Integrating the Healthcare Enterprise International – Cardiology Domain Update

Webinar Series 2017

IHE Integrating the Healthcare Enterprise

Presenting Members

Jerry Serwer MD, University of Michigan *[PC co-chair*]

David Slotwiner MD, Weill Cornell Medical College *[PC co-chair]*

Nick Gawrit, heartbase *[TC co-chair]*

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Paul Dow, American College of Cardiology *[TC/PC Secretariat]*

2017 Webinar Agenda

1. Cardiology Interoperability: Guiding Principles and Needs
2. Three Ways IHE Can Improve Your Cardiac Service Line Communications with Other Departments
3. Cardiac Procedure Note [CPN] Helps Clinicians Optimize EP/Cath Lab Workflow
4. Four Ways Interoperabilty Contributes to Improving Care Delivery in Your Facility
5. Call for Proposals
6. Questions and Answers

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Cardiology Characteristics

- **Both inpatient and outpatient settings (increasingly blurred)**
- **Heavily procedure oriented – diagnostic and interventional**
- **Many people require data and contribute to data acquisition**
  - Clinicians
  - Nursing/extenders/technicians/medical assistants
  - Anesthesia
- **Huge data sets that may be in different "silos"**
- **Numerous reports generated from same data**
  - Pre procedure report
  - Anesthesia record
  - Nursing record
  - Procedure report
  - Post procedure record
  - Discharge report and referring clinician letters
  - Patient letter and instructions

Cardiology Needs

- **Avoid entering data multiple times**
- ***EVERYONE*** **requires access to** ***ALL*** **the discrete data**
- **Report consumers**
  - EHR
  - HIE
  - Billing - Payers
  - Regulatory agencies
  - Registries
  - Patients
  - Oh yea - Clinicians

Cardiology Interests for the C-Suite

- **Return on investment**
- **Increased efficiency (decreasing costs)**
- **Meeting the patient and clinician needs**
- **Quality Improvement initiatives**
- **Accreditation Issues**
- **Rapid response by vendors to new needs**
  - Data fields and structure
  - Changes in practice
  - Governmental regulations

Cardiology Needs To Standardize

- **Data Models**
- **Nomenclatures**
- **Workflows**
- **Structured Reporting**
- **Semantic and Syntactic Interoperability**

Cardiology Needs to Avoid

- **Proprietary, Site Specific Data Elements**
- **Duplicative Testing**
- **Manual Data Entry**
- **Reinventing**
- **Addressing Only Very Specific Situations**

Additional Needs and Goals

- **More input from clinicians and industry**
- **Closer ties with other IHE domains, professional societies, and policy makers**
- **Proactive customers to encourage use of IHE work by industry**

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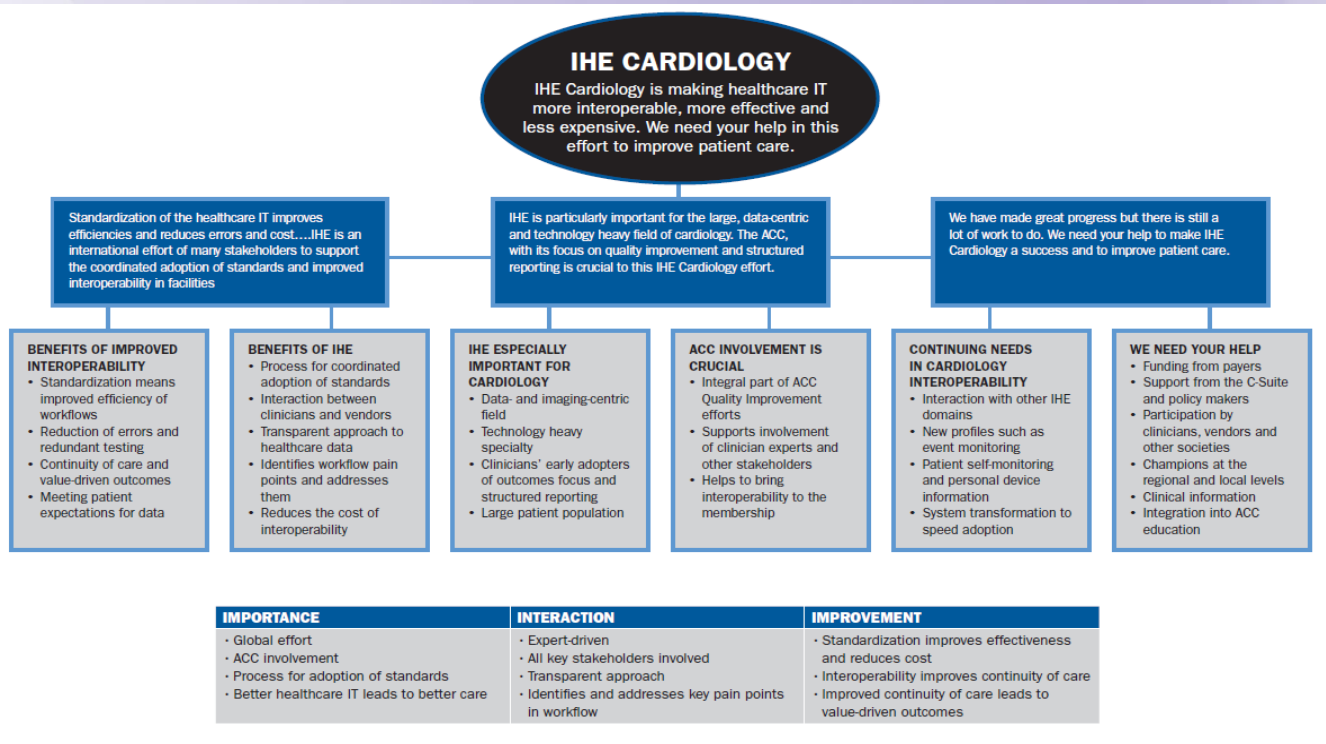
IHE Cardiology Key Message Goals and Mission



