

Powering the Future
of Healthcare ▶

 **CitiusTech**

Medical Imaging

Enabling global medical imaging leaders
to digitally transform their legacy
infrastructure, automate workflows and
improve quality of diagnoses



www.citiustech.com

Who we are

As a strategic partner to some of the world's largest healthcare and life sciences organizations, we play a deep and meaningful role in accelerating digital innovation, driving sustainable value and helping improve outcomes across the healthcare ecosystem.



As a pure-play healthcare technology company, we are uniquely positioned to drive digital transformation, automate workflows and improve quality of diagnoses for global medical imaging leaders.

400+

Medical imaging experts

Multiple specialized offerings

like Interoperability, Mammography, Oncology, Cardiology etc.

30+

Active projects across the Imaging practice

Medical imaging offerings

CitiusTech has extensive experience with market leaders in medical imaging – across VNA, RIS, PACS, modalities, standards and viewers, helping them across their healthcare ecosystem meeting all the technology needs.

Imaging Solutions



**Imaging
Analytics / AI**



**Clinical
Services**



Interoperability



**Visualization
& Archival**



**Strategic
Consulting**



**Service &
Support**

Tech Services



**Product
Engineering**



Cybersecurity



**Data
Management**



**QA &
Automation**



**Sustenance &
Serviceability**



**Data Science
& AI**



**Customer
Value**

*Improved Radiologist
Productivity*

*Intelligent Radiology
Workflows*

*Improve care
Outcomes*

*Augmented clinical
decision support*

*Faster time to
market*

Addressing next-gen technology needs of medical imaging companies

Visualization



- Product development for Thin and Thick Client (Client Server architecture)
- Integration of AV tools, real-time 3D Processing over web
- UX Modernization

Interoperability



- Imaging solutions based on Healthcare Standards IHE, DICOM, DICOMweb, FHIR, HL7
- Imaging workflow with EHR Integration using FHIR resource
- IHE based imaging workflows

Archiving



- Access to data from third-party sources
- Data curation services
- 3rd party data validation
- De-identification services
- Synthetic data generation
- SaMD / 510K regulatory support

Enterprise Imaging Workflows



- Seamless access to patient data using Cloud based Imaging solutions (case exchange)
- Longitudinal view of patient data, De Identification
- Third Party Integration

Addressing next-gen technology needs of medical imaging companies

Image Acquisition



- Console application development for Modalities CT, MR, USG
- Endoscopy, Portable modalities
- Protocol Management
- Workflow optimization

AI & Machine Learning



- Automate customer service with Chatbot
- Operational and financial efficiency
- AI based imaging solutions
e.g. worklist prioritization, image pattern recognition, etc.

Next-gen Services



- FHIR-based Mobile apps.
- Teleradiology
- Image sharing networks & Edge gateways
- IOT, Cloud & Big Data
- Cybersecurity & vulnerability assessment

Product Deployment



- Remote serviceability
- Continuous integration and continuous delivery
- Customized deployment
- Docker and container approach of development and deployment

Case Study: Prefetching Imaging Studies from Cloud Using VNA

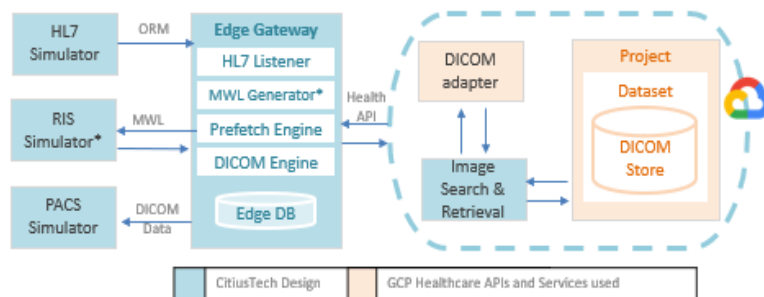
A leading provider of cloud computing and storage services wanted to demonstrate Cloud capabilities for radiology by developing a smart prefetch system, which would fetch archived images of the visiting patient from VNA using HL7 orders. The system would also import imaging data from the VNA, reconcile, and transfer to local PACS.

