

Argonaut Project Implementation Program

July 23, 2015

Argonaut Project Implementation Community

- **Argonaut Project Testing Community** (as of July 23, 2015)

1. Accenture
2. AcutaMeds Corp.
3. AEGIS
4. Aetna
5. Akana
6. American Medical Association
7. Amida Technology Solutions
8. Apigee
9. Applied Informatics
10. athenahealth
11. Bespoke Systems
12. BIDMC
13. Care at Hand
14. Carebox
15. Carefluence
16. Carolinas HealthCare System
17. Cerner
18. CipherHealth
19. DoD/VA
20. Drajer LLC
21. Duke Medicine
22. EMR Direct
23. Epic
24. GE
25. Geisinger
26. Hackensack University Medical Center
27. Health Samurai
28. Infor
29. Intermountain Healthcare
30. InterSystems Corporation
31. Massachusetts eHealth Collaborative
32. Mana Health
33. Mayo Clinic
34. McKesson
35. Medfusion
36. MedicaSoft
37. MEDITECH
38. MITRE
39. MobileSmith
40. ModuleMD
41. NavHealth
42. Netsmart
43. NextGen
44. Office of National Coordinator
45. Optum (UnitedHealth Group)
46. Orion Health
47. OSIA Medical
48. Partners Healthcare
49. Pokitdok Inc.
50. Practice Fusion
51. Premier Inc
52. Qvera
53. Redox Engine
54. Reliant Medical Group
55. River Rock Associates
56. RxREVVU
57. Surescripts
58. The Advisory Board Company
59. The Sequoia Project (formerly Healthway)
60. Trinity Health
61. UC Santa Cruz
62. UPMC
63. US Postal Service
64. Vetter Software
65. Vigilanz Corporation
66. VSee
67. xG Health Solutions
68. Xperterra

Agenda

- **Argonaut Project background and overview**
- **FHIR development**
- **Security development**
- **Implementation Program**

Origins

Argonaut Project is a focused, market-driven code and documentation sprint

Its origins lie in:

- JASON Task Force recommendations on market-based interoperability governance and coordination, and call to action on “public APIs”
- Market experience with MU 2 and associated certification
- HL7 request for resources to support FHIR DSTU2 in early summer

Small group of vendors and providers founded the effort with funds for:

- Funding for technical expertise and project management
- General support to HL7 for DSTU2 development
- Focused support for narrower focus profiles and implementation guides
- Support for implementation program for market testing/adoption

Argonaut Project welcomes all participants!

Argonaut Structure

Founding organizations

- athenahealth
- Beth Israel Deaconess Medical Center
- Cerner
- Epic
- Intermountain Health
- Mayo Clinic
- McKesson
- MEDITECH
- Partners Healthcare System
- SMART at Boston Children's Hospital Informatics Program
- The Advisory Board Company
- Accenture
- Surescripts

Staff

- HL7 – prime contractor
- Grahame Grieve – FHIR API development
- Dixie Baker, Josh Mandel – OAuth 2.0 Security development
- Micky Tripathi, Jennifer Monahan – Project management

Argonaut Scope

The Argonaut Project is refining and packaging specifications and implementation guides for:

- FHIR RESTful API for data element query of the Common MU Data Set and Provider Directories
- FHIR RESTful API for document-level query of static documents (such as CCDA)
- SMART on FHIR OAuth 2.0 security profile for authorization of applications to retrieve health data within and across enterprises

Argonaut Phase 1 (Dec 2014 – Jun 2015)

- Argonaut FHIR Implementation Guide:
 - http://argonautwiki.hl7.org/index.php?title=Implementation_Guide
- Argonaut SMART on FHIR OAuth 2.0 Security Implementation Guide (within enterprise)
 - <http://fhir-docs.smarthealthit.org/argonaut-dev/authorization/>

Argonaut Project Phase 2 (Jul 2015 – Dec 2015)

- FHIR: 1) adoption-oriented constraints to align server and client expectations; 2) provider directories
- Security: 1) add technical specs and best practices for server developers; 2) add profile for cross-enterprise use cases

