Making IT work Better in

Digitized
Healthcare
Solutions

SRIT India Ltd.

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Renaissance Healthcare Solutions Catalog

SRIT IN HEALTHCARE

MERITS OF SRIT's RADIOLOGICAL INFORMATION SOFTWARE SYSTEM

- ❖ Highly scalable and secure product. Internationally certified, US FDA approved. Standards compliant with DICOM, HL7 and HIPAA
- ❖ Interoperable system with no proprietary formats whatsoever
- ❖ VNA and communication features are built as an integral part of the product
- ❖ Secured product with audit trails and access control
- ❖ Instant access to images, no waiting time
- ❖ High quality images for diagnosis, with advanced post processing tools
- ❖ Radiology department can go digital directly, thus doing away with films
- ❖ Nurses can focus on patient care. They free themselves from the tasks of collection of films and reports, thus optimal use of manpower
- ❖ Hospitals operational efficiencies are improved. Images are made readily available as & when needed. No more search & trace of old films from record rooms
- ❖ Archival of digital images ensures instantaneous retrieval for medico-legal and research purposes, as films are difficult to store beyond a certain period of time
- ❖ Hospitals can provide access to Physicians/Radiologists even when those Physicians/Radiologists operate from remote locations and can get their readings, observations & opinions before patients are shifted to the OT or ICU, especially during night hours or in emergency cases
- ❖ Soft copies of images can be mailed to any part of the world for reviews and consultations
- ❖ Above all, the Radiological Information Software System (RIS) manages the complex workflows of the hospital. The RIS system gives immense benefits to Radiologists, Physicians, Surgeons, Technicians and Administrators.

Need for implementing RIS-PACS

Traditional film-based radiology systems have serious limitations in providing patient care. A film-based system forces clinicians to make decisions based on non-optimal information. Comparison between images taken at different times is more difficult as compared to the comparison of digital images using digital tools. Comparison between different parts of the same film can't be made easily. This relies on the skills and observation power of the radiologist examining the film.

Film based systems also make the transfer of films and prior studies to Hospitals or Dispensaries cumbersome and complicated. Missing films from hospital archiving centers, as well as during transfer between different parts of the hospital, create a serious practical problem. Even when films are not missing, transferring them to departments where they urgently required takes time and effort. Besides, a single copy of film cannot be present in more than one location, but the same image may be required at different locations for discussion amongst the doctors involved, like in the radiology department as well as the emergency center. This is a serious problem especially when lives depend on timely access to these images for the treatment of critical conditions.

Storage of films for the minimum regulatory duration has been another major challenge facing hospitals. It is a well-known fact that in films, the quality of the image deteriorates over a period of time.

Further, the film storage requires a well-maintained storage facility with adequate staff to handle the records properly. Misplacement of films can cause disruption in the treatment of chronic diseases and pose legal problems in case of medico-legal cases.

Advantage offered by implementing RIS-PACS

➤ Soft copy of images ensures radiologist and clinicians have access to a whole spectrum of computer tools to manipulate and post-process the images. Alteration of the contrast, width and level allows soft tissue and bony structures to be seen clearly on a single exposure. This leads to an increase in the amount of information available from a single image.

➤ PACS ensures all the images are automatically grouped into the correct examination, are chronologically ordered, correctly orientated and labelled, and can be easily retrieved using a variety of criteria like name, hospital number, date, referring clinician, etc. Since all the imaging studies of a patient are available on PACS, it encourages the review of examinations with preceding studies and inter-modality comparisons.

➤ Images in PACS cannot be lost, stolen, or misfiled and are always available. Hence, patient appointments need not be cancelled, clinical decision are not deferred, imaging is not repeated due to the loss of film, and time is not wasted by doctors and other staff in looking for missing films.

➤ PACS allows the simultaneous viewing of the same image at multiple locations whereas films can only physically exist in one place at any point of time.

➤ Instantaneous transfer of images on PACS allows a referring doctor to view the image(s) by the time a patient, sent for an urgent radiological examination, returns to the outpatient department.

