



# Health IT Services



## ●●● Your Benefits

### Flexibility of Scale

- Through its flexible delivery models, BSI offers medical equipment companies options to scale up/down the team
- Our Global Engineering Model and reach ensures that you can ramp-up the team as and when you want without adding to your fixed costs

### Accelerating Time-to-market

- Our experience in Product Engineering, technology expertise and wide experience in health IT solutions and their integration ensure that the product development cycle is shortened without compromising on quality

### Higher leverage of R&D budgets & Cost Efficiencies

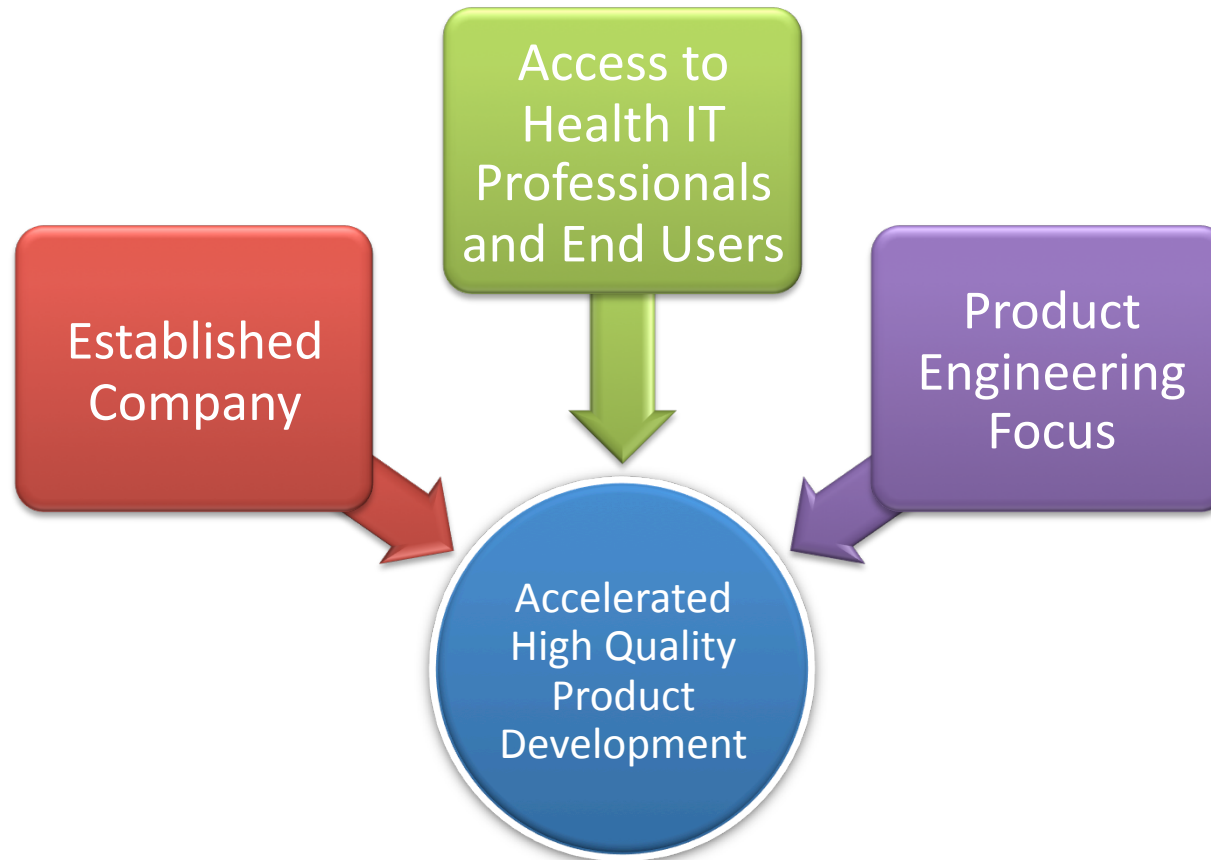
- BSI can take up your non core activities (like Maintenance, Support, Testing, Release & Version management, Documentation) so that your team can focus on core activities
- Reduction in overall cost by leveraging our competency groups (Architecture, Imaging, Usability, Quality) and by right shore sourcing as and when needed rather than having a recurring cost

### Compliances and Interoperability

- BSI's expertise in various communications and regulatory standards like DICOM, HL7, 21 CFR Part 11 can be leveraged to ensure compliance and interoperability

