

DICOM WORKSHOP

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Managing and Migrating Large Imaging Databases

Fred M. Behlen, Ph.D.

LAITEK Inc., Homewood, IL USA

LAITEK Medical Software S.R.L., Cluj-Napoca



PACS Data Migration

Old PACS



101001011100010110101010100101...

New PACS



Work in data migration provides opportunity to witness the varied ways that the DICOM Standard is interpreted, misinterpreted or ignored in real-world implementations.

... the work is part consultancy, part janitorial.

- **Feedback from the Real World of DICOM Implementations**
 - The Right
 - The Wrong
 - The Weird
 - The Troublemakers
 - The Ambiguous

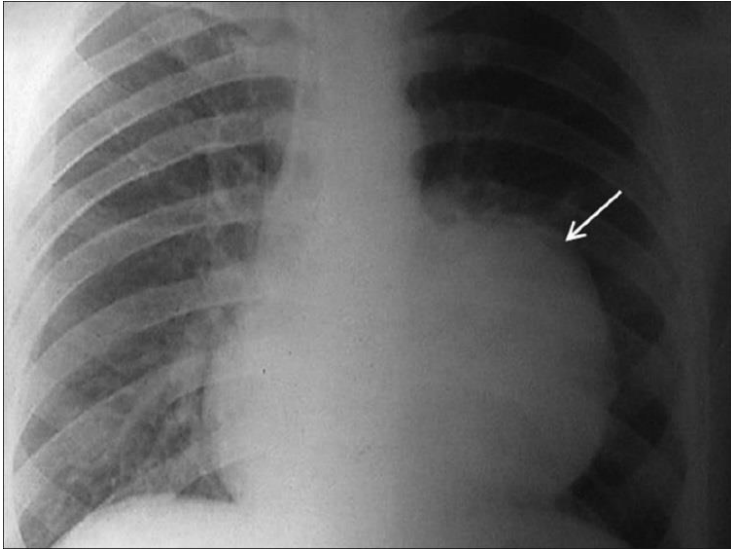
- **Attributes in retrieved data not the same as in C-FIND**
 - Study, Series and SOP Instance UIDs
 - On-the-fly transformations (“tag morphing”)
- **Non-Unique UIDs**
 - Standard says no two UIDs can be the same
 - Hierarchical Query Model can tolerate duplicates if
 - Series UIDs are unique within Study
 - Instance UIDs are unique within Series
- **Over-length fields**
 - (0018,0015) Body Part Examined (CS) > 16 char
- **C-MOVE Final Status returned before sub-operations complete**

- **C-FIND**
 - Multiple return records for the same Study
 - Different values in (0020,1208) Number of Study Related Instances, that may not add up to the total number of images in the Study
- **Duplicate copies of images**
 - Same Image, Same UID
 - Same Image, Different UID
 - Different Image, Same UID
- **Changing Study UID to match HL7 order**
 - Study is sent & stored, but can't be found

- **Studies with Zero images**
 - Created by HL7 interface & forgotten
- **Closing of Studies**
- **Can't C-FIND studies with null Study Date**
- **Increasing use of proprietary annotation**
 - Expendable if merely illustrative
 - Must be preserved if it contains clinically significant information, e.g. corrections to laterality markers

