



PRTG: A Solution for Monitoring Healthcare IT

Healthcare IT and the IT Professional

IT infrastructure in healthcare environments includes traditional IT elements – like routers, switches, servers, and so on – as well as medical devices, medical systems, and communication protocols that are specific to medical IT.

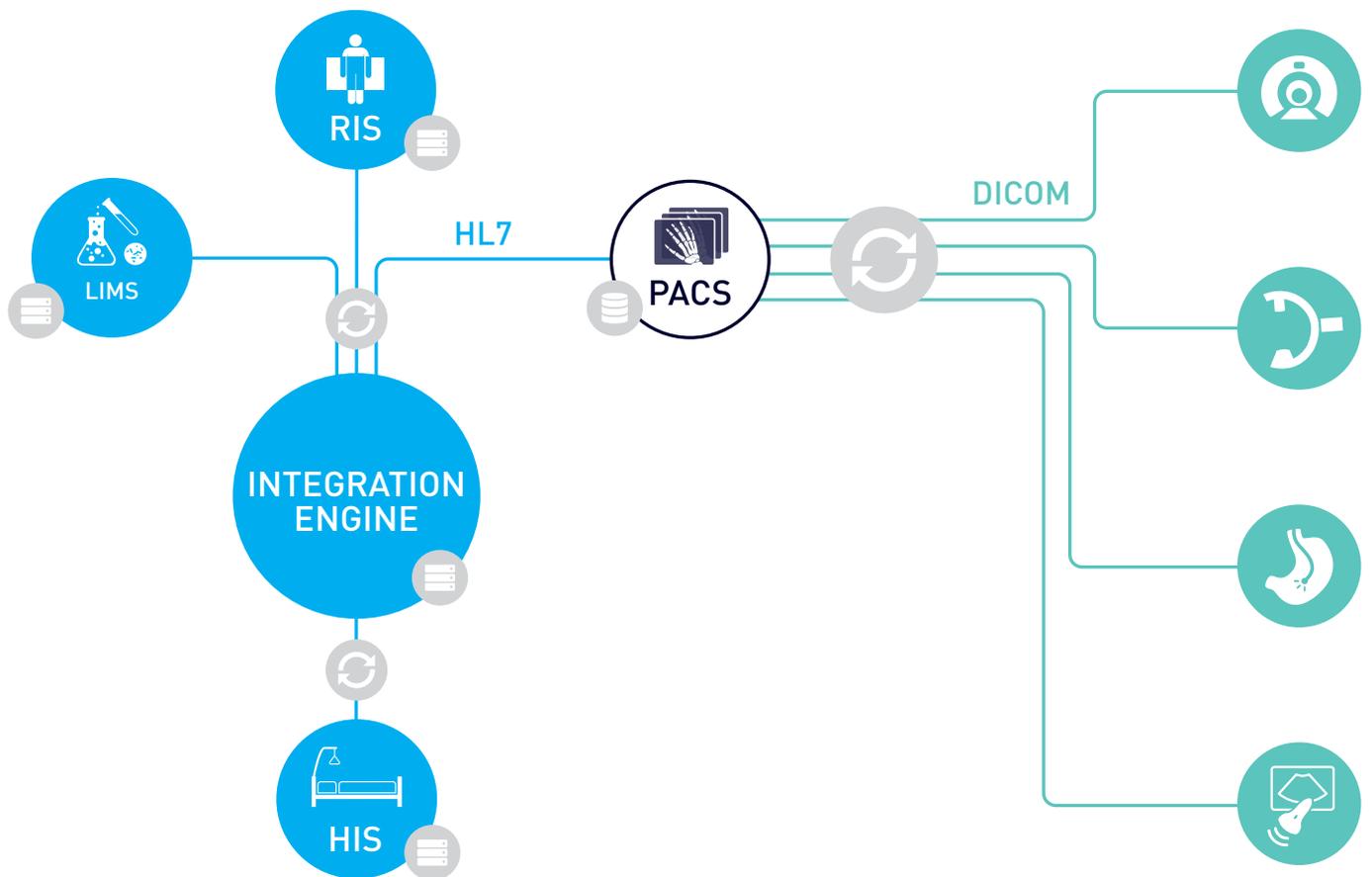
Think of it as a pyramid that looks something like the one on the right:



But what exactly is Healthcare IT?

Healthcare IT refers to a combination of **medical devices**, **systems**, and **data format standards**.

THIS IS WHAT A HEALTHCARE IT ENVIRONMENT MIGHT LOOK LIKE:



DEVICES



Modalities

Devices specifically for creating medical images, such as Magnetic Resonance Imaging, X-rays, CT Scans, and ultrasounds. Modalities have worklists, which list the jobs associated with a specific modality.