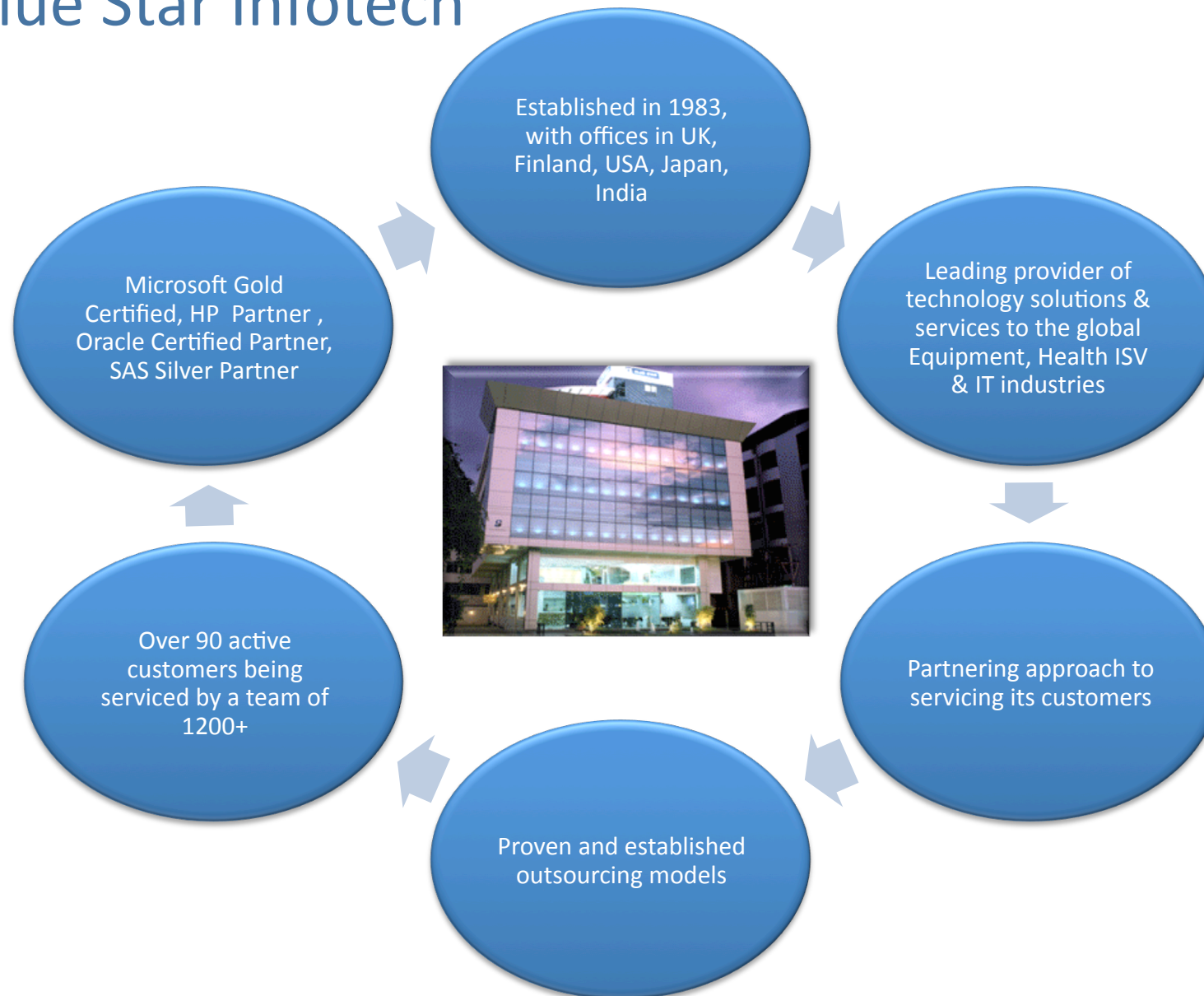
*Your Innovation Partner*

## ●●● Why Blue Star Infotech?

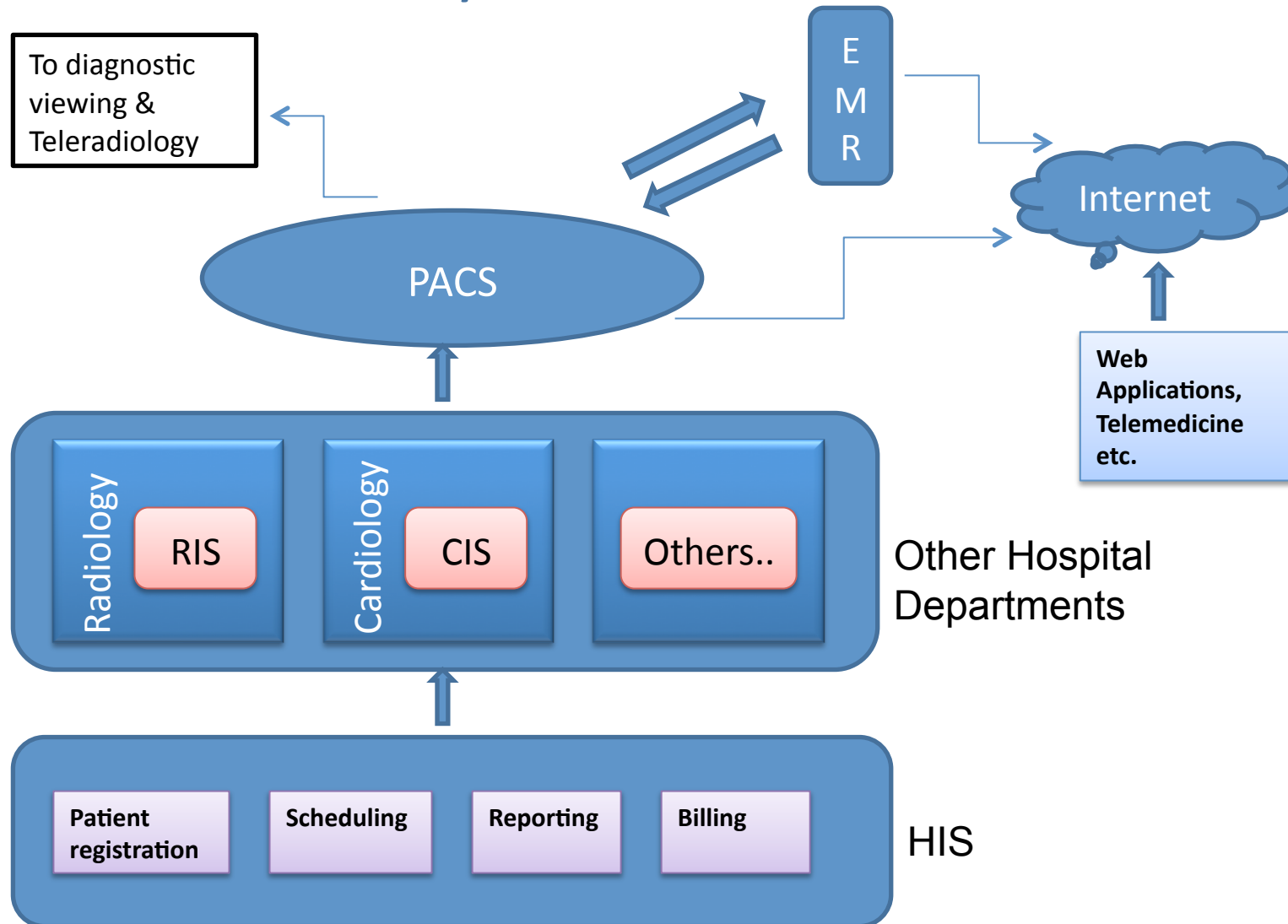


*Accelerated High Quality Product Development leveraging Domain, Technology & Product Engineering expertise*

# ●●● Blue Star Infotech



## Healthcare IT Systems



## ●●● Services for Health IT Companies

EMR/PMS solutions

HIS / RIS

Web based  
solutions

