The Office of the National Coordinator for Health Information Technology

HEART Overview

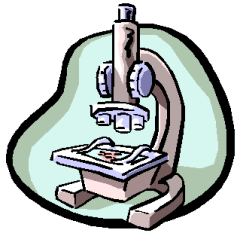
Nancy Lush, Lush Group, Inc

HEART Overview

- Why HEART?
- What is HEART?
- Value of HEART

Healthcare Challenges/Gaps (1 of 2)

- Needs to see a specialist outside of her healthcare system
- Share health data with a spouse or adult child



- Share health data with a research organization
- A new provider does not have access to a patient's record

Healthcare Challenges/Gaps (2 of 2)

- Ability to share relevant device data
- Needs to keep some aspects of their data private
- Patients travel or relocate seasonally
- Decision making by an advocate or medical power of attorney
- Emergency responder access

Pain Points – the human perspective

- Frustration
- Waste of time
- Negative impact of care

Why HEART?

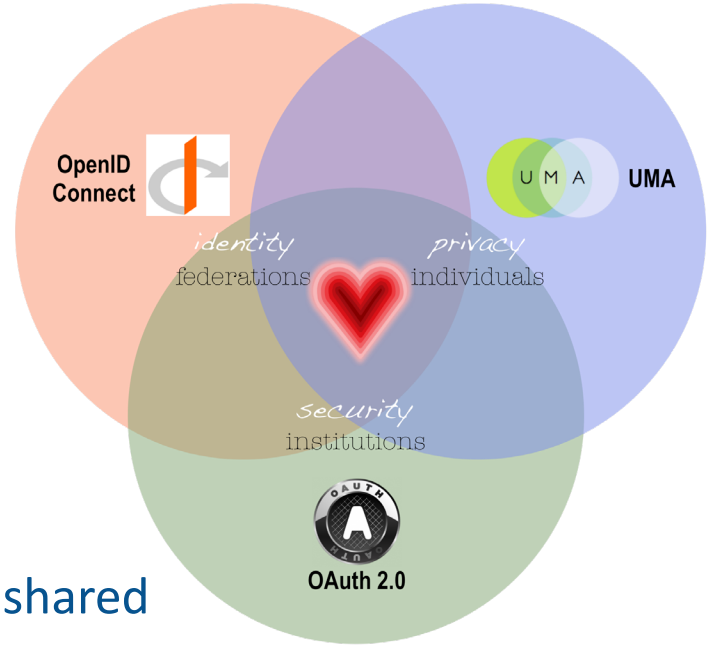
- Created to address these challenges and gaps
- Enables the patient to safely share her health records with users of her choice, in an interoperable way that respects and honors patient security and privacy
- Enables patient directed sharing of their clinical data

What is HEART?

HEART (HEAlth Relationship Trust)
is a set of profiles that enable patients
to control how, when, and with whom
their clinical data is shared.

What is HEART?

- Leverages existing open standards
  - FHIR / SMART on FHIR
  - OAuth 2
  - OpenID Connect
  - User Managed Access
- Best practice security standards
- Adds additional security features
- Gives patients control over how their data is shared
- Defines interoperable process for patient directed clinical data sharing



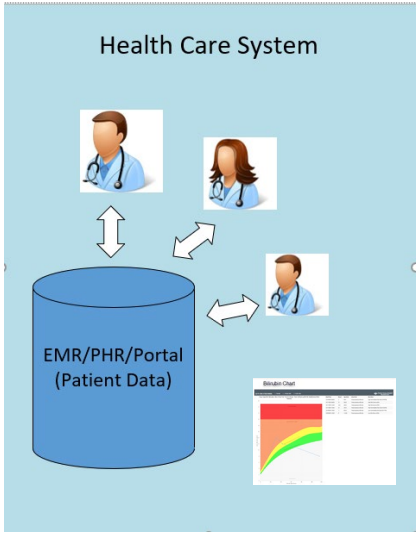
Building the Bridge to Trust

Background

Where Is the Industry Now?

Providers can access patient health data within their health care system

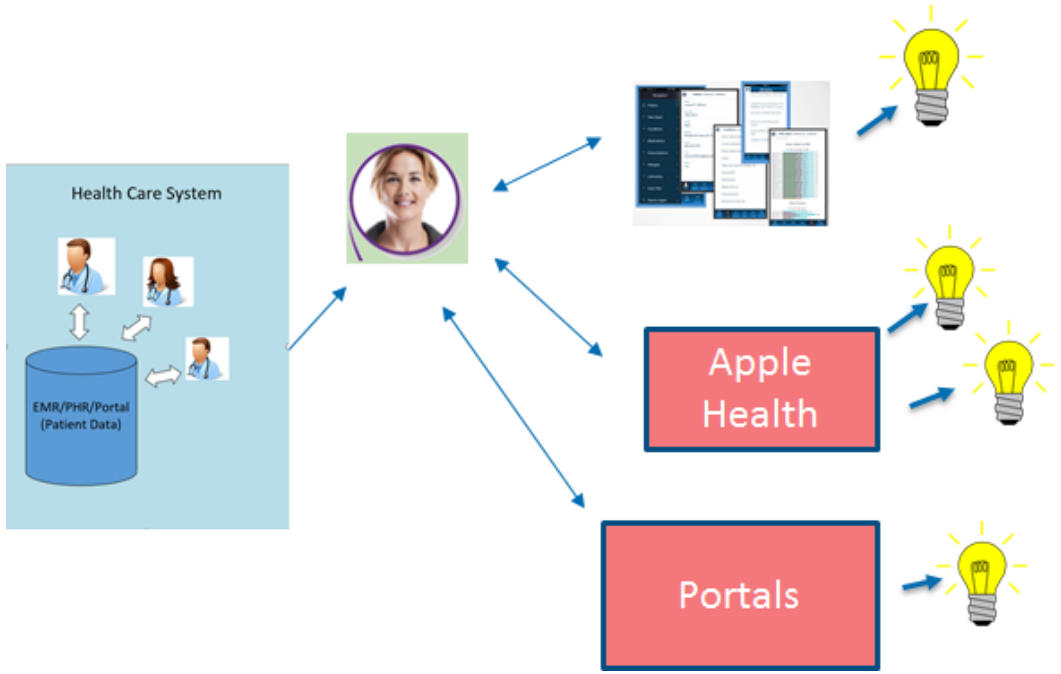
Using FHIR, innovative clinical functionality can be integrated with clinical data and made available to providers, all within their health care system



Background

Where Is the Industry Now?

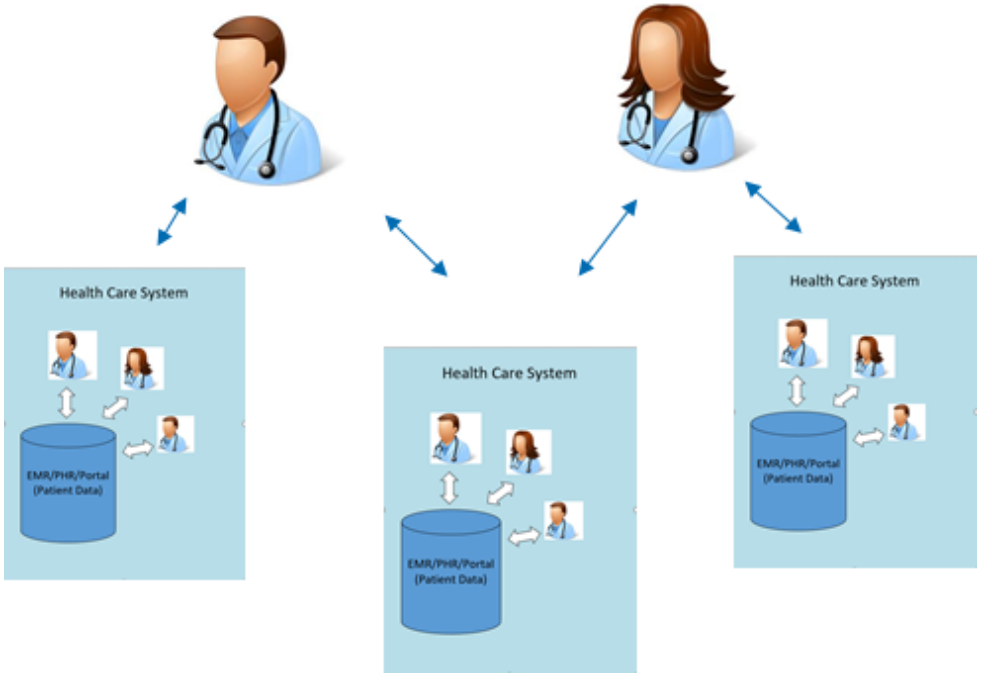
- The industry is rolling out systems where the patient can safely access her health records from her provider's EMR/portal
- This enables patient-focused innovations



Background

Industry Next Step

- Empower the patient to safely **share** her health records, with users of her choice, in an interoperable way that respects and honor patient security and privacy.

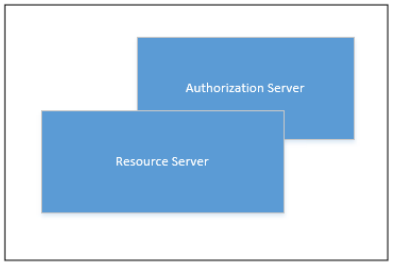


Terminology: Wide Ecosystem

Clinical data needs to be exchanged across health care systems

Background: Terminology

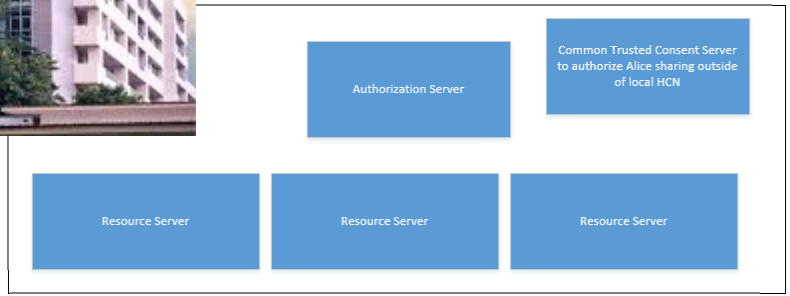
Users authenticate within one physical office



This is a ‘Narrow Ecosystem’

Background: Terminology

In a larger integrated facility, data access from multiple resources may authenticate with one server



This is still a ‘Narrow Ecosystem’

Terminology: Wide Ecosystem

Patients need to exchange clinical data across many health care systems.

