The Role of Middleware in Integration

Monroe Pattillo
Practical Health Interoperability, LLC
Middleware is Classic in Concept

• Classic Computing Design Concept
  – Input – Processing – Output
• Middleware can see all that comes to it
• Middleware can see all that it produces
Middleware is Abstraction

- Middleware sits between information creators and information consumers
- It converts protocols
  - proprietary ⇔ open (standards or profile based)
- Isolates information creators and consumers from changes in vendors
- Serves as an information viewpoint for issue analysis as it can see both sides of the conversation
Middleware is Value Add

- Offload processing as a concentrator
- Batch data to even out consumer load
- Protocol conversion
- Fill in missing information
  - Resource identification, Timestamps
- Correct for incorrect information
  - Isolating consumers from information errors
- Adapt unsecured producers to secure consumers
- Provide supplemental logging for other systems
Roles for Middleware

• Integration protocol conversion
  – Proprietary ⇔ Open

• Data preparation for archiving
  – Normalizing data and correcting errors
  – Filling in missing data

• Remote alarm distribution
  – Bridges alarm reporters, staff responsibilities, notification destinations, and communication device protocols
  – Manages assignments, escalation and reporting
Middleware Solution Categories

- **Fixed Purpose Protocol Adapters**
  - For example – Serial to Ethernet (Digi, Moxa, Precedia, etc.)
  - Single function, specific protocol in, specific protocol out

- **Multiple protocol adapters (Capsule, iSirona, etc.)**
  - From proprietary to HL7 or possibly DICOM for lots of devices

- **Integration Engines (Orion, Corepoint, Greenway, etc.)**
  - Few protocols in, few protocols out
  - Focus is on data normalization and error containment

- **Remote Alarm Distribution (Philips, AMCOM, Cerner)**
  - Lots of proprietary and standard protocols in & out
  - Also deals with assignments, escalation, logging, reporting
CE-IT Community Town Hall

John McHutcheon,
Vice President of Professional Services
Capsule Tech, Inc.
Why Do Hospitals Need Device Connectivity?

- Allows the clinician to spend more time on direct patient care
- Provides quicker alerts to impending conditions
- Eliminates manual transcription errors
- Ensures that vital signs are charted accurately
- Delivers near real time data to patient records for improved decision making
- Improves patient care & safety
- Increases the adoption of the EMR
Introduction to Integration Options/Concepts

• Types of Devices:
  – Network vs. Serial

• Association Types:
  – Location, Device or Patient Centric

• Continuous vs. Periodic
  – Vitals automatically collected and sent to EMR unsolicited (as collected)
  – Vitals collected at POC via screens for annotation and sent on request

• Validated vs. Un-Validated
  – Validation done at POC and vitals sent directly to EMR
  – Validation done when nurse is ready to chart in EMR
Periodic Data Collection

- Designed for lower acuity environments, such as med-surg
- Capture, validate and send vitals right from the point of care
- The all-in-one application features support for positive patient identification
  - Scanning the patient’s wristband with a bar code scanner
  - Choosing the patient from the drop down unit list
  - Typing in the patient’s name\ID onto the Capsule Neuron’s touch screen display
How to prepare for selecting a connectivity solution provider

- Evaluate and document current process & clinical workflow
- Review short and long term connectivity goals
- Create a complete list of devices that need to be connected now and in the future
- Review any current connectivity such as monitoring gateways
- Assemble cross functional device integration team
Towards Interoperability

Lauren Weigand
Product Manager
iSirona
2/25/13
Evolution of Interoperability

Manual Transcription
Selective Device Data Integration
Enterprise Device Data Integration
Feedback Control Loops, Safety Interlocks, Free Device Swapping, etc.
Regulatory Obstacles

Where most hospitals are
How do we get here?

Where most hospitals are
Selective Device Data Integration
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Manual Transcription
Obstacles to Enterprise MDI

- Lack of standardization
- Absence of business incentives
- Workflow variation
- Component overlap/duplication/gaps
- Emerging behaviors
- Unclear ownership
- Device replacement timelines
A Systems Perspective Breaks Barriers

Many Separate Interfaces

3rd Party Integrator
Taking the Next Steps

- Think enterprise
  - (Even if you’re buying selective)
What Every MDI Vendor Does

Core Benefits
- Improves data accuracy
- Saves time for clinicians

Core Features
- Works with many different devices and EMRs
- Supports low and high acuity inpatient workflows
- Meets applicable HIPAA requirements
- Ensures data delivery (RED FLAG if not)
- Offers centralized management (RED FLAG if not)
What NO MDI Vendor Can Do

• Change the way your EMR or devices work
• Guarantee end-to-end data security or transmission time
• Eliminate the need for you to do risk analysis
• Predict the future
What to Look For

• Clinical workflow
• Hardware requirements – and implications
• Implementation methodology
• Troubleshooting and support
• Driver creation/update process
• FLEXIBILITY
Towards Interoperability

Manual Transcription

Selective Device Data Integration

Enterprise Device Data Integration

Feedback Control Loops, Safety Interlocks, Free Device Swapping, etc.