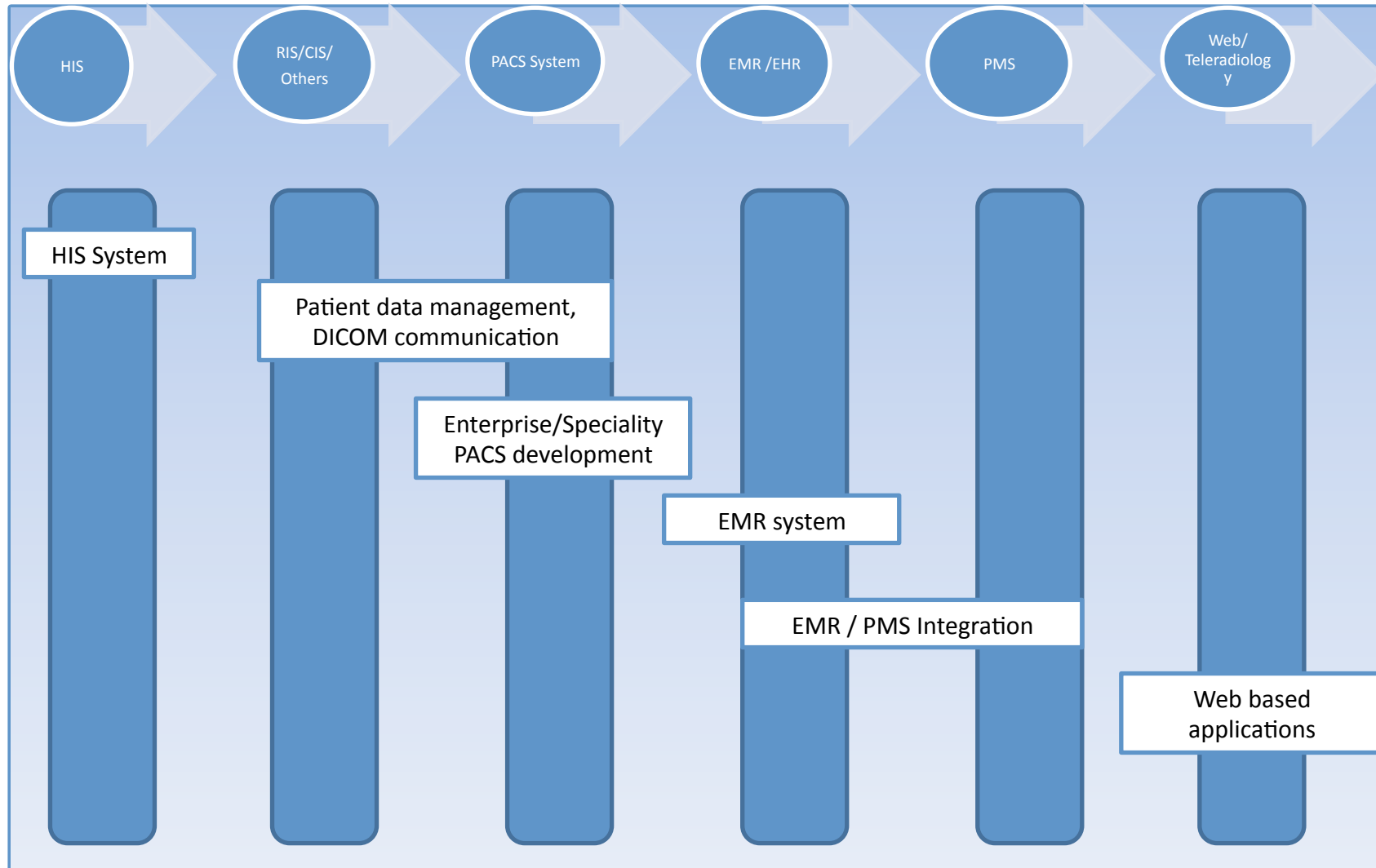
PACS – Enterprise and  
Specialty

DICOM and HL7  
standards based  
integration

### Services

- Collaborative Product Development, Enhancement, Sustenance
- Design and development of new features for EMR/PMS
- PACS - Development of imaging tools and multi-modality viewers
- Web based application development
- Integration between different healthcare systems