Now we have a ‘Wide Ecosystem’

HEART Overview

1. HEART enables patient directed **sharing** across a wide ecosystem

Patient Directed Sharing

1. Gives patients control over how their data is shared
2. Electronic consents define patient's sharing wishes
3. Authorization is based on patient-specified policy
4. Enables multi-party sharing
5. Authorization is provided asynchronously
6. The patient makes the decision on who has access to their data

Patient Directed Sharing

Patient Directed Sharing

- The general population is becoming more aware of cybersecurity and privacy concerns
- Greater awareness of privacy concerns
- Realization of privacy rights and options
- Increased patient demand to exercise those rights.

HEART Overview

1. HEART enables patient directed **sharing** across a wide ecosystem
2. The patient controls who has access to their data (Patient Directed)

Best Practice Security

HEART works in conjunction with Best Practice Security Standards

- We want to know that our patient Alice is really Alice
  - The patient is identified through identity assurance
  - The patient is authenticated through trusted authentication systems
- We want to know that the user requesting information is who he says he is
  - The user is identified through identity assurance
  - The user is authenticated through trusted authentication systems

Best Practice Security

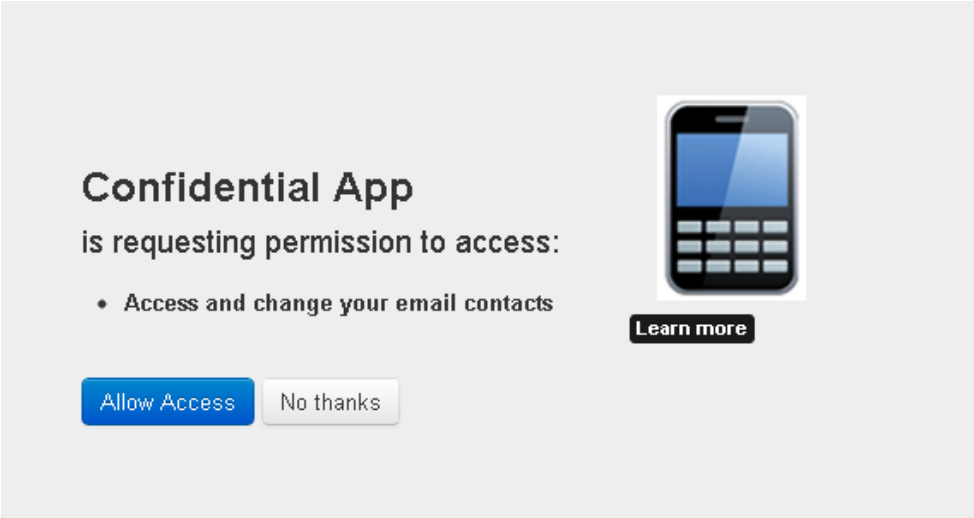
True secure delegation; no password sharing

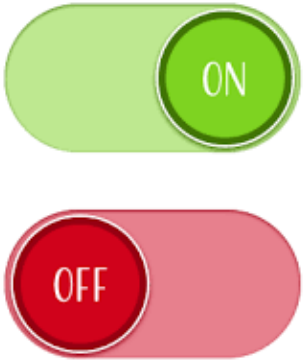
Foster compliance through standards

HEART Overview

1. HEART enables patient directed **sharing** across a wide ecosystem
2. The patient controls who has access to their data (Patient Directed)
3. HEART works in conjunction with Best Practice Security Standards

More Granular Data Management





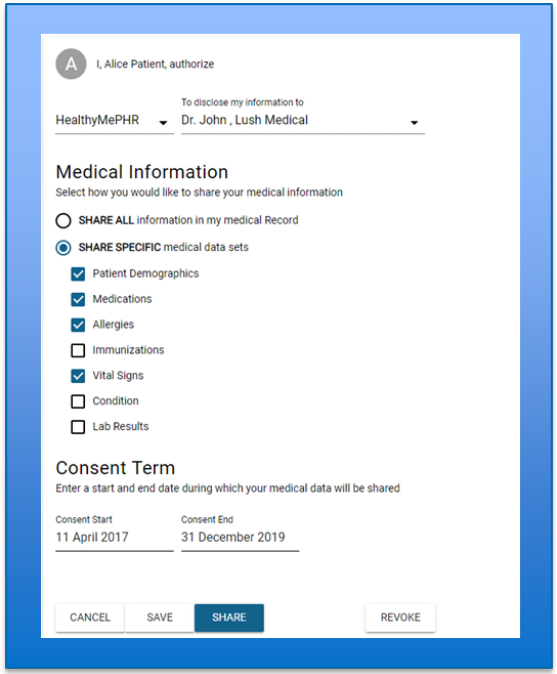
More Granular Data Management

- Which Resource?
- What Scopes?
- What sensitive data?
- The options vary per data source

More Granular Data Management

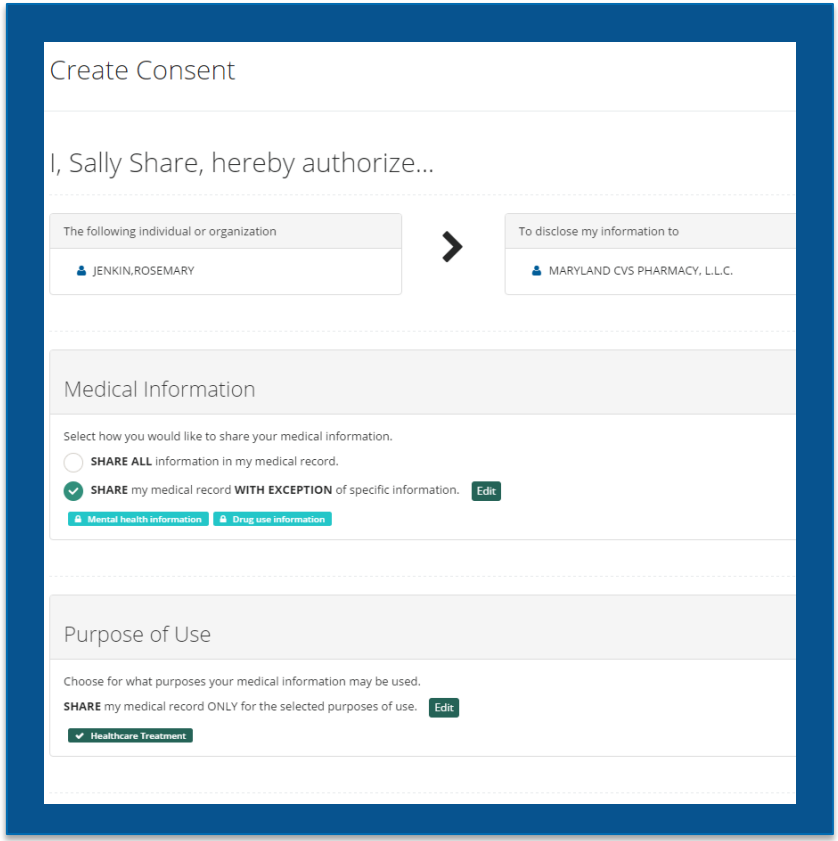
Example A

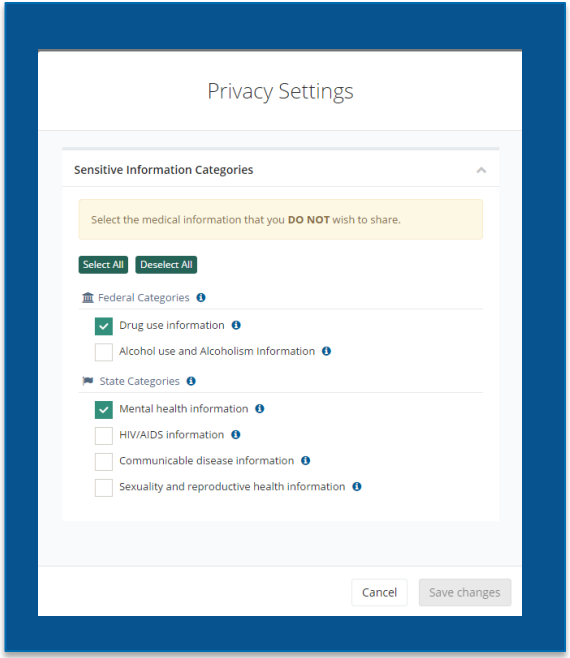
- A portal supports reading a patient's common clinical data set
- That same portal may allow users to both read and update a care plan
- The patient may chose to authorize a new specialist to read some subset of her clinical data set and update her care plan



