THE DICOM 2013 INTERNATIONAL CONFERENCE & SEMINAR
March 14-16 Bangalore, India

Multivendor Algorithm Analysis Nuclear Medicine Applications

Author : Y.Kiran Kumar

Co-Authors: A.K.Narayan, Kishan Harwalkar

Philips Healthcare,

Philips Innovation Campus

Bangalore

India

Multivendor Algorithm Analysis for Nuclear Medicine Applications

- **Outline**
- **Introduction**
- **Clinical Workflow Background**
- **Interoperability Issues & Clinical Relevance**
- **Algorithm analysis**
- **Conclusions**

Outline

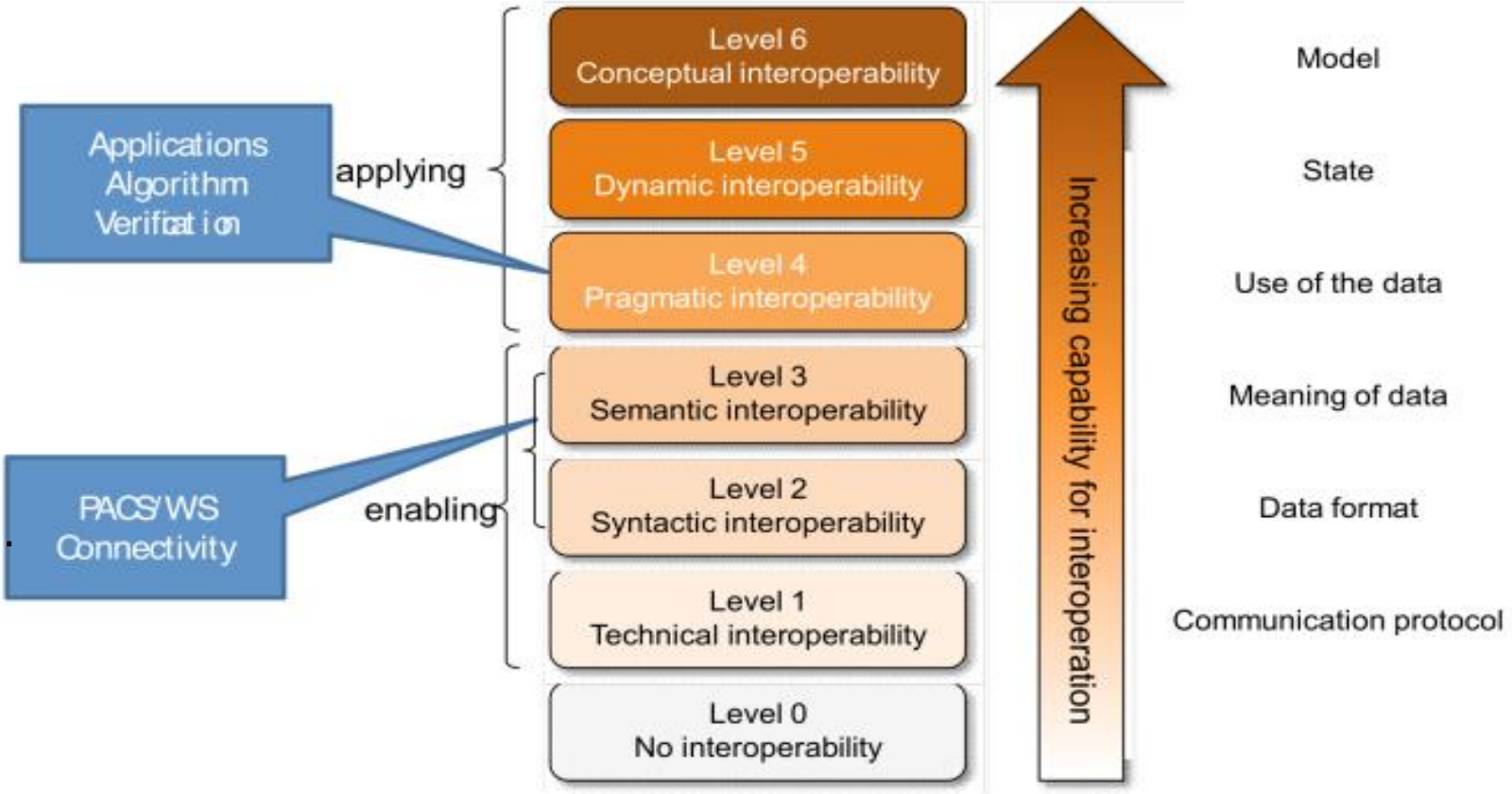
Customers are concerned to see variations in measurements of the same patient from various vendors that worries them about patient safety .