➤ For medical colleges, PACS serves as an invaluable tool for teaching and training students. Students will have access to a variety of cases to study and learn from. The benefit of using images of rare cases as a teaching aid cannot be easily quantified in monetary terms.

➤ Tangible savings from not using film, film packets, film processing chemicals, darkroom technicians, film filing clerks and reutilization of space previously used for film storage leads to direct economic benefits. However, the real advantage of a hospital wide PACS deployment is the huge increase in the efficiency of data management it provides leading to an even larger intangible benefit for the hospital.

Implementation of a high quality PACS and RIS software would ensure enhanced quality, operational efficiency, efficient patient care, and compliances both from a medical-legal standpoint as well as enhanced revenue generation opportunity.

Our Solution

Ours is a centralized solution. The PACS and RIS application as well as the storage will be hosted in the central data-center and the Disaster Recovery Data-center. As the amount of image data generated within a hospital is large, bandwidth constraints and internet connectivity becomes the challenge. We have factored this challenge when engineering our solution. The next section of this document explains our solution which overcomes the challenges posed by heavy imaging data.
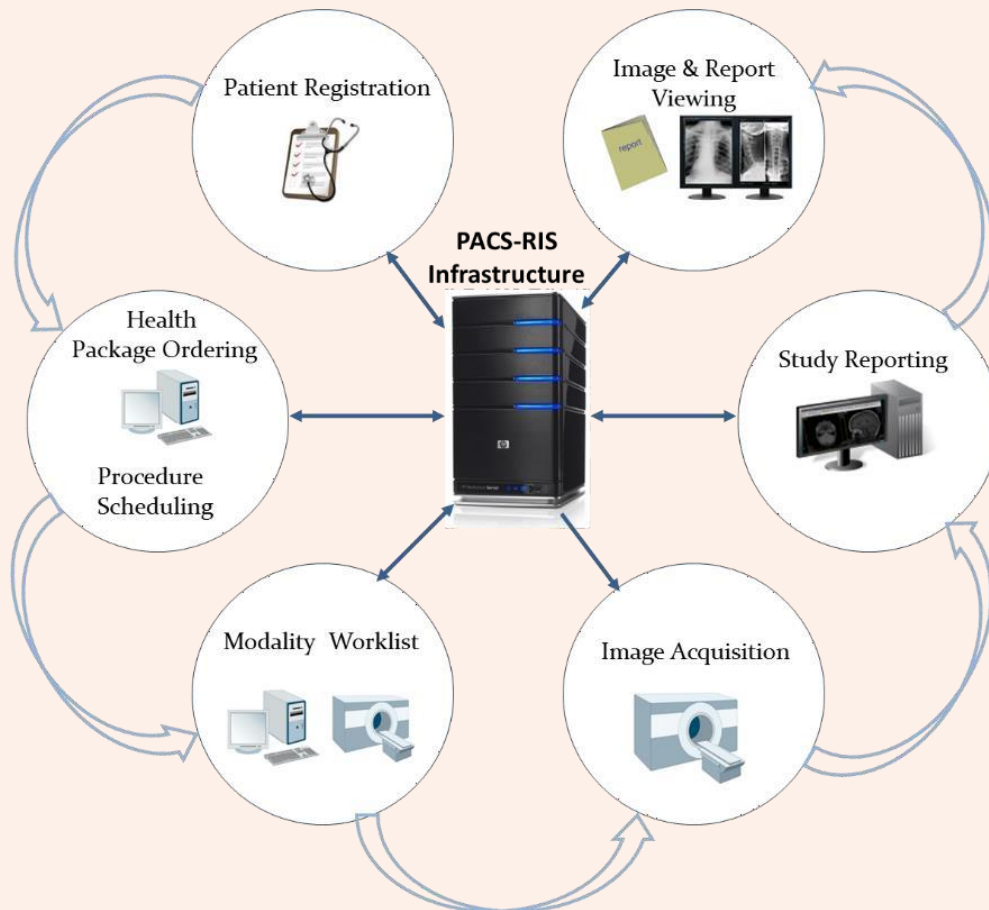