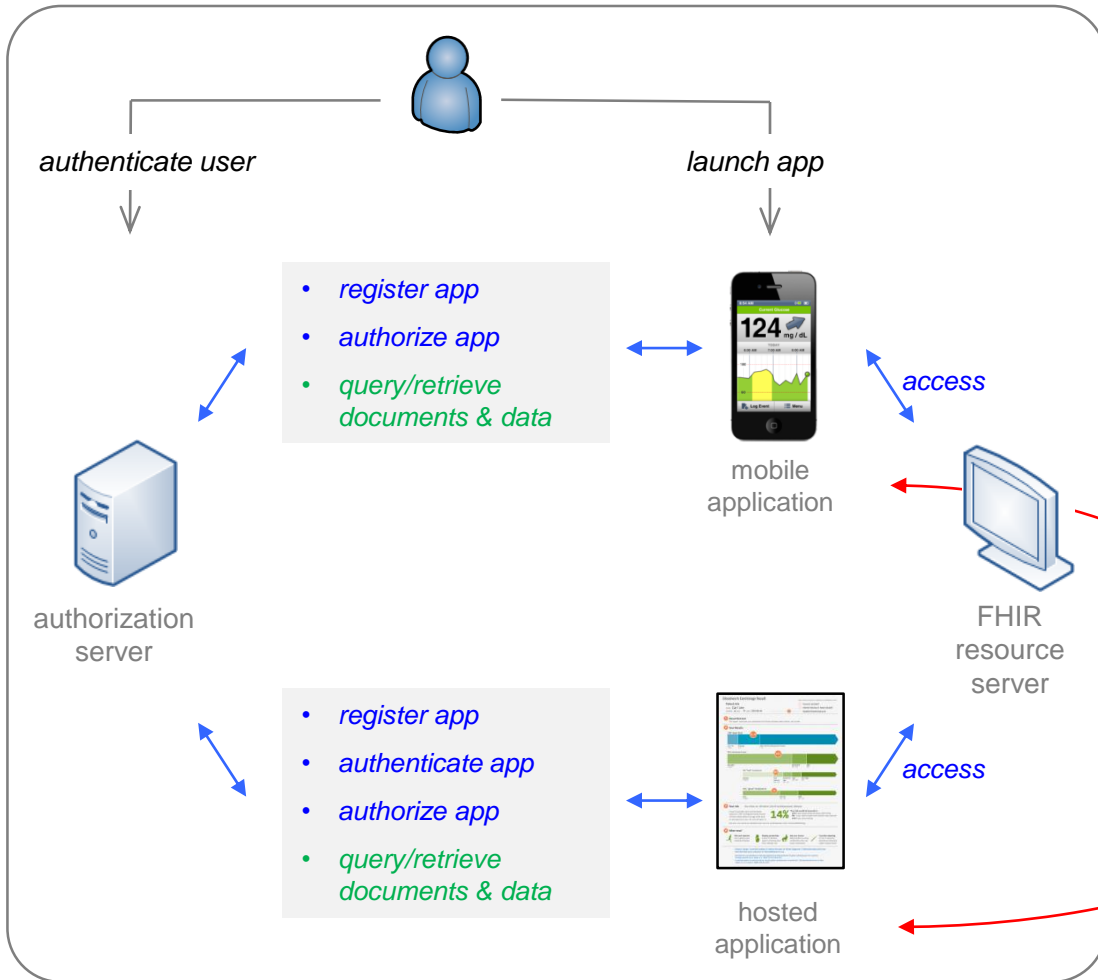
Stewardship

- The FHIR Data Query Profile and FHIR Document Query Profile are mapped to the general FHIR DSTU R2
- The Security Implementation Guide will eventually be incorporated in the HL7 balloting process but for this project will be developed in parallel to accompany the FHIR Data Query and Document Query Profiles and Implementation Guides

Argonaut Phase 1 and Phase 2 Scope

Phase 1: "within" enterprise

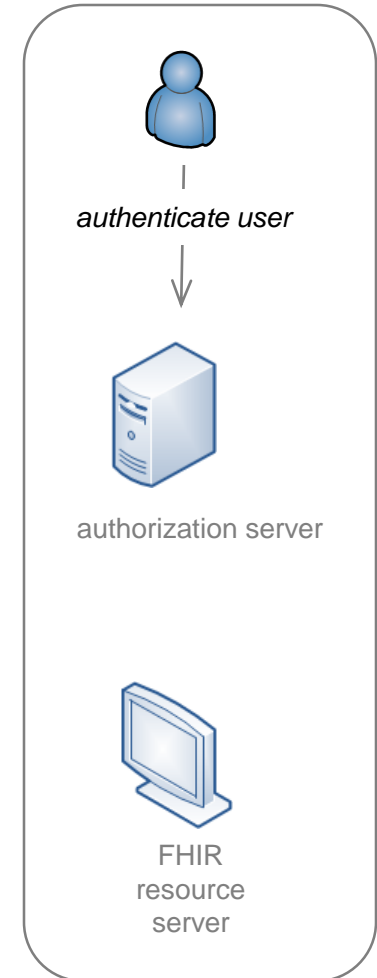
health care organization A



Phase 2: cross-enterprise

health care organization B

- *authenticate enterprise*
- *authenticate federated user identity across enterprises*
- *authorize app for access scope*
- *query/retrieve documents & data*



current Argonaut security scope
future Argonaut security scope
current Argonaut FHIR scope

Alignment with Federal Certification

The health care delivery and health care information technology markets are rapidly evolving, and so too will the balance of public versus private roles in driving interoperability

- Ultimately, we hope that successful and rapid adoption would preclude the need for further federal government intervention in interoperability standards.
- We also believe that a premature certification requirement might have an adverse effect on the development and adoption of this important work.

