DICOM Prefetch
Quick access to priors

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DICOM Prefetch

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Introduction

Prefetch

Workflow automation mechanism, for fetching relevant prior studies of the Patient from Image Archives (PACS, VNA etc)
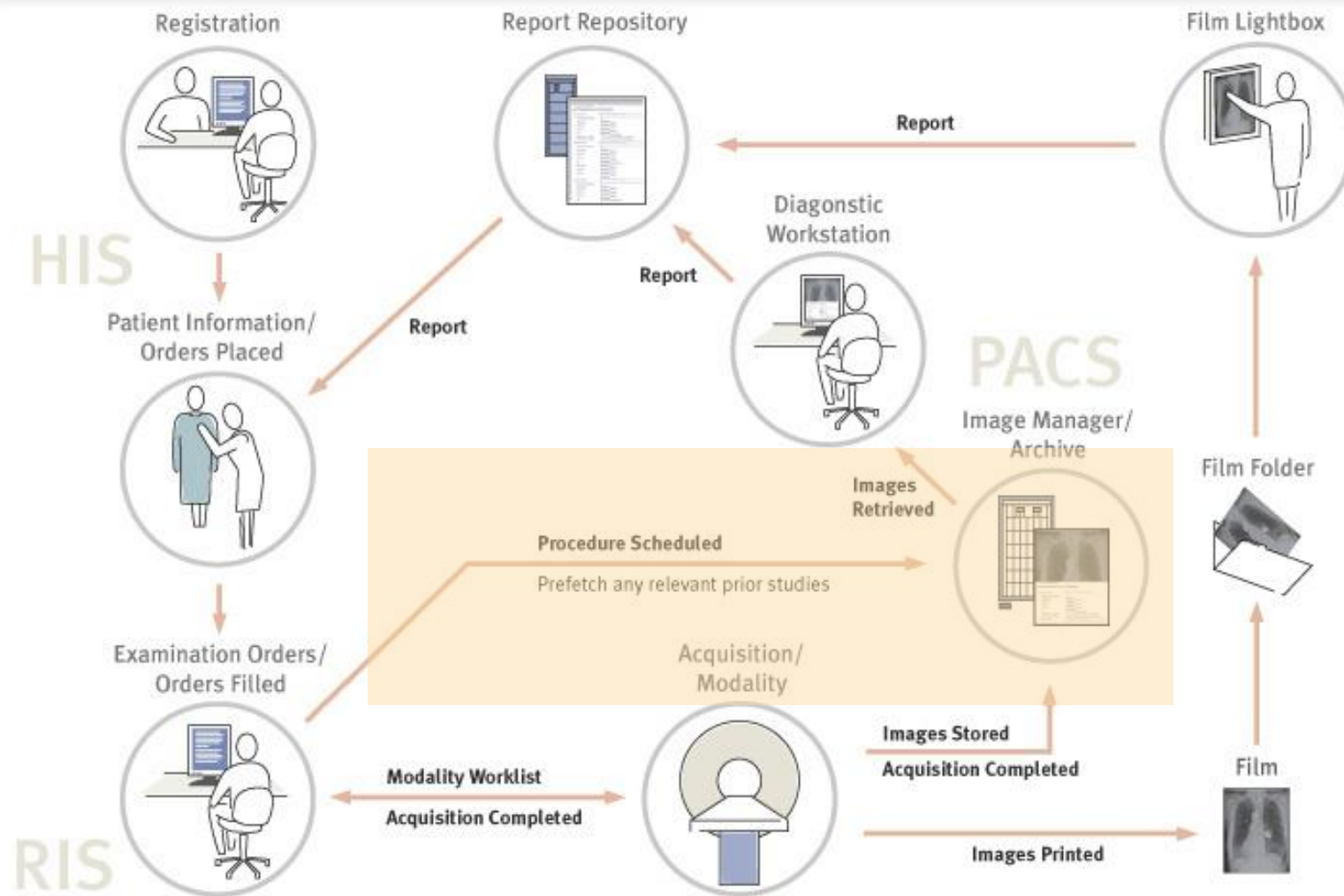
Why Prefetch

Required for diagnostic scenarios which need comparison of studies acquired over time

Fetching prior studies manually will mean more waiting time for the Radiologist, specially when the number of images is high