CitiusTech was selected to develop the information management solution given its expertise and proven experience in medical imaging standards and health Cloud.

Advantage CitiusTech

We developed an information management solution on the Google Cloud platform to aggregate and auto-download PACS data, accelerating the fetch process for each patient visit. The Google Healthcare API-enabled Vendor Neutral Archive (VNA) gateway identified and prefetched imaging data.

*Physicians could now access a patient's imaging information on a **visualization workstation** and **analyze imaging data from multiple PACS**.*



Highlights

- Centralized, scalable, and interoperable repository for medical images
- Single source of truth on Cloud for all PACS and hospital data
- Remote access to patient images 24/7 through multiple devices

Case Study: Cloud-based Medical Image Exchange

A leading provider of medical imaging systems needed to build a Cloud-hosted image exchange platform with image viewing capabilities.

CitiusTech was selected because of its deep expertise in Cloud and mobile app development experience.

Advantage CitiusTech

We deployed a Cloud-hosted exchange platform with the ability to interact with multiple systems, including distributed PACS, VNA, and physician-patient portals.

The key requirements for Cloud-based medical image sharing and viewing included:

- Ability to support all major browsers on tablets and mobile devices through an HTML5 interface

- Capability to distribute consolidated data (DICOM and non-DICOM) to clinicians that are not employed by the hospital and patients who do not have direct access to content without the need to access multiple systems
- Healthcare standards-based recommendations on the product roadmap

*The platform **enabled physicians to get a single, consolidated view** of a patient's imaging information, anytime, anywhere, through tablets and mobile devices..*

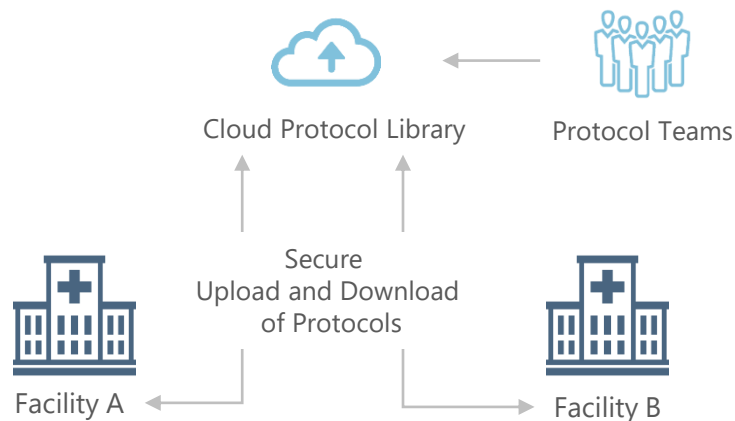
Highlights

- Created clear definitions and an efficient implementation of product roadmap within prescribed deadline
- Accelerated development through timely availability of wireframes and test data, enabling faster query resolution

Case Study: Protocol Management Solution on AWS Cloud

A leading provider of medical imaging systems wanted to build a Cloud-hosted, multi-modality protocol management solution that could identify protocol variations, standardize imaging workflows, and improve protocol compliance to achieve three goals – enhanced patient safety, improved operational efficiency, and optimized patient experience.

CitiusTech was selected to develop the platform due to its robust expertise in medical imaging and Cloud technologies.



Advantage CitiusTech

We leveraged our strong experience in medical imaging and product engineering to design the protocol management solution. We established a team of professionals with expertise in AWS, NodeJS, and AngularJS 2.0.