More Granular Data Management

Example B
Consent 2 Share





HEART Overview

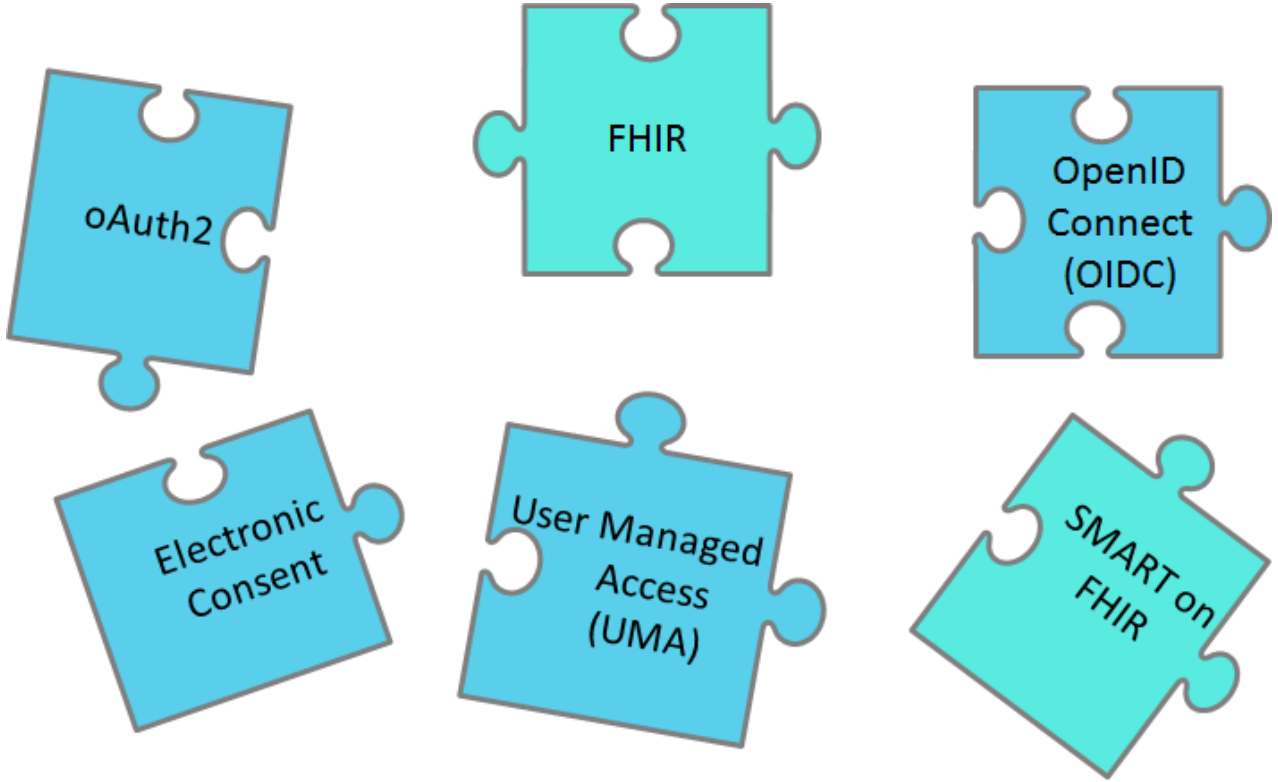
1. HEART enables patient directed **sharing** across a wide ecosystem
2. The patient controls who has access to their data
3. HEART works in conjunction with Best Practice Security Standards
4. HEART provides more granular management over protected resources