ACCE, AAMI, HIMSS
The Role of Middleware in Integration

Jim Anderson, CBET
Director Clinical Equipment Planning and Support
SSM Health Care, Integrated Health Technologies
Based in St. Louis, SSM is one of the nation’s largest Catholic health systems and owns, manages and is affiliated with 20 hospitals in four states: Wisconsin, Illinois, Missouri and Oklahoma.
The Countdown to Clinical Transformation
HTM’s Primary Responsibility in the EMR Implementation

- Clinical Device Integration
  - This phase uses several different integration tools to accomplish integration. These include:
    - HL-7
    - Cloverleaf integration broker
    - device gateways
    - Middleware Engine/
  - At SSM, fixed physiological monitors to capture vital signs in the electronic record and anesthesia machines are part of the current integration scope.
HTM Must Be Involved in Purchasing Process of Clinical Devices

- There is continued planning to assess the need for additional device integration.
- SSM CES is involved in all clinical equipment purchases to validate the devices have capabilities that would allow us the flexibility for future integration.
- Standardization of equipment integrated with the EMR should be promoted – the more variations in installed models, the more complicated and expensive it is to integrate, use and support.
Purchasing Middleware

- SSM CES is also responsible for purchasing all middleware and managing the integration vendors and cost.
- Determine every piece of equipment you might integrate over the next 5 years and provide this to your potential vendor.
- Software versions are extremely important, so get those while you are at it.
- Works and works for clinical staff needs; can be two different things.
Setup Scenarios for Middleware

- Set aside 3 hours with multi-disciplinary team to go over what-if scenarios
- Call the vendors when you get stuck – ask them to be ready for technical calls
- Sometimes the OEM device vendor is not the best option
- Find which vendor works best overall
Pre Go-Live Preparation

- Verify all equipment to be connected to EMR is capable.
- Build an equipment list with room number locations and an equipment naming convention that will work with your EMR, Middleware and/or Mapping software.
- Log all IS network wall plate numbers and associate these with your equipment naming convention and the associated physical location (department name, room number, equipment name).
- All parties need to agree on the Integration List.
Pre Go-Live Preparation (continued)

- Identify what protocol (IP, Decnet, etc.) your equipment will be communicating in and verify the IS Network can handle.
- Get your equipment vendors and IS together and test this communication chain all the way through the Cloverleaf server to the EMR work station.
  - Do not accept assurances it will work without testing.
Healthcare Technology Management's Role in Testing

- The HTM department will need to provide a technician and test equipment to perform the testing.
- The HTM department should be present during the testing to verify that ALL parameters to be transmitted to the EMR are tested.
  - This should be done 30-60 days before Go-Live.
- Test all devices at once, making every device active at the same time to verify the system can handle a “full house.”
- The HTM department should verify they have a process in place to verify that the patient data is getting to the data mapping engine (i.e. Cloverleaf).
  - If the data is at the data mapping engine, you can feel confident the medical device is sending data.
If data is flowing into the Middleware engine, it is not a device issue.

HTM's responsibility
Team’s needed for Success

- HTM Department
  - OR Specialist, Patient Monitor Specialist, Computer Specialist, HL7 Specialist
- IS Department
  - Network Specialist, Server Specialist, VM Specialist, Desktop Specialist, EMR Specialist
- Clinical Staff from Each Department
- Facilities Department
- EMR Vendor
- Medical Device Vendors
- Low Voltage Contractor
- Clinical Leadership
- Middleware Vendor
HTM's Role in Support

- HTM, IS and the EMR Product Specialists MUST work closely together to identify the issues and respond appropriately.
  - Set up a support triage process before Go-live that includes ALL support groups that may be called upon.
  - Make sure you know the name and number of who to call for expert help (no matter what time of day or night).
A Few Lessons Learned

• An EMR implementation is a BIG DEAL to hospital administration and should be given a top priority. You do not want the HTM department to be the reason why a go-live date was missed.

• Get the HTM staff trained prior to Go-Live on the EMR work flow and how to triage whether the issue is a device issue, a data engine issue, or a network issue.
A Few Lessons Learned (cont.)

- Set up processes to prevent “The Ping Pong Effect” – what occurs when a service call is placed to the incorrect department. The customer gets told to call another department, and then another, with nobody coordinating to resolve the issue.
A Few Lessons Learned (cont.)

- If you are not being asked to participate in planning sessions, ask to be included. Don’t wait until the last minute to be told to perform 6 month’s of tasks in one month’s time frame.
- While the spike in HTM hours needed to plan for and implement an EMR is significant, it is typically just temporary.
  - HTM staff may become resentful that IS hired so many people to support the EMR, when they did not.
  - During the six months leading up to go-live (especially the final 2 months), expect a significant strain on the department’s workload.
The HTM department should provide technicians 24/7 that are knowledgeable on the equipment and EMR data flow during the first week following go-live.

- You will need to have multiple techs trained to respond.
- Go-live is stressful for everyone involved, including the clinicians. They will not want to wait for a technician to drive in from home.
There will be a Problem

- The Great HTM departments resolve them before Go-Live!
- The only complaint you want to hear post Go-Live is how bored your technicians were!