FHIR- and OAuth 2.0-based standards are not mature enough for inclusion in 2015 Edition Certification

- A premature certification requirement will have an adverse effect on development and adoption of FHIR and OAuth 2.0

The current ONC draft certification rule is consistent with this evolutionary approach

- Signals that FHIR-based APIs will likely be included in future certification requirements
- Gives credit for early adopters who deploy functional APIs to meet MU use cases, but does not require APIs in certified systems

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- Security development
- Implementation Program

Project Argonaut FHIR API Scope

FHIR Data Query Profiles

- A set of FHIR Resources and accompanying profiles that enables query/response of the discrete data elements contained in the meaningful use common data element set (starting point: DAF Data Element definitions)
- http://argonautwiki.hl7.org/index.php?title=Implementation_Guide

FHIR Document Query Profile

- A FHIR resource and profile based on IHE MHD that enables query/response of IHE X* metadata resources, and specifically, transition of care and patient summary CCDAs
- http://argonautwiki.hl7.org/index.php?title=Argonaut_Document_Access

99 FHIR Resources (50 DSTU1, 49 DSTU2**)

16 Argonaut Common MU Dataset Resources in blue

Clinical

AllergyIntolerance
CarePlan
CarePlan2**
ClinicalAssessment**
Condition (aka Problem)
Contraindication**
DiagnosticOrder
DiagnosticReport
FamilyHistory
Goal**
ImagingObjectSelection**
ImagingStudy
Immunization
ImmunizationRecommendation
Medication
MedicationAdministration
MedicationDispense
MedicationPrescription
MedicationStatement
NutritionOrder**
Observation
Procedure
Questionnaire
QuestionnaireAnswers**
ReferralRequest**
RiskAssessment**
Specimen
VisionPrescription**

Administrative

Alert
Appointment Response**
Appointment**
Communication**
CommunicationRequest**
Contract**
Device
DeviceComponent**
DeviceMetric**
DeviceUseRequest**
DeviceUseStatement**
Encounter
EpisodeOfCare**
Group
HealthcareService**
Location
Order
OrderResponse
Organization
Patient
Person**
Practitioner
ProcedureRequest**
RelatedPerson
Schedule**
Slot**
Substance
Supply

Infrastructure

Basic**
Binary**
Bundle**
Composition
ConceptMap**
Conformance
DataElement**
DocumentManifest
DocumentReference
ExtensionDefinition**
List
Media
MessageHeader
NamingSystem**
OperationDefinition**
OperationOutcome
Other
Profile
Provenance
SearchParameter**
SecurityEvent
Subscription**
ValueSet

Financial

ClaimResponse**
Coverage**
EligibilityRequest**
EligibilityResponse**
EnrollmentRequest**
EnrollmentResponse**
ExplanationOfBenefit**
InstitutionalClaim**
OralHealthClaim**
PaymentNotice**
PaymentReconciliation**
PendedRequest**
PharmacyClaim**
ProfessionalClaim**
Readjudicate**
Reversal**
StatusRequest**
StatusResponse**
SupportingDocumentation**
VisionClaim**

Argonaut Requirements: FHIR Resources and DAF Profiles

Meaningful Use conceptual data element	DAF profile	FHIR Resource
Medication allergies	DAFAllergyIntolerance	AllergyIntolerance
Laboratory Order(s)	DAFDiagnosticOrder	DiagnosticOrder
Laboratory Test(s)	DAFDiagnosticReport	DiagnosticReport
Encounter Diagnoses	DAFEncounter	Encounter
Family Health History	DAFFamilyMemberHistory	FamilyMemberHistory
Immunizations	DAFImmunization	Immunization
Laboratory Result Value(s)	DAFLabResults	Observation
Medications	DAF profiles for medications, DAFMedication, DAFMedicationStatement, DAFMedicationAdministration, DAFMedicationDispense, DAFMedicationPrescription	Medication, MedicationStatement, MedicationAdministration, MedicationDispense, MedicationPrescription
Patient name, Sex, Date of Birth, Race, Ethnicity, Preferred Language	DAFPatient	Patient
Problems	DAFCondition (Problem)	Condition
Procedures	DAFProcedure	Procedure
Smoking status	DAFSmokingStatus	Observation
Vital Signs (Height, weight, BP, BMI)	DAFVitalSigns	Observation
MedicationAllergies list, Problem list, Medication List, Immunizations, Encounters, Laboratory Result Values	DAFAllergyIntoleranceList, DAFProblemList, DAFMedicationList, DAFImmunizationList, DAFEncounterList, DAFResultsList	List
	DAF Supporting Profiles:DAFOrganization, DAFLocation, DAFPractitioner, DAFSubstance,DAFRelatedPerson	Organization, Location, Practitioner, Substance, RelatedPerson

Source: <http://hl7.org/fhir/2015May/daf.html>

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Security Task Overview

Objectives

- To identify and characterize authentication and authorization risks associated with RESTful, FHIR-based transactions
- To enhance “SMART on FHIR” EHR Authorization Profiles as needed to address identified risks

Authentication and Authorization for RESTful, FHIR based transactions

- Authentication – The provision of strong evidence that a subject (person or software) is the entity it claims to be
- Authorization – The granting (or denial) of access to a resource in accordance with the requester’s entitlements
- Does not include identity management (e.g., identity proofing, credentials management)
- Phase 1 does not include identity federation between organizations