Leverages Open Standards

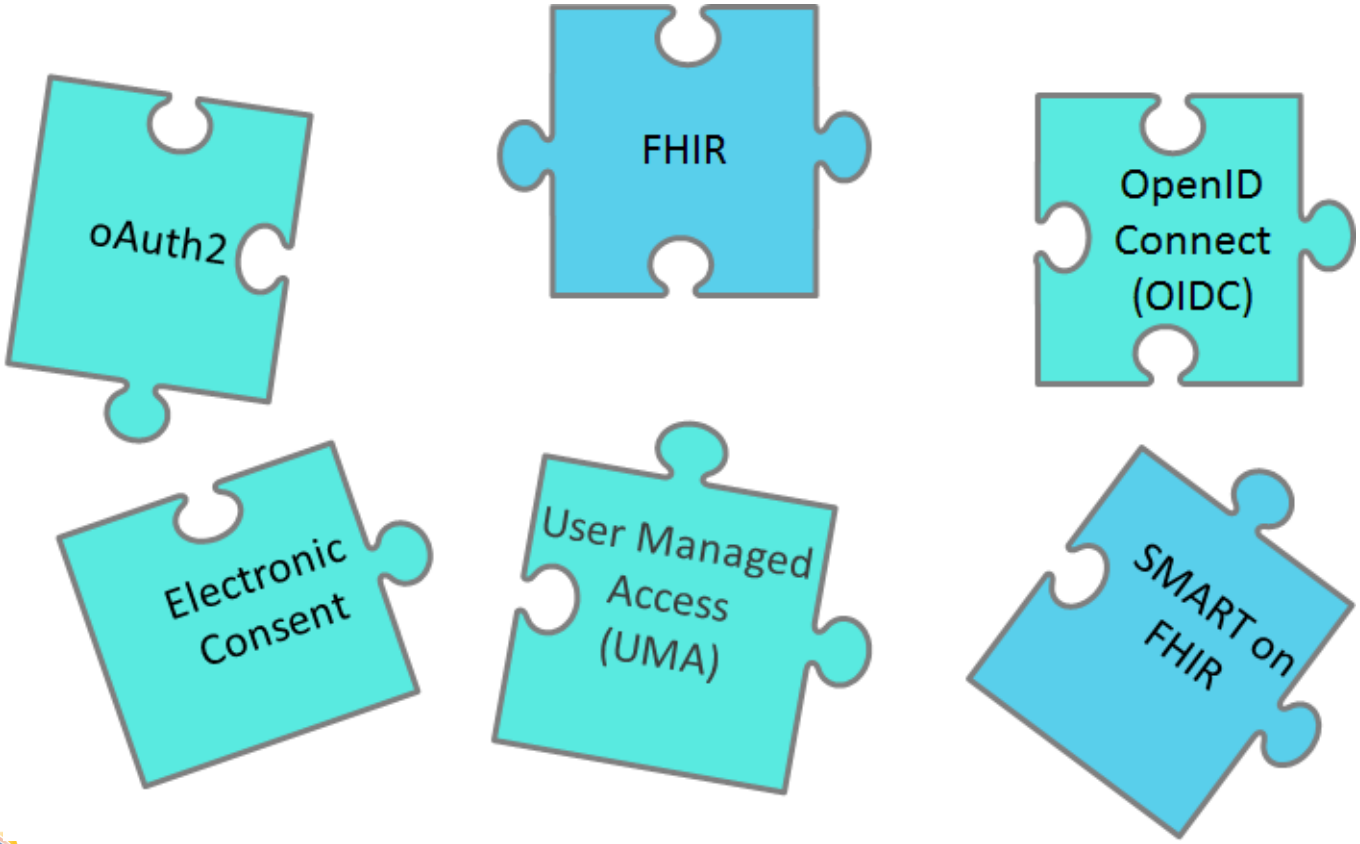
- Leverages existing open standards

- FHIR/ SMART on FHIR
- OAuth 2
- OpenID Connect
- User Managed Access

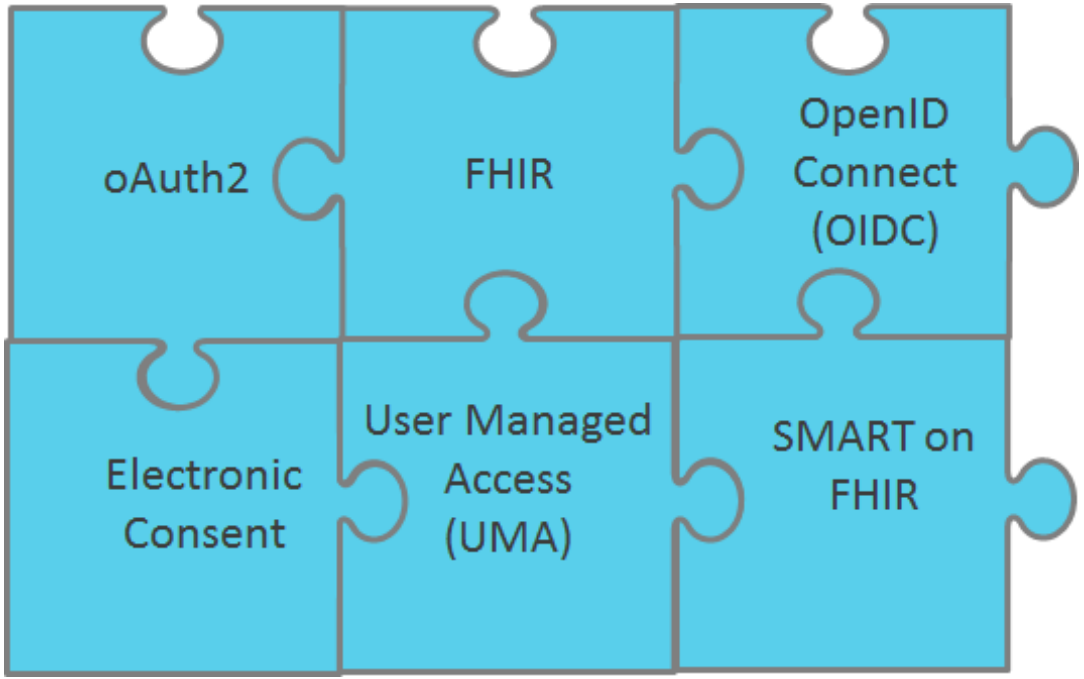
HEAlth Relationship Trust



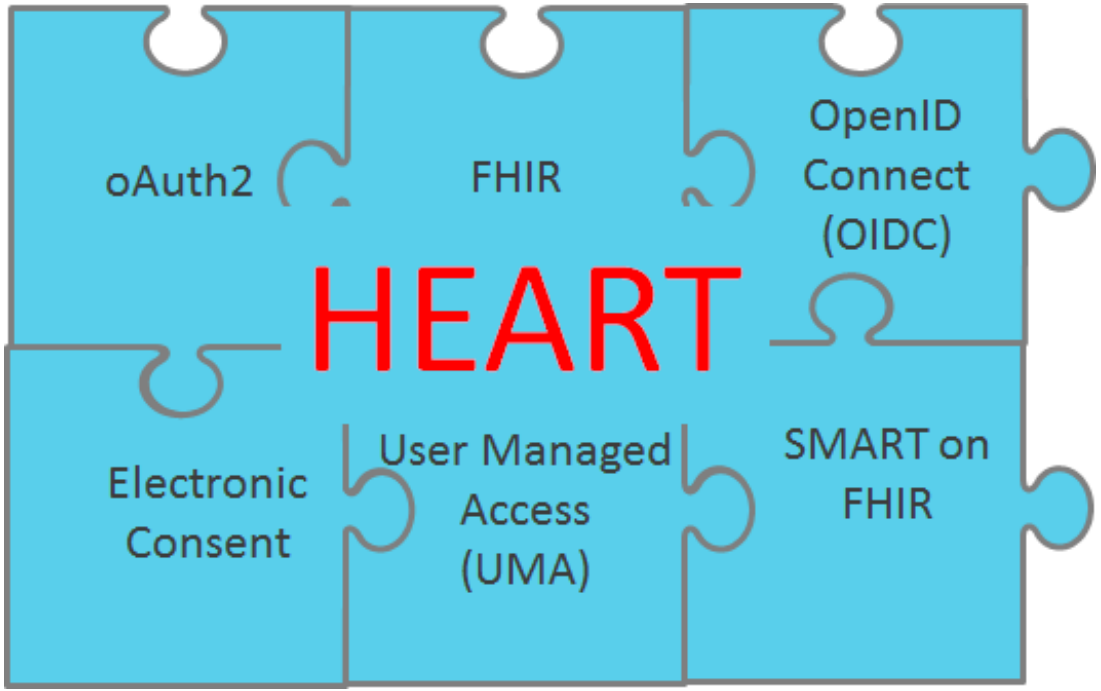
HEAlth Relationship Trust



HEART


oAuth2
FHIR
OpenID Connect (OIDC)
Electronic Consent
User Managed Access (UMA)
SMART on FHIR

HEART


oAuth2
FHIR
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HEART
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User Managed Access (UMA)
SMART on FHIR

HEART Overview

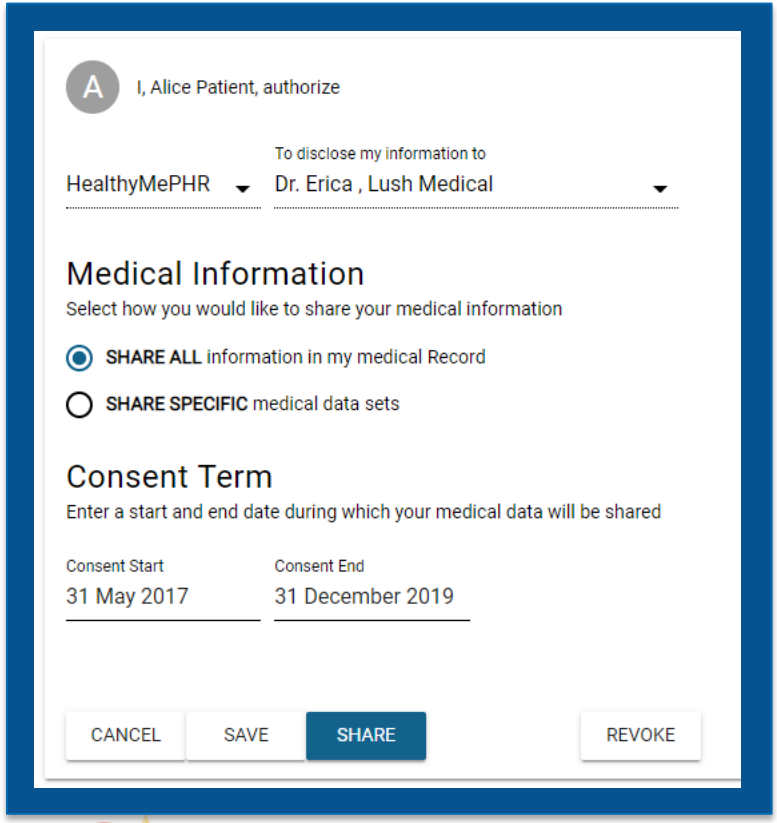
1. HEART enables patient directed **sharing** across a wide ecosystem
2. The patient controls who has access to their data
3. HEART works in conjunction with Best Practice Security Standards
4. HEART provides more granular management over protected resources
5. Leverages existing open standards

Ease of Use

- HEART has addressed pesky use case challenges

- The more difficult issues are addressed by HEART
- The patient interface is **easy** to use
- The provider interface is **easy** to use
- As this new paradigm is adopted and trust increases, sharing private clinical data will become seamless
  - Ultimately this improves health and reduces the cost of healthcare.

Ease of Use



- Patient Alice creates a policy to share with Dr. Erica, she selects her sharing preferences, and presses SHARE

SHARE

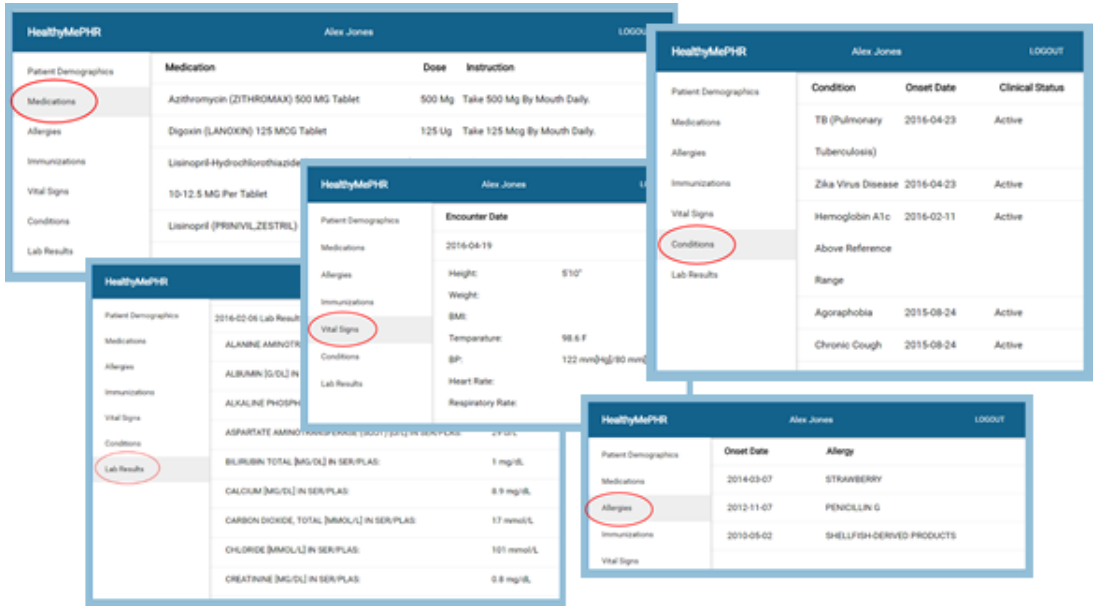
- Patient sharing is easy!

Ease of Use

Provider wishes to view clinical data

Dr John receives secure email

Dr John Clicks link, Signs in, and views Clinical Data



- Provider usage is also easy. The power is in what happens behind the scenes!

HEART Overview

1. HEART enables patient directed **sharing** across a wide ecosystem
2. The patient controls who has access to their data
3. HEART works in conjunction with Best Practice Security Standards
4. HEART provides more granular management over protected resources
5. Leverages existing open standards
6. HEART Patient and Provider clients are intended to be EASY to use