Required by systems like PACS, Advanced Visualization Workstations, Scanners which are used for planning & analysis
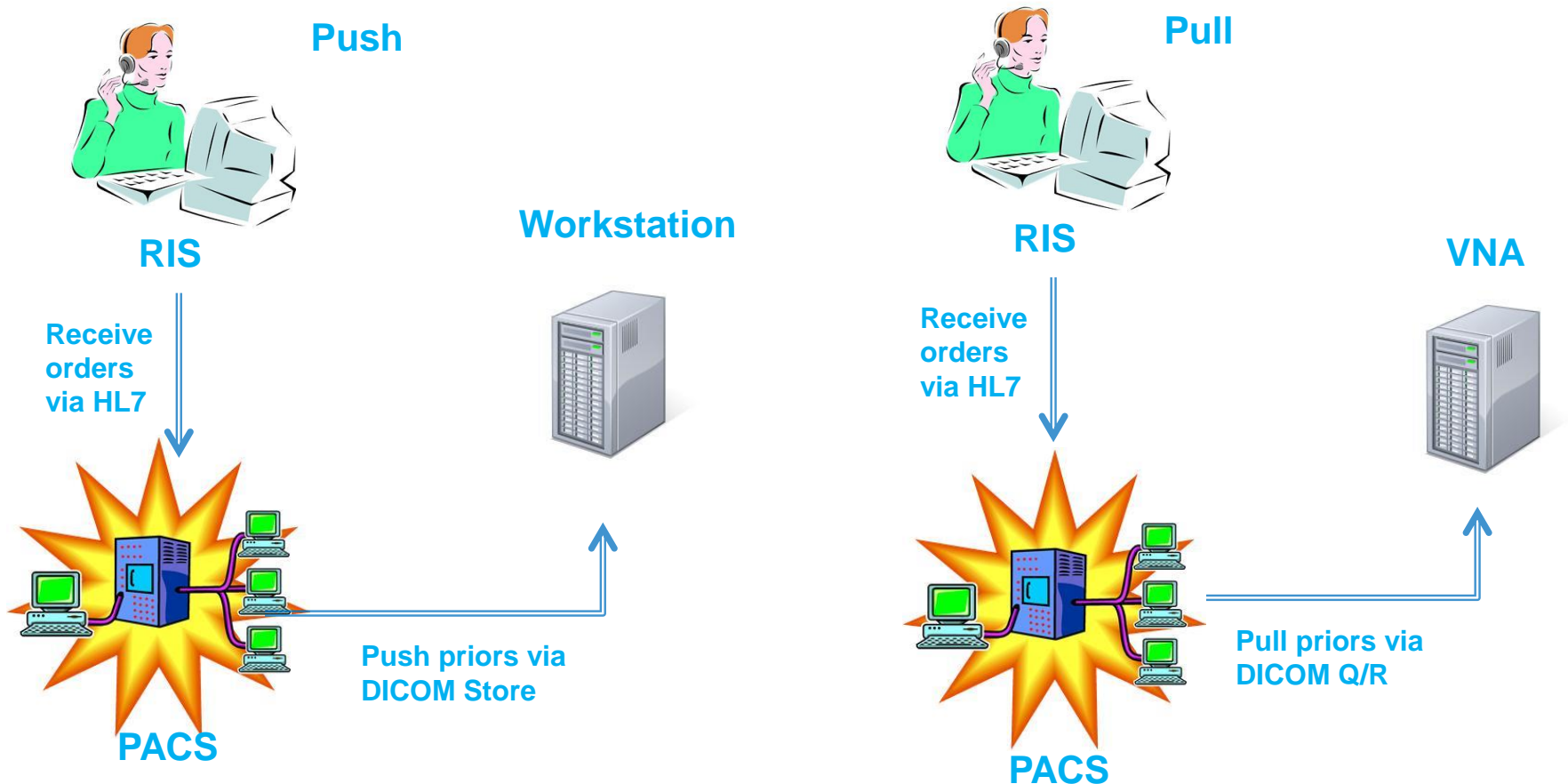
Picture from IHE Scheduled Workflow (www.ihe.net)

Prefetch in PACS & VNA domain

Push

Pull

RIS

Workstation

RIS

VNA

Receive orders via HL7

Receive orders via HL7

Push priors via DICOM Store

Pull priors via DICOM Q/R

PACS

PACS

DICOM Prefetch (1/2)