OAuth 2.0 and OpenID Connect Implementation Guidance

- Focus on enhancing “SMART on FHIR” implementation guidance, informed by other existing OAuth 2.0 and OpenID Connect implementation guidance

Broad Definitions

“EHR System” – any system that holds and controls individually identifiable health data

“Provider approved” – named application that has been approved and registered by the data holder

“Web application” – hosted on trusted server and capable of protecting a secret used to authenticate its own identity

“Mobile app” – incapable of providing assured protection of secrets

Use Case Considerations

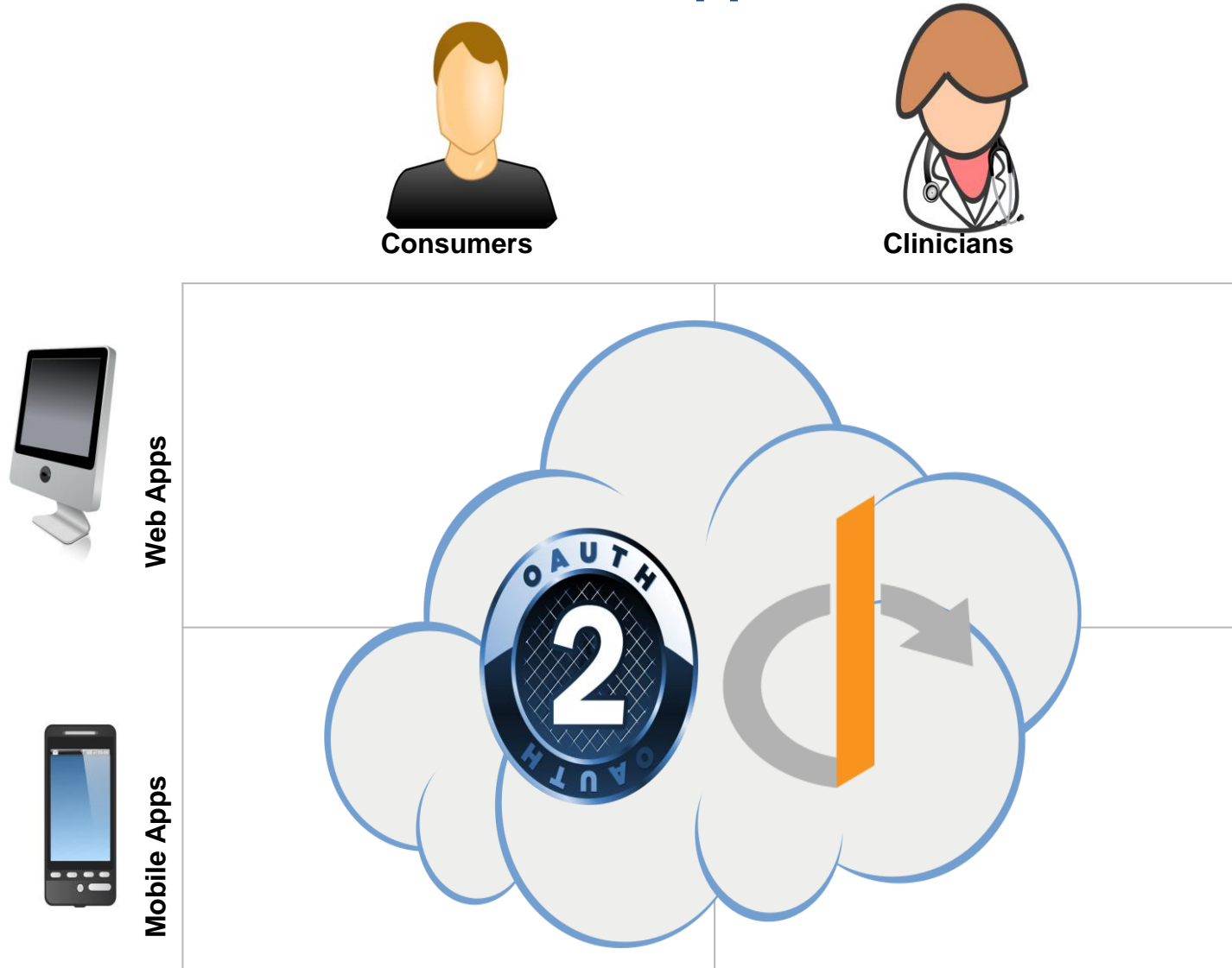
These specifications will introduce a new architectural pattern (REST), a new style for accessing data and services (FHIR), and new, more flexible and open, methods for authorizing access to health information (OAuth 2.0)

For a healthcare organization, “newness” represents risk

Therefore, we defined use cases that are simple, yet functional, and that address both real security risks and trust risks associated with potential discomfort with these new ways of doing things, as both of these can impede vendor and provider adoption

Once these methods and technologies are safely implemented, greater functionality will follow