# Addressing client needs across the Hospital Enterprise workflow





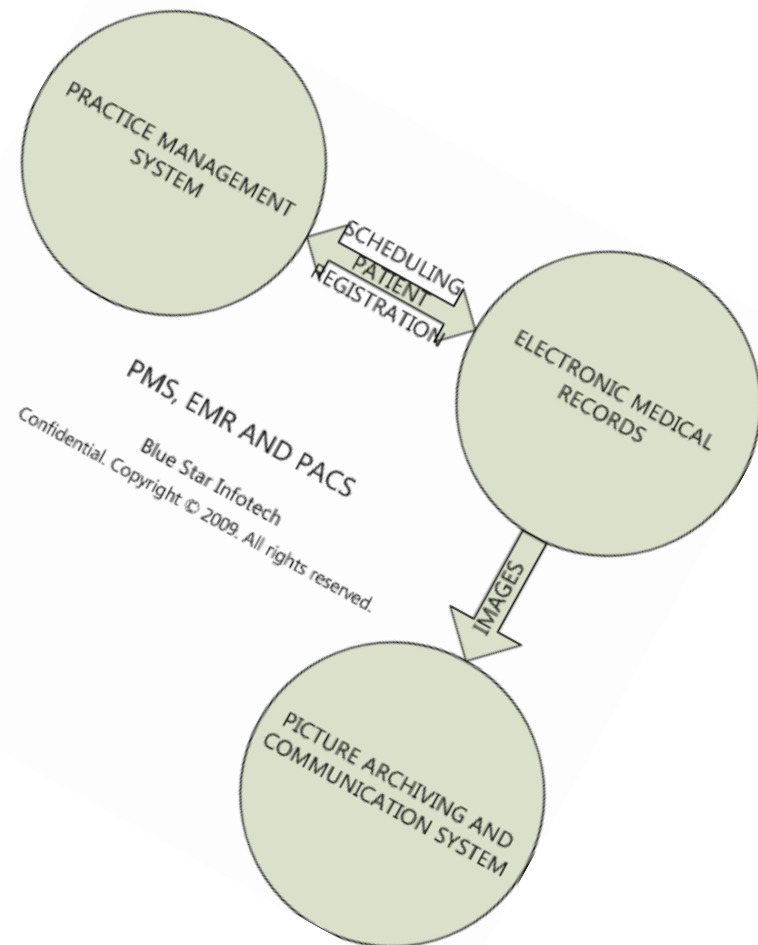
# ●●● EMR/PMS

## Registration/Scheduling

- ❖ command over the hl7 message
- ❖ needed for scheduling, registration etc.
- ❖ experience with online scheduling applications

## Integrations

- ❖ good understanding of the EMR/ workflow and sharing of data between the two applications
- ❖ understand the data flow between the PACS and the EMR system for optimum user experience





## ●●● EMR/PMS

### Features:

- ❖ rich experience in designing various modules for EMR/PMS systems including capturing the past history, feeding in prior charts and records, recording the body vitals, clinical data and claims processing modules
- ❖ worked extensively on the fax capability to allow for automated fax capability for billing purposes
- ❖ reducing manual work on capturing data easily through automated tools and programs thereby reducing manual intervention wherever possible
- ❖ delivered applications that cover the entire spectrum from prescriptions, drug interactions, order investigations, diagnosis, alerts to medical transcription and digital templating
- ❖ sound knowledge of cpt and icd9 coding methodologies
  - worked on claims tracking modules

# ●●● HIS

- ❖ Hospital data management functionalities like patient registration, Administration and Billing.
- ❖ Integration with other hospital systems providing a common user interface.
- ❖ Integration with various information systems like RIS, CIS and LIS
- ❖ Compliant with IHE, HIPAA and support DICOM and HL7 protocols

## ●●● RIS

- ❖ Implementation of imaging workflows involving modality performed procedure step (MPPS) and modality worklist (MWL)
- ❖ Interfacing with PACS using DICOM and HL7 protocols
- ❖ Reporting workflow for diction, transcription, signing and distribution.
- ❖ Web based reporting module for offsite 3rd party medical transcriptionists.

