The Argonaut Project: Accelerating the Next Generation of Interoperability

February 2017
Agenda

Why do we need the Argonaut Project?

Who’s behind it and what do we want to do?

What have we done?

What’s next for the Argonaut Project?
What is the Argonaut Project?

The Argonaut Project is an implementation community comprising leading technology vendors and provider organizations to accelerate the use of FHIR and OAuth in health care information exchange.

We are:
- Private sector initiated and funded
- Working collaboratively with other FHIR initiatives such as SMART-on-FHIR, the Health Systems Platform Consortium, and the FHIR Foundation
- Creating open industry Implementation Guides in high priority use cases of importance to patients, providers and the industry as a whole

We are NOT:
- A standards development activity
- A separate legal entity
- A proprietary activity
## Who’s Behind the Argonaut Project?

<table>
<thead>
<tr>
<th>Technology Vendors</th>
<th>Provider Organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accenture</td>
<td>Beth Israel Deaconess Medical Center</td>
</tr>
<tr>
<td>Athenahealth</td>
<td>Intermountain Health</td>
</tr>
<tr>
<td>Cerner</td>
<td>Mayo Clinic</td>
</tr>
<tr>
<td>Epic</td>
<td>Partners Healthcare</td>
</tr>
<tr>
<td>McKesson</td>
<td>SMART at Boston Children’s Hospital</td>
</tr>
<tr>
<td>MEDITECH</td>
<td></td>
</tr>
<tr>
<td>Surescripts</td>
<td></td>
</tr>
<tr>
<td>The Advisory Board Company</td>
<td></td>
</tr>
</tbody>
</table>

**Staff (current and past)**
- Prime contractor: HL7
- FHIR initiatives: Grahame Grieve, Josh Mandel, Brett Marquard, Eric Haas
- OAuth initiatives: Dixie Baker, Josh Mandel
- Project Management: Micky Tripathi, Jennifer Monahan
81 Organizations Registered in Argonaut Implementation Community

<table>
<thead>
<tr>
<th>Organization</th>
<th>Company/University/IHIS</th>
<th>Group/Provider</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accenture</td>
<td>GE</td>
<td>Office of National Coordinator (ONC)</td>
</tr>
<tr>
<td>ActualMeds Corp.</td>
<td>Geisinger</td>
<td>Optum (UnitedHealth Group)</td>
</tr>
<tr>
<td>AEGIS.net, Inc.</td>
<td>Hackensack University Medical Center</td>
<td>Orion Health</td>
</tr>
<tr>
<td>Aetna</td>
<td>Health Samurai/Aidbox</td>
<td>OSIA Medical</td>
</tr>
<tr>
<td>Akana</td>
<td>i2b2/Mass General Hospital</td>
<td>Partners Healthcare</td>
</tr>
<tr>
<td>Allscripts</td>
<td>Iconic Systems</td>
<td>Persistent System Ltd</td>
</tr>
<tr>
<td>American Medical Association</td>
<td>Infor</td>
<td>Personal Medicine Plus</td>
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<tr>
<td>Amida Technology Solutions</td>
<td>Inpriva</td>
<td>Pokitdok Inc.</td>
</tr>
<tr>
<td>Apigee</td>
<td>Intermountain Healthcare</td>
<td>Practice Fusion</td>
</tr>
<tr>
<td>Applied Informatics</td>
<td>InterSystems Corporation</td>
<td>Premier Inc</td>
</tr>
<tr>
<td>athenahealth</td>
<td>KaiRx</td>
<td>Quvera</td>
</tr>
<tr>
<td>Bespoke Systems</td>
<td>Mana Health</td>
<td>Redox Engine</td>
</tr>
<tr>
<td>BIDMC</td>
<td>Mayo Clinic</td>
<td>Reliant Medical Group</td>
</tr>
<tr>
<td>Care at Hand</td>
<td>McKesson/RelayHealth</td>
<td>RxREVU</td>
</tr>
<tr>
<td>Carebox</td>
<td>Medfusion</td>
<td>SMART Health IT</td>
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<td>Carefluence</td>
<td>MedicaSoft</td>
<td>Surescripts</td>
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<td>Carolinas HealthCare System</td>
<td>Medicity</td>
<td>The Advisory Board Company</td>
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<tr>
<td>Cerner</td>
<td>MEDITECH</td>
<td>The Sequoia Project (formerly Healthway)</td>
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<tr>
<td>CipherHealth</td>
<td>Medivo</td>
<td>Trinity Health</td>
</tr>
<tr>
<td>Clinical Cloud Solutions, LLC</td>
<td>MITRE</td>
<td>UC Santa Cruz</td>
</tr>
<tr>
<td>Commerce Kitchen</td>
<td>MobileSmith</td>
<td>UPMC</td>
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<tr>
<td>DoD/VA</td>
<td>ModuleMD</td>
<td>US Postal Service</td>
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<tr>
<td>Duke Medicine</td>
<td>My Total Health</td>
<td>Vetter Software</td>
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<tr>
<td>eClinicalWorks</td>
<td>NavHealth</td>
<td>VigiLanz Corporation</td>
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<tr>
<td>Eligible</td>
<td>NaviNet</td>
<td>VSee</td>
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<tr>
<td>EMR Direct</td>
<td>Netsmart</td>
<td>xG Health Solutions</td>
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<tr>
<td>Epic</td>
<td>NextGen/QSI</td>
<td>Xperterra</td>
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</tbody>
</table>
It all started with JASON

