CENTER for MEDICAL INTEROPERABILITY

C4MI Update

21 January 2015

San Antonio, TX

CENTER for MEDICAL INTEROPERABILITY

Interoperability Definition and Maturity Model

C4MI Definition of Interoperability

The ability of two or more systems to appropriately, seamlessly and interchangeably share information enabling safer, higher quality and more affordable delivery of healthcare.

- **Systems:**
  - ✓ **Applications and/or Devices**
- **Appropriately:**
  - ✓ **Aligned with Intended Purpose;**
    - Don't need a sledge hammer to drive a nail.
- **Seamlessly:**
  - ✓ **Fluid information flow; ease of integration and deployment.**
- **Interchangeably:**
  - ✓ **1:Many Plug-and-Play; Test once**

C4MI Definition of Interoperability

- **Information:**
  - ✓ Ranging from unstructured documents and scans to complex command and control exchanges appropriate to the intended purpose
- **Safer:**
  - ✓ Patient safety is a very strong consideration. Syntactic, semantic and contextual interoperability will remove inconsistencies in interpretation.
- **Higher Quality:**
  - ✓ Increased availability of appropriate information will result in more informed higher quality decision making and healthcare
- **More Affordable:**
  - ✓ The ability to connect systems and maintain those connections with minimal effort will lead to technical costs and should also lead to workflow and other cost savings.

Why an Interoperability Maturity Model?

- We also created a Maturity Model which further enhances our understanding of this concept.

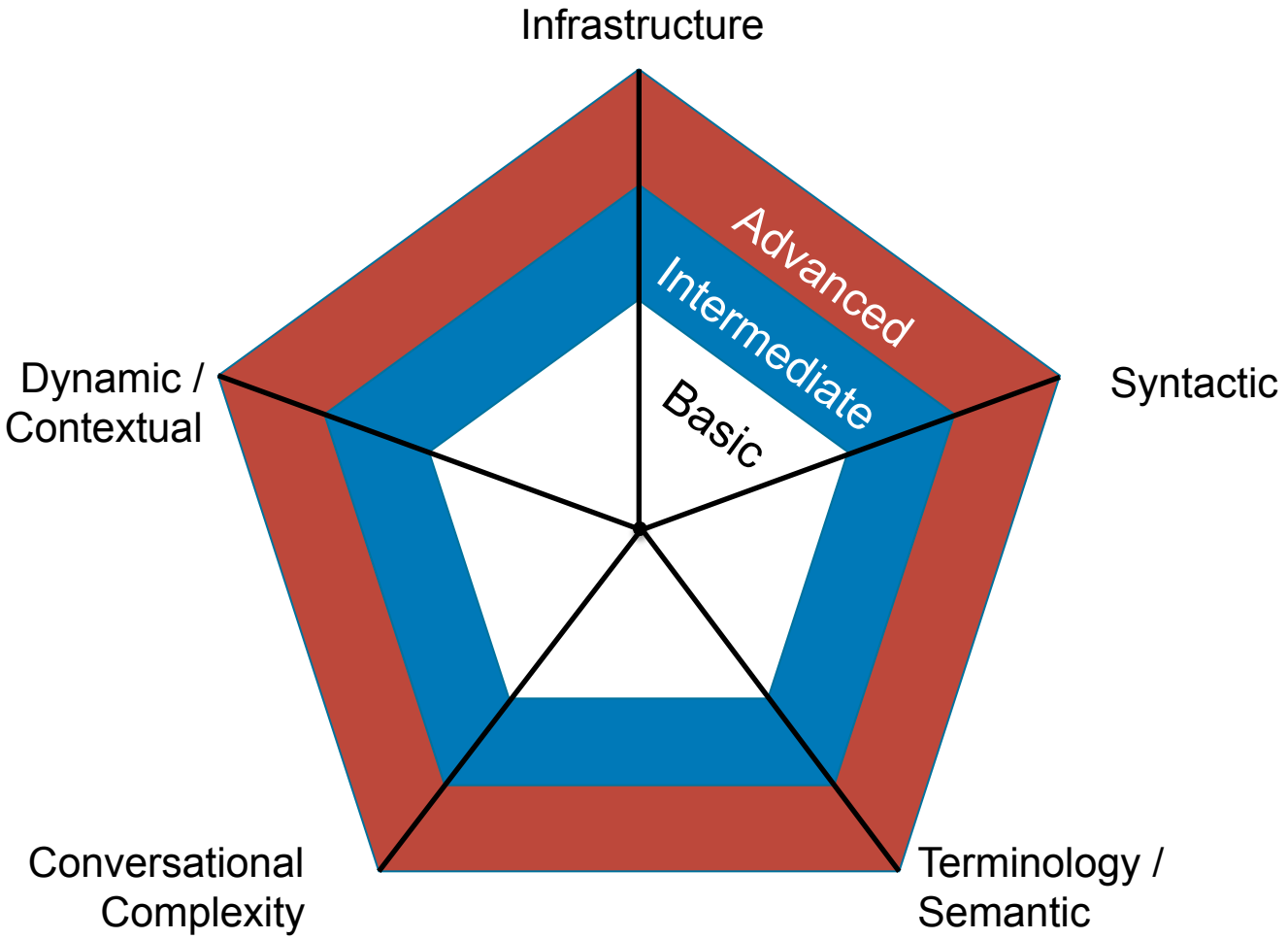
- The Maturity Model can be used to:
  - ✓ Understand use case requirements
  - ✓ Assess current state-of-the-art
  - ✓ Assess deployed solutions
  - ✓ Visualize the level of interoperability
  - ✓ Visualize gaps between needs and solutions