HEART Implementations

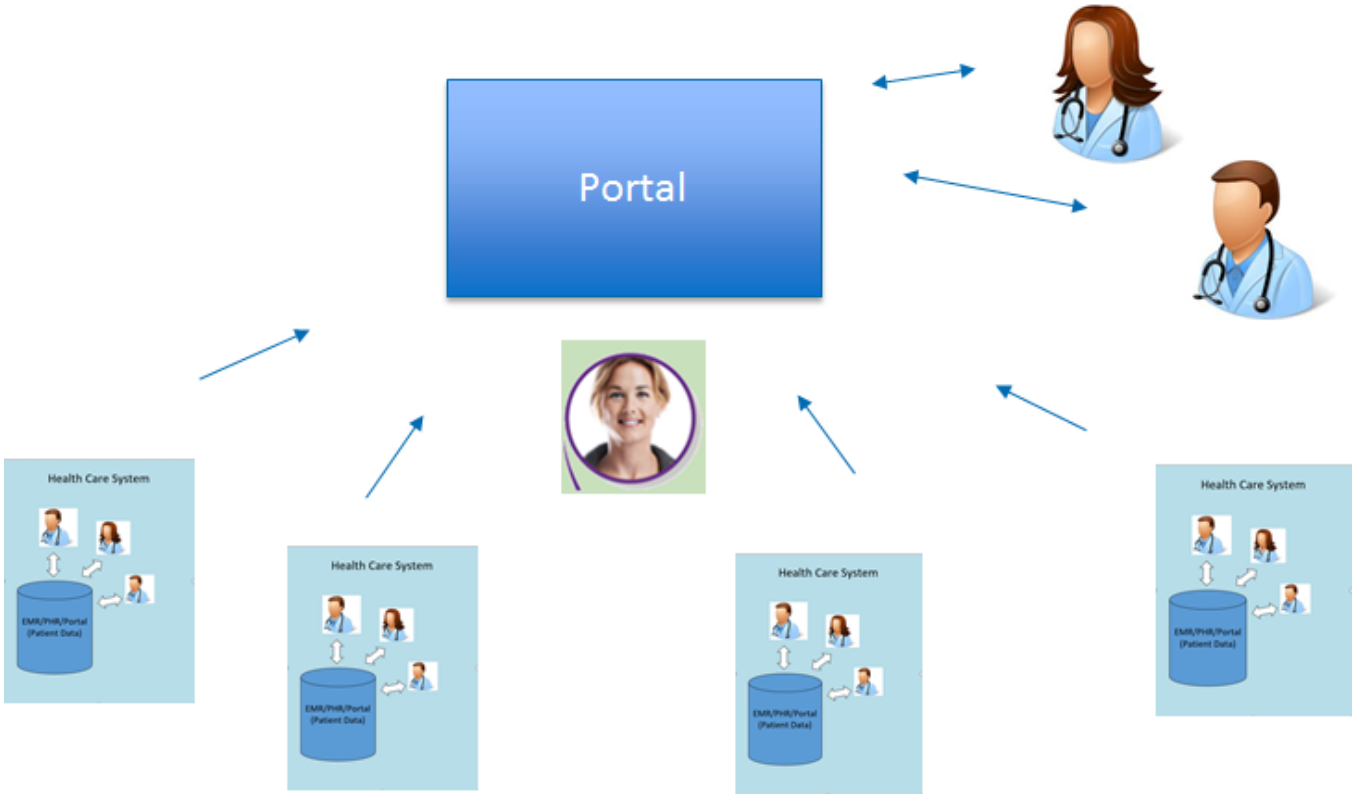
- EMR Direct/HealthToGo

- HIE of One/Trustee

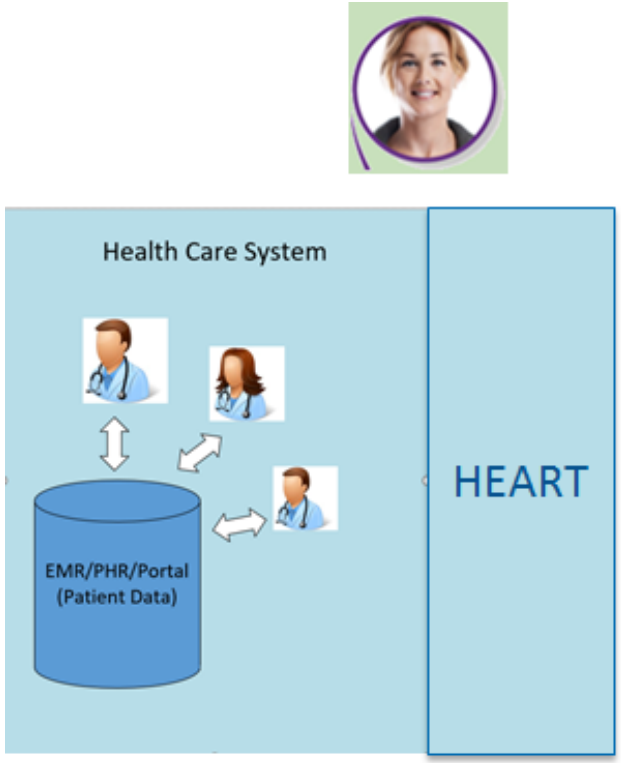
- HealthyMePHR/ShareMedData

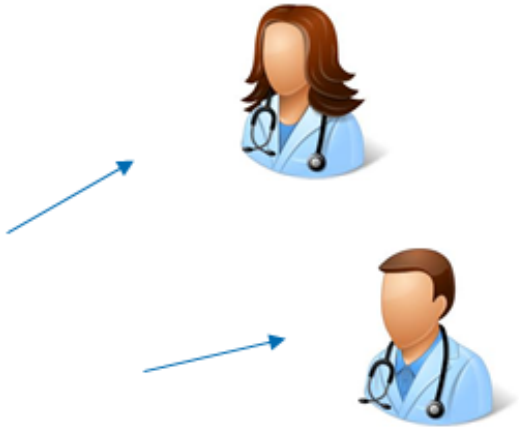
Reference implementers drafts at openid.net/wg/heart
Latest specs approved March 12, 2019

HEART Use Cases - #1 Portal

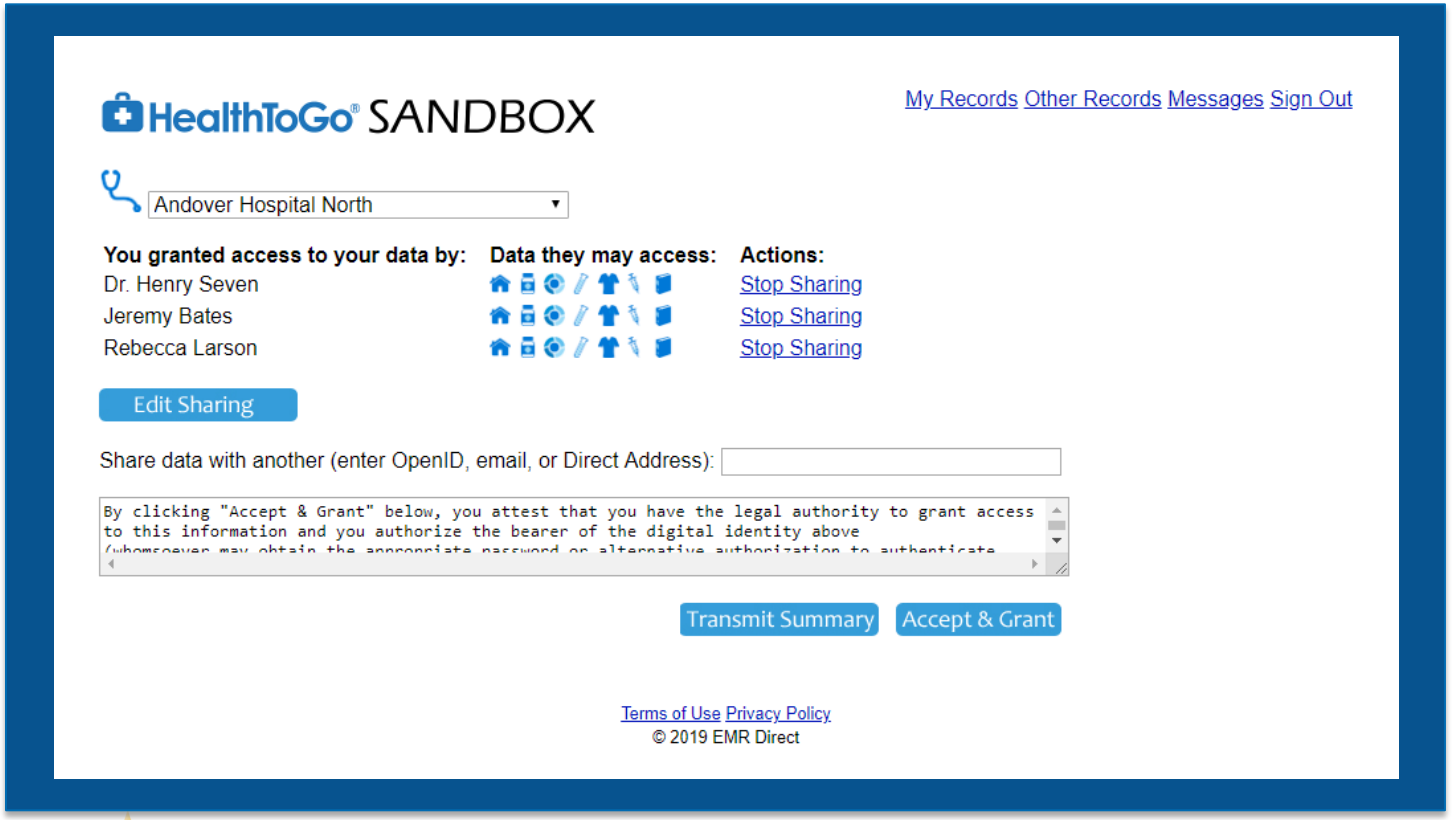


HEART Use Cases - #2 Shared from EMR (1 of 2)