*The solution helped **drive consistency in care quality using standardized workflows**. It **improved clinical efficiency and compliance**. It also helped **reduce maintenance and optimization efforts** for users.*

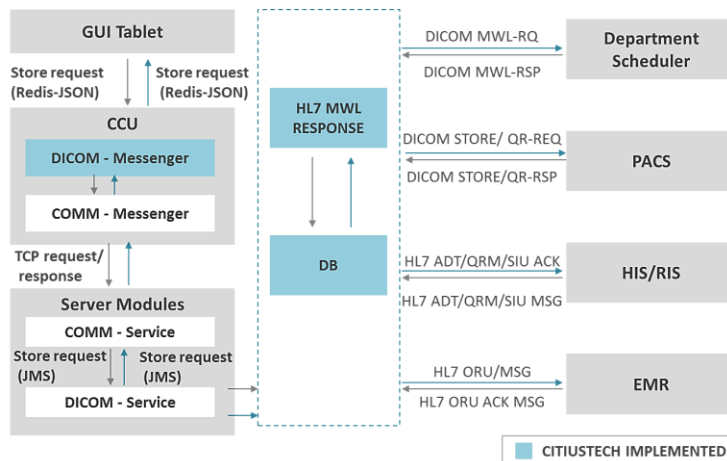
Highlights

- Import/export workflows for various modalities, e.g., CT, MR, x-ray.
- Cloud-hosted (AWS) with components like Lambda, DynamoDB, SQS, SNS, Cognito.
- Microservices-based integration with Node.js in AWS Lambda
- SNS/SQS-based asynchronous communication with lab devices
- Responsive UI development with Angular 2.0

Case Study: Interoperability for Imaging Solutions

A global leader in orthopedic solutions needed to achieve interoperability among its image management solutions and RIS, PACS, and other hospital applications.

CitiusTech was selected because of its deep expertise and experience in interoperability and standards-based messaging using DICOM & HL7.



Advantage CitiusTech

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

The solution helped the client build a seamless, interoperable application / product ecosystem, leading to significantly enhanced data access and decision support capabilities for its hospital customers

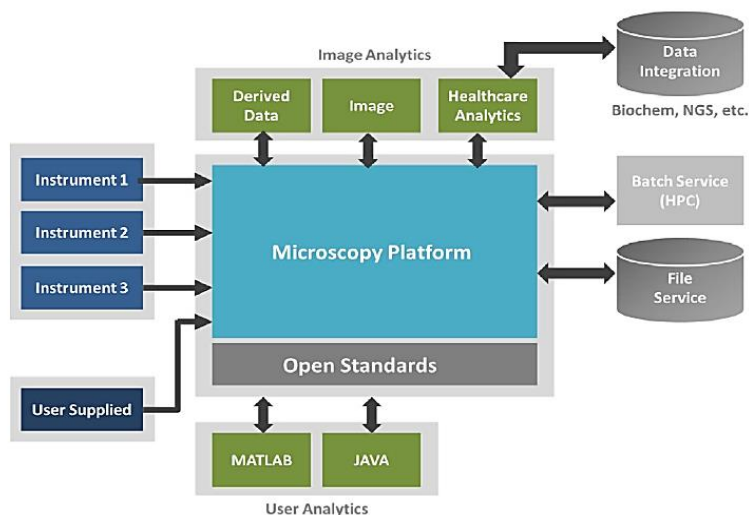
Highlights

- Interoperability among client applications and RIS, PACS, as well as other hospital information systems
- Developed standards-based, DICOM-compliant solution to enable extensibility to other applications

Case Study: Image Processing, Visualization and Analytics for Cellular Research

The client is a leading provider of medical imaging and diagnostic services to pharmaceutical and life sciences companies. Its platforms produce large volumes of high throughput multimodal imaging data.

The client needed to build an enterprise-scale analytics platform to gain visual and clinical insights from their data. It selected CitiusTech for its deep imaging expertise and strong analytics capabilities.



Advantage CitiusTech

We developed a unified analytics platform that synchronously worked with multiple imaging tools, serving a variety of needs and configurations.