Interoperability Maturity Model (IMM)

- **Levers - Independent properties…**
  - ✓ Infrastructure
  - ✓ Conversational Complexity
  - ✓ Syntactic
  - ✓ Terminology / Semantic
  - ✓ Contextual / Dynamic

- **Levels – Conceptual Levels Maturity:**
  - ✓ Basic
  - ✓ Intermediate
  - ✓ Advanced

IMM Levers and Levels



Interoperability Maturity Model (IMM)

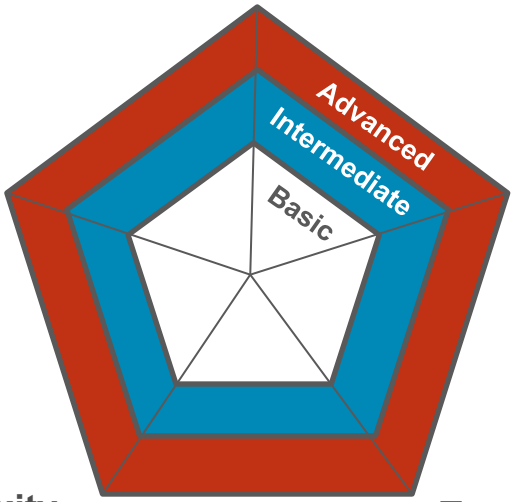
DRAFT

Infrastructure

Transport level connectivity including security; technology independent of systems and applications

Contextual / Dynamic

Ability of devices and applications to share data based on the patient and clinical workflow



Syntactic

Use of recognized formats to communicate and exchange information

Conversational Complexity

Extent and sophistication of information exchange including orchestration

Terminology / Semantic

Use of recognized vocabularies, nomenclatures, and ontologies as well as information models

IMM Levers and Levels

DRAFT

Levers	Attribute	Level	Example
Infrastructure	Common Physical Layer, Transport Layer	Basic	Ethernet, TCP/IP
	Security (Encryption)	Basic	HTTPS
	Security (Authentication / Authorization / Accounting)	Intermediate	
	Auto Discovery / Learning	Advanced	
	Robust / Resilient Network	Advanced	
Conversational	Uni-Directional Data	Basic	
Complexity	Non-Critical Data	Basic	
	Bi-Directional Data Exchange	Intermediate	
	Command and Control Exchange	Advanced	
	Multi-Party coordinated conversations	Advanced	
	Safety and Time Critical Data	Advanced	Real-Time,
Syntactic	Information – Minimal data	Basic	Fax, PDF
	Structured information - Proprietary	Basic	
	Structured coarse information - Standardized	Intermediate	HL7, DICOM
	Structured granular information - Standardized	Advanced	11073, HSPC/FHIR
	Encrypted content	Advanced	
Terminology /	Nomenclature – Proprietary	Basic	
Semantic	Nomenclature - Standardized	Intermediate	LOINC, Rosetta, SNOMED
	Information Model	Intermediate	11073 DIM, HL7 RIM,
	Capabilities Model	Advanced	
	Standardized Abstract Model	Advanced	CIMI
Contextual /	No accounting for context	Basic	
Dynamic	Some situational awareness	Intermediate	
	Adaptation to context of use (learning system)	Advanced	
	Workflow automation and support	Advanced	
	Support “real-time” patient intervention/therapy	Advanced	