Annotations

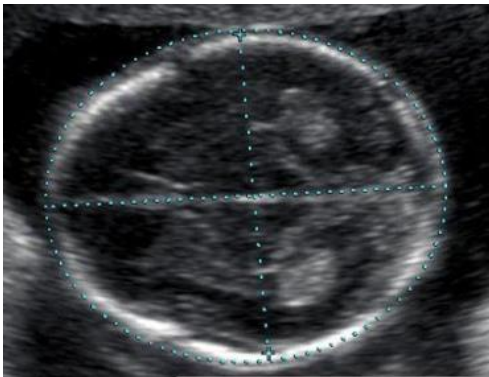
Point out the obvious



Laterality correction



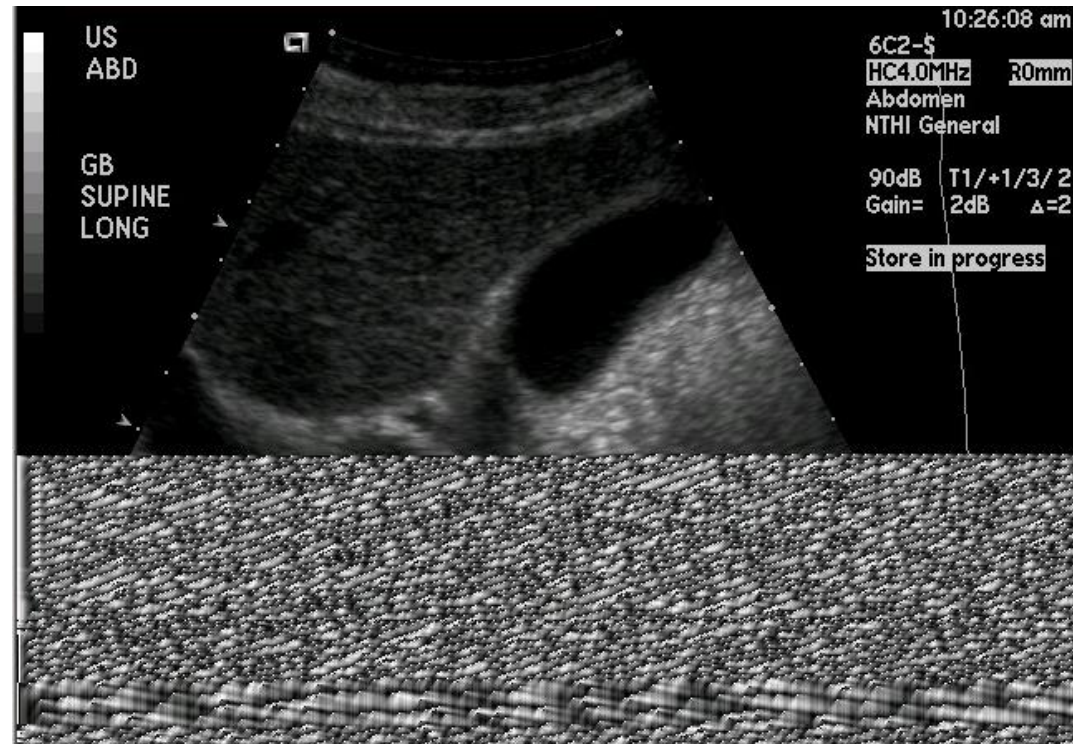
Measurement calipers



Troublemakers (cont'd)

- **Transient errors**

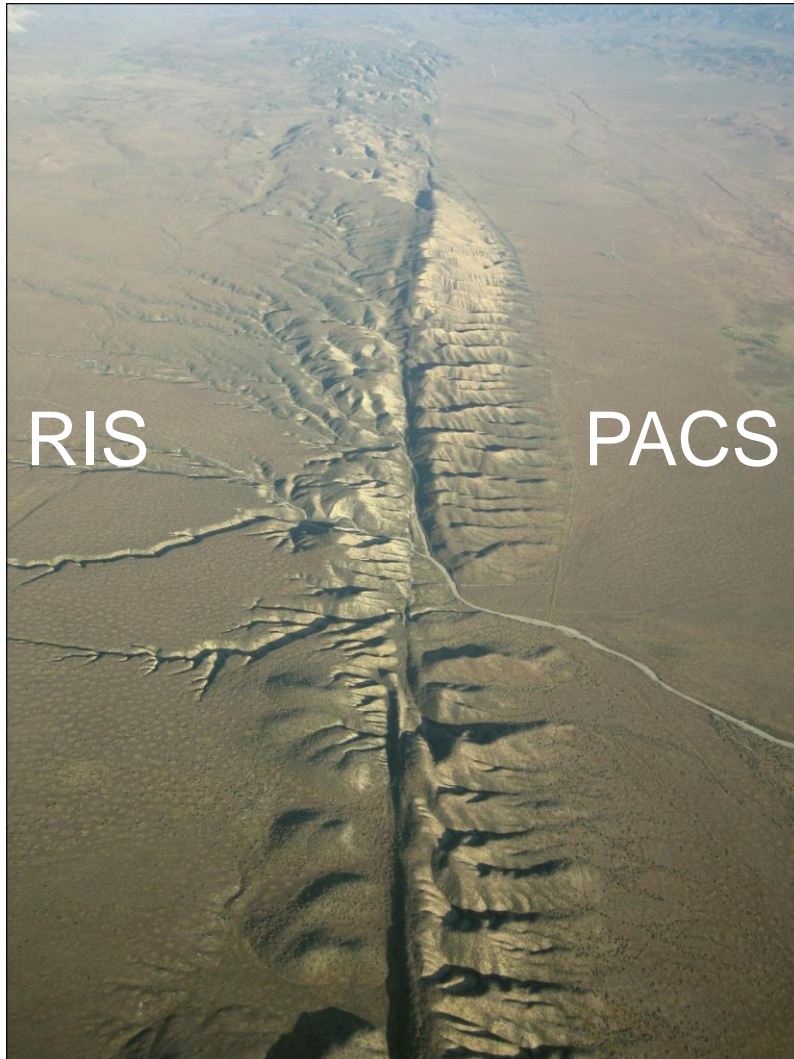
- No problem if detected (simply re-fetch)
- May be insidious in migration
- Automatic detection needed





- **Cardinality of Accession Number to Study UID – two camps**
 1. 1:1 Accession Number uniquely identifies Study
 2. 1:N Multiple studies may share same Accession Number
 - N:1 (Grouped Procedures) variously addressed
- ➔ Migrating from Camp 2 to Camp 1 requires Study merges

San Andreas Fault



- **Fidelity of migration is key to long term data integrity**
- **Overall fidelity of migrations is high, thanks to DICOM**
- **DICOM compliance is improving**
- **More annotation being used, needs DICOM implementations for portability**
- **Some tightening of DICOM specs on Query/Retrieve behavior will help**
- **There will always be stuff to fix when data moves to a new system**