

# IHE MESA Test Connect - a - thon

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## IHE MESA Test and Connect-a-thon

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### = Abstract =

IHE defines the detailed implementations of standards such as DICOM, HL7, in a publicly available document called the IHE technical framework (IHE-TF). IHE also held an annual interoperability testing event to facilitate adoption of IHE-TF by the imaging and information systems industry. Testing process is divided into two step. First step of that is a computer-based simulation test using a set of software called MESA (Medical Enterprise Simulators and Analyzers) tool, and next step is real connection test called "connect-a-thon". MESA tool was developed to help participants prepare for connect-a-thon at the annual meetings, and to allow the pre-test before connect-a-thon by computer simulation. Products which are passed MESA test can be participated in the centerpiece of testing process, connect-a-thon, an interoperability-testing event. It offers vendors a unique opportunity for connectivity testing, removing barriers to integration that would otherwise have to be dealt with on site, at the customer's expense. After of all process, IHE technical committee offer the results of connect-a-thon on their website.

**Key words:** IHE, Technical Framework, Testing Process, MESA Tools, Connectathon

1. Healthcare Enterprise - North America)가  
 . RSNA HIMSS IHE  
 (integration) ,  
 1998 11 , HIMSS(Health Information and HL7, DICOM  
 Management Systems Society) RSNA(the Radiological IHE (technical framework)  
 Society of North America) , 가 IHE  
 IHE - NA (Integrating the . IHE  
 가 ,  
 : , (120 - 752) 134  
 Tel: 02 - 361 - 5753, Fax: 02 - 313 - 1039 [1].  
 E - mail: hjkim@yumc.yonsei.ac.kr " IHE 가  
 ( : 02 - PJ3 - PG6 - EV08 - 0001). , 가

MESA(Medical Enterprise Simulators and Analyzers) 가 [2].  
 MESA (actor)  
 IHE TF (integration profile)  
 “connect - a - thon” 가  
 IHE IHE -  
 NA HTML PDF  
 IHE - Korea  
 IHE ( perl scripts)

## 2. MESA(Medical Enterprise Simulators and Analyzers) Tools

MESA  
 IHE가 , IHE - NA 가  
 connect - a - thon DICOM HL7  
 가 IHE  
 MIR(Mallinckrodt Institute of Radiology) Steve Moore  
 MESA(the Medical Enterprise Simulators and Analyzers) MESA 가

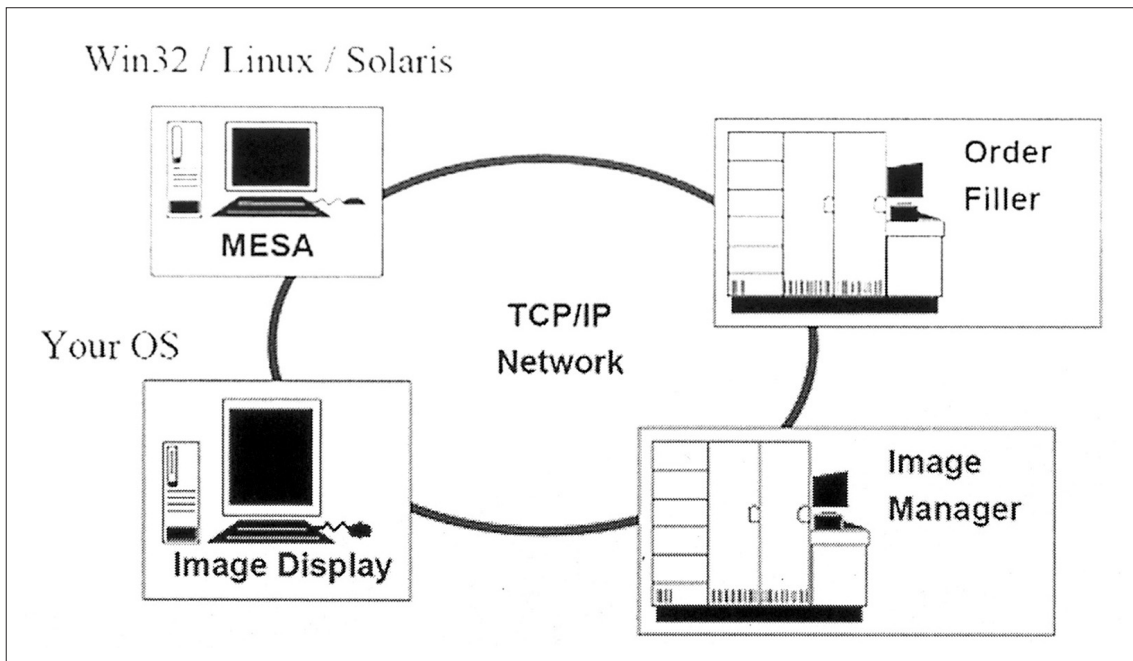


Fig. 1. Require Separate Network Node for MESA System.