Some Interoperability Use Cases…

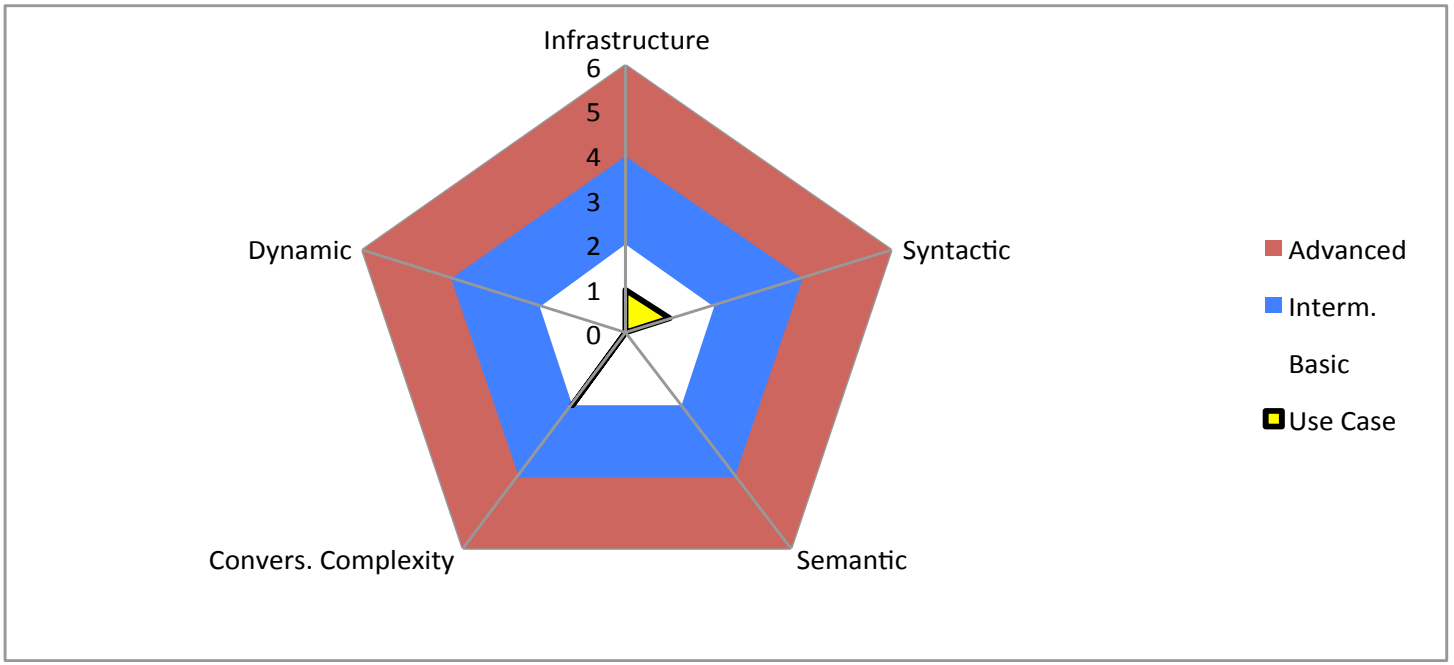
- **Discharge Summary:**
  - ✓ **Compare:**
    - Fax Exchange with
    - Structured Document Exchange

- **Medical Device Data Reporting to EHR:**
  - ✓ **Compare:**
    - Legacy Medical Device with
    - IHE-PCD based Medical Device Gateway

- **Medical Device Patient Area Network**
  - Plug and Play MD with
  - Plug and Play MD Therapy Control

