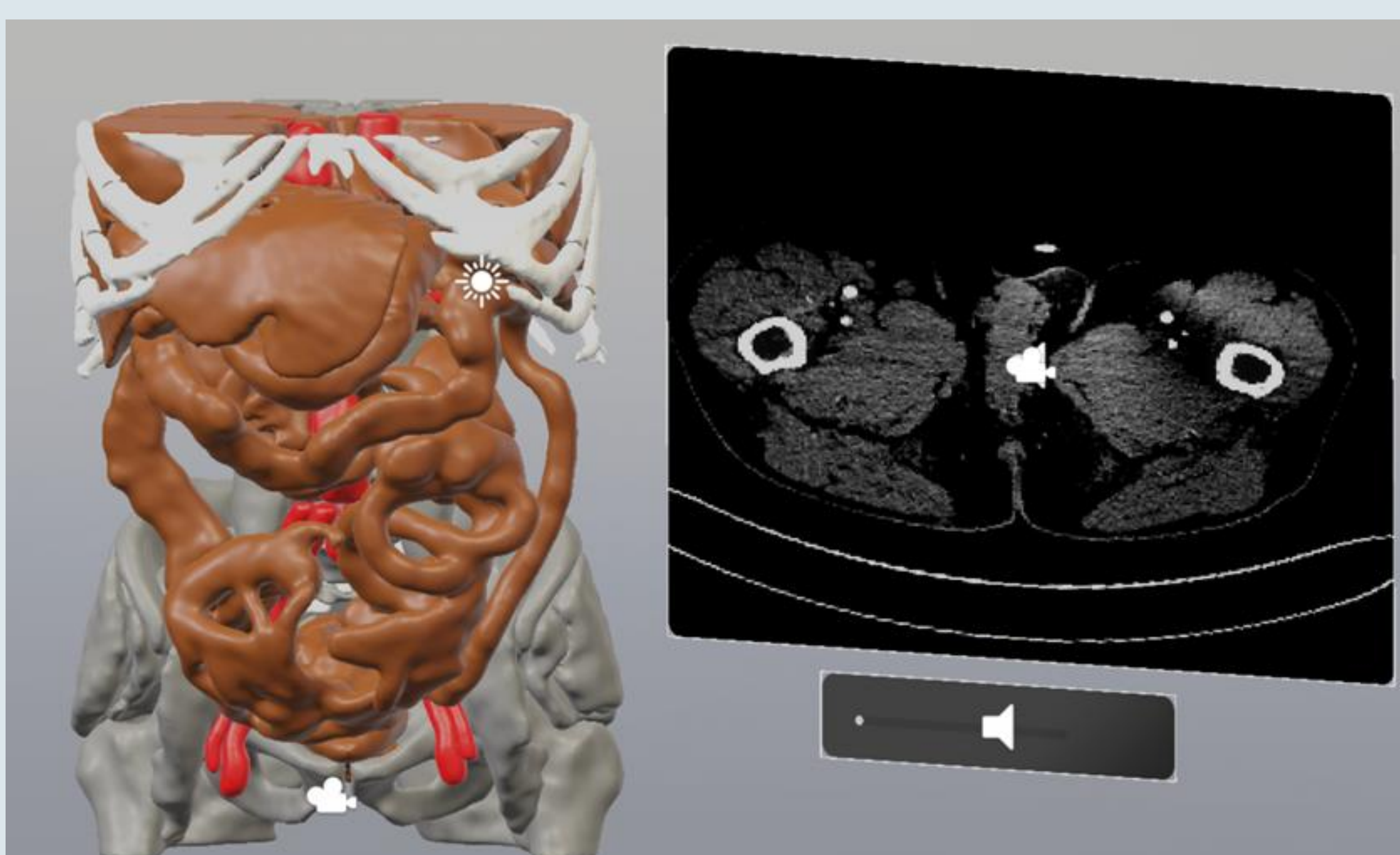
- FHIR manages structured data (patient demographics, clinical observations)
- DICOM server stores and serves medical images (CT, MRI) via DICOMweb
- FHIR resources reference DICOM objects for seamless linkage

VR Client

- Built with Unity and Firely
- Uses Meta Quest 3 hardware and Meta SDK for interaction
- Supports hand gestures, controllers, and voice commands



Medical data visualized within the game engine, e.g., structured data, image data and lab values



Screenshot of a virtual reality scene displaying the medical imaging data on the right and the AI segmentation as 3D model on the left

Visualization in VR

- Structured data rendered as interactive MetaUI elements
- Medical images visualized as 2D slices, 3D models, and volume renderings
- EKG and other numerical data displayed as interactive 3D plots

Advantages

- Seamless data retrieval via standardized RESTful API
- Interoperability and centralized data management
- Intuitive VR interactions and advanced rendering techniques
- Flexible, immersive, and intuitive user interaction