## ●●● PACS

- ❖ Web and Windows architecture development supporting onsite and offshore image distribution
- ❖ Windows and Web Image viewers with manipulating capabilities and Integrated 3D tools
- ❖ Customized data management solutions with robust disaster recovery mechanisms and data backup and restoration
- ❖ Data migration with standard and proprietary data
- ❖ Teleradiology with smart and rapid image streaming and image compression support
- ❖ Integration with multiple EMR/PMS systems
- ❖ Building of custom connectors for Non Standard Systems
- ❖ Integration with 3rd party programs/software to implement scalable and compatible programs
- ❖ Compliant with IHE, HIPAA and support DICOM and HL7 protocols

# ●●● DICOM Expertise

## ■ Network Image Management Services

- Storage Service
  - C STORE
- Query/Retrieve Service
  - C FIND
  - C MOVE
  - C GET
- Storage Commitment Service
- Verification Service
  - C ECHO

## ■ Network image interpretation management

- Comprehensive Structured Reports
- Secondary Capture Images

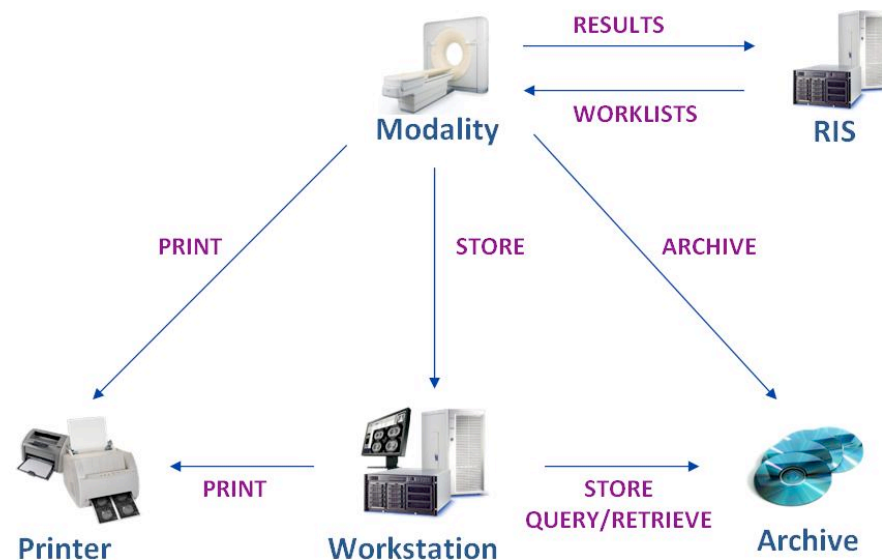
## ■ Network print management

## ■ Imaging procedure management

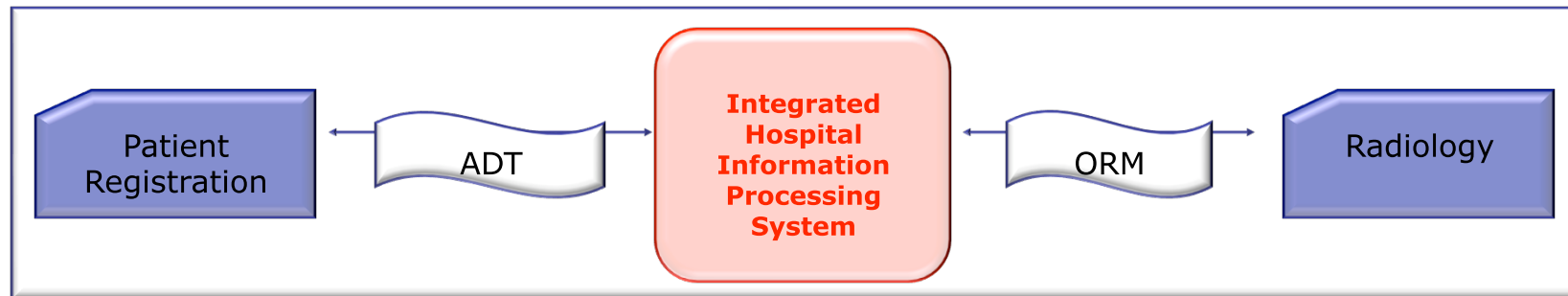
- Modality Worklist Management (MWM)
- Modality Performed Procedure Step (MPPS)

## ■ Off-line storage media management

- Archiving data in DICOM Part10 file formats to CD/ DVD media.