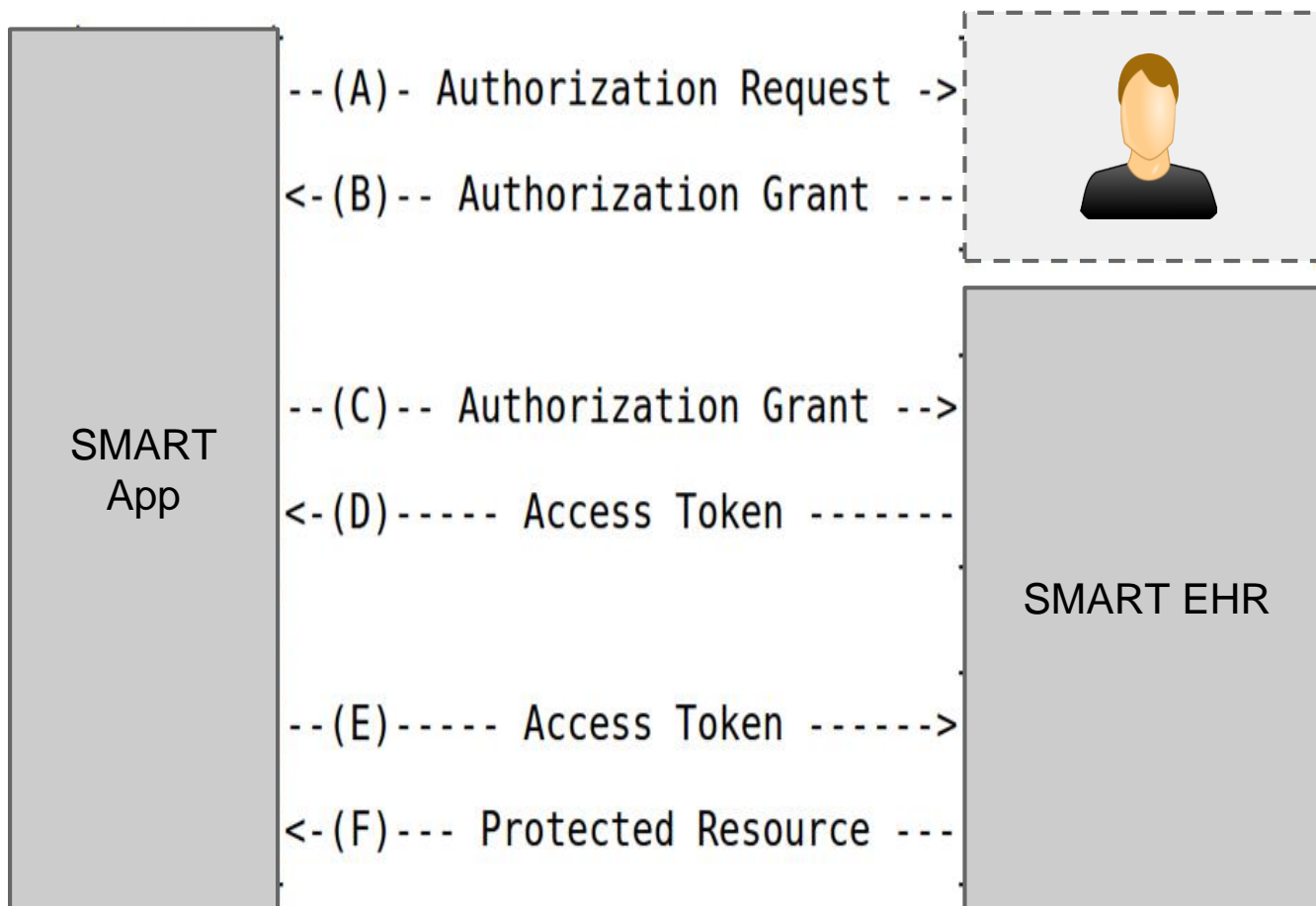
Use Cases for App Launch: 2x2



Use Cases

- 1. Patient uses provider-approved, hosted web application to access health data**
 - Client type: Deployment-specific "client_id" with pre-registered "redirect_uri" and with "client_secret")
- 2. Patient uses provider-approved mobile app to access health data**
 - Client type: Deployment-independent "client_id" with pre-registered "redirect_uri" and without "client_secret"
- 3. Clinician uses provider-approved, hosted web application to access health data**
- 4. Clinician uses provider-approved mobile app to access health data**

What's a *Launch*? (cont)



Note: SMART describes roles of Resource Server + Authorization Server as a single "EHR" unit.

Under the hood, they can be separate -- but apps don't know or care.

Figure 1: Abstract Protocol Flow

What's a *Launch*? (cont)