- Highly critical of the status and trajectory of US healthcare interoperability
  - Blamed EHR vendor technology and business practices and lack of an architecture supporting standardized APIs

- Recommended a “unifying software architecture” to migrate data from legacy systems to a new centrally orchestrated architecture
  - ONC should define “an overarching software architecture for the health data infrastructure” within 12 months
JASON Task Force Recommendations (2014)

- Foundation of interoperability should be an orchestrated architecture employing Public APIs based on FHIR

- Current interoperability approaches need to be gradually replaced with more comprehensive API-based models

- Meaningful Use Stage 3 should be used as a pivot point to initiate this transition

<table>
<thead>
<tr>
<th>Member Name</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>David McCallie (Co-Chair)</td>
<td>Cerner</td>
</tr>
<tr>
<td>Micky Tripathi (Co-Chair)</td>
<td>MAeHC</td>
</tr>
<tr>
<td>Deven McGraw</td>
<td>Manatt</td>
</tr>
<tr>
<td>Gayle Harrell</td>
<td>Florida State Legislator</td>
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<tr>
<td>Larry Wolf</td>
<td>Kindred Healthcare</td>
</tr>
<tr>
<td>Troy Seagondollar</td>
<td>Kaiser</td>
</tr>
<tr>
<td>Andy Wiesenthal</td>
<td>Deloitte</td>
</tr>
<tr>
<td>Arien Malec</td>
<td>RelayHealth</td>
</tr>
<tr>
<td>Keith Figlioli</td>
<td>Premier, Inc.</td>
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<td>Wes Rishel</td>
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<tr>
<td>Larry Garber</td>
<td>Reliant Medical Group</td>
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<tr>
<td>Josh Mandel</td>
<td>Boston Children’s Hospital</td>
</tr>
<tr>
<td>Landen Bain</td>
<td>CDISC</td>
</tr>
<tr>
<td>Nancy J. Orvis</td>
<td>FHA/DoD</td>
</tr>
<tr>
<td>Tracy Meyer</td>
<td>FHA/ONC</td>
</tr>
<tr>
<td>Jon White</td>
<td>HHS</td>
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</table>
Why do we need new standards?

Current standards are:

Too Limited
• Document exchange (e.g., CCDA) is too broad, while existing data-level exchange (e.g., HL7 v2, NCPDP) is too narrow
• No nationwide standards to support query-based use cases

Too Complex
• CCDAs are inefficient and cumbersome
• IHE-based standards are complex

Too Myopic
• Not based on modern internet standards, protocols, or conventions
• Not scalable

Implication
• Standards and ecosystem don't support a rich set of use cases
• Cost and complexity of standards are barrier to adoption
• Discourages innovators from outside health care
What’s so great about FHIR?