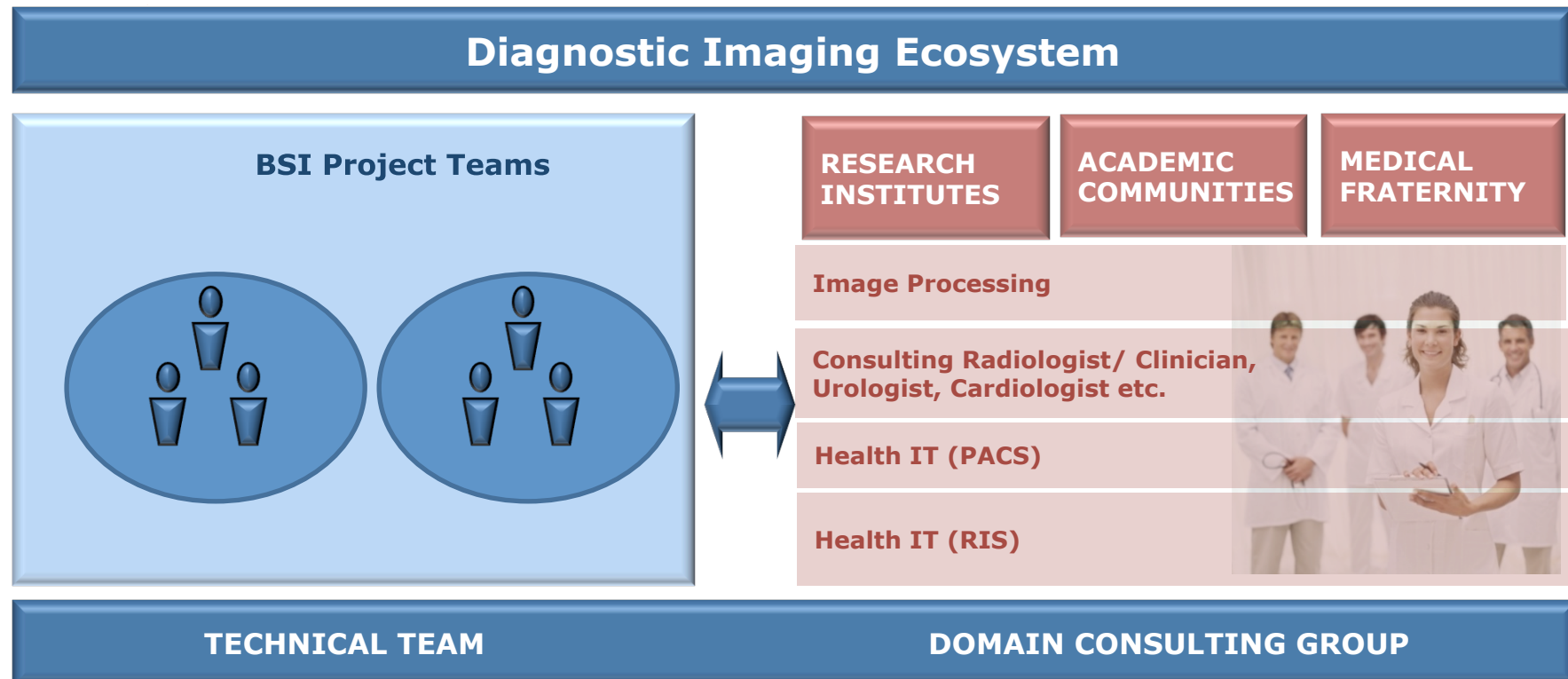
## ●●● HL7 Support



Message	Purpose
ADT/ACK_A01	Patient Admit Message
ADT/ACK_A02	Patient Transfer Message
ADT/ACK_A03	Patient Discharge Msg.
ADT/ACK_A06	Transfer Out-patient to In-patient
ADT/ACK_A07	Transfer In-patient to Out-patient
ADT/ACK_A08	Update Patient information
ADT/ACK_A11	Cancel Patient admission
ADT/ACK_A12	Cancel Patient transfer
ADT/ACK_A13	Cancel Patient discharge
ORM/ACK_O01	General Order Message (Creation of Radiology request)
ORU/ACK_O01	Unsolicited Transmission of Observation Message

- Communication between HIS & RIS applications
- Data exchanged by sending/receiving the HL7 messages
- Messages used:
  - Admission, Discharge & Transfer messages
  - General Order messages
  - Unsolicited transmission of an observation message

## ●●● Our Team



Well networked with domain/technical experts and universities for consultancy on :

- Domain/user perspective
- Ground truth generation for algorithm development
- Customized image processing solutions
- Enterprise and specialty solutions



# ●●● Technology Expertise

- Windows
- Unix
- Solaris
- HP-UX
- Linux

Platforms

- C / C++
- C#
- VB.Net
- eVC++
- Managed C++
- Java

Languages

- Visual Studio .Net
- Mobile .Net
- Eclipse
- Java, Sun Studio
- J2SE, J2ME, GNU

Software Devlpt.  
Tools

- Rational Rose, UML, Rational XDE, Enterprise Architect, NUnit, .NET Memory Profiler, Ants Profiler, Visual Source Safe, ClearQuest

Other Tools

- Cedara IAP Server (for image processing)
- **DICOM libraries:** MergeCOM , DicomObjects
- **HL7 API** : HAPI

