



Powering the Future of Healthcare ▶

## Case Studies – Imaging Pipeline Ingestion Framework

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# Case Study 1: Development of Imaging Platform for Secondary Analysis

## Client Requirement

Client is a leading Pharmaceutical company powered by technology leadership in R&D, world-class drug commercialization, global access and data science. Client wanted to standardize the ingestion pipeline for DICOM and non-DICOM images acquired from external sources

Client wanted CitiusTech to conceptualize and implement image acquisition, storage, data visualization and annotation workflow solutions by setting up a data management imaging pipeline in their environment

## Value Delivered

- Reduce time and effort in acquiring images from external parties
- Powerful search providing quick access to data on one enterprise platform
- Metadata management and cataloging using FHIR standard for better image exchange
- Data preparation at scale for machine learning algorithms

## CitiusTech Solution

- Setting up ingestion pipeline for DICOM and non-DICOM native data formats
- Standardizing metadata using sponsor defined taxonomy and structured codes
- Extraction of metadata from DICOM and non-DICOM images and mapping it to FHIR resources to create a systematic approach to metadata cataloging and management
- Automation in Quality control and deidentification of image and metadata
- Design UX/UI to facilitate data browsing and viewing through robust search on the platform
- Orchestration of Radiologist workflow for image access through 3rd part viewer and performing necessary annotation
- Exchanging annotated data internally and externally to build cohort for machine learning

# Case Study 2: SUV Measurements in Image Viewer

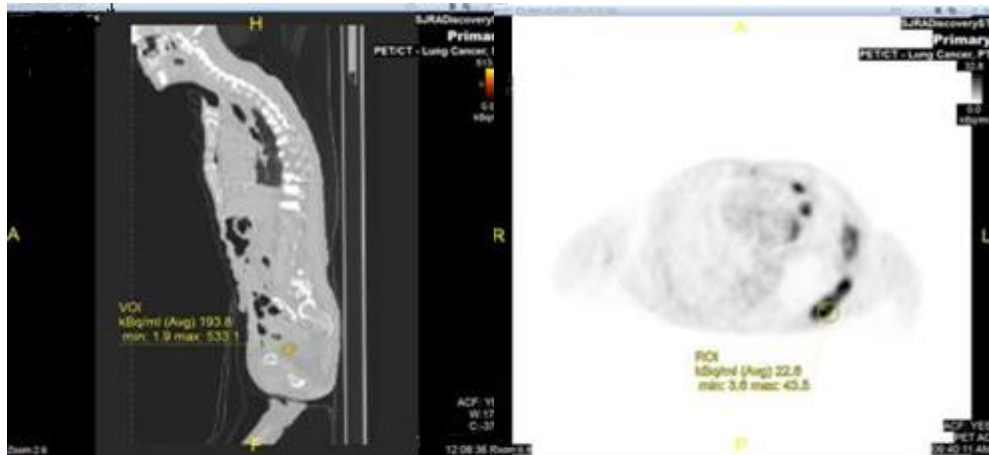
## Client Requirement

- Calculate SUV (Standardized Uptake Value) for PET images based on user preferences (Body mass, Surface area, etc.)
- Calculate SUV for the selected ROI from the image or 3D reconstruction
- Customized calculations based on the source PACS
- Ensure that the calculations were aligned with existing PET applications in the product suite

## CitiusTech Solution

- Worked closely with Clinicians and global PET SMEs to establish and implement the calculation algorithms
- Validated the algorithms with Clinical application specialists
- Added support for preserving and restoring values in presentation state objects
- Successfully demonstrated the feature at RSNA

## Solution Schematic



## Value Delivered

- Advanced oncology clinical measurements are now part of existing Radiology Viewer with standard SUV calculations
- Clinical measurement toolbar controls and image overlay controls have similar user experience as specialized oncology image viewer