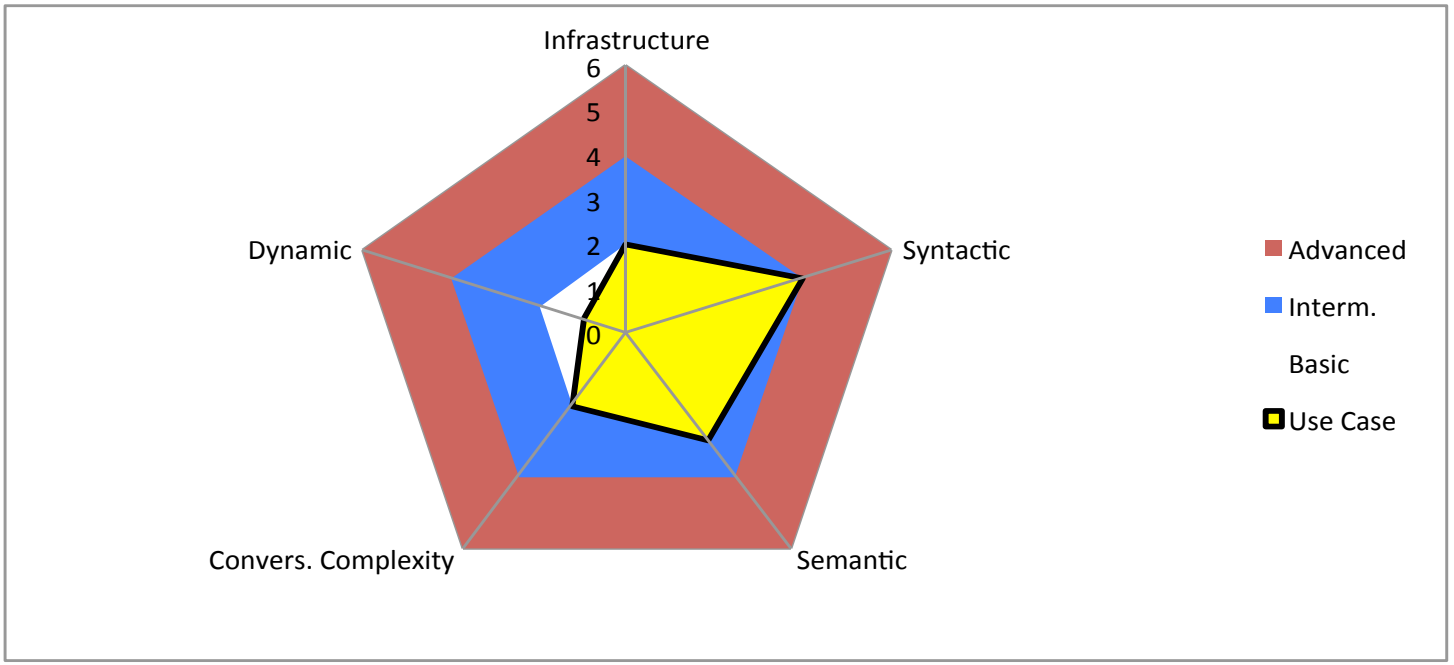
Discharge Summary:
Fax Machine ➔Fax Machine

	Advanced	Interm.	Basic	Use Case	Comment
Infrastructure	6	4	2	1	Very simple infrastructure
Syntactic	6	4	2	1	Very simple syntax
Semantic	6	4	2	0	No vocabulary
Convers. Complexity	6	4	2	2	Uni-Directional
Dynamic	6	4	2	0	Not dynamic