3rd Party  
Software

- Intel x86, Intel i960, Motorola 68K, Motorola PPC, ARM7, ARM9, MIPS R3000

Processor  
Architectures

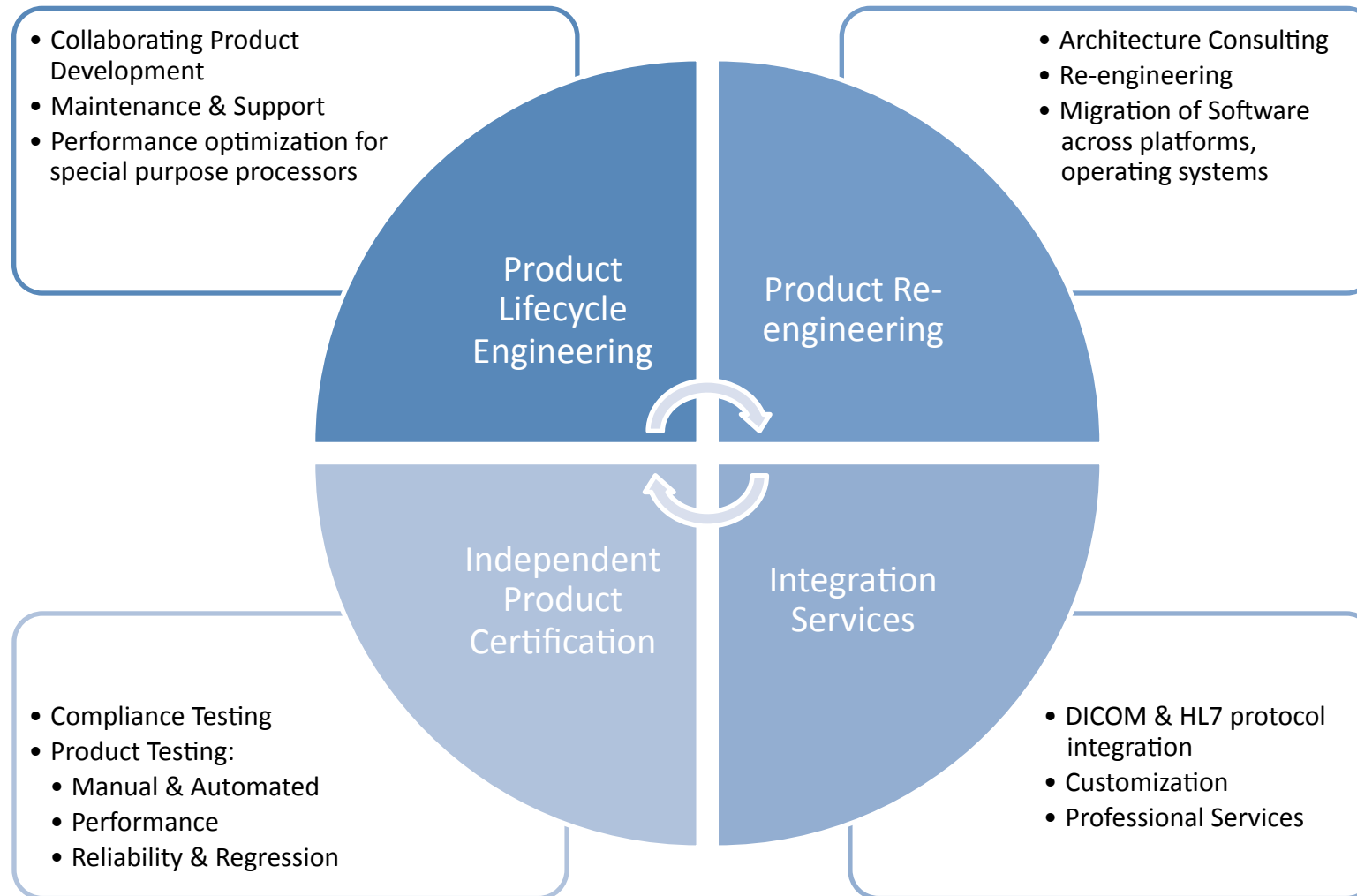
- VxWorks, pSOS+, Embedded Linux, eCOS, MQX, CMX, OSE, Windows CE, mC/OS

Embedded  
Operating  
Systems

- DCM
- JPEG
- BMP etc.

File Formats  
(Imaging)

## ●●● Product Engineering Services



## ●●● Few success stories...

### Multi Modality Console

A medical giant involved in manufacturing, sales and marketing of a variety of medical systems

*Since last 9 years, BSI has been a core development and support partner for the range of new generation diagnostic imaging equipments.*

### DICOM connectivity

Pioneer in the devlp. of computer aided detection (CAD) software used by medical practitioners

*Implemented a pluggable architecture for DICOM connectivity & structured reporting functionality*

### SPECT Imaging

The client is in the business of designing, building, selling and servicing pre-clinical imaging systems and multimodality pre-clinical imaging systems.

*Developed a new, standalone image acquisition application for the SPECT(Single Photon Emission Computed Tomography). It also involved design and implementation of various image acquisition protocols such as Static, Dynamic and Tomographic including the gating signal support.*

### Analytical Instr. s/w

A worldwide leader in developing innovative products and technologies for life science research.

*Development of Quantitative Polymerase Chain Reaction software and making it 21 CFR Part 11 compliant.*

### Algorithm development

Leading provider in Image analysis solutions.

*Researched and developed the image analysis algorithm for segmentation of vessel pathology in CT Angiography images*

## ●●● Integration with PACS using DICOM

### Client

The client is pioneer in the development of computer-aided detection (CAD) software used by medical imaging community to aid in earlier detection of disease

### The Need

- The client wanted to provide DICOM connectivity to their Colon CAD application so that it can exchange data to and from PACS Servers, SCU and SCP applications.
- Client also intended to implement Structured Reporting so that reports generated by CAD applications can be shared with other applications in a DICOM compliant format

### BSI's Role

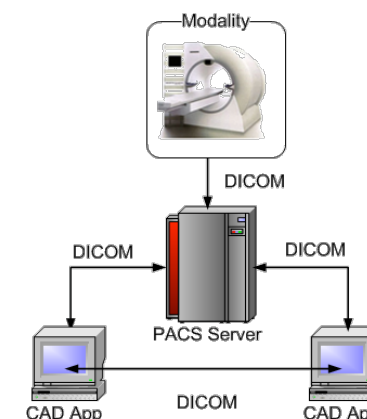
- For providing DICOM connectivity with other DICOM compliant devices, following DICOM Services were implemented within the CAD application:
  - C-Store SCU
  - C-Store SCP
  - C-Find SCU
  - C-Find SCP
  - C-MOVE SCU

For Structure Reporting functionality BSI proposed a plug-in architecture which was developed separately and later merged with the CAD application.