Need

Required for DICOM based systems providing diagnostic & analysis applications

Needed in Oncology & Cardiology domain and for applications like Tumor Tracking & Analysis
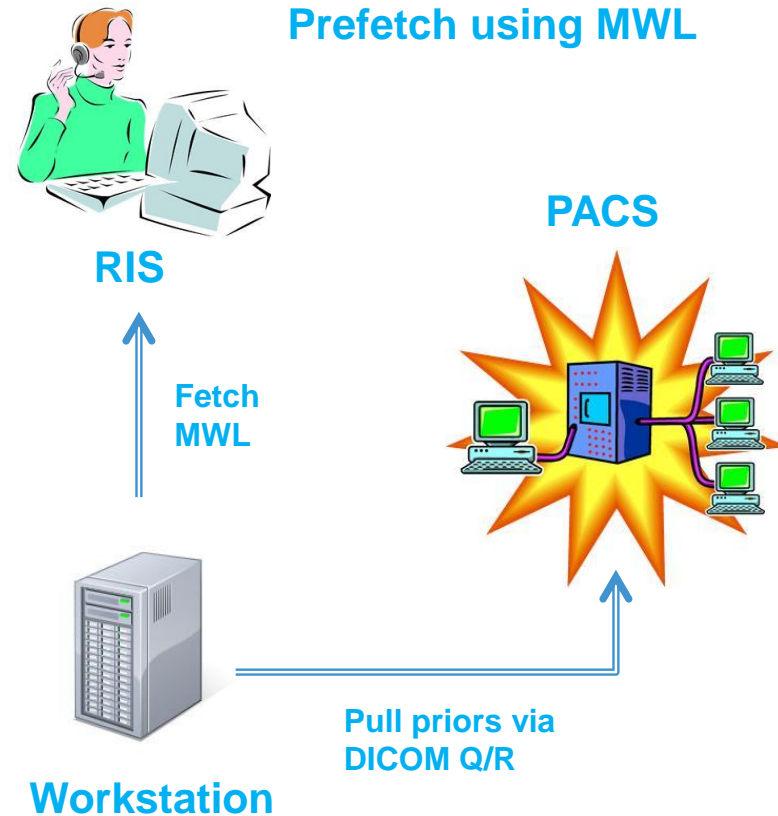
Approach 1

Periodically pull the scheduled orders from RIS

Fetch the corresponding priors from PACS
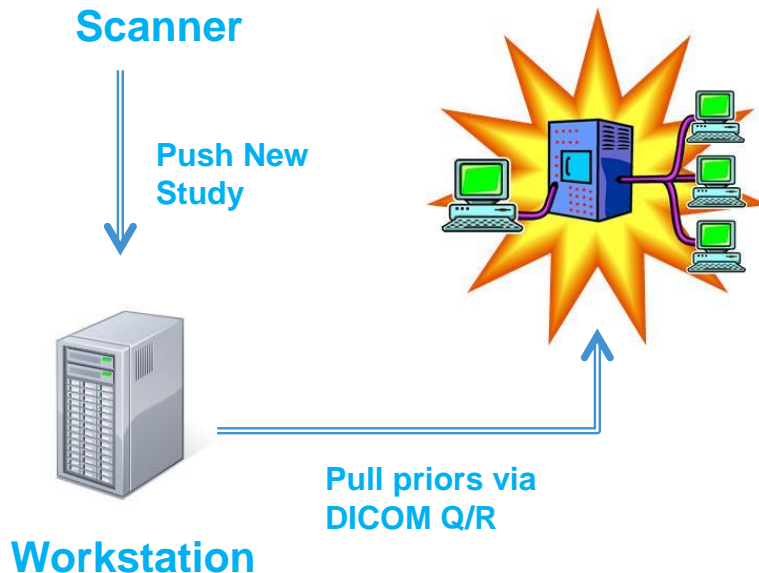
Usage Limitations

Can be used only when scheduling is done on RIS

Solution will not work in markets where RIS is not commonly implemented (e.g. emerging markets)

Prefetch using MWL

RIS

PACS

Fetch MWL

Workstation

Pull priors via DICOM Q/R

DICOM Prefetch (2/2)

Prefetch via Study Arrival

Scanner

Push New Study

PACS

Workstation

Pull priors via DICOM Q/R

Approach 2

Push scanned studies from scanners to Workstation via DICOM Store

Fetch corresponding priors from PACS using DICOM Q/R

Usage

Require workflow tuning in the field to send the images directly to workstation as well