Figure 1: Process diagram represents the process flow of a radiology study lifecycle starting from patient registration to report viewing by a referring physician

Figure 1 shows the general radiology imaging workflow followed in hospitals implementing our solution. The process starts with Patient registration in the HIS followed by ordering of procedures within the Ordering system and ending with the ordering physician receiving the image and the associated report given by a radiologist. All the external systems shown in the diagram are integrated with our solution thus enabling tracking of the entire lifecycle of the radiology study. Our state-of-the-art, feature-rich, completely integrated solution is optimally designed and customized to suit the specific needs of the Client and will help overcome the challenges faced in radiology operations.
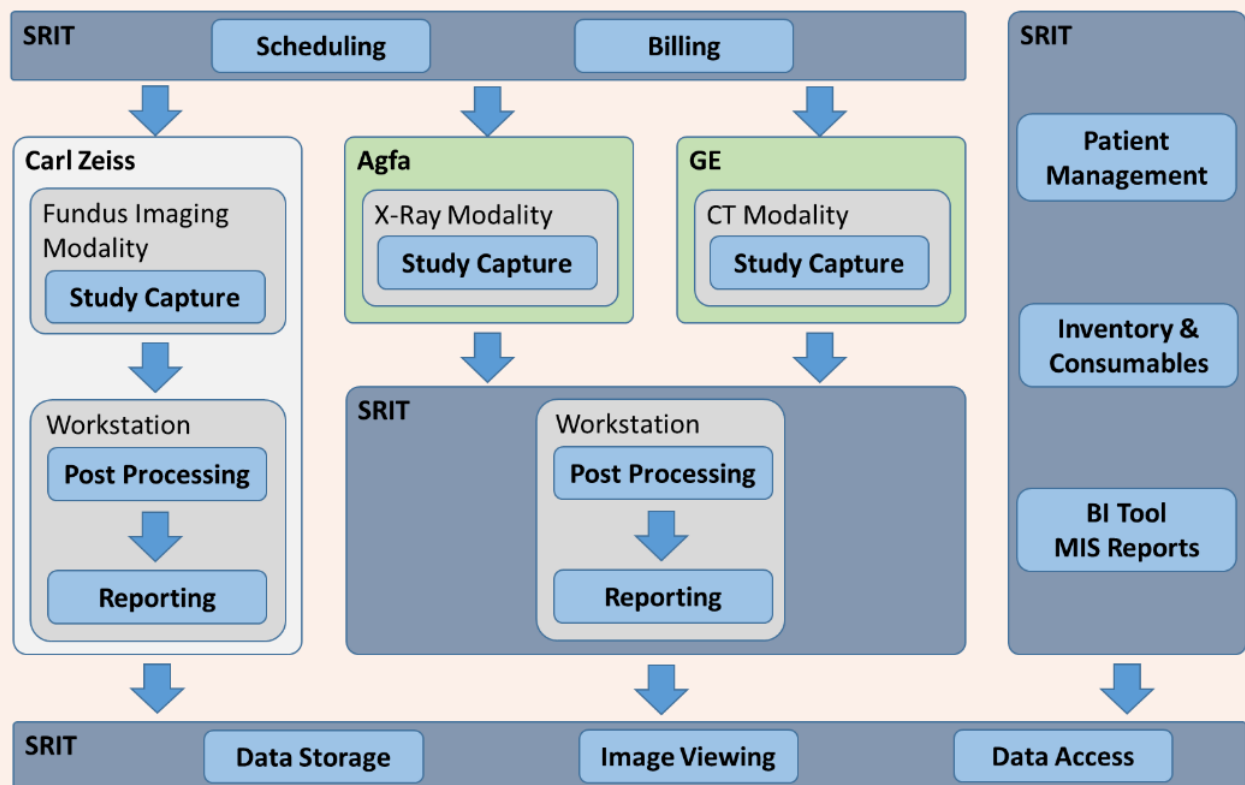
Figure 2: Illustrative Workflow Capturing multiple aspects of different modalities operating at a hospital