Windle JR et al: ***2016 ACC/ASE/ASNC/HRS/SCAI health policy statement on integrating the healthcare enterprise.*** J Am Coll Cardiology 2016; 68:1348-64.

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Consistent Cardiac Imaging Workflow

Scope:

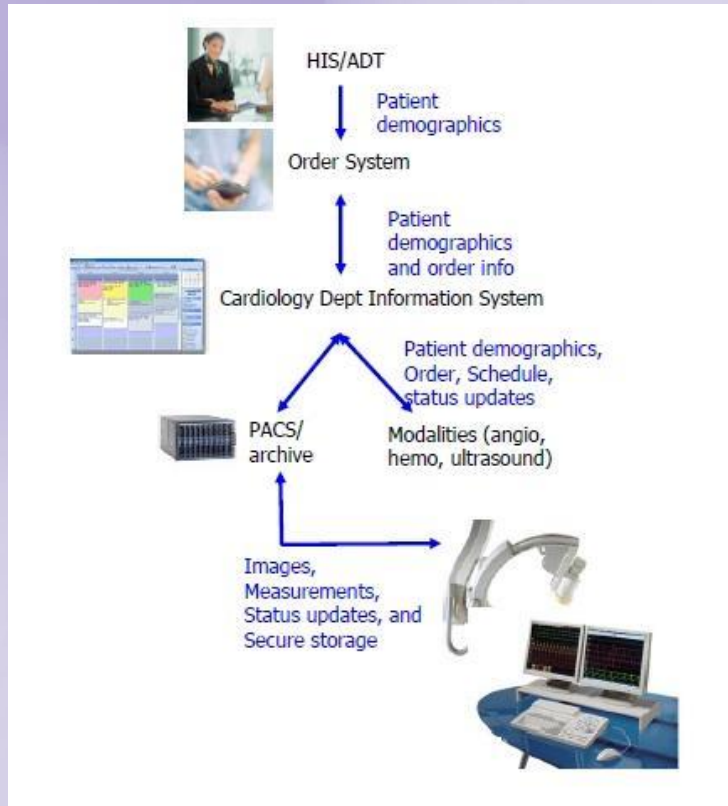
- Scheduled and unscheduled cardiac imaging exams, including multi-modality exams

Benefit:

- Consistent, robust workflow minimizes manual procedure management tasks

Addresses clinical use cases:

- Patient registered and exam ordered
- Patient registered and procedure not ordered
- Emergency case
- Patient information updated during the procedure
- Room change during procedure
- Procedure cancelled
- Evidence creation during and post-procedure
- Intermittently connected modality
- Staged protocols (e.g. Stress)

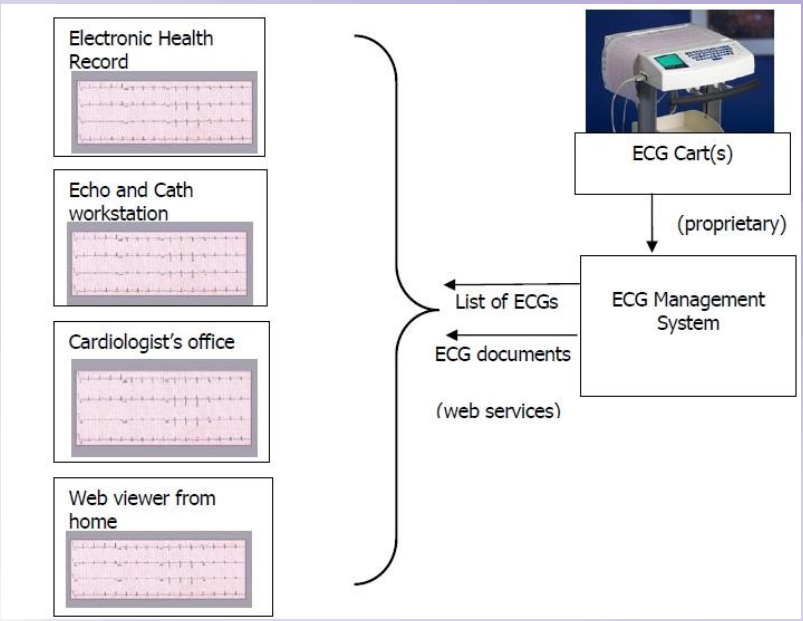


IHE defines a standards-based vendor neutral solution!