BSI implemented the Comprehensive Structure Report. Diagnostic snap shots of the findings were presented in the report as Seconday Capture Images

### Technology

- C# .NET, DicomObjects



### Benefits to the Client

- BSI's DICOM knowledge and medical domain expertise resulted in creating an approach that would fulfill the project requirements within the stipulated time
- BSI proposed a design approach wherein existing application code could be reused to some extent which resulted in lesser development effort and time
- Pluggable design approach also made possible to develop structured-reporting functionality remotely thereby resulting in a 35% savings on the overall development budget

## ●●● Integration of EMR and PMS Systems

### Client

- The client is a fortune 500 company in the United States, specializes in EMR, PMS and PACS products for orthopedic group practices.

### Business Need

The growing EMR market and the presence of a Practice Management system in most clinics served as the main driving force for the company to develop integration tools between the EMR and PMS systems in an orthopedic group practice.

### Solution offered

- Necessary to integrate the PMS system and the EMR systems for orthopaedic practise. This allows for single point patient data entry and brings efficiency to the practice.
- The proposed solution required creating custom HL7 solutions and using an integration engine to productively work with various data formats and standards, including HL7 (all versions), XML, DICOM, delimited files, etc.
- Some of the most commonly created HL7 interfaces were as follows:

- Scheduling information sent from PMS to EMR
- Patient Information send from PMS to EMR
- Billing information sent from EMR to PMS



### Technology

C# .NET, ASP, ASP.NET, .NET Remoting  
 SQL Server 2005  
 DICOM (Custom), HL7 (Custom)

### Benefits to the Client

- Integration tools created by BSI enabled seamless integration between the PMS and EMR System helping clinics to decrease the overhead costs and increase revenue through accurate billing and better charge capture
- Rapid prototyping of key concept modules helped the client understand the process and gave better clarity to the proposed product design.

# ●●● Patient Information Management

## Client

The client is one of the world's largest manufacturers & sellers of medical electronics equipment.

## The Need

Patient Information management solution for easy information access

## BSI's Role

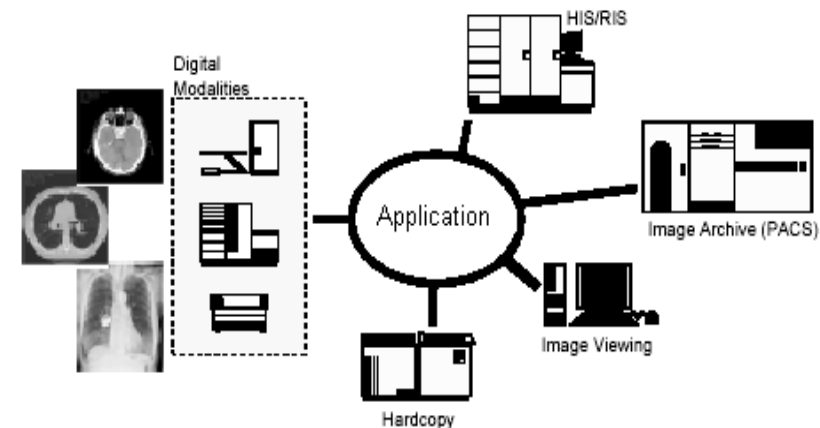
- The features supported by the BSI solution included the following:
  - Patient Registration
  - Emergency Patient Registration and reconciliation
  - Accessing Patient Information from Hospital Information System
  - Examination scheduling
  - Patient data including Examination reports storage, archival and retrieval.
  - Advanced search facilities to Search Patient information

## Technology

- .Net (VB .Net, C#, Managed C++)

## Benefits to the Client

- Seamless integration with other systems in Health Care Enterprise.



# ●●● DICOM compliance in Modality Console Application

## Client

The client is one of the world's largest manufacturers & sellers of medical electronics equipment

## The Need

- The application required compliance with IHE framework and DICOM standard support. It involved the following DICOM Services
  - FIND SCU/SCP
  - STORE SCU/SCP
  - MOVE SCU/SCP
  - STORAGE COMMITMENT SCU/SCP
  - VERIFICATION SCU/SCP
- The DICOM data was also required to be archived to media devices like CD DVD

## BSI's Role

- BSI provided extensive support to the client for implementation of the services listed above.
- A separate communication layer was developed to convert the application specific data to DICOM format and also vice versa.
- Design of a robust and flexible architecture for the application and implementation using .NET technology.

## Technology





- .Net (VB .Net, C#, Managed C++)
- MergeLibrary, MESA Server for testing

## Benefits to the Client

- BSI's experience in DICOM and medical domain expertise helped in understanding the requirement quickly and ensured faster development.
- The services were tested extensively using MESA Server to ensure stability.



## ●●● Some of our customers...

 <p><b>STRATAGENE</b> An Agilent Technologies Company</p>	 <p>GAMMA MEDICA-IDEAS INNOVATION FOR LIFE</p>
 <p>MEDICSIGHT See more. Save more.</p>	 <p><b>HYCOR</b> An Agilent Technologies Company</p>
<p>Leading medical equipment manufacturer from Japan</p>	<p>UK based advanced medical visualization company</p>

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