Flexible to document-level and data-level exchange
• Sometimes individual data elements are important, sometimes entire documents are appropriate

Based on modern internet conventions
• RESTful API – same browser-based approach as used by Facebook, google, twitter, etc
• Infinitely extensible to detailed resources/profiles to meet any use case
• Supports push and pull use cases

Attractive to developers from outside of healthcare
Why do we need the Argonaut Project to accelerate FHIR?

Standards development process, by design, values comprehensiveness over speed-to-market.

Market input is needed to make standards relevant and usable:
- Identification of priority use cases to meet market needs
- Development of well-packaged implementation guides
- Facilitation of testing and implementation community
- Coupling with other standards or protocols needed for implementation (e.g., security)

Implementers need to have greater input (i.e., deeper, earlier) into standards development.

Need to get as much collaboration as early as possible in the cycle to head off problems of heterogeneous implementations down the road.
STU2 Data and Document Access Implementation Guide Released!

http://www.fhir.org/guides/argonaut/r2/

- Access to individual data elements of Common Clinical Data Set
- Access to structured document (CCD) containing all Common Clinical Data Set elements
- Leverage OAuth2-based security and authorization
Argonau t Focusing on FHIR Resources Supporting CCDS

2015 Edition
Common Clinical Data Set

<table>
<thead>
<tr>
<th>Patient name</th>
<th>Sex</th>
<th>Date of birth</th>
<th>Race</th>
<th>Ethnicity</th>
<th>Preferred language</th>
<th>Smoking status</th>
<th>Problems</th>
<th>Medications</th>
<th>Medication allergies</th>
<th>Laboratory tests</th>
<th>Laboratory results</th>
<th>Vital signs</th>
<th>Procedures</th>
<th>Care team members</th>
<th>Immunizations</th>
<th>Unique Device identifiers</th>
<th>Assessment and Plan of Treatment</th>
<th>Goals</th>
<th>Health concerns</th>
</tr>
</thead>
</table>

93 FHIR DSTU2 Resources (17 Argonaut CCDS Resources in red)

Clinical
- AllergyIntolerance
- Condition (Problem)
- Procedure
- ClinicalImpression
- FamilyMemberHistory
- RiskAssessment
- DetectedIssue
- CarePlan
- Goal
- ReferralRequest
- ProcedureRequest
- NutritionOrder
- VisionPrescription
- Medication
- MedicationOrder
- MedicationAdministration
- MedicationDispense
- MedicationStatement
- Immunization
- ImmunizationRecommendation
- Observation
- DiagnosticReport
- DiagnosticOrder
- Specimen
- BodySite
- ImagingStudy
- ImagingObjectSelection

Identification
- Patient
- Practitioner
- RelatedPerson
- Organization
- HealthcareService
- Group
- Location
- Substance
- Person
- Contract
- Device
- DeviceComponent
- DeviceMetric

Workflow
- Encounter
- EpisodeOfCare
- Communication
- Flag
- Appointment
- AppointmentResponse
- Schedule
- Slot
- Order
- OrderResponse
- CommunicationRequest
- DeviceUseRequest
- DeviceUseStatement
- ProcessRequest
- ProcessResponse
- SupplyRequest
- SupplyDelivery

Infrastructure
- Questionnaire
- QuestionnaireResponse
- Provenance
- AuditEvent
- Composition
- DocumentManifest
- DocumentReference
- List
- Media
- Binary
- Bundle
- Basic
- MessageHeader
- OperationOutcome
- Parameters
- Subscription

Conformance
- ValueSet
- ConceptMap
- NamingSystem
- StructureDefinition
- DataElement
- Conformance
- OperationDefinition
- SearchParameter
- ImplementationGuide
- TestScript

Financial
- Coverage
- EligibilityRequest
- EligibilityResponse
- EnrollmentRequest
- EnrollmentResponse
- Claim
- ClaimResponse
- PaymentNotice
- PaymentReconciliation
- ExplanationOfBenefit
## Setting Practical Constraints on Server-Client Interactions