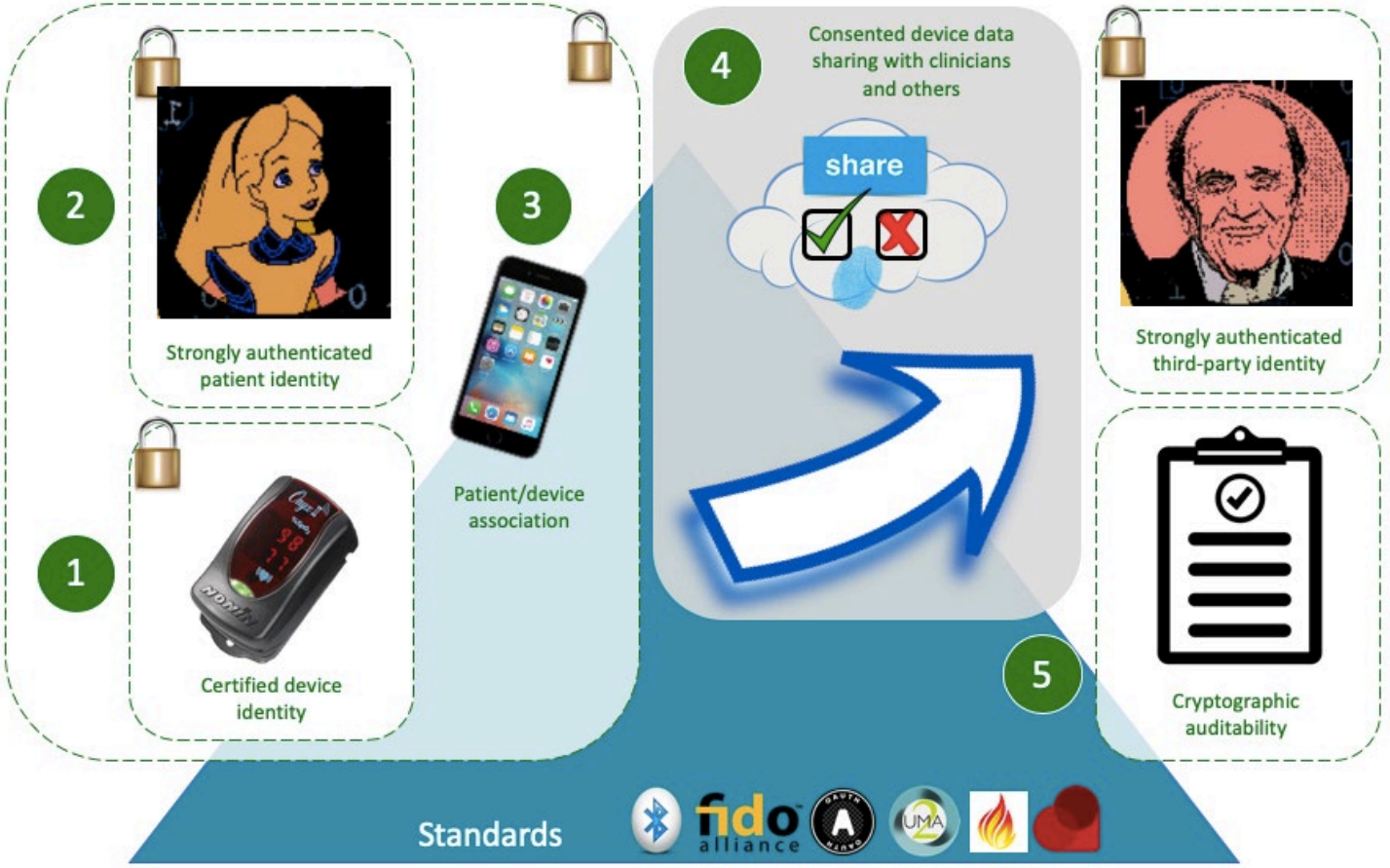




HEART Use Cases - #2 Shared from EMR (2 of 2)



HEART Use Cases - #3 Device Data Sharing



Why is HEART good for organizations?

- Leverages existing standards
- Empowers the patient
- Delivers patient-mediated sharing to a wide ecosystem
- Meets goal of seamless clinical data availability

Benefits to Providers

- Accurate data
- Adequate data
- Innovation

Benefits to Patients

- Control over access
- Transparency over who has accessed
- Empowerment
- Ability to share and consult
- Better Care

Call to Action

- openid.net/wg/heart/
- Refer to the HEART profiles and use cases for more information
- Reach out to the HEART WG to learn more and get involved

The Office of the National Coordinator for Health Information Technology

HEART Overview

CONTACT INFORMATION

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ref: http://openid.net/wg/heart/

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User-Managed Access (UMA) 2.0 Overview

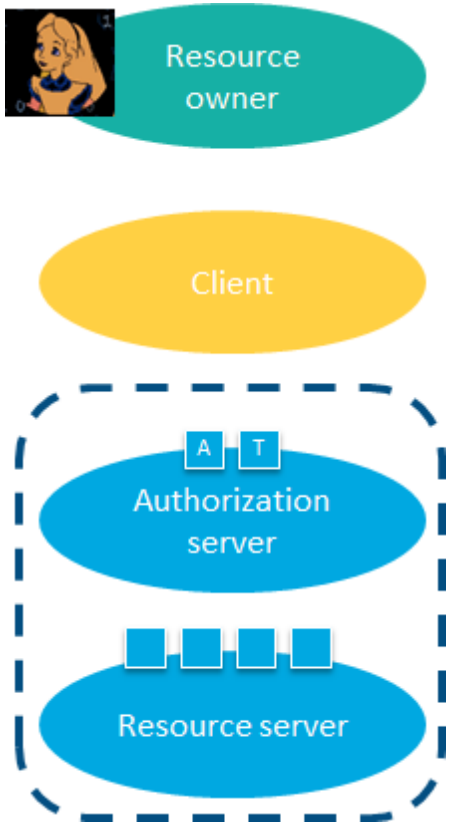
kantarainitiative.org/confluence/display/uma/Home

Eve Maler, UMA Work Group chair and HEART Working Group co-chair | @xmlgrrl | @UMAWG

OAuth enables constrained delegation of access to apps

Benefits:

- Flexible, clever API security **framework**
- Alice can **agree** to app connections and also **revoke** them



UMA adds cross-party sharing…

Benefits:

- **Secure** delegation
- Alice **can be absent** when Bob attempts access
- Helpful **error handling** for client applications

Resource owner

Requesting party

Client

A T

Authorization server

Resource server

…in a wide ecosystem…

Resource owner

Requesting party

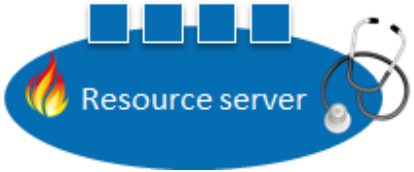
Client

Benefits:

- Alice **controls trust** between a service that hosts her resources and a service that authorizes access to them

A T

Authorization server



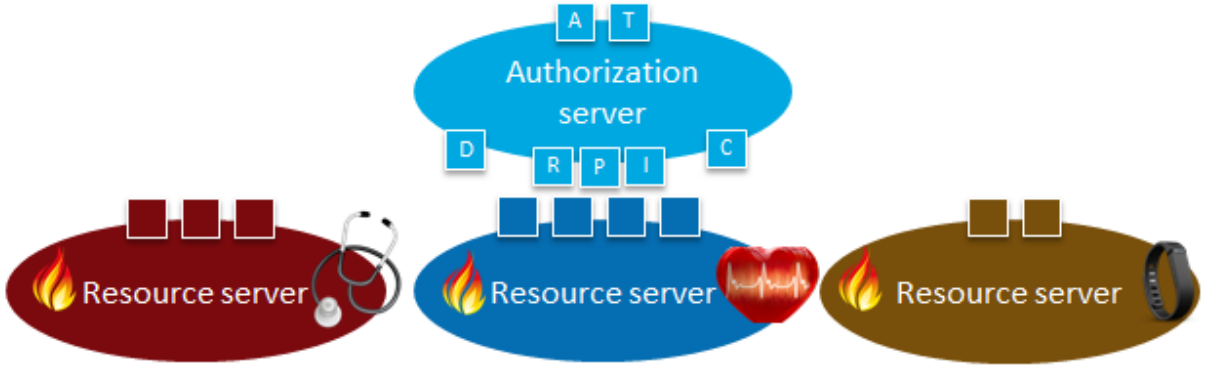
…of resource hosts

Resource owner

Requesting party

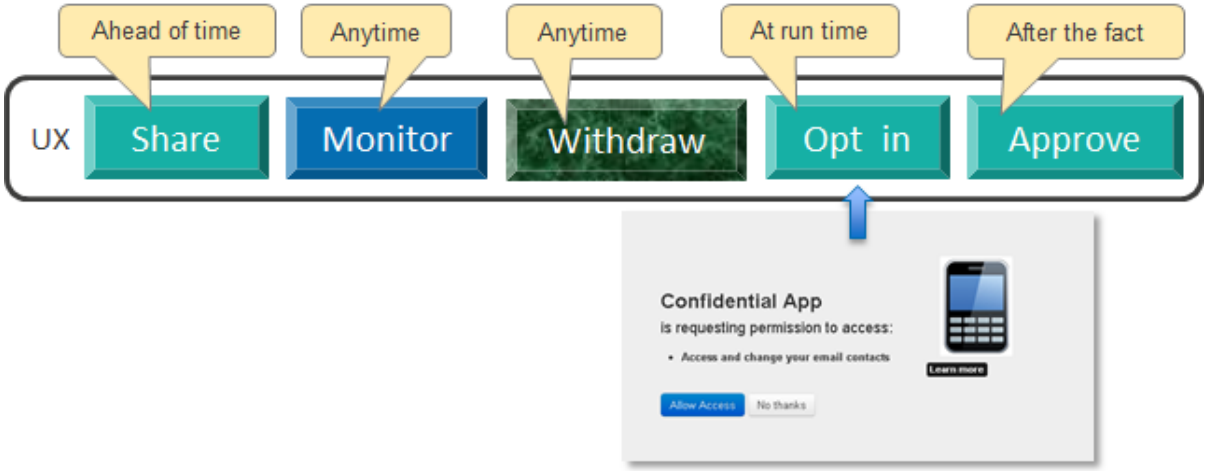
Client

Benefits:
- Resource hosts can **outsource authorization** management – and liability – to a specialist service
- Alice can **manage sharing** at a centralizable service
- Bob can **revoke *his* access** to *Alice's* resources



UMA user experience opportunities

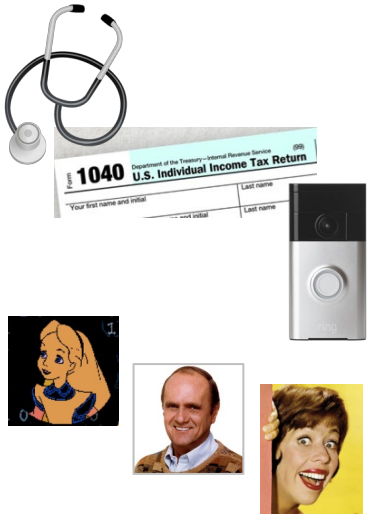
Resource owner



Benefits for service providers: a summary

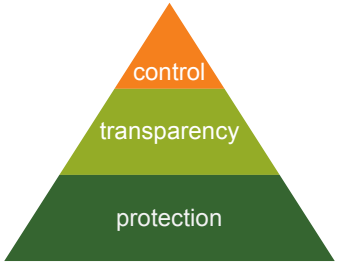
True secure delegation; no password sharing