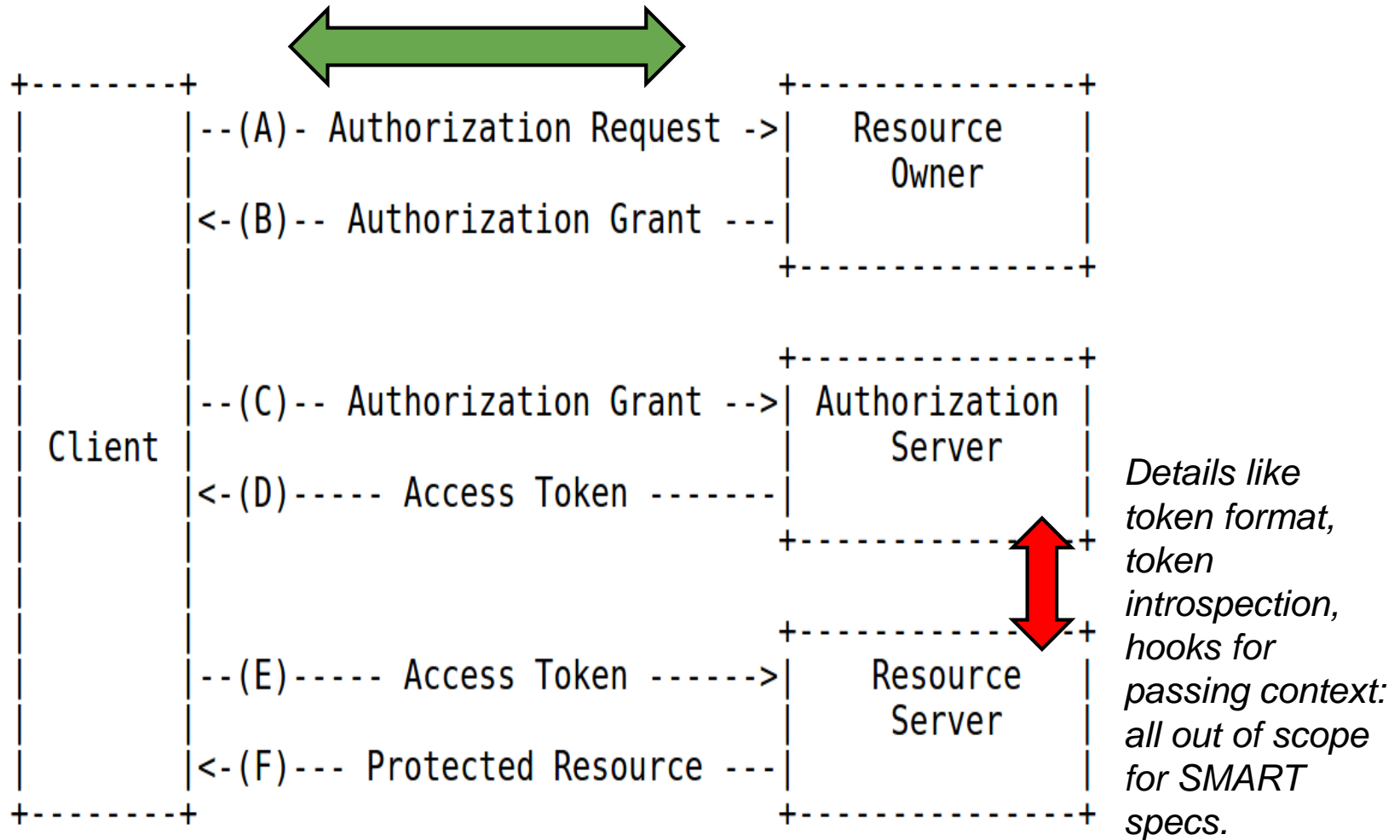


Figure 1: Abstract Protocol Flow

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Argonaut Pilot/Implementation Plan

Key aims of the Argonaut Project are to facilitate rapid adoption of FHIR APIs through:

- Narrowly focused initial use cases: Simple low-risk use cases that offer low barrier to entry, and an opportunity for organizations to get comfortable with new ways of doing things
- Specification and Implementation Guides: Rapid development of focused implementation guides for RESTful FHIR APIs and OAuth 2.0 security
- Market feedback: Market testing, pilot implementations and feedback, ideally while specification is still unstable
- Market diffusion: Engagement of broad array of market participants (vendors and providers)

Open participation in Argonaut Project

- Make available emerging specification and documentation artifacts for any interested vendor and provider participants
- Participation in structured testing sprints
- Participation in collaborative community for Q&A, information sharing, and results dissemination

Key Implementation Goals and Principles

Participation

- Agree to write and deploy working code
- Participate in testing sprints
- Share learnings with others through Argonaut channels
- Communicate results through Argonaut channels
- Abide by HL7 rules for IP and anti-competitive practices

Scope

- Implement, test and pilot both FHIR API(s) and security
- Minimally test Argonaut-specific specs/IGs and use cases

Argonaut specs/IGs

- FHIR document-level API: IHE Mobile Access to Health Documents (MHD) to access static CCDA and other IHE X* documents
- FHIR data-level API: Query for MU common data set (DAF definitions)
- Security: SMART on FHIR OAuth 2.0 implementation guides for implementing mobile and hosted apps

Argonaut use cases

- Patient uses provider-approved, hosted web application to access health data
- Patient uses provider-approved mobile app to access health data
- Clinician uses provider-approved, hosted web application to access health data
- Clinician uses provider-approved mobile app to access health data

Tentative Schedule

Implementation Phase	Time
Pre-Sprint Setup	Through Jul 31
Sprint 1 Document-level query (MHD)	Aug 3 – Aug 14
Sprint 2 Patient demographics	Aug 17 – Aug 28
Sprint 3 Problems, Meds, Allergies	Aug 31 – Sep 11
Sprint 4 TBD by community	TBD

