

How DICOM Director's Intravision XR uses Azure to power their groundbreaking HoloLens healthcare application

SphereGen Case Study DICOM Director

DICOM Director delivers unique PACS solutions that are fully customizable, scalable, and seamlessly support DICOM, HL7 and IHE standards.



**DICOM
DIRECTOR**

OVERVIEW

CT and MRI scans (dicom images) are created by scanning a subject in a 360-degree arc, allowing 3D views of the scans. Unfortunately, technology to view scans in this way has not always been available, so current medical practices typically view scans in 2D slices or 3D volume renders. The capability exists, however, to create 3D models from CT and MRI scans.

The ability to use 3D models in the surgical process is game-changing. These 3D models are built to enable full-scale viewing of internal and external anatomy structures. Using this process, surgeons have a better understanding of a patient's circulatory, tissue, or bone structure, thereby improving the level of diagnosis. This information can be used in pre-surgical analysis, patient education for informed consent, post-operational case conferences, and peer mentoring.

To realize the true value of CT and MRI 3D imaging, DICOM Director built a practical solution, Intravision XR, for building and viewing anatomical 3D models. This application includes a web portal for uploading and processing dicom images to build custom 3D models in real-time. The models are then available for viewing in Microsoft's Mixed Reality headset – the HoloLens.

The HoloLens Mixed Reality (MR) platform provides the ability to interact with models in physical space while remaining hands-free. As opposed to VR, this is a huge advantage for physicians when working with patients. In the beginning stages of prototype development, DICOM's Director started out as an on-premise application that required manual intervention to produce models. This design was time and labor-intensive and not easily accessible to multiple users. To move to product deployment and realize the goals of on-demand accessibility and automation, DICOM's development partner SphereGen moved DICOM to Azure to solve these problems.

Challenges

Imaging and Application Access

Surgeons work from many locations. They need access to information from their offices, multiple hospital locations and homes. They also need to share this information with consulting physicians in any location.

Dicom images are stored on PACS systems (Picture Archive and Communication Systems). Typical PACS systems are on-premise servers that may require on-site network access to retrieve data. They are not easily accessible from locations outside of the network.

Performance

Surgical models require the highest level of detail. These models are large, complex, multi-polygonal files that need sizable processing power for quick turn-around time and graphics power for viewing. Desktop processing was causing large delays in model production and manual intervention and post-processing was required to complete the creation.

Viewing of large, complex models was limited on the HoloLens. Viewing limitations were capped at models containing less 500,000 polygons. This limitation compromised the value of models in the surgical realm.

APPROACH

Access

Creating an environment which allows easy access to DICOM's PACS server and the application itself, required a cloud-based solution. Using Azure as a basepoint, SphereGen built a cloud PACS which utilizes single or two factor authentication and data encryption in TLS and at rest.

The DICOM Director application allows hosting servers on a public or private tenant to satisfy any security compliancy their customers may require.

Physicians can use the web portal from any location or device which has access to the internet. Dicom images are accessible and models can be created spontaneously when needed. Multiple Physicians can access necessary data without being limited to a hospital or office location.

Performance

To tackle performance issues, two areas needed to be addressed – processing power and high-resolution model viewing.

Using Azure GPU servers, the application has increased capability to build complex segmented models in short turn around times. The application manages model submission queues to spin up more GPU servers if needed to process extra volumes. Now model production is automated and creation time is measured in minutes.

Viewing high-resolution models in the HoloLens was solved by leveraging the use of Azure Remote Rendering (ARR). ARR enables your application to stream high-resolution models to the HoloLens. Using ARR allows extended viewing capability of models with millions of polygons – high quality, detail-leveled models which Surgeons can rely upon.

RESULTS

Image/Application Accessibility



75%

Accessibility rate increased

Model Creation Time



80%

Time reduced

Quality of Model Viewing



500%

Quality increased

CONCLUSION

Using the power of Azure cloud services, DICOM Director was able to upgrade their application to deliver quality results in a fraction of the processing time previously required. The DICOM application can now produce high-resolution models in minutes and stream them to the HoloLens for holographic viewing. Game changing technology for the Healthcare industry!

*SphereGen builds custom software solutions offering services in the following areas: Application Modernization, Application Support, Extended Reality (AR/MR/VR) and RPA. We specialize in delivering complete integration from Unity to Azure.