Scale permissioning through self-service



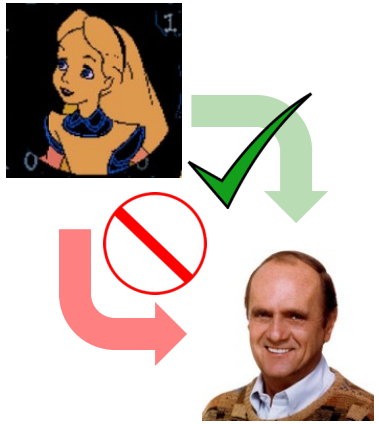
API-first protection strategy

Foster compliance through standards

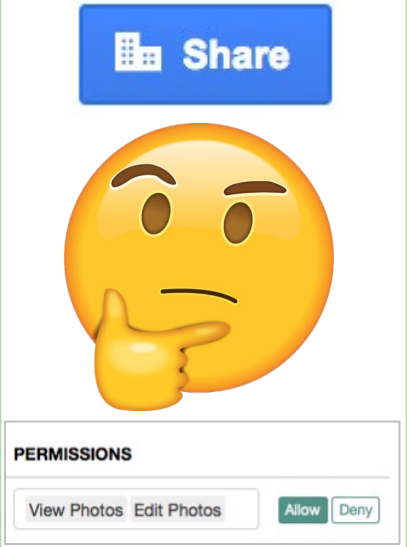


Benefits for patients and consumers: a summary

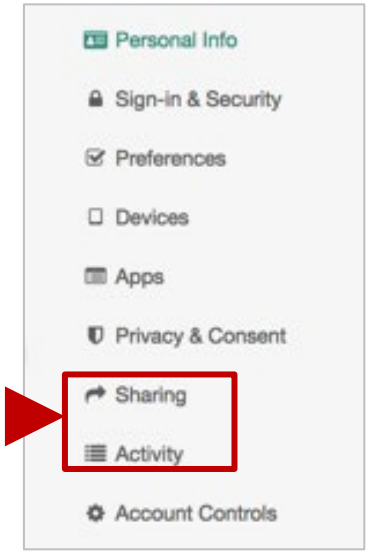
Choice in sharing with other parties



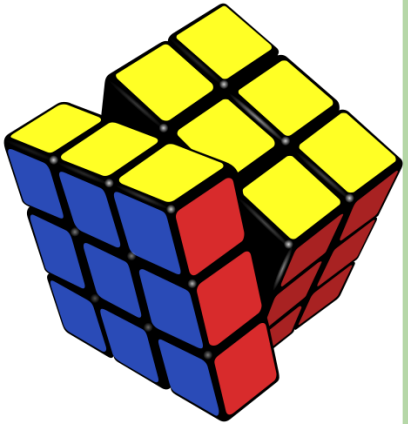
Convenient sharing/approval with no outside influence



Centralizable monitoring and management



Control of who/what/how at a fine grain



UMA in a nutshell

- Developed at Kantara Initiative; V2.0 complete in Jan 2018
- Leverages existing open standards:
  - OAuth2
  - OpenID Connect and SAML (optional but popular)
- Contributed to IETF OAuth WG in Feb ‘19
- Profiled by multiple industry sectors (financial, healthcare)
- UMA business model effort (“BLT”) supports **legal licensing** for personal digital assets
  - Example: Mother (legal guardian) manages sharing for child (data subject); child becomes old enough and starts to manage sharing herself

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User-Managed Access (UMA) 2.0 Overview

CONTACT INFORMATION

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UMA 2.0 Deep Dive

kantarainitiative.org/confluence/display/uma/Home

Eve Maler, UMA Work Group chair and HEART Working Group co-chair | @xmlgrrl | @UMAWG

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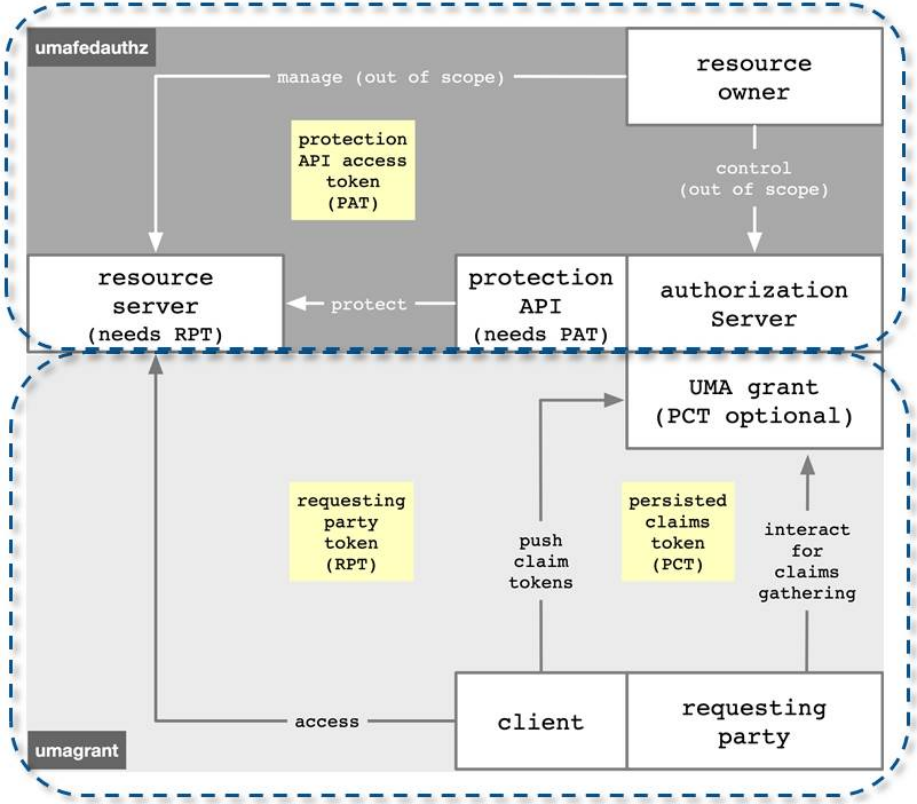
The Big Picture

The marvelous spiral of delegated sharing, squared

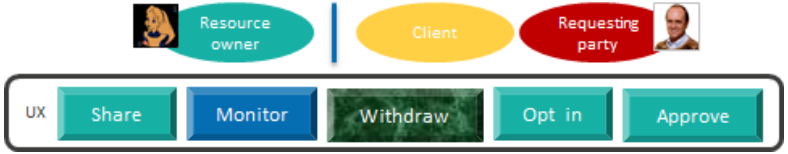
1. The **UMA grant of OAuth** enables Alice-to-Bob delegation
2. UMA **standardized an API for federated authorization** at the AS to make it centralizable
3. There are **nicknames** for enhanced and new tokens to keep them straight



The UMA extension grant adds…

docs.kantarainitiative.org/uma/wg/rec-oauth-uma-grant-2.0.html

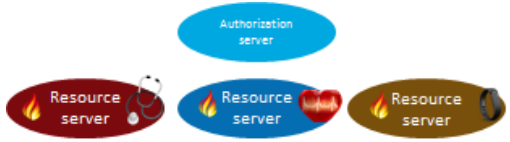
- **Party-to-party:** Resource owner authorizes protected-resource access to clients used by requesting parties
- **Asynchronous:** Resource owner interactions are asynchronous with respect to the authorization grant
- **Policies:** Resource owner can configure an AS with rules (policy conditions) for the grant of access, vs. just authorize/deny
  - » Such configurations are outside UMA's scope



UMA federated authorization adds…

docs.kantarainitiative.org/uma/wg/rec-oauth-uma-federated-authz-2.0.html

- **1-to-n:** Multiple RS's in different domains can use an AS in another domain
  - » "Protection API" automates resource protection
  - » Enables resource owner to monitor and control grant rules from one place
- **Scope-grained control:** Grants can increase/decrease by resource and scope
- **Resources and scopes:** RS registers resource details at the AS to manage their protection



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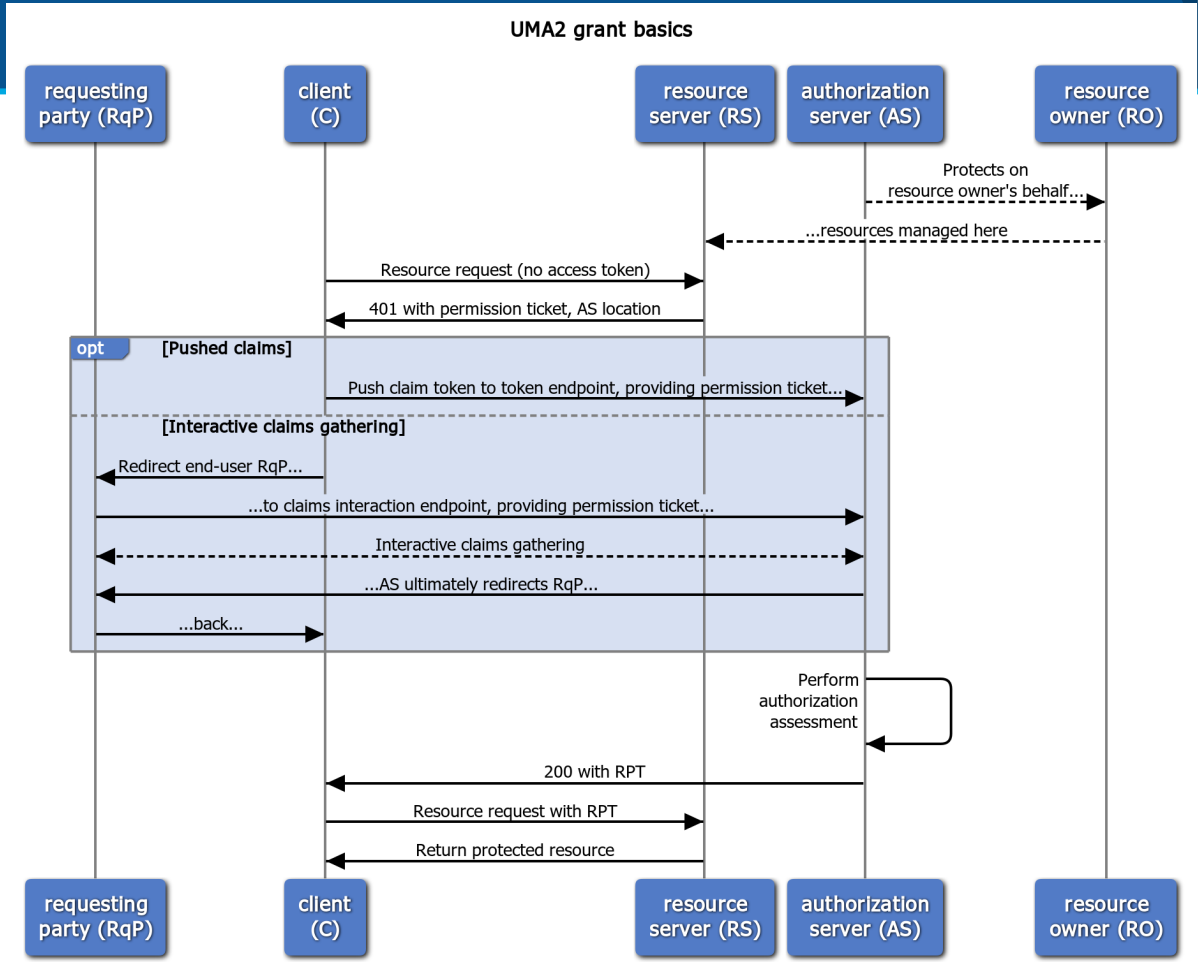
The UMA Grant