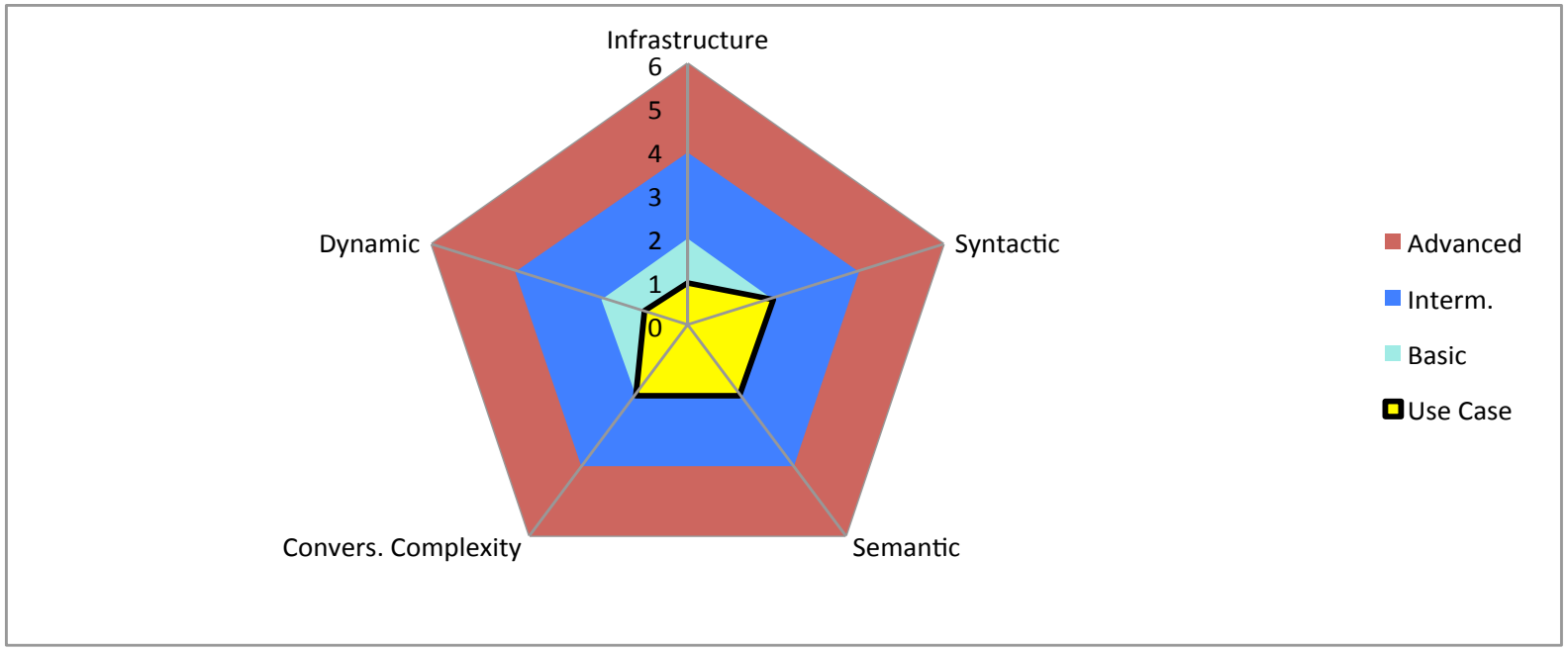
Discharge Summary: Structured Doc ➔ Structured Doc

	Advanced	Interm.	Basic	Use Case	Comment
Infrastructure	6	4	2	2	Very simple infrastructure
Syntactic	6	4	2	4	Strong syntax
Semantic	6	4	2	3	Some vocabulary
Convers. Complexity	6	4	2	2	Uni-Directional
Dynamic	6	4	2	1	Not dynamic