Pre-Sprint Setup (1 of 2)

1. Enroll on tracking sheet, if you haven't already:

- https://docs.google.com/spreadsheets/d/1JAVbVh_8M6e6amNh-btVMC114zBIJe4XytDNKIOMyZM/edit?pli=1#gid=2060997323

2. Enroll in Argonaut google group, if you haven't already:

- <http://groups.google.com/group/argonaut-project>

3. Complete Data Use Agreement for access to Argonaut data set to get credentials to access Argonaut server, if you haven't already:

- http://www.hl7.org/documentcenter/public_temp_52FAB67C-1C23-BA17-0CF7A97A831DB7F8/wg/argonaut/Argonaut%20Project%20Data%20Use%20Agreement-1%20Mar%202015.pdf

4. Setup your FHIR server and/or client

- Instructions can be found in the Argonaut Project Participation Kit
- http://www.hl7.org/documentcenter/public_temp_53287C46-1C23-BA17-0C9B0FFFE74A575E/wg/argonaut/Argonaut%20Participation%20Kit%20Version%201.0-13%20March%202015.pdf

5. Confirm handshake with FHIR server

- <http://argonaut.healthintersections.com.au/>

Pre-Sprint Setup (2 of 2)

Two modes of testing

- Hub-and-spoke: participants test servers/clients against Argonaut Reference Implementation
- Pairwise: participants test servers/clients against each other

For Pre-Sprint we recommend that everyone get set up against the Argonaut Reference Implementation, and we will reach out to identify who would like to participate in Pairwise testing and document:

- Server endpoints and availability
- Security processes
- Data availability
- Any specific constraints or server expectations of clients

Argonaut Testing Dashboards

Sprint 1: CCDA query

	Reference Server 1	Server 2	Server 3	...	Server N
Reference Client 1	NA	Green	Red	Green	Green
Client 2	Green	Yellow	Green	Green	Red
Client 3	Red	Green	Yellow	Green	Green
...	Green	Green	Red	Red	Green
Client N	Red	Yellow	Green	Green	Yellow

Goal will be to share results for as much pairwise testing as possible

Sprint Structure

Sprint scripts for each sprint

- Link will be posted for each sprint at: <https://github.com/argonautproject/implementation-program/wiki>
- In the sprint tracking sheet, you should document
 - What you intend to do, and when, and with whom
 - Detailed results
 - Issues

Kick-off call at beginning of each sprint

- Review any outstanding issues from previous sprint
- Go over expectations and participants for next sprint
- FHIR SMEs will be available to answer questions

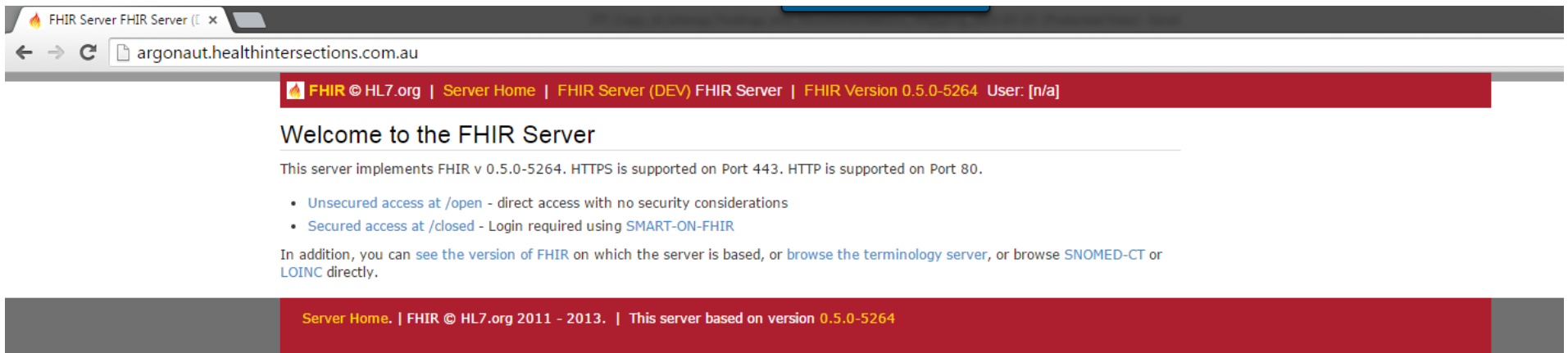
Communication

- Collaboration: <http://groups.google.com/group/argonaut-project>
- Logging server issues: <https://github.com/grahamegrieve/fhirserver/issues>
- Logging specification/IG issues: <https://github.com/argonautproject/argonautproject/issues>
- Tracking results: <https://github.com/argonautproject/implementation-program/wiki>

Argonaut Reference Implementation

Reference implementation is on Argonaut Server

- <http://argonaut.healthintersections.com.au/>
- Maintained by Grahame Grieve
- Latest Argonaut FHIR and Security specifications
- Project may add another reference implementation site to address capacity



The screenshot shows a web browser window with the URL argonaut.healthintersections.com.au. The page has a red header bar with navigation links: [FHIR © HL7.org](#), [Server Home](#), [FHIR Server \(DEV\)](#), [FHIR Server](#), [FHIR Version 0.5.0-5264](#), and [User: \[n/a\]](#). The main content area is white and contains the following text:

Welcome to the FHIR Server

This server implements FHIR v 0.5.0-5264. HTTPS is supported on Port 443. HTTP is supported on Port 80.