Overcoming challenges posed by Heavy Image Data

We understand that heavy image data records (like X rays, CT scan, MRI, ECG, and Angioplasty) puts a strain on the bandwidth necessary to access / transfer these records. SRIT's solution incorporates a clever mechanism where a local caching server will cater to the need for accessing image data locally at the hospital or clinics.
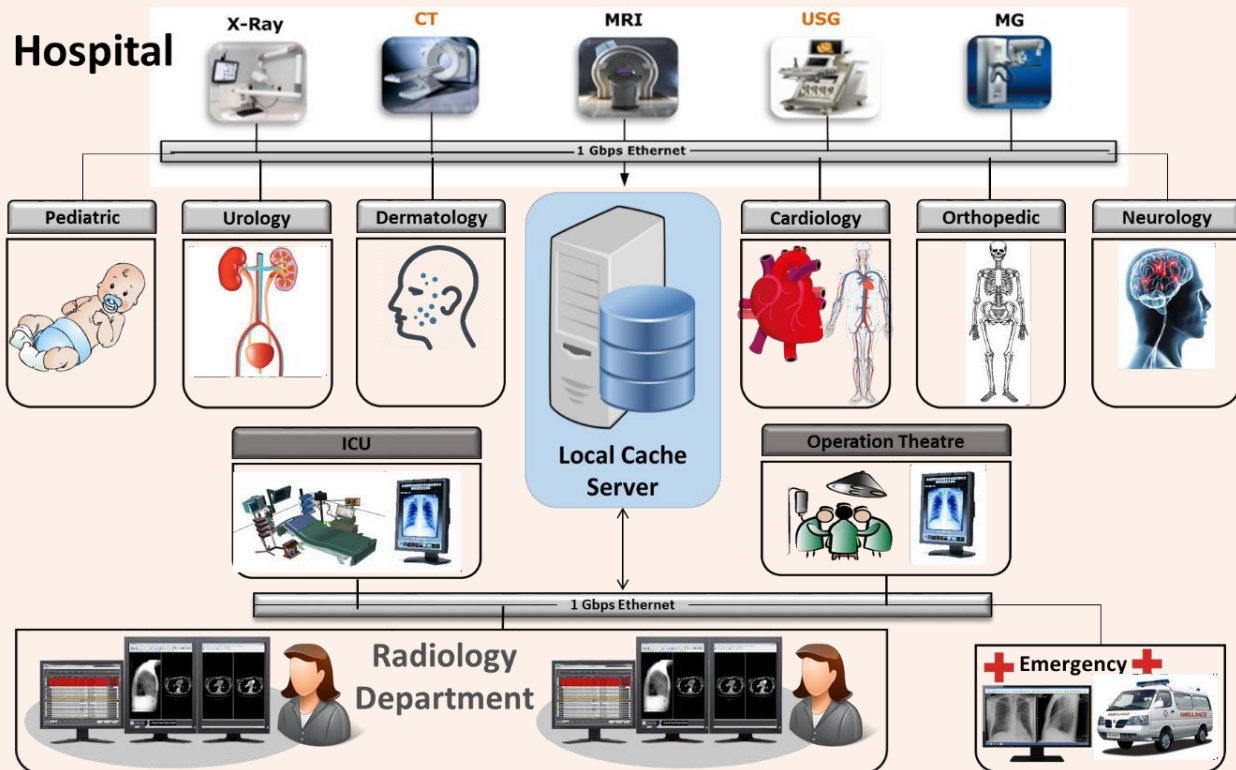
Figure 3: Local Cache Server serving imaging needs within a Hospital