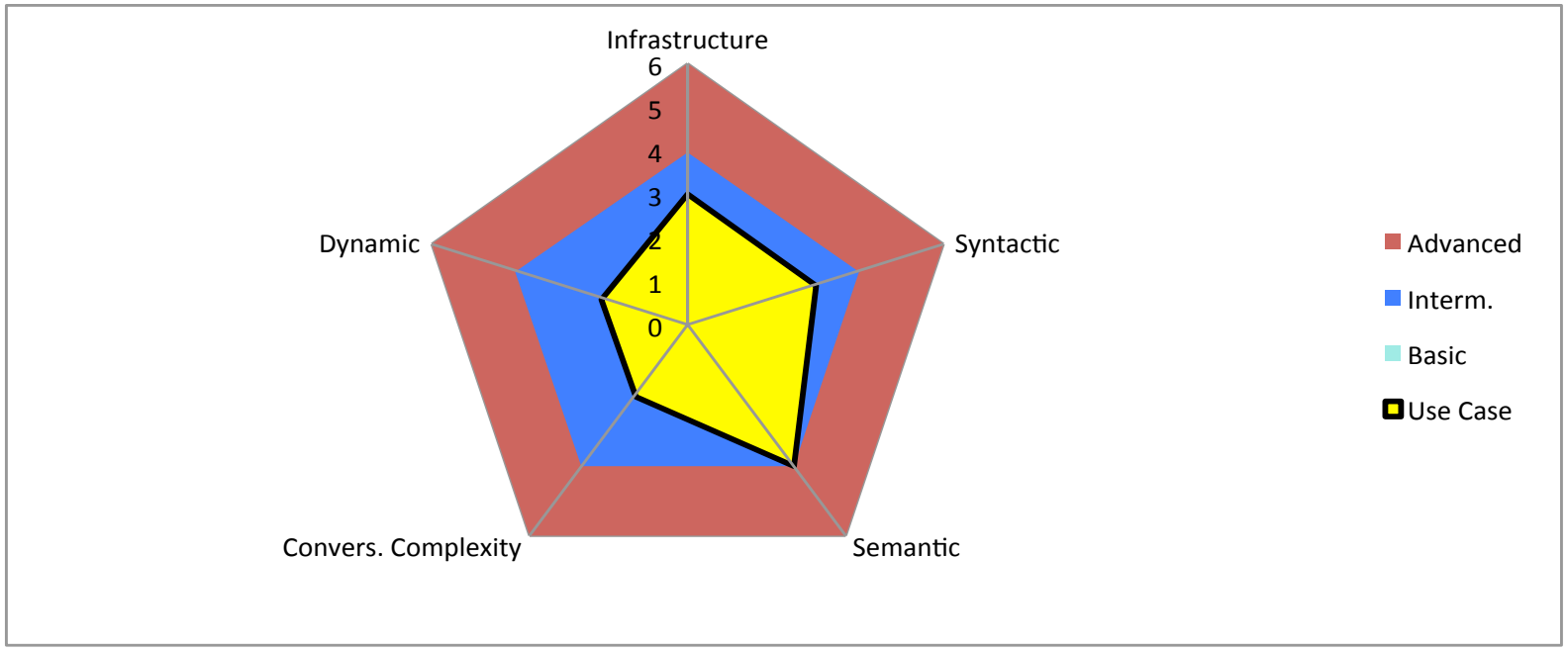
Device Data to EHR:
Legacy Medical Device ➔ EHR

	Advanced	Interm.	Basic	Use Case	Comment
Infrastructure	6	4	2	1	Typically RS232
Syntactic	6	4	2	2	Proprietary Syntax
Semantic	6	4	2	2	Proprietary Vocabulary
Convers. Complexity	6	4	2	2	Uni-Directional
Dynamic	6	4	2	1	Some real-time