Support for Most Common Cardiology Exam - ECG

Scope:

- Consistent resting ECG acquisition workflow for multi-vendor solution
  - Supports scheduled, unscheduled and post-exam reconciliation
- Enable access to and display of ECG anywhere in the healthcare environment



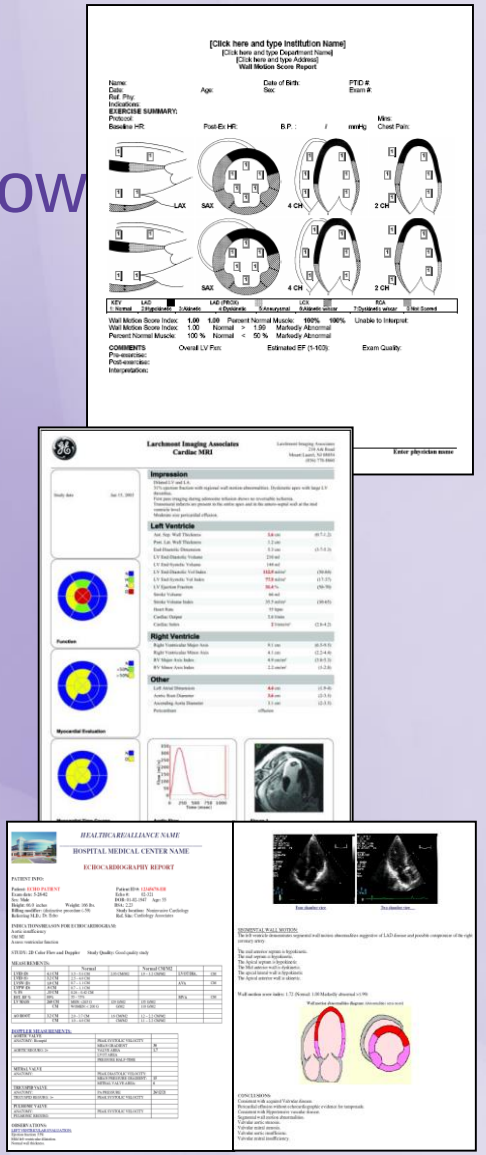
Benefits:

- Components and workflow shared with imaging specialties.
- Simplified and standardized Web-based access to ECGs eliminates need for printed ECGs.

Standardized Reporting Workflow

Scope:

- Create, finalize, archive, and distribute reports ready for display
- Create evidence for specific cardiac imaging exams and procedures in structured format and standardized nomenclatures
- Communication between reporting systems and image archive/manager for
    - Access to clinical content to include in report
    - Distribution of report for access by content consumers



Benefits:

- Consistent, robust workflow minimizes manual procedure management tasks
- Provides access to all the data where needed downstream

IHE defines a standards-based vendor neutral solution!

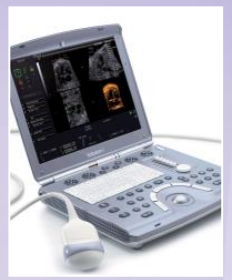
Extending Workflow to Ambulatory Office Setting

Scope:

- Enable physicians office with workflow for production of diagnostic images
  - Supports use cases for explicitly ordered consultation or diagnostic exam/procedure, unordered exam, patient update, procedure update
- Bi-directional integration of imaging suite with office HIT systems
- Supports integration of EMR with image order filler for scheduling and management functions

Benefit:

- Leverages workflow from in-patient environment to office domain

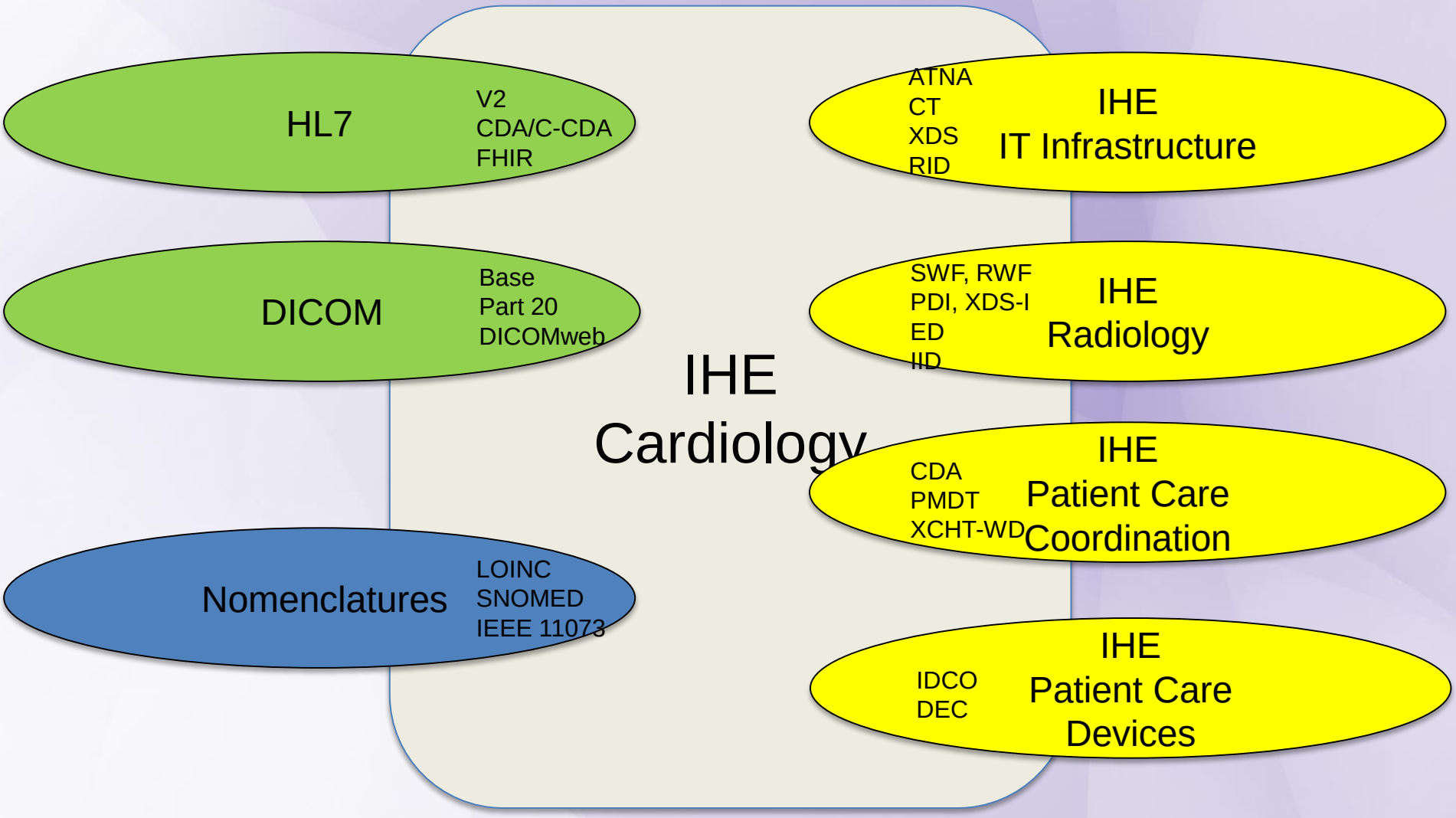


Existing Cardiology Profiles

http://wiki.ihe.net/index.php/Profiles#IHE_Cardiology_Profiles

- **[CATH] Cardiac Cath Workflow-** integrates ordering, scheduling, imaging acquisition, storage and viewing for Cardiac Catheterization procedures — FINAL
- **[ECHO] Echocardiography Workflow** - integrates ordering, scheduling, imaging acquisition, storage and viewing for digital echocardiography — FINAL
- **[ECG] Retrieve ECG for Display** - provides access throughout the enterprise to electrocardiogram (ECG) documents for review purposes — FINAL
- **[ED] Evidence Documents** - Cardiology-specific options to the Radiology ED profile for DICOM Structured Reports — FINAL
- **[STRESS] Stress Testing Workflow** - provides ordering and collecting multi-modality data during diagnostic Stress testing procedures — TRIAL
- **[DRPT] Displayable Reports** - manages creation and distribution of “display ready” (PDF or CDA) clinical reports from the creating application, to the department, and to the enterprise. — TRIAL
- **[REWF] Resting ECG Workflow** - workflow for collecting ECG data in both ordered and unordered procedures, data storage and access, and ECG reporting — TRIAL
- **[IEO] Image-Enabled Office Workflow** - integrates an imaging suite with an EHR system in an ambulatory office setting, including ordering, imaging, report creation, and web-based imaging exam review — TRIAL

Cardiology in the World of Interoperability Standards



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Cardiac Procedure Note [CPN] Help Clinicians Optimize EP/Cath Lab Workflow

Benefits

- Report Templates
- Defined Structure and Content
- Support for Electrophysiology (EP) and the Cath Lab
- Future Imaging Expansion

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Cardiac Procedure Note [CPN] Help Clinicians Optimize EP/Cath Lab Workflow

Who implements CPN?

Why does it help Workflows?

Actor	Option Name
Content Creator (Note 1)	Diagnostic Cath
	PCI
	Structural Heart Interventions
	Electrophysiology Implant/Explant
Content Consumer	View Option
	Document Import Option
	Section Import Option
	Discrete Data Import Option

Note 1: The Content Creator shall at least support one of the options listed here.

Cardiac Procedure Note [CPN] Help Clinicians Optimize EP/Cath Lab Workflow

CathPCI Registry
STS/ACC TVT Registry
ICD Registry
HL7 CDAR2
HL7 C-CDA
DICOM
UCUM
LOINC
SNOMED CT
RxNorm
IEEE 11073 10103

Clinical Document Architecture (CDA)

- HL7® CDA format for the cardiac procedure note.
- human readable narrative historically used for clinical reports.
- discrete data elements that may be used for longitudinal or population analysis or other computer processing.
- DICOM® Study associated with the procedure.
- Header, Section, Entry templates
- valueSets

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Evolving a Cardiology Procedure Note

Sections	
Document Summary	Procedure Disposition
Medical History	Procedure Results
Allergies and Intolerances	Complications
Family History	Postprocedure Diagnosis
Social History	Plan of Care
Physical Exam	Key Images
Vital Signs	DICOM Object Catalog
Pre-Procedure Results	Procedure Specimens
Planned Procedure	
Procedure Indications	
Anesthesia	
Medications Administered	
Procedure Description	