<table>
<thead>
<tr>
<th>What search criteria can you use?</th>
<th>What type of data will you get in response?</th>
<th>How will that data be represented?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Search operations</td>
<td>Scope of response</td>
<td>Content of response</td>
</tr>
<tr>
<td>Examples:</td>
<td>Examples:</td>
<td>Examples:</td>
</tr>
<tr>
<td>• Can search for individual</td>
<td>• Search for patient will get all</td>
<td>• Patient search will get</td>
</tr>
<tr>
<td>patient by identifier (e.g.,</td>
<td>FHIR patient resources</td>
<td>name, identifier, gender,</td>
</tr>
<tr>
<td>MRN) OR full name &amp; gender</td>
<td>• Search for Procedures will get all</td>
<td>birthdate, birth sex, REL</td>
</tr>
<tr>
<td>OR full name &amp; birthdate</td>
<td>current and historical procedures or</td>
<td>• Procedures search will get</td>
</tr>
<tr>
<td>• Can search for Procedures</td>
<td>within specified date range</td>
<td>type of procedure, date</td>
</tr>
<tr>
<td>by patient or by patient &amp;</td>
<td></td>
<td>performed, and procedure</td>
</tr>
<tr>
<td>specified date range</td>
<td></td>
<td>status</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• In some cases created</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Argonaut extensions and value sets</td>
</tr>
</tbody>
</table>
### Argonaut Implementation Guides In a Nutshell

<table>
<thead>
<tr>
<th>Query</th>
<th>Supported searches</th>
<th>Scope of response</th>
<th>Content of response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient</td>
<td>Identifier (e.g., MRN) OR (Full name + gender OR Full name + birthdate)</td>
<td>FHIR patient resources</td>
<td>• Name • Patient identifier • Gender • Birthdate • Birth sex • Race, ethnicity, language</td>
</tr>
<tr>
<td>Allergies</td>
<td>Patient OR Patient + Date</td>
<td>All allergies</td>
<td>• Type of allergy • Allergy status</td>
</tr>
<tr>
<td>Assessment and Plan of Treatment</td>
<td>Patient OR Patient + Category OR Patient + Status OR Patient + Specified date range</td>
<td>All Assessment and Plan of Treatment information</td>
<td>• Care plan category (Argonaut extensions) • Care plan status • Narrative summary</td>
</tr>
<tr>
<td>Care Team</td>
<td>Patient OR Patient + Category OR Patient + Status OR Patient + Specified date range</td>
<td>All current Care Team members</td>
<td>• Care plan category (Argonaut extensions) • Care plan status • Care team members • Care team provider roles</td>
</tr>
<tr>
<td>Goals</td>
<td>Patient OR Patient + Specified date range</td>
<td>All patient goals</td>
<td>• Narrative description of goals • Goals status</td>
</tr>
<tr>
<td>Immunizations</td>
<td>Patient</td>
<td>All immunizations</td>
<td>• Immunization status (Argonaut valueset) • Date of administration • Type of vaccine • Indicator of vaccine given or reported</td>
</tr>
<tr>
<td>Medications (statements)</td>
<td>Patient</td>
<td>All medications</td>
<td>• Medication • Medication status • Date or date range</td>
</tr>
<tr>
<td>Medications (order)</td>
<td>Patient</td>
<td>All medication orders</td>
<td>• Medication • Order date • Order status • Prescriber</td>
</tr>
<tr>
<td>Query</td>
<td>Supported search operations</td>
<td>Scope of response</td>
<td>Content of response</td>
</tr>
<tr>
<td>--------------------------------------------</td>
<td>----------------------------</td>
<td>-------------------</td>
<td>------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Laboratory results (diagnostic reports)    | Patient                    | All diagnostic reports | • Laboratory code (LOINC)  
• Result  
• Status  
• Time of measurement  
• Time of report  
• Source of report |
|                                            | OR Patient + Diagnostic Report Code(s) |                     |                                                                                   |
|                                            | OR Patient + Specified date range |                   |                                                                                   |
| Laboratory results (observations)         | Patient                    | All observations   | • Laboratory code (LOINC)  
• Result value  
• Status  
• Time of measurement  
• Reference range |
|                                            | OR Patient + Laboratory Code(s) |                     |                                                                                   |
|                                            | OR Patient + Specified date range |                   |                                                                                   |
| Problems and Health Concerns              | Patient                    | All problems and health concerns, current and historical | • Problem or health concern code  
• Problem or health concern category code (Argonaut extension)  
• Problem or health concern status  
• Verification status |
| Procedures                                 | Patient                    | All procedures, current and historical | • Type of procedure  
• Date performed  
• Procedure status |
|                                            | OR Patient + Specified date range |                   |                                                                                   |
| Smoking status                             | Patient                    | Smoking status     | • Smoking observation status  
• Result value code (LOINC)  
• Date recorded  
• Smoking status |
| Vital signs                                | Patient                    | All vitals         | • Type of measurement (Argonaut value set)  
• Time of measurement  
• Result value (Argonaut value set)  
• Observation status |
|                                            | OR Patient + Specified date range |                   |                                                                                   |
| Implantable devices                        | Patient                    | All UDIs for a patient’s implantable devices | • Human readable form of barcode string  
• Type of device |
<table>
<thead>
<tr>
<th>Query</th>
<th>Supported search operations</th>
<th>Scope of response</th>
<th>Content of response</th>
</tr>
</thead>
</table>
| Provider Directory | Practitioner  
 OR Practitioner + Specialty  
 OR Practitioner + Location (WIP)  
 OR Organization Identifier  
 OR Organization Name  
 OR Organization Address  
 OR Endpoint identifier  
 OR Endpoint name       | All practitioner, organization, and endpoint information                                      | • Practitioner name  
 • Practitioner Identifier  
 • Practitioner Role and organization  
 • Practitioner Qualifications  
 • Organization name  
 • Organization identifier  
 • Organization status  
 • Organization contact  
 • Organization physical address  
 • Organization endpoint address  
 • Endpoint name  
 • Endpoint status  
 • Endpoint organization  
 • Endpoint channel type  
 • Endpoint address |
| Document         | Document  
 OR Patient                                                  | All documents for a patient                           | • Patient  
 • Document HTTPS address  
 • Document type  
 • Document format  
 • Document reference date  
 • Status  
 • Document identifier |
What will Argonaut Implementation Guides allow people to do?