- [Unsecured access at /open](#) - direct access with no security considerations
- [Secured access at /closed](#) - Login required using [SMART-ON-FHIR](#)

In addition, you can [see the version of FHIR](#) on which the server is based, or [browse the terminology server](#), or browse [SNOMED-CT](#) or [LOINC](#) directly.

The footer is a red bar with the text: [Server Home](#). | FHIR © HL7.org 2011 - 2013. | This server based on version [0.5.0-5264](#)

Unsecured Access

FHIR RESTful Server - FHIR x

argonaut.healthintersections.com.au/open

FHIR © HL7.org | Server Home | Health Intersections FHIR Server | FHIR Version 0.5.0-5264 | User: ANONYMOUS (104.247.40.194)

Health Intersections FHIR Server

Welcome ANONYMOUS (104.247.40.194) (or use [Secure API](#))

This is an implementation of the RESTful FHIR specification found at <http://hl7.org/fhir>. This server has a baseURL (see the FHIR specification) of "http://argonaut.healthintersections.com.au/open". This server defines some [extensions to the API](#), and also offers [Terminology Services](#)

System Operations:

- [Conformance Profile](#) (or as [xml](#) (or [JSON](#)))
- [Tags defined on this System](#)
- [General Search](#)
- [History for the whole system](#) (History of all resources)
- [Upload Services](#)
- Create/Edit a new resource based on the profile:

This server hosts the following resource types:

Type	# stored	Operations	Type	# stored	Operations
AllergyIntolerance	3909	Profile	List	17974	Profile
Appointment	0	Profile	Location	3365	Profile
AppointmentResponse	0	Profile	Media	0	Profile
AuditEvent	8541	Profile	Medication	33470	Profile
Basic	0	Profile	MedicationAdministration	0	Profile
Binary	2979	n/a	MedicationDispense	0	Profile
BodySite	0	Profile	MedicationPrescription	0	Profile
Bundle	0	Profile	MedicationStatement	33470	Profile
CarePlan	0	Profile	MessageHeader	0	Profile
Claim	0	Profile	NamingSystem	1	Profile
ClaimResponse	0	Profile	NutritionOrder	0	Profile
ClinicalImpression	0	Profile	Observation	196457	Profile
Communication	0	Profile	OperationDefinition	18	Profile
CommunicationRequest	0	Profile	OperationOutcome	0	Profile

Secured Access

The screenshot shows the Health Intersections FHIR Server interface. At the top, there is a navigation bar with the following text: "FHIR © HL7.org | Server Home | Health Intersections FHIR Server | FHIR Version 0.5.0-5264 | User: Micky Tripathi". Below this is the main heading "Health Intersections FHIR Server" and a welcome message "Welcome Micky Tripathi".

The interface provides information about the RESTful FHIR specification and offers "Terminology Services". Under "System Operations", there is a list of actions:

- Conformance Profile (or as xml (or JSON))
- Tags defined on this System
- General Search
- History for the whole system (History of all resources)
- Upload Services
- Create/Edit a new resource based on the profile: ValueSet [dropdown] [GO]

Below the operations, it states "This server hosts the following resource types:" followed by a table with two columns of resource types and their details.

Type	# stored	Operations	Type	# stored	Operations
AllergyIntolerance	3909	Profile Updates Search Tags	List	17974	Profile Updates Search Tags
Appointment	0	Profile Updates Search Tags	Location	3365	Profile Updates Search Tags
AppointmentResponse	0	Profile Updates Search Tags	Media	0	Profile Updates Search Tags
AuditEvent	8543	Profile Updates Search Tags	Medication	33470	Profile Updates Search Tags
Basic	0	Profile Updates Search Tags	MedicationAdministration	0	Profile Updates Search Tags
Binary	2979	n/a Updates n/a Tags	MedicationDispense	0	Profile Updates Search Tags
BodySite	0	Profile Updates Search Tags	MedicationPrescription	0	Profile Updates Search Tags
Bundle	0	Profile Updates Search Tags	MedicationStatement	33470	Profile Updates Search Tags
CarePlan	0	Profile Updates Search Tags	MessageHeader	0	Profile Updates Search Tags
Claim	0	Profile Updates Search Tags	NamingSystem	1	Profile Updates Search Tags

Next Steps

Go through Pre-Sprint Setup steps

Decide on your testing approach – we will reach out to you for more information

Begin to align your resources for testing sprints

Look for invite to Kickoff Call for Sprint #1 on August 3

Thank you for joining the Argonaut Project!

Please direct any general questions, comments, concerns to:

- Administrative/Logistical: Jennifer Monahan (jmonahan@maehc.org)
- Policy/Technical: Micky Tripathi (mtripathi@maehc.org)