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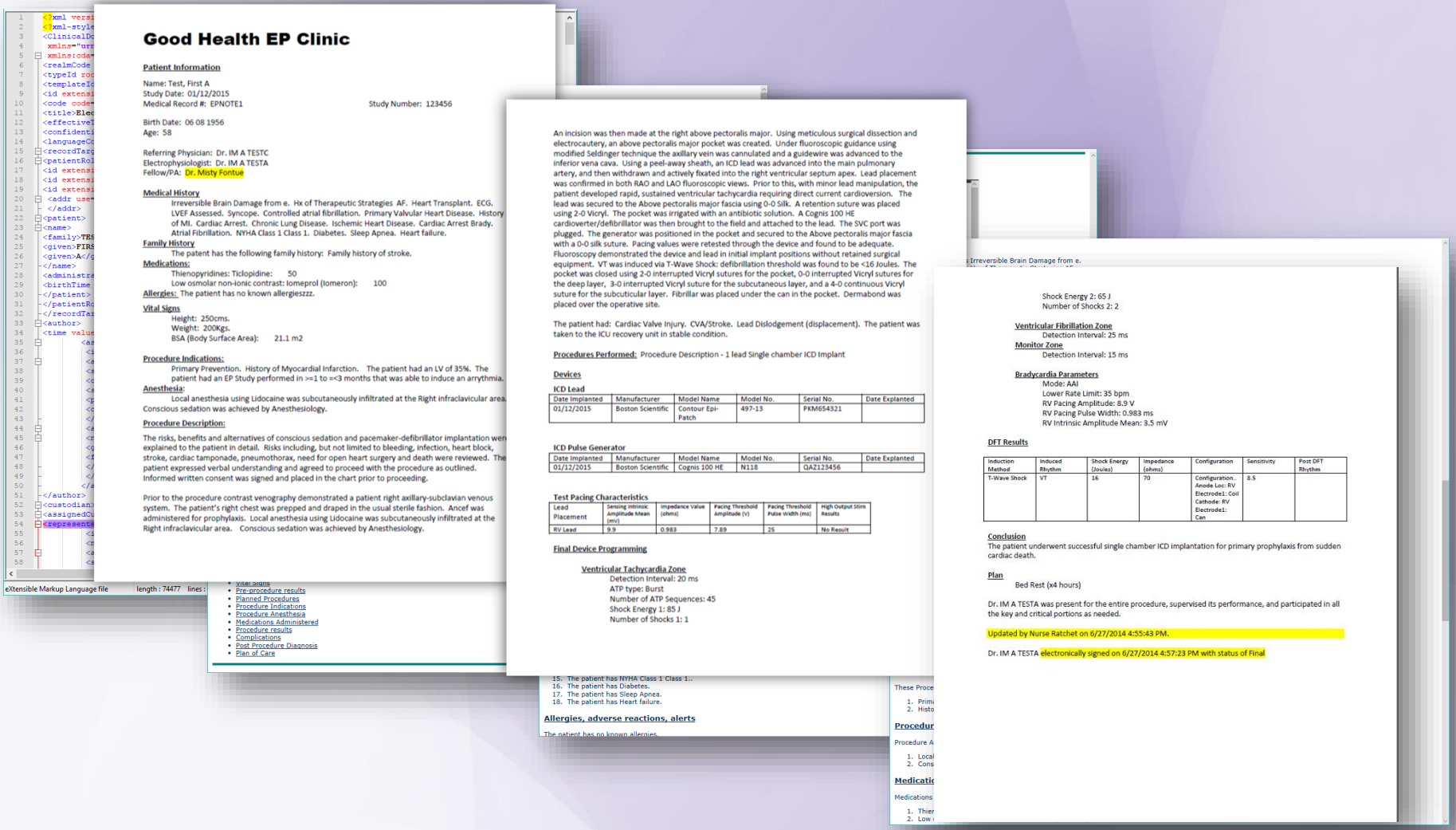
EP C-CDA Document



Good Health EP Clinic

Patient Information

Name: Test, First A
Study Date: 01/12/2015
Medical Record #: EPNOTE1 Study Number: 123456

Birth Date: 06 08 1956
Age: 58

Referring Physician: Dr. IM A TESTC
Electrophysiologist: Dr. IM A TESTA
Fellow/PA: Dr. Misty Fontue

Medical History
Irreversible Brain Damage from e. Hx of Therapeutic Strategies AF. Heart Transplant. ECG. LVEF Assessed. Syncope. Controlled atrial fibrillation. Primary Valvular Heart Disease. History of MI. Cardiac Arrest. Chronic Lung Disease. Ischemic Heart Disease. Cardiac Arrest Brady. Atrial Fibrillation. NYHA Class 1 Class 1. Diabetes. Sleep Apnea. Heart failure.

Family History
The patent has the following family history: Family history of stroke.

Medications:
Thienopyridines: Ticlopidine: 50
Low osmolar non-ionic contrast: Iomeprol (Iomeron): 100

Allergies: The patient has no known allergieszzz.