Indian Scenarios – Multivendor Workflow

Introduction

DICOM
Digital Imaging and Communications in Medicine

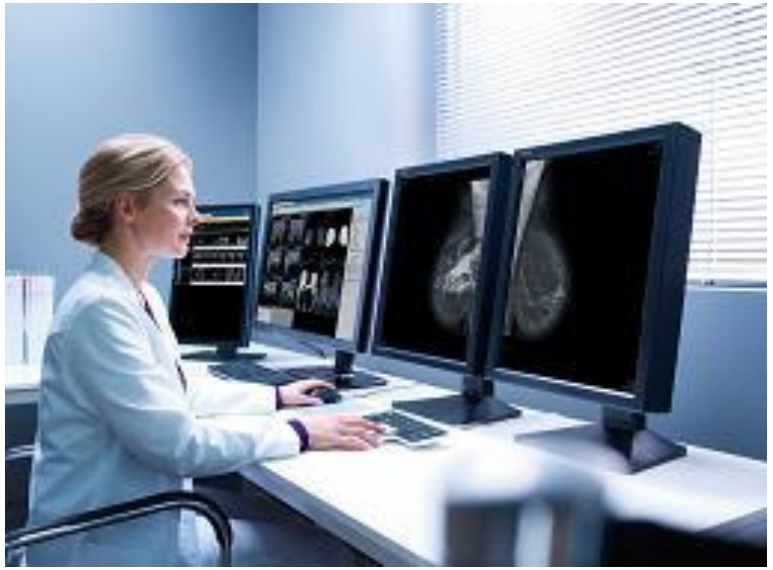
Interoperability Levels



Clinical Workflow - Nuclear Medicine

Vendor 1: Modality

Vendor 2: Modality



Reporting Room - WorkStations

Clinical Workflow - Nuclear Medicine

- **Technologist:**
  - ✓ **Scan**
  - ✓ **Data Preparation**

Physician:

- ✓ **Review the study**
- ✓ **Perform post processing and interpretation.**

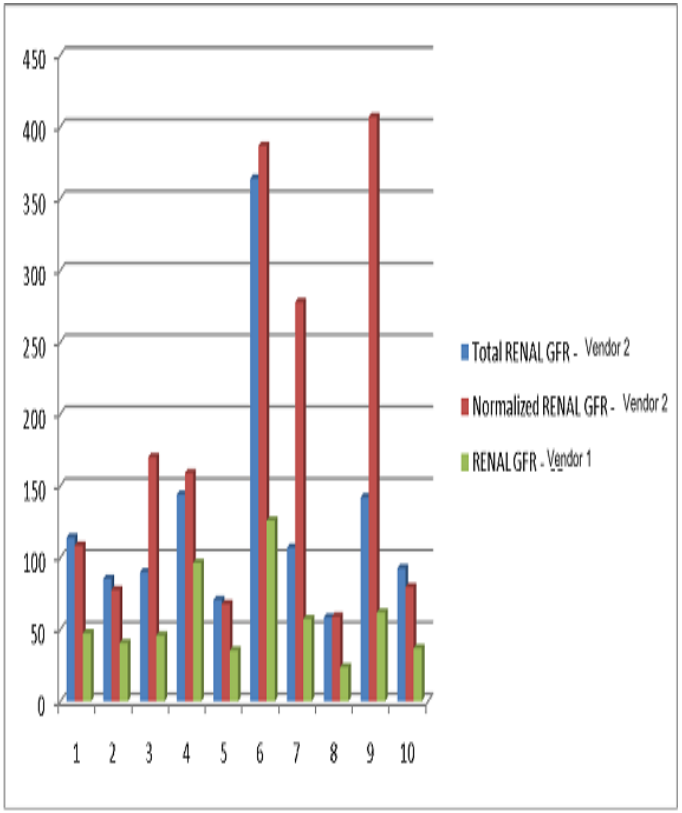
Interoperability Issues

Issues found in Pragmatic level Interoperability :