# Case Study 3: Imaging Analytics For Lung Cancer Risk Quantification

## Client Requirement

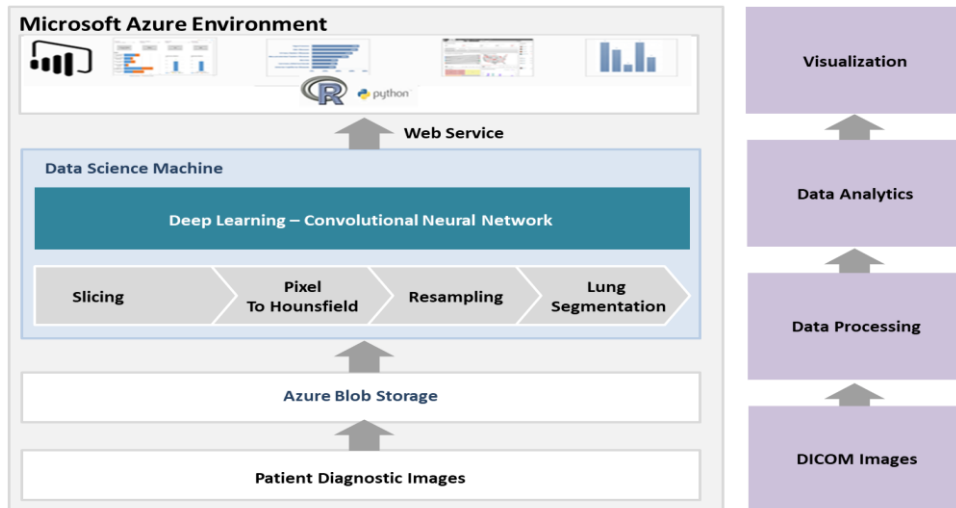
Client was a radiologist that wanted to leverage Computed Tomography (CT) images to quantify the patient's risk of suffering from lung cancer.

The use case helped in improving the accuracy to detect cancer in the lungs using deep learning infrastructure.

## CitiusTech Solution

- **Get DICOM images** of the patients that include –
  - Cancerous and non-cancerous images
- Scan coming out of different scanners might have different number of slices, arranging the scan in a way that all scans contains same number of slices
- **Converting the pixel values to Hounsfield Units (HU)** and what tissue these unit values correspond to
- **Resampling to an isomorphic resolution** to remove variance in scanner resolution
- **Lung segmentation:** Generating the section of the lungs that we are interested in
- **Performing a 3D convolutional neural network** to identify the patterns in the data and identify the cancerous nodules in the lungs

## Solution Schematic



## Value Delivered

- Improving the accuracy of cancer detection
- Assisting the radiologist in decreasing observational oversights
- Helps in reducing the turnaround time for viewing the large number of scans

# Case Study 4: Interoperability for Imaging Devices

## Client Requirement

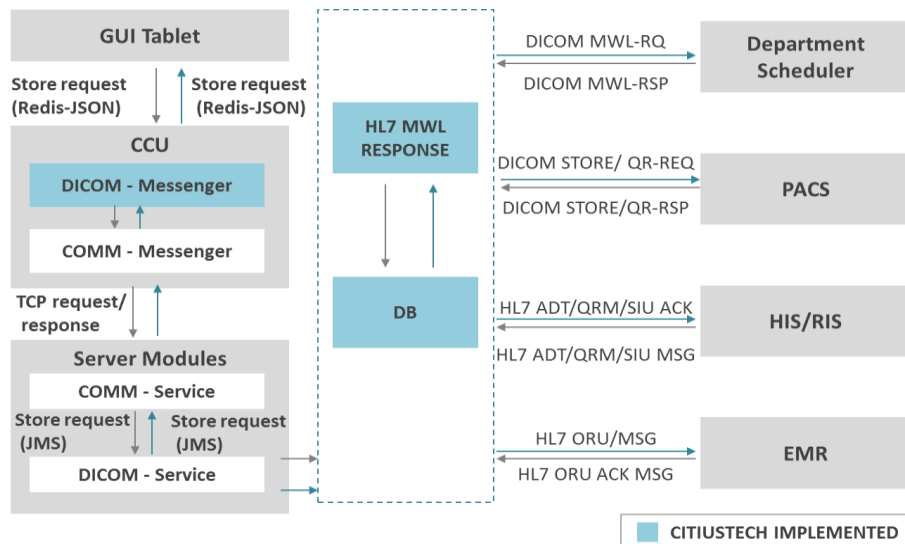
Client is a global medical device company and a leader in providing solutions for orthopaedics. Client wanted to achieve interoperability between its image management solutions and RIS, PACS and other hospital applications. CitiusTech was selected for its expertise in interoperability and standards-based messaging using DICOM and HL7

## CitiusTech Solution

CitiusTech established a team of interoperability professionals with expertise in interface design and development. CitiusTech's services included:

- Integration of image management solution with RIS, PACS and hospital systems in DICOM and HL7 standards using InterSystems Ensemble
- Provision of a platform for communication in JSON, TCP, JMS and XML formats between applications
- Image conversion using DCMTK open source imaging library

## Solution Schematic



## Value Delivered

- Developed a standards-based solution to enable extensibility to other applications
- Leveraged CitiusTech's expertise to provide interoperability between client applications and RIS, PACS, and other hospital information systems