Vital Signs
Height: 250cms.
Weight: 200Kgs.
BSA (Body Surface Area): 21.1 m2

Procedure Indications:
Primary Prevention. History of Myocardial Infarction. The patient had an LV of 35%. The patient had an EP Study performed in >=1 to =<3 months that was able to induce an arrythmia.

Anesthesia:
Local anesthesia using Lidocaine was subcutaneously infiltrated at the Right infraclavicular area. Conscious sedation was achieved by Anesthesiology.

Procedure Description:
The risks, benefits and alternatives of conscious sedation and pacemaker-defibrillator implantation were explained to the patient in detail. Risks including, but not limited to bleeding, infection, heart block, stroke, cardiac tamponade, pneumothorax, need for open heart surgery and death were reviewed. The patient expressed verbal understanding and agreed to proceed with the procedure as outlined. Informed written consent was signed and placed in the chart prior to proceeding.

Prior to the procedure contrast venography demonstrated a patient right axillary-subclavian venous system. The patient's right chest was prepped and draped in the usual sterile fashion. Ancef was administered for prophylaxis. Local anesthesia using Lidocaine was subcutaneously infiltrated at the Right infraclavicular area. Conscious sedation was achieved by Anesthesiology.

An incision was then made at the right above pectoralis major. Using meticulous surgical dissection and electrocautery, an above pectoralis major pocket was created. Under fluoroscopic guidance using modified Seldinger technique the axillary vein was cannulated and a guidewire was advanced to the inferior vena cava. Using a peel-away sheath, an ICD lead was advanced into the main pulmonary artery, and then withdrawn and actively fixated into the right ventricular septum apex. Lead placement was confirmed in both RAO and LAO fluoroscopic views. Prior to this, with minor lead manipulation, the patient developed rapid, sustained ventricular tachycardia requiring direct current cardioversion. The lead was secured to the Above pectoralis major fascia using 0-0 Silk. A retention suture was placed using 2-0 Vicryl. The pocket was irrigated with an antibiotic solution. A Cognis 100 HE cardioverter/defibrillator was then brought to the field and attached to the lead. The SVC port was plugged. The generator was positioned in the pocket and secured to the Above pectoralis major fascia with a 0-0 silk suture. Pacing values were retested through the device and found to be adequate. Fluoroscopy demonstrated the device and lead in initial implant positions without retained surgical equipment. VT was induced via T-Wave Shock: defibrillation threshold was found to be <16 Joules. The pocket was closed using 2-0 interrupted Vicryl sutures for the pocket, 0-0 interrupted Vicryl sutures for the deep layer, 3-0 interrupted Vicryl suture for the subcutaneous layer, and a 4-0 continuous Vicryl suture for the subcuticular layer. Fibrillar was placed under the can in the pocket. Dermabond was placed over the operative site.

The patient had: Cardiac Valve Injury. CVA/Stroke. Lead Dislodgement (displacement). The patient was taken to the ICU recovery unit in stable condition.

Procedures Performed: Procedure Description - 1 lead Single chamber ICD Implant

Devices

ICD Lead

Date Implanted	Manufacturer	Model Name	Model No.	Serial No.	Date Explanted
01/12/2015	Boston Scientific	Contour Epi-Patch	497-13	PKM654321	

ICD Pulse Generator

Date Implanted	Manufacturer	Model Name	Model No.	Serial No.	Date Explanted
01/12/2015	Boston Scientific	Cognis 100 HE	N118	QAZ123456	

Test Pacing Characteristics

Lead Placement	Sensing Intrinsic Amplitude Mean (mV)	Impedance Value (ohms)	Pacing Threshold Amplitude (V)	Pacing Threshold Pulse Width (ms)	High Output Stim Results
RV Lead	9.9	0.983	7.89	.25	No Result

Final Device Programming

Ventricular Tachycardia Zone
Detection Interval: 20 ms
ATP type: Burst
Number of ATP Sequences: 45
Shock Energy 1: 85 J
Number of Shocks 1: 1
Shock Energy 2: 65 J
Number of Shocks 2: 2

Ventricular Fibrillation Zone
Detection Interval: 25 ms

Monitor Zone
Detection Interval: 15 ms

Bradycardia Parameters
Mode: AAI
Lower Rate Limit: 35 bpm
RV Pacing Amplitude: 8.9 V
RV Pacing Pulse Width: 0.983 ms
RV Intrinsic Amplitude Mean: 3.5 mV

DFT Results

Induction Method	Induced Rhythm	Shock Energy (Joules)	Impedance (ohms)	Configuration	Sensitivity	Post DFT Rhythm
T-Wave Shock	VT	16	70	Configuration, Anode Loc: RV Electrode1: Coil Cathode: RV Electrode1: Can	8.5	

Conclusion
The patient underwent successful single chamber ICD implantation for primary prophylaxis from sudden cardiac death.

Plan
Bed Rest (x4 hours)

Dr. IM A TESTA was present for the entire procedure, supervised its performance, and participated in all the key and critical portions as needed.

Updated by Nurse Ratchet on 6/27/2014 4:55:43 PM.