MIR (Mallinckrodt Institute of Radiology), IHE, Witten/Herdecke University of OFFIS, OTech, MESA  
 IT 2004 12, 7.10.8  
 (infrastructure), MIR ERL (Electronic Radiology Laboratory)  
 , visualization tools display con - <http://www.erl.wustl.edu/mesa/index.html>

**Table 1.** MESA test list (Test # 100-902)

Name	Description	Name	Description
100	MWL Tests	412	Presentation State Retrieve
101	Scheduled / Unidentified #5	413	Key Image Note Query
102	Pre-reg/Order Cancel/Reorder	414	Key Image Note Retrieve
103	Case 1: Unidentified Patient Registered at ADT and Ordered at the Order Placer	500	Display Calibration
104	Unidentified #2 / Multiple SPS	501	Image SCU Query Keys
105	Case 3: Unidentified Patient Registered at ADT but Completed at Modality Prior to Order	502	SCU Query Evaluation
106	Presentation of Grouped Proc	503	GSPS SCU Query Keys
107	Status Update	504	Key Img Note SCU Query Keys
108	PGP Test Data	505	Patient Update in Img Mgr
109	Exception Management	506	Patient Merge in Img Mgr
110	Billing and Material Option	511	Create/Render KIN 511
111	Performed Work Status Update	512	Create/Render KIN 512
131	Administrative and Procedure Performance Process Flow	513	Create/Render KIN 513
132	Order Change Flow (initiated by Order Filler)	521	Consistent Presentation of Imgs
133	Case 2: Unidentified Patient Registered at ADT and Ordered at Department System Scheduler/Order Filler	522	Consistent Presentation of Imgs for Print Composers
141	Administrative and Procedure Performance Process Flow for Japanese characters	523	Consistent Presentation of Imgs for Print Servers
151	Appointment Notification - New Bookings	524	Kids Test
152	Appointment Notification - Reschedule Bookings	551	Example Images/GSPS
153	Appointment Notification - Cancel Bookings	552	Example Key Image Note
161	Instance Availability Notification: All Images	600	Example SR Object
162	Instance Availability Notification: Missing Images	601	Simple Image Report: No Ref
201	Unscheduled Case	602	Simple Image Report: One Ref
211	Simple Case, One SPS	603	Simple Image Report: Two Ref
213	Simple Case, Two SPS	604	Partial and Unverified
214	Simple, 2 SPS, 3 Protocol Items	605	Partial and Verified
215	Perform Different Procedure	606	Complete and Verified
216	Assisted Protocol, One SPS	607	Amended Report
218	Billing and Material Option	611	Numeric Report
221	Group Case, 1 Sched Procedure	651	SINR for Measurement Workstations
222	Group Case, 2 Sched Procedures	652	Add a Section
231	Append Case	653	Remove a Reference
241	Abandoned Case	654	Change Text
242	Exception Management	655	Finalize Numeric Report (see 671)
251	Storage Commitment Assoc Negotiation	661	Simple Report Export
271	Patient Update Tests	663	Report Export w/2 Image Ref
281	Example Images	671	Finalize Numeric Report
282	Example GSPS Objects	801	Modalities in Study
401	Modalities in Study	802	Related Series/SOP Instances
402	Related Series/SOP Instances	803	Other Report Repos Attributes
403	Other Image Mgr Attributes	804	Report Specific Queries
404	Image Specific Queries	811	SR Retrieve
405	Storage Commitment	901	SR SCU Query Keys
411	Presentation State Query	902	SCU Query Evaluation

**Table 2.** MESA Test Required for Scheduled Workflow

Test	MOD	ADT	OF	IC	ID	IM	OP	Test	MOD	ADT	OF	IC	ID	IM	OP
107			R				R	222	O						
109			RO			RO		231	R						
110			RO					241	R						
111			RO			RO		242	RO						
131		R	R			R	R	251	R						
132		R	R			R	R	281	R						
151			RO				RO	401						R	
152			RO					402						R	
153			RO					403						Z	
201	R							404						R	
211	R							405						R	
213	R							501				R	R		
214	O*							502					R	O	
215	O*							505					O		
218	RO							506					O		
221	O														