- **Analysis shows – significant variations of results**
- **Launching of Multivendor Datasets**

Algorithm Analysis Variation - RENAL

RENAL Datasets	RENAL GFR – Vendor 1 (ml/min)	RENAL GFR – Vendor 2 (ml/min)	Difference of GFR (ml/min)
Patient -1	114	47.3	66.7
Patient-2	85.42	40.5	44.92
Patient-3	90	45.8	44.2
Patient-4	144	96.4	47.6
Patient-5	70.69	35.4	35.29



Normal results range - 90 – 120 mL/min/1.73 m^2

Algorithm Analysis & Clinical Relevance - MUGA

MUGA:

•MUGA (Multi-Gated Acquisition) allows you to automatically segment and quantify gated blood pool datasets, and create statistical Information about the cardiac cycle.

• A Left Ventricle ROI is required for MUGA. The widely used Edge detection algorithm in the MUGA scan is MUGA – GBP. The same algorithm is used between various vendors.

Clinical Significance of the statistical Results:

•In the MUGA Application the results like Ejection Fraction values are varied between the various vendors.

Algorithm Analysis & Clinical Relevance-Cardiac SPECT

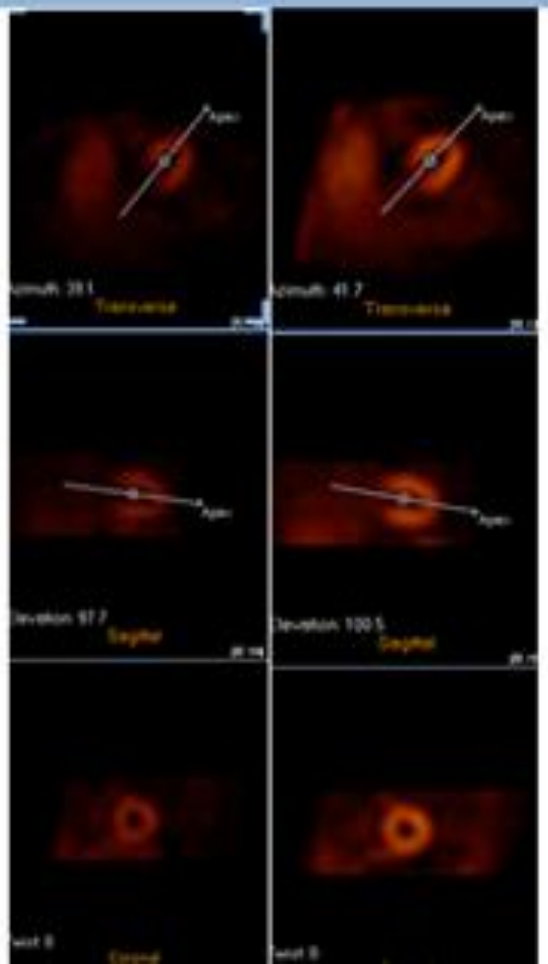
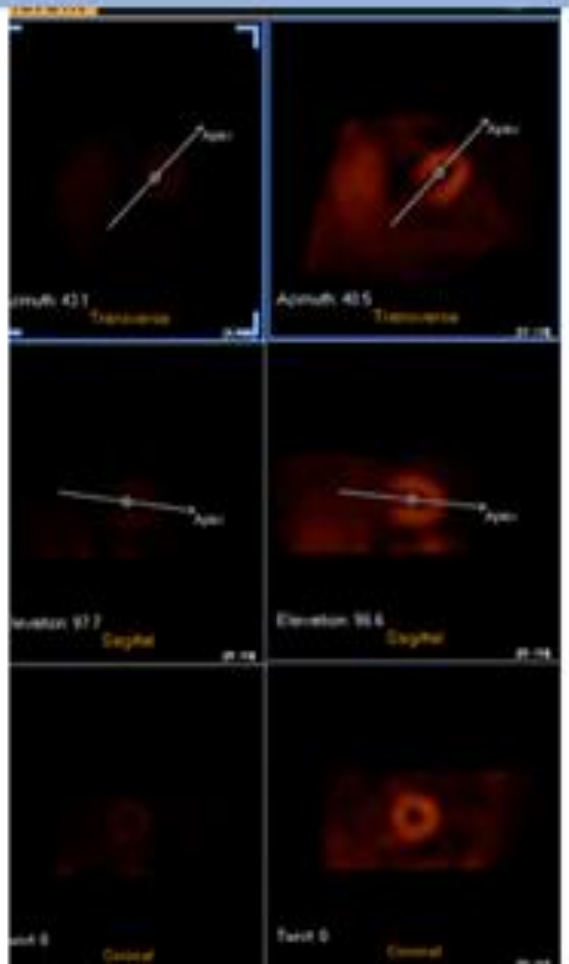
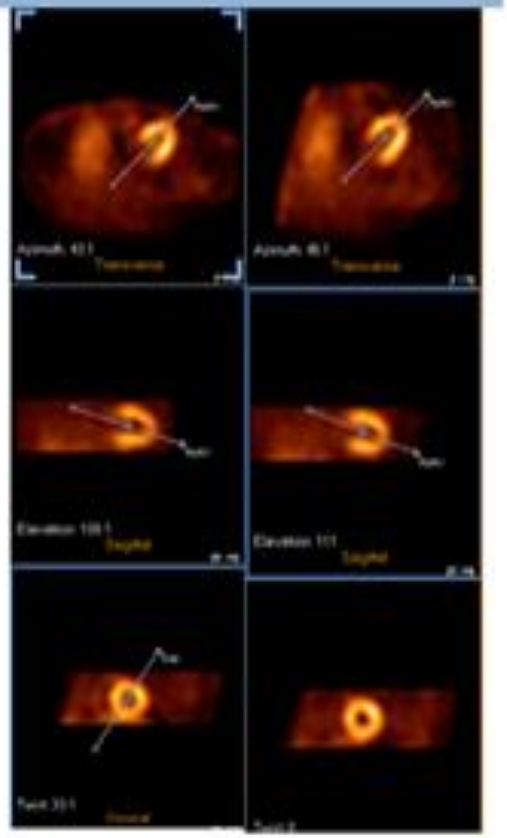
- **Result analysis for the reorientation algorithms outputs.**