### Within enterprise

- health care organization A
  - **authenticate user**
  - **launch app**
  - **register app**
  - **authorize app**
  - mobile application
  - hosted application

### Cross-enterprise

- health care organization B
  - **authenticate user**
  - **authenticate enterprise**
  - **authenticate federated user identity across enterprises**
  - **authorize app for access scope**
  - access data & documents
  - FHIR resource server
  - authorization server
Who’s using the Argonaut Project Implementation Guides

The following Argonaut founders are basing their FHIR APIs on the Argonaut Implementation Guides:

- Accenture
- athenahealth
- Cerner
- Epic
- MEDITECH
- Surescripts
- The Advisory Board Company

The following nationwide health information networks are implementing Argonaut specifications:

- Carequality – have already implemented a preliminary version of the upcoming Argonaut Project Provider Directory Implementation Guide
- CommonWell Health Alliance – are building FHIR into their core services using the Argonaut Implementation Guides for Data & Document Access and Provider Directory
Argonaut Project: 2017 Plan

1. Publication of Provider Directory Implementation Guide based on FHIR STU3

2. Scheduling
   • Appointments request – request for appointment
   • Appointment response – reply to an appointment request
   • Slots – blocks of time available for booking appointments

3. Enhancing integration of EHRs and Apps (in collaboration with CDS Hooks Project)
   • Integration of an external app into an EHR workflow
   • Validation of security model for integration of external apps with EHRs
FHIR Technical Experts:  Brett Marquard (brett@riverrockassociates.com), Eric Haas (ehaas@healthedainc.com), Graham Grieve (grahame@healthintersections.com.au)

Project management:  Micky Tripathi (mtripathi@maehc.org), Jennifer Monahan (jmonahan@maehc.org)

www.argonautproject.org