Where R: Required, O: Optional, RO: Required if Option Supported, x: Test incomplete, D: Deprecated (not required), Z: Placeholder for future year, not required: C: Optional for Client, S: Required for Server, CS: Optional for client, Required for Server, ZO: Placeholder for future year, test will be optional; not required for the moment

CTX: MESA Version 7.10.7 created March 15, 2004  
 Evaluation of 401/results/a  
 Results for Study Instance UID: 1.113654.1.400.10  
 Modalities in Study match  
 MESA IMGMR: MR TEST IMGMR: MR  
 Results for Study Instance UID: 1.113654.1.400.20  
 Modalities in Study match  
 MESA IMGMR: MR\CT TEST IMGMR: CT\MR  
 Results for Study Instance UID: 1.113654.1.400.30  
 .....  
 Test Passed.  
 Query all studies with CR images passed.  
 Query for all studies with US images failed.  
 A response was returned when none was expected.

**Fig. 2.** The result of image manager test 401 evaluation.

Table 2 SWF [3].  
 MESA  
 가  
 가  
 (Fig. 2).  
 Technical Project  
 Manager MESA  
 MESA  
 가

2.1. MESA Transaction/Message Test

3. Connect-a-thon

1xx MESA con -  
 Schedule Workflow(SWF)/Patients nect - a - thon 가  
 Information Reconciliation(PIR) , 가  
 , IHE - NA 가 1 -  
 . Table 1 MESA 100 902 2 . Connect - a - thon



가 7 가 IHE , , DR , storage commit-  
 , 가 ment image archive image manager ,  
 가 PACS 가  
 SWF . 가 가  
 가 ADT(admit discharge transfer) ,  
 Order Placer, 가  
 evidence Evidence Creator 가  
 가 , 가  
 (Fig. 5, 6). , DSS , 5 Modality Worklist Provided  
 (Department Schedule System)/Order Filler 가 DSS/Order Filler

IHE Integration Statement		Date
		15 Sept 2003
Vendor	Product Name	Version
Emageon	Emageon System 2003-R2.0	2003-R2.0
This product implements all transactions required in the IHE Technical Framework to support the IHE Integration Profiles, Actors and Options listed below:		
Integration Profiles Implemented	Actors Implemented	Options Implemented
Scheduled Workflow	Image Manager / Image Archive	Modality Presentation State Stored Query Presentation States Retrieve Presentation States Creator Presentation States Stored Key Image Notes Stored Query Key Image Notes Retrieve Key Image Notes Evidence Documents Stored Query Evidence Documents Retrieve Evidence Documents
	Image Display	Query Presentation States Retrieve Presentation States Query Key Image Notes Retrieve Key Image Notes Query Evidence Documents Retrieve Evidence Documents
	Evidence Creator	Creator Presentation States Stored Creator Procedure Step in Progress Creator Procedure Step Completed Key Image Notes Stored Evidence Documents Stored
	Performed Procedure Step Manager	
Patient Information Reconciliation	Image Manager / Image Archive	
	Report Repository	
	Performed Procedure Step Manager	
Consistent Presentation of Images	Image Manager / Image Archive	
	Image Display	
	Evidence Creator	Creator Images Stored
	Print Composer	
	Performed Procedure Step Manager	
Key Image Note	Image Manager / Image Archive	
	Image Display	Query Presentation States Retrieve Presentation States
	Evidence Creator	
	Performed Procedure Step Manager	

Fig. 4. Example of integration statement.