- **The inputs for the algorithms are the projection data from Vendor-1, and Vendor -2.**

- **The findings of the variation is the wrong assumption of the recon limits.**

Algorithm Analysis Variation- Cardiac SPECT

DICOM
Digital Imaging and Communications in Medicine

Vendor 1 RENAL DATASETS	Algorithm -1 Results	Algorithm -2 Results	Ground Truth Value given by Clinical Expert
Patient -1			

Conclusions

- **Variability in the Renal results, MUGA, Cardiac SPECT Results, has significant impact in the terms of the treatment, diagnosis, and therapy planning.**

- **When the variation is more than the expected normal range, the physician has to decide not only by the quantification results but also by the Visual Interpretation.**

- **For Diagnosis, Treatment and Therapy planning in NM - pragmatic interoperability level is required.**

References

www.ihe.net

ttp://www.accp8.org/web/data/Plenary%20Session/Session%203/Alan%20Lau%20PS.pdf

http://www.jacmp.org/index.php/jacmp/article/viewArticle/2977/1655

Functional assessment of the right ventricle with gated myocardial perfusion SPECT. Surjit Singh Wadhwa, Martin Caralon, Donna Abbati , Clinical Nuclear Medicine 2002.

Evaluation of radiocardiographic methods for determination of cardiac output and right and left LVEF using a cardiac phantom . Henning Kel February 1987, Nuclear medicine Communications.

Contact info of Presenter

Y.Kiran Kumar

Philips Healthcare,

Philips Innovation Campus

Bangalore-560045

Kiran.kumary@philips.com