Each hospital will have a local caching server hosting PACS within the hospital premise. Images received by the caching server from various modalities within the hospital can be served to various out-patient and in-patient departments within the hospital. This image will be synced to the central data-center after which the image data will be available to all remote users too. The RIS will be hosted on the central data-center and access to the system will follow the same mechanism as accessing HIS and EMR. Thus, a radiologist will have the ability to access the images for reporting from within the hospital or remotely through the internet.
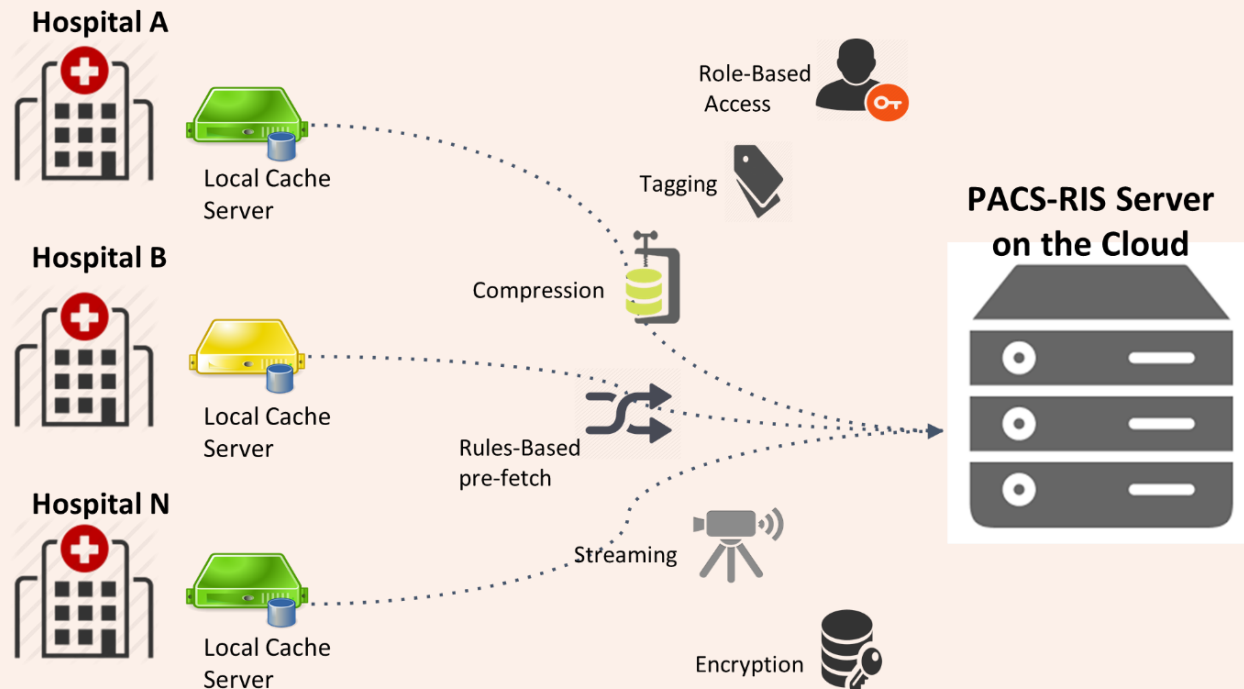
Figure 4: High-level PACS Solution Architecture

The local caching servers store image data locally for a specific duration, for example 'x' months of data storage. This duration has been made configurable to suit the needs of various healthcare organizations. Our solution also has the ability to intelligently pre-fetch image data from the cloud for older data when a scheduled patient shows up. The RIS will intelligently interface with PACS to retrieve image data either from the local cache server or the central data center, thus ensuring image data, if available within the whole environment, is made available to doctors and radiologist.

The solution envisages a web viewer (Zero foot-print) solution that will work with mobiles, tablets and thin clients, besides desktops. The viewer application will run on all HTML5 supported browsers without the need to download any viewer application or browser plugin. In the absence of a web viewer solution, clinical users would need to download and install our viewer application.