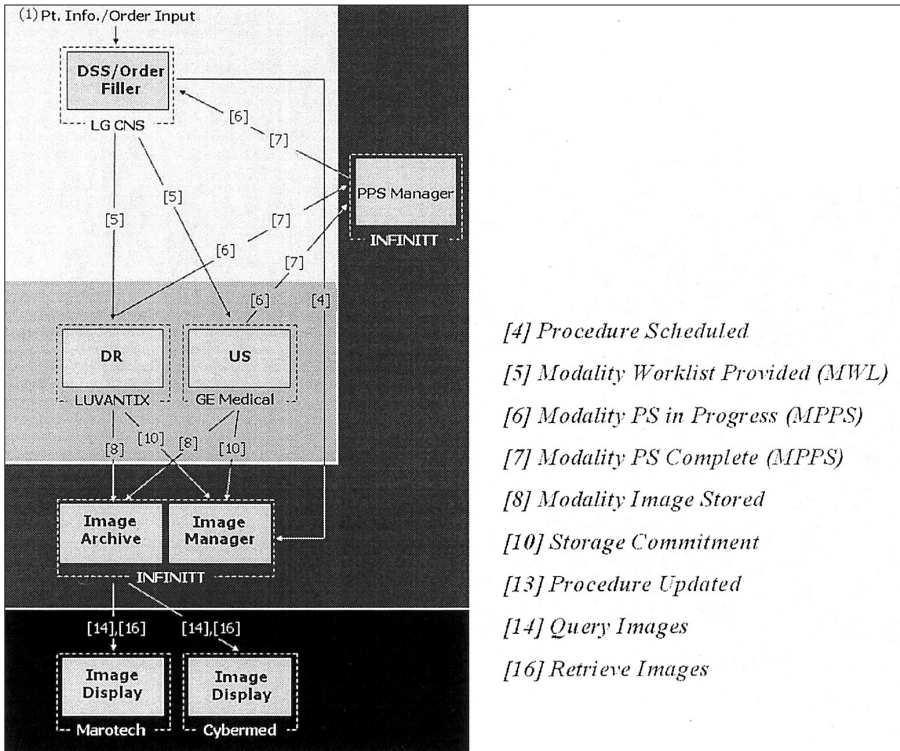


Fig. 5. Test layout of IHE Korea year 1 connect-a-thon.

- [4] Procedure Scheduled
- [5] Modality Worklist Provided (MWL)
- [6] Modality PS in Progress (MPPS)
- [7] Modality PS Complete (MPPS)
- [8] Modality Image Stored
- [10] Storage Commitment
- [13] Procedure Updated
- [14] Query Images
- [16] Retrieve Images

가 , 6, 7 MPPS 가  
in Progress/Complete , DSS/Order Filler MPPS 가  
가 , PPS Manager, DSS/Order Filler , 가  
가 IHE , IHE 가  
5 , 가  
가  
4.  
IHE Korea 1 connect - a - thon . 1  
7 가 5 가  
SWF

1. <http://www.ihe.net/>, IHE Technical Framework and Connect-a-thon
2. <http://www.erl.wustl.edu/mesa/index.html>, MESA documents and distribution page
3. <http://ihe.med.univ-rennes1.fr/home/>, IHE Testing Process
4. OTech, DICOM/HL7 SEMINAR, CARS, June 2000

Scenario 1	7	(Young-Hee Kim)	가
- ID: 4184896/	: 981112-2111111/	: Young-Hee^Kim/	: 1998 11 12 / : F
Scenario 2	B	가	47 (Chul-Soo Park)
- ID: 2308194/	: 580102-1133123/	: Chul-Soo^Park/	: 1958 01 02 / : M
1. Patient Registration / New Order & Verify Order			
Scenario 1:		“ X-ray of the arm ”	Order , X-ray
Scenario 2:		“ Ultrasound of the abdomen ”	Order ,
	가	( , 가 )	ADT Order Placer가 , DSS/Order Filler
Actor: DSS/Order Filler			
2. New Requested Procedure Scheduled			
Order	Schedule	가	“ pediatric X-ray of the arm-A/P and lateral-right laterality ( ) ” “ Sonography of the abdomen( ) ”
		DSS Image Manager	ORM
Actor: DSS/Order Filler, Image Manager			
Transaction: [4], [13]			
3. Modality Worklist Provided			
X-ray(or )		Department Schedule Query	
	Modality	DICOM Modality Worklist C-FIND REQUEST	DSS Query
Actor: DSS/Order Filler, Acquisition Modality			
Transaction: [5]			
4. Procedure Step Started			
X-ray(or )	Modality	가	Performed Procedure Step Manager N-CREATE
	DSS		Image Manager
Actor: Acquisition Modality, Performed Procedure Step Manager, DSS/Order Filler			
Transaction: [6], [20], [42]			
5. Performed Procedure Step completed			
가	가 QC	OK	가
가	PPS manager	Schedule	DSS Modality N-SET
Image Manager			
Actor: Acquisition Modality, Performed Procedure Step Manager, DSS/Order Filler			
Transaction: [7], [21], [42]			
6. Images are sent			
Acquisition Modality		Image Archive	Modality DICOM C-STORE
Actor: Acquisition Modality, Image Archive			
Transaction: [8]			
7. Images Committed			
Modality	Storage Commitment	DICOM N-ACTION REQUEST	Image Archive Storage Commitment
DICOM N-EVENT REPORT			
Actor: Acquisition Modality, Image Manager			
Transaction: [10]			
8. Get Images			
interpretation	retrieve	DICOM Query/Retrieve service	retrieve (
DICOM C-STORE Service			
Actor: Image Archive, Image Display			
Transaction: [14], [16]			

Fig. 6. Test scenario of IHE Korea year 1 connect-a-thon.