Dr. IM A TESTA electronically signed on 6/27/2014 4:57:23 PM with status of Final

- Vital Signs
- Pre-procedure results
- Planned Procedures
- Procedure Indications
- Procedure Anesthesia
- Medications Administered
- Procedure results
- Complications
- Post Procedure Diagnosis
- Plan of Care

15. The patient has NYHA Class 1 Class 1..
16. The patient has Diabetes.
17. The patient has Sleep Apnea.
18. The patient has Heart failure.

Allergies, adverse reactions, alerts

The patient has no known allergies.

Irreversible Brain Damage from e.

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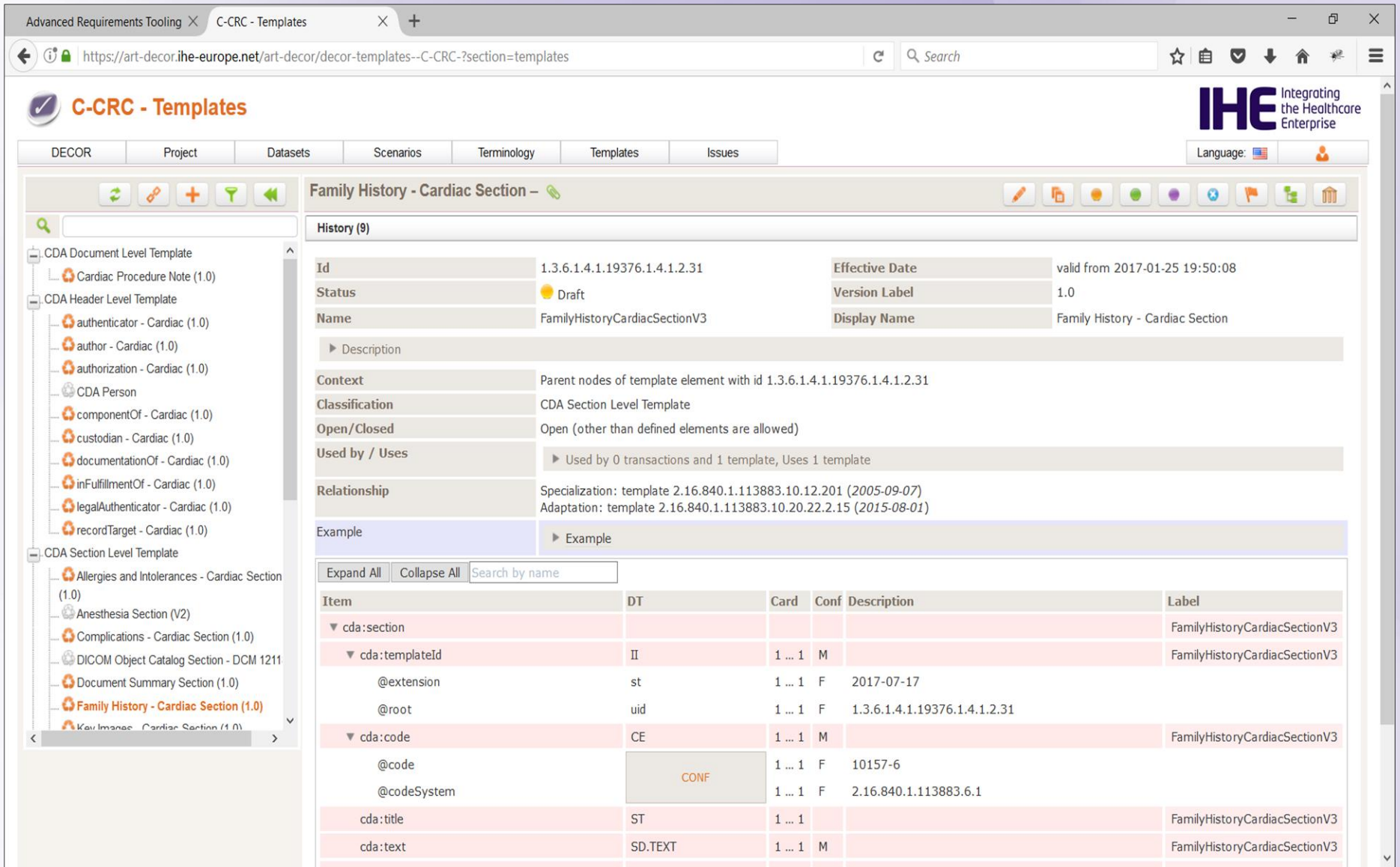

Benefits

Why CPN in the workflow process

- Facilitates workflows
- Standard for interchange in workflow
  - Diabetes means diabetes
- Consumable discrete data
  - Can view report and consume the data (versus PDF)
  - Registry consumption

Device Registries

- Nomenclature Standard
  - SNOMED CT, LOINC, RxNorm, IEEE11703, Others
- HIT and Registry consumption
- Standard look for report
- Significant reduction in transcription services
- Quicker turnaround of Procedure Note
- Discrete Data agrees with report