*CitiusTech's engineering team worked closely with the client to leverage its existing technology platforms and components, **enabling the client to go-to-market faster with the analytics platform.***

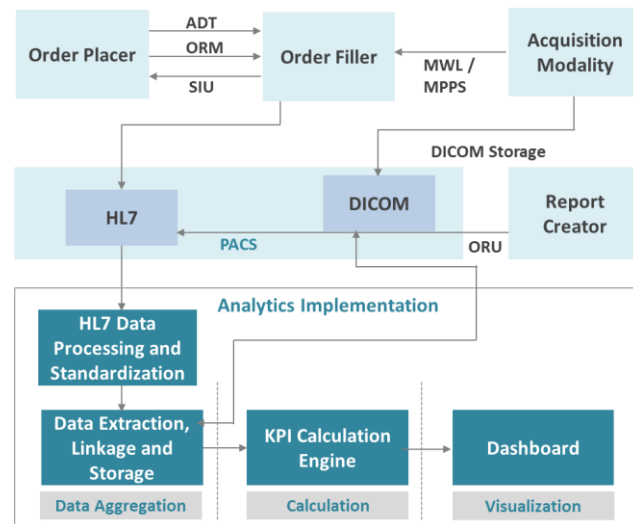
Highlights

- Capture images configured based on assays
- Analyze and interpret data from live- and fixed-cell assays
- Perform complex subcellular assays
- Quantify multiple biomarker expression patterns, correlating to non-imaging data
- Visualize and interpret statistical and machine learning analytics results

Case Study: Imaging Operational Analytics

Client is a leading medical imaging company with best-in-class applications for advanced visualization, imaging practice management, and image management.

It wanted to build an application that would support imaging health system administrators in identifying inefficiencies in the system and discover areas of improvement, ultimately helping increase revenue and savings.



Advantage CitiusTech

The client leveraged our strong healthcare data & analytics expertise to accelerate requirement analysis and data modelling. We also provided deep HCD/UX capabilities to develop an intuitive user interface

Highlights

- Identified potential areas in the imaging workflow that had a direct impact on revenue and cost savings
- Analyzed data from an imaging center to identify and validate potential business process improvements
- Created data models to grade the identified opportunities and compute projected profit margins
- Created an exhaustive user interface prototype to showcase the business requirements
- Developed, tested, and created product manual documentation

About CitiusTech

With 7,500+ healthcare technology professionals worldwide, CitiusTech helps leading healthcare and life sciences organizations reinvent themselves by accelerating digital innovation, leveraging next-gen technologies, and driving data convergence across the healthcare ecosystem.

We provide strategic consulting, digital engineering, data, analytics & AI, specialized platforms and end-to-end solutions to over 130 organizations across the payer, provider, medtech and life sciences industries. Our key focus areas include healthcare interoperability data management, quality performance analytics, value-based care, omni channel member experience, connected health, virtual care delivery, real-world data solutions, clinical development, personalized medicine and population health management.

Our cutting-edge technology expertise, deep healthcare domain expertise and a strong focus on digital transformation enables healthcare and life sciences organizations to deliver better outcomes, accelerate growth, drive efficiencies, and ultimately make a meaningful impact to patients.

100%
healthcare focus

130+
healthcare clients

50M+
lives touched

4.5/5
client satisfaction score

\$348M+
worldwide revenue

Key Contacts



Dhaval Shah

Exec. Vice President
Healthcare Technology
CitiusTech

20+ years of experience in healthcare technology, spanning various domains including healthcare interoperability and enterprise application architecture. At CitiusTech, Dhaval heads strategic partnership management for large healthcare organizations.

Prior to CitiusTech, Dhaval worked with leading healthcare organizations and contributed in different roles such as Research Engineer, Lead Engineer and Chief Architect.

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Shujah Dasgupta

Asst. Vice President
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15+ years of experience in developing and designing healthcare products. Leads Interoperability and Imaging practice at CitiusTech.

Previously worked across multiple roles spanning engineering, managing large programs, setting up the medical imaging vertical in the consulting practice, managing key strategic customers and driving new business development efforts. Has a Bachelors degree in computer engineering, Virginia Tech.

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