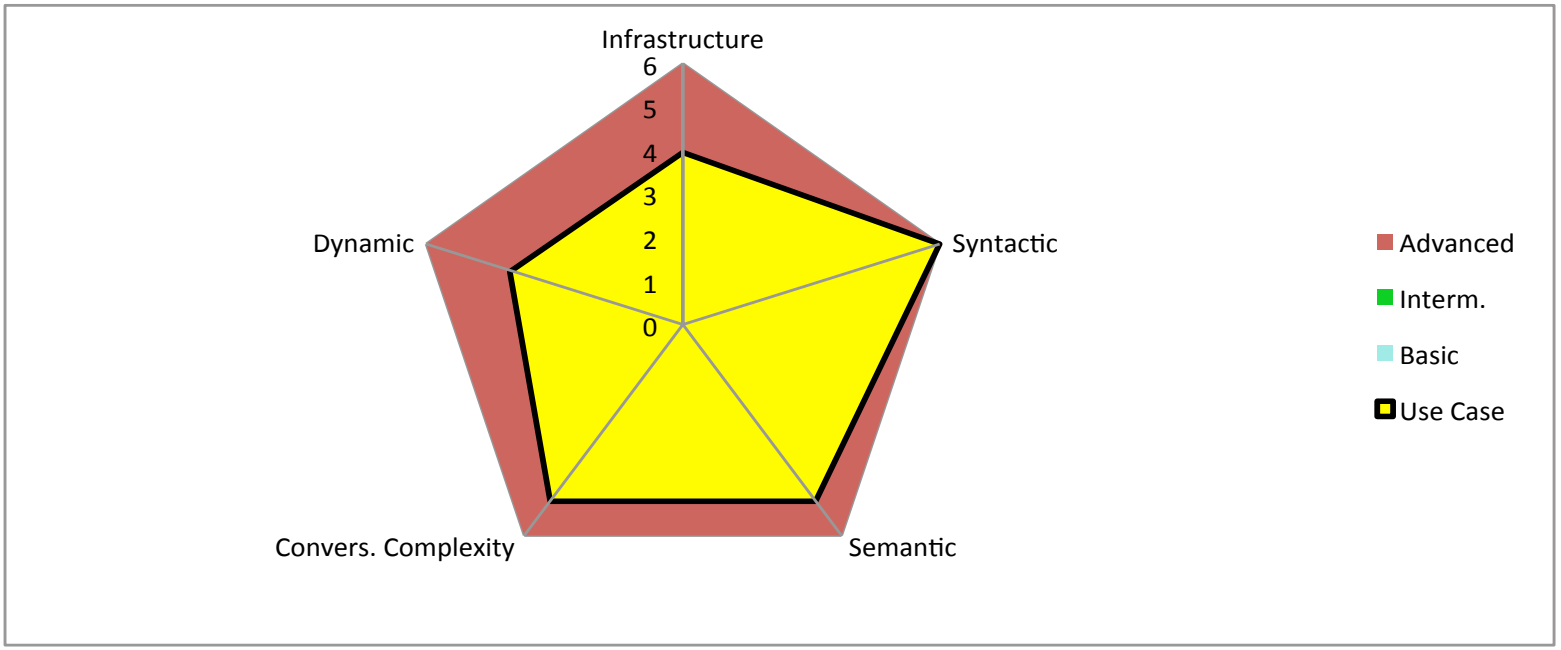
Device Data to EHR:
IHE-PCD Compliant Gateway ➔EHR

	Advanced	Interm.	Basic	Use Case	Comment
Infrastructure	6	4	2	3	TCP; MLLP
Syntactic	6	4	2	3	HL7 Syntax
Semantic	6	4	2	4	x73 Nomenclature
Convers. Complexity	6	4	2	2	Uni-Directional
Dynamic	6	4	2	2	Some real-time



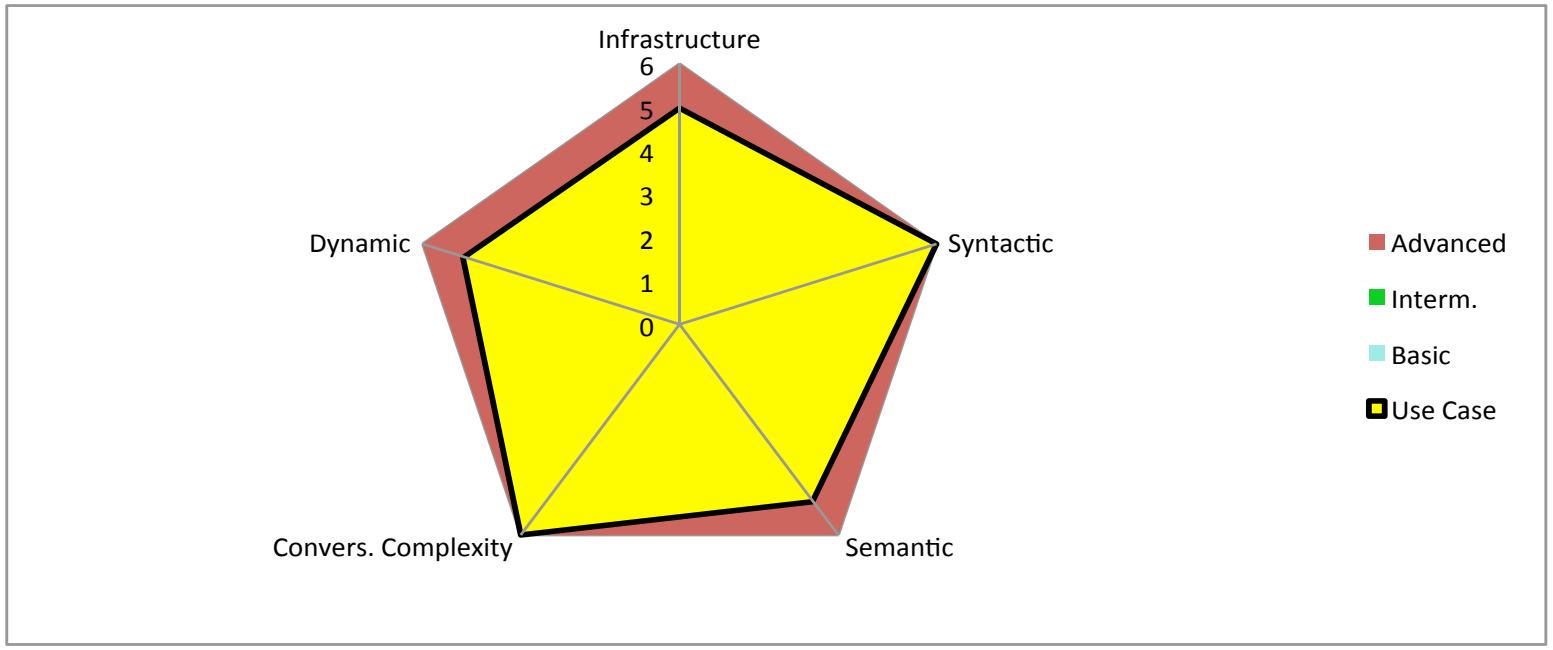
Medical Device Patient Area Network PnP Monitor ←→ App