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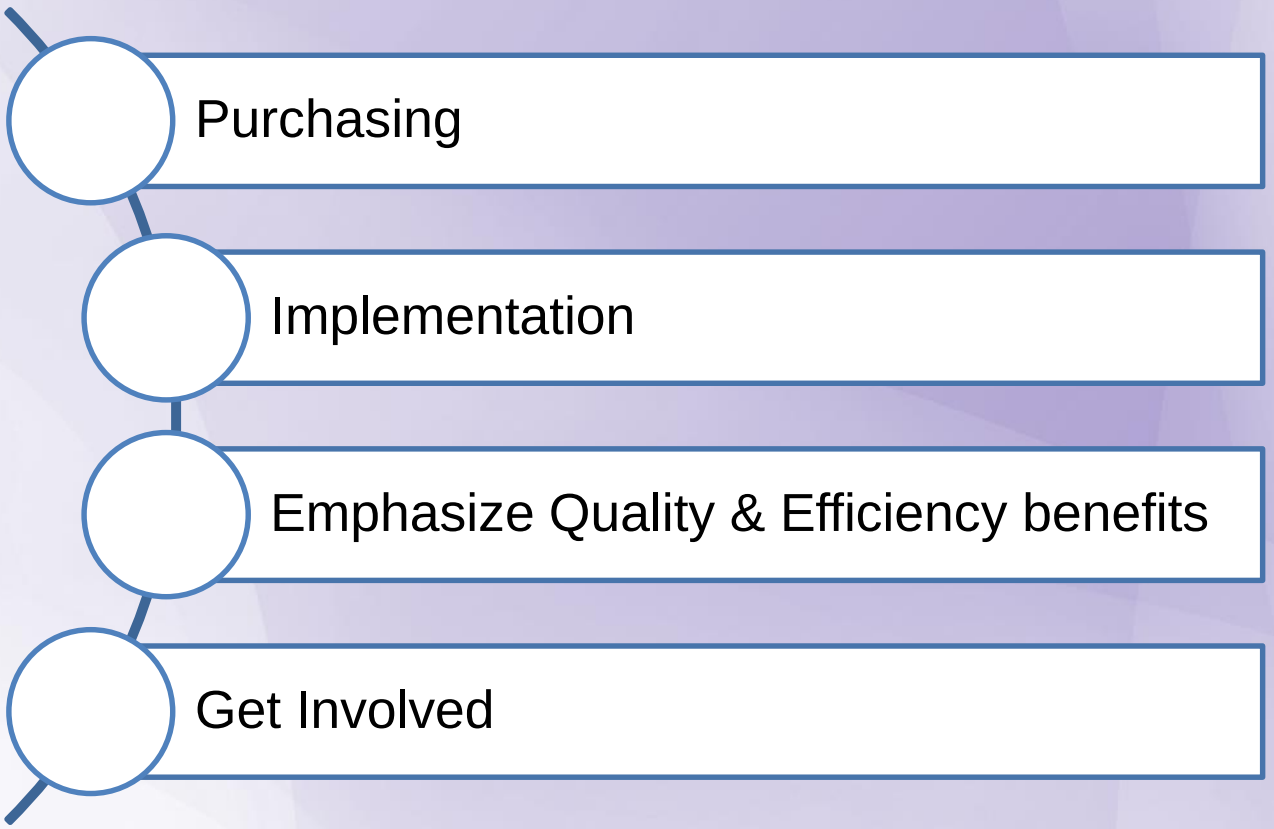
How Interoperability Contributes to Improving Care Delivery at Your Hospital

- Demographics
- Laboratory Results
- Diagnostic Images
- Electronic Prescriptions

Promote Interoperability in Your Institution



Upcoming Cardiology Events

Call for Proposals

Opens – Aug 4, 2017

Closes – Sept 15, 2017

Registration for Connectathon

Opens – Sept 6, 2017

Closes – Oct 6, 2017

IHE Cardiology Planning Committee

Responsibilities

- Identifying priority issues for the cardiology community
  - Liaison to sponsor organizations
- Soliciting and developing IHE Profile Proposals
- Evaluation of Technical Committee work
- Marketing IHE Cardiology profiles to user community

Contact Information

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gserwer@med.umich.edu
Co-Chair, David Slotwiner, MD
djs2001@med.cornell.edu

Committee's wiki page
http://wiki.ihe.net/index.php?title=Cardiology_Planning_Committee

IHE Cardiology Technical Committee

Responsibilities

- Development of IHE Profiles and white papers
- Maintenance of IHE Cardiology Technical Frameworks
- Liaison with other IHE domains
- Support for Planning Committee marketing

Contact Information

Secretary, Paul Dow

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Co-Chair, Nick Gawrit

ngawrit@heartbase.net

Co-Chair, Chris Melo

chris.melo@philips.com

Committee's wiki page

http://wiki.ihe.net/index.php?title=Cardiology_Technical_Committee

For More Information

Links to IHE Resources

IHE Cardiology Domain Page

Technical Committee Wiki

To become an IHE member and contribute to the Planning or Technical Committee contact Paul Dow, IHE Cardiology Secretary pdow@acc.org

The Call for Proposals is open until Friday, Sept 15th, 2017.

If you have ideas for work items and would like assistance assembling and submitting the forms please contact Paul Dow, IHE Cardiology Secretary pdow@acc.org

For more details on IHE's domains and its processes please refer to other webinars at http://www.ihe.net/Webinars

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