Medical Devices

Any medical device. These include diagnostic devices, patient bedside devices, and so on.

COMMON HEALTHCARE SYSTEMS

Systems	Description
Integration Engine	Central software for handling message distribution between various systems. It receives, modifies and distributes messages or data in multiple formats, usually HL7 and DICOM, but also FHIR and HTTP-based requests.
Radiological Information System (RIS)	System for managing imaging departments digitally. Includes functionality for patient scheduling, resource management, procedure billing, and more.
Laboratory Information Management System (LIMS/LIS)	System for managing the flow of patient data and test results between the laboratory and the other departments.
Hospital Information System (HIS)	System for administrating the day-to-day requirements of running a hospital, such as patient appointments, registering patients, booking rooms for patients, and so on. HIS also forms part of a bigger ecosystem for transferring Electronic Medical Records between hospitals, doctors, and other medical touchpoints.
Picture Archiving and Communication Systems (PACS)	A central system for storing and retrieving images from modalities.

DATA FORMAT STANDARDS

These systems need to communicate with each other. They generally do this by means of the following data format standards.

Data Format Standard	Description
DICOM (Digital Imaging Communications and Management)	Used to transfer and store image data from radiology, CAT scans, and ultrasound imaging in a central system (usually a PACS). Common DICOM requests include: <ul style="list-style-type: none">• C-ECHO – check that DICOM devices are responding• C-STORE – store images to a PACS• C-MOVE – move images from one system to another (e.g. from a PACS to a workstation)• C-FIND – find image data or query the modality worklist
HL7 (Health Level 7)	Used for communication between systems (usually through the Integration Engine).
FHIR (Fast Healthcare Interoperability Resources)	Used to exchange Electronic Health Records (i.e. global patient details). It includes a RESTful API.

Challenges Healthcare IT Professionals Face

Downtime can directly impact the treatment of patients, so IT professionals need to stay on top of potential IT problems. Common issues include systems going down, images from X-rays, ultrasound or CT scans not being available to doctors, medical devices malfunctioning or not transmitting data, and network problems (like bandwidth issues, low storage space, and so on).

IT Professionals need to be able to monitor their entire infrastructure.

There are some issues with monitoring the healthcare infrastructure:

- Medical devices have their **own special protocols** and cannot be monitored in the same way as other devices (for example: many medical devices do not provide SNMP support)
- It's difficult to get a **single dashboard view of the status of the ENTIRE structure**, including both “traditional” and “health-care IT” components.

EXAMPLE 1: RIS OR HIS GOES DOWN

- Patients must be processed manually.
- Patient examinations may be delayed.
- Production of reports and invoices is delayed.

EXAMPLE 2: PACS IS DOWN

- Medical images cannot be accessed, uploaded or distributed.
- Patient examinations and diagnoses may be delayed.

What Should Be Monitored?



HEALTHCARE SYSTEMS & INTERFACES

Ensure that devices and interfaces are responding.



TRANSFERAL & STORAGE OF MEDICAL IMAGING DATA

Monitor if the DICOM devices are responding, and the bandwidth used to store images.



WORKLIST ENTRIES

Check the number of worklist entries to ensure there are not bottlenecks or other problems.



TRADITIONAL IT SERVERS & DEVICES

Check on aspects like bandwidth, storage space, uptime, CPU usage, etc.

Why PRTG?

How can PRTG help medical IT professionals? Well, PRTG offers some out-of-the-box dedicated sensors, and some custom sensors that can be configured.

Sensor	Description
DICOM Bandwidth Sensor	Uses the DICOM C-STORE request to store test images to the PACS and reports on response times and bandwidth used to perform the operation.
DICOM C-ECHO Sensor	Checks that DICOM devices are responding, and what their response time is.
DICOM Query/Retrieve Sensor	Makes use of the DICOM C-FIND request to check if specific information can be retrieved from a device or PACS, such as images and patient details. It is also used to check on the number of worklist items planned for the modalities.
HL7 Sensor	Can be used to check that HL7 interfaces are responding, and what their response times are.
Business process sensor	Shows the overall status of a group of sensors. This can be used to create a view of a specific workflow, such as a radiology workflow, or laboratory workflow.
REST Custom Sensor	Can be used to query RESTful APIs of various systems, such as the Integration Engine.
Traditional IT Sensors	The same sensors that are used to monitor IT infrastructure in other environments can be used in a healthcare infrastructure

A single view of the entire healthcare infrastructure

Hospitals can get dashboards that show statuses, alerts, and notifications of their traditional and healthcare-specific infrastructure. All in one place.