Key technology elements behind SRIT's Enterprise RIS-PACS solution

- Computer Graphics, Image Processing & Image Rendering
- Filtering and Image Compression Algorithms including Wavelets
- Fast Algorithms for reconstruction and Image re-sampling
- Fast Fourier Computational methods for implementing convolutions in the frequency domain
- Distributed Computing
- Pipelined architectures to circumvent hardware limitations
- Streaming technologies
- Multi resolution paramedical analysis
- Clustered Storage including Virtualization
- Virtualization of operating systems including containers
- Componentized software development including SOA

➢ Fault tolerant networking

Advantage with SRIT's RIS-PACS

➢ **Standard Compliant:** SRIT's state-of-the-art RIS-PACS addresses the latest global standards and requirements related to the meaningful use of Radiology Systems for Patients. The RIS-PACS software system is standards compliant (HL7, DICOM and patient data privacy requirement). The system also complies with all regulatory requirements. Consequently, the system complies with all regulatory aspects like privacy, security, access, disclosure and exchange of patient data. Further, the implementation of RIS-PACS ensures fulfillment of data management requirements for quality and accreditation bodies like NABH and NABL.

➢ **Scalable Multi-Tenant Systems:** SRIT's flagship products are built with scalability and multi-tenancy. The basic product architecture ensures suitability for large-scale deployments on the cloud. SRIT has built and deployed next generation systems tailored for cloud implementation as opposed to adapting an older generation system for cloud deployment. SRIT's centralized RIS-PACS provides central storage, image viewing and radiology workflow management solution.

➢ **Smart XDS Platform** allows integration across multiple sites and multiple equipment vendors to store various types of documents (text, images, annotations) and parse them in an intelligent manner to make critical data available across the enterprise to Physicians and Care-Providers. All necessary XDS-I and other profiles are in-built and supported to ensure that the goals of having a single distributed repository along with parsing meaningful data becomes a reality through our state-of-the-art solution.

➢ **Local Caching Mechanism to overcome Low Bandwidth limitations:** Besides the central solution at the central data center, our local caching server at each hospital will ensure image data availability within the hospital without dependency on network bandwidth. The local caching server will help overcome time loss while a radiologist / doctors waits for images to be downloaded on the local system from the central data center due to low bandwidth. Pre-fetching the image data from the central data center for older data when a scheduled patient shows up will remove the need to wait for downloading the image data for older patient records.

➢ **Physician Ordering Systems**: SRIT's RIS-PACS solution keeps track of facilities available for procedures and, also makes prior medical exams and reports available thus making sure that the patient does not undergo any unnecessary procedures or exams exposing her/him to radiation risks, or highlighting allergies in terms of dyes, or preventing a person with metal implants from undergoing an MRI scan.

➢ **Security:** Physicians and Health Systems Providers can choose the information that needs to be shared in accordance with Governmental regulations thereby protecting the patient's privacy and the doctor's privileges. For instance, this become necessary in cases

where the doctor's notes on treating a case say (psycho-therapy) are not accessible to the patient while the imaging data is made available. Further, all integrated systems will interact (across modules or across facilities) on secure encrypted channels.

➢ **Vendor Neutral Archive (VNA):** SRIT's PACS stores DICOM images received from various imaging equipment in VNA format which will allow archiving the medical imaging data and reports in a non-proprietary industry standard format. This ensures interoperability with not just different imaging equipment vendors but also with other applications that need to access the stored images.

➢ **Big Data and Analytics Capabilities:** Healthcare is one of the industries that generates enormous amount of data. Even when we consider the total data generated by a single hospital, it can easily go into the realm of 'Big Data'. This is even more applicable when it comes to handling Medical Imaging data.

SRIT's RIS-PACS systems are pre-integrated with HIS and EMR solutions, thus enabling us to analyze and produce meaningful results holistically. Thus, benefits from data analytics in the form of culling important KPI, presenting them on dashboards and sending alerts to key decision makers can be reaped from implementing our solution.

➢ **Pre-integrated with HIS and EMR:** Our RIS-PACS solution comes pre-integrated with HIS and EMR solution. This ensures faster implementation of our solution while removing the need to undertake integration processes between two independent systems which could be a time consuming and painful process. Besides, the proven integrated solution ensures that a tested solution which is functioning well at other operational sites will get implemented for the next large-scale project roll-out.