Prefetch Settings

Identifying Priors: Two steps
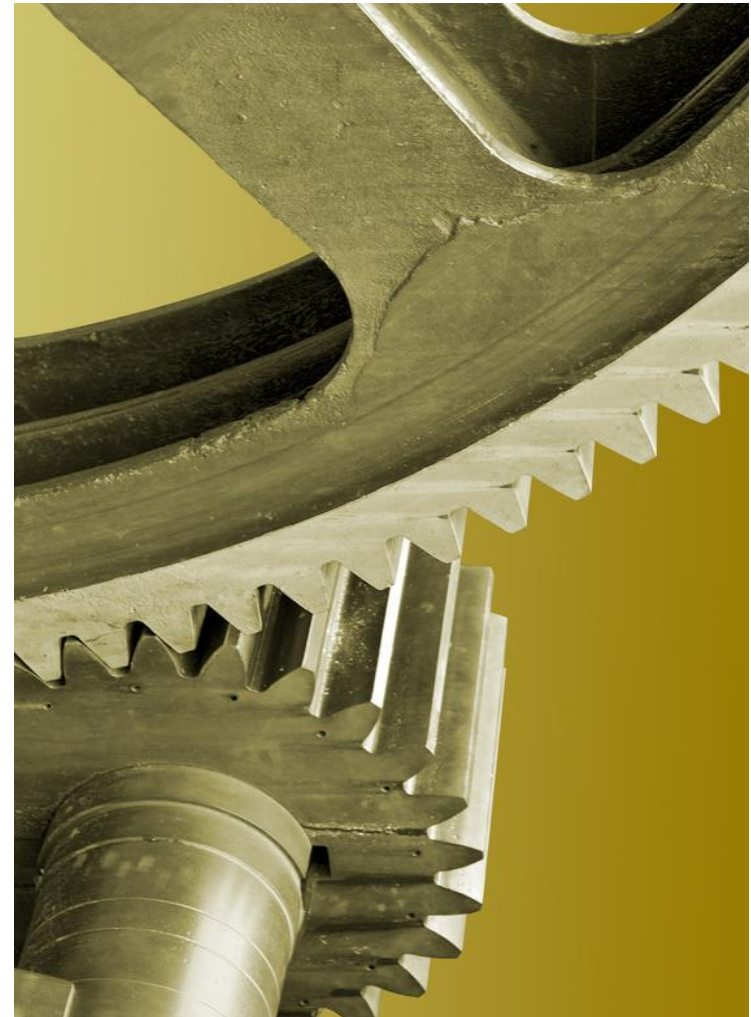
1. Identify Studies which need priors

- Not all studies require priors

2. Identify the right set of priors on PACS

- Not all priors are the right priors

Parameters for Identifying right studies

- Modality
- Scan Protocol
- Body Part Examined
- Study Description
- Study Date Range

Challenges in Deployment (1/2)

MWL Query

No consistent way of mapping RIS/Scan codes to DICOM Study information

Needs site specific customization of RIS queries as the protocols used are different

Some RIS systems do not support querying for exams scheduled on the Modality field

Interval for fetching MWL varies from site to site (once per minute to once every day)

Challenges in Deployment (2/2)
PACS Query

Querying for priors based on DICOM Patient ID & Name may not result in any priors due to Patient demographic reconciliation on PACS

Not all PACS support matching/returning optional query parameters like StudyDescription, ModalitiesInStudy, BodyPartExamined etc

A study of 15 PACS at Connectathon revealed that 40% do not return Protocol and 30% for ModalitiesInStudy

Free text fields like StudyDescription are not consistently filled at sites. Implementations have to consider multiple values/synonyms

Some PACS support only single Association per node. When Prefetch is in progress manual Q/R by users will be blocked.

Conclusion

Workflow automation is an important aspect of patient care, which increases the overall throughput for Radiologists and Physicians

Its possible to implement workflow automations using existing DICOM Services

Implementations have to be flexible to address

- Varied implementations and interpretations of the standard in the field

- Legacy systems in the field which may not support the latest editions to standards

IHE profiles like PAWF, MIMA, IOCM will help in identifying and prefetching the right prior studies

References

http://dicom.nema.org/

http://www.HL7.org/

http://www.IHE.net/

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Thank you for your attention !