	Advanced	Interm.	Basic	Use Case	Comment
Infrastructure	6	4	2	4	x73
Syntactic	6	4	2	6	x73 Syntax
Semantic	6	4	2	5	x73 Nomen & DIM
Convers. Complexity	6	4	2	5	Bi-Directional, Settings
Dynamic	6	4	2	4	Real-Time interaction



Medical Device Patient Area Network
PnP Therapy Device ⟷ App

	Advanced	Interm.	Basic	Use Case	Comment
Infrastructure	6	4	2	5	x73
Syntactic	6	4	2	6	x73 Syntax
Semantic	6	4	2	5	x73 Nomen & DIM
Convers. Complexity	6	4	2	6	Bi-Directional, Settings
Dynamic	6	4	2	5	Real-Time interaction



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MDI Campaign Initiatives and Schedule Overview

January 15, 2014

MDI Campaign Update

- **MDI Campaign Technical Team:**
  - ✓ **Continued progress on open source SW development**
    - Detailed schedule defined and used
    - 4+1 Architecture design review in process
    - PIM Software Module
      - Skeleton PIM SW by end of January 2015
    - IEEE 11073 Software Module
      - Release of SpO2 demo with alerts
      - Refactoring of existing software
    - IHE-PCD Software Module
      - Progressing on development of required objects

MDI Campaign Update

- **MDI Campaign Vendor Team:**
  - ✓ **Continued engagement.**
  - ✓ **Main technical effort has been testing and evaluating the SpO2 Device Simulator developed by C4MI**
  - ✓ **Considerable discussion around schedule and impact on testing and public demonstrations**
    - HIMSS window missed

MDI Campaign Update

MDI Campaign Member Team:

- Johns Hopkins – Dr. Jim Fackler
- Ascension – Jenny Mayronne
- Scripps – Marcia Wylie
- Intermountain – Kyle Johnson, Steve Howe
- Hennepin – Daniel Huwe, Philip Gil
- Vanderbilt - Patrick Norris

✓ **Had 2 meetings (virtual)**
✓ **Reviewed C4MI background and MDI Campaign progress**
✓ **Starting to discuss potential work:**
- RFP language
- Interoperability value proposition

MDI Campaign Initiatives Overview

- The following initiatives are under discussion:
  - ✓ Initiative #1: Device Data Aggregators to HIT Systems
  - ✓ Initiative #2: Devices to Data Aggregators
  - ✓ Initiative #3: Support Legacy Devices
  - ✓ Initiative #4: Support Additional Protocols
  - ✓ Initiative #5: Bi-Directional communication
  - ✓ Initiative #6: Device Management