The UMA extension grant flow and its options

- The AS is acting as an **agent** for an absent RO
- The client's first resource request is **tokenless**
- The RS provides a **permission ticket** and allows **AS discovery**
- There are two **claims collection options** for meeting policy
- Authorization assessment and token issuance has **guardrails**
- RPTs can be **upgraded**, **revoked**, **introspected**, and **refreshed**



The permission ticket: how you *start* building a bridge of trust

- **Binds client, RS, and AS:** Every entity may be **loosely coupled**; the whole flow needs to be bound
  - » It's like an overarching state parameter or "ticket-getting ticket"
  - » Or maybe even a bit like an authorization code
- **Refreshed for security:** The client can retry RPT requests after non-fatal AS errors, using either claims collection option of the grant flow
  - » The AS **refreshes** the permission ticket when responding with such errors

Pushed claims scenario: for wide-ish ecosystems

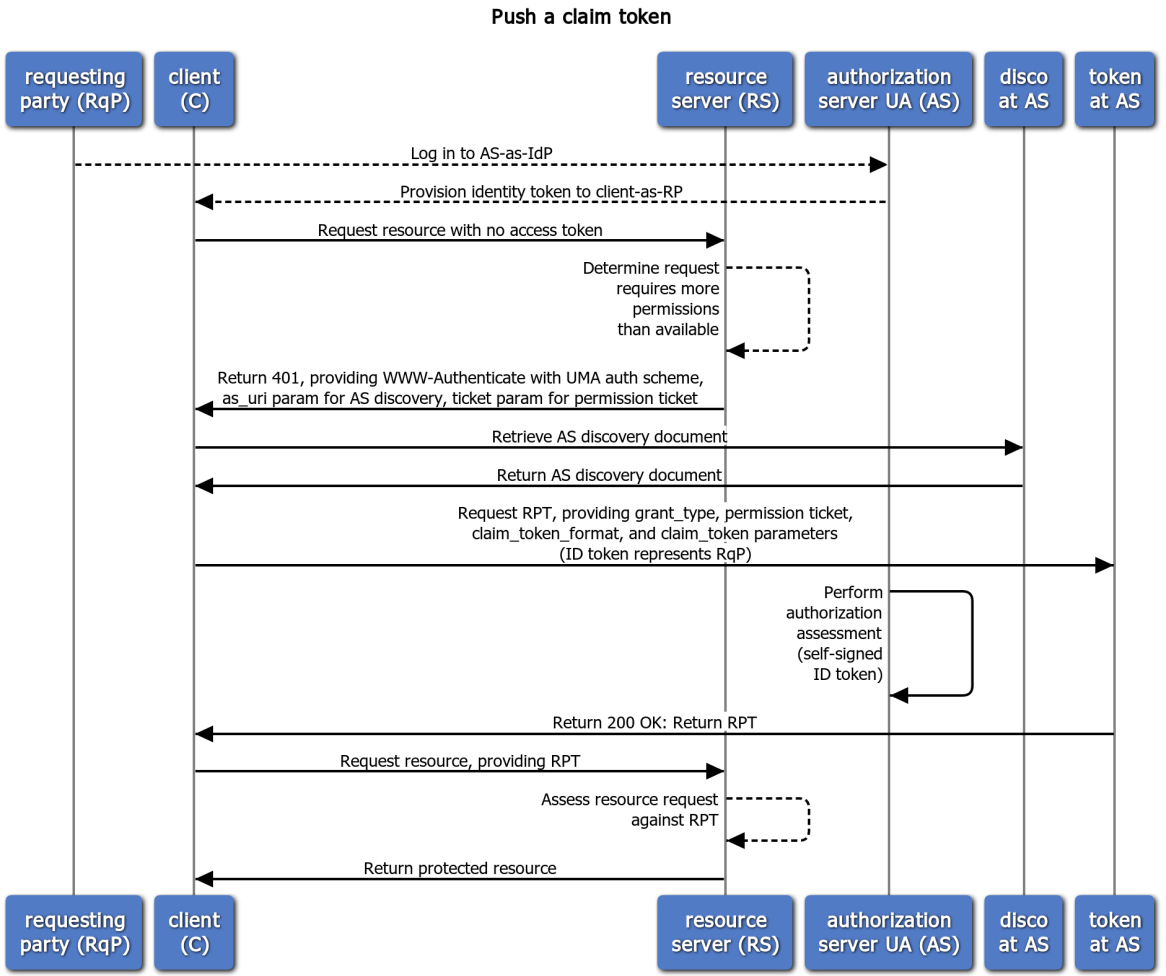
The AS is the requesting party's IdP and the client is the RP

More detail on the **RS's initial response** to the client

The client **pushes its existing ID token** to the token endpoint

The AS is **in the primary audience** for this token

Somewhat resembles SSO or the OAuth assertion grant, where a token of expected type and contents is "turned in"



Interactive claims gathering scenario: for wide ecosystems

(eliding detail already seen)

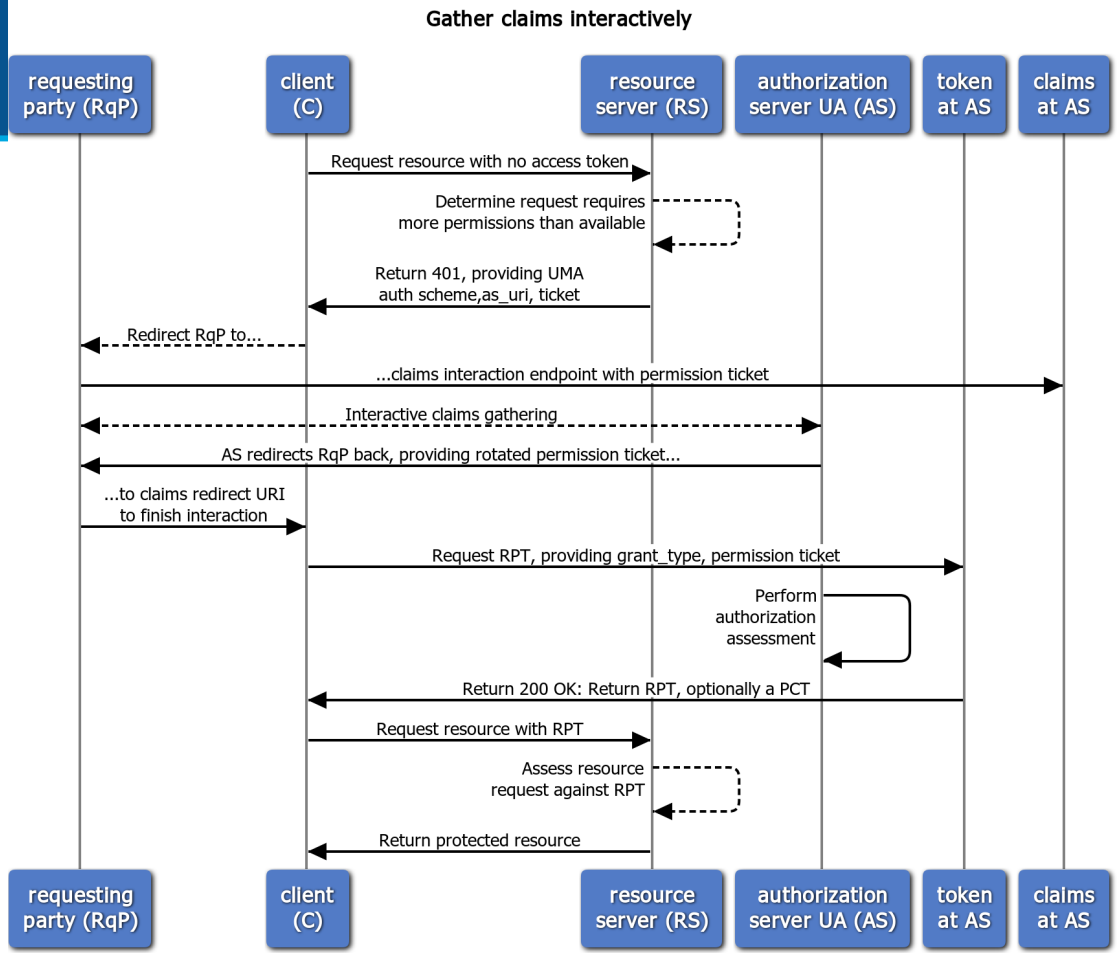
A claims interaction endpoint **must have been declared** in the discovery document to allow this flow

The AS mediates gathering of **claims from any source**

A key "metaclaim" to think about: **consent to persist claims**

A PCT potentially enables a **better RqP experience** next time; the AS can then re-assess using claims on hand

Resembles the **authorization code grant**, but can apply to non-unique identities and is repeatable and "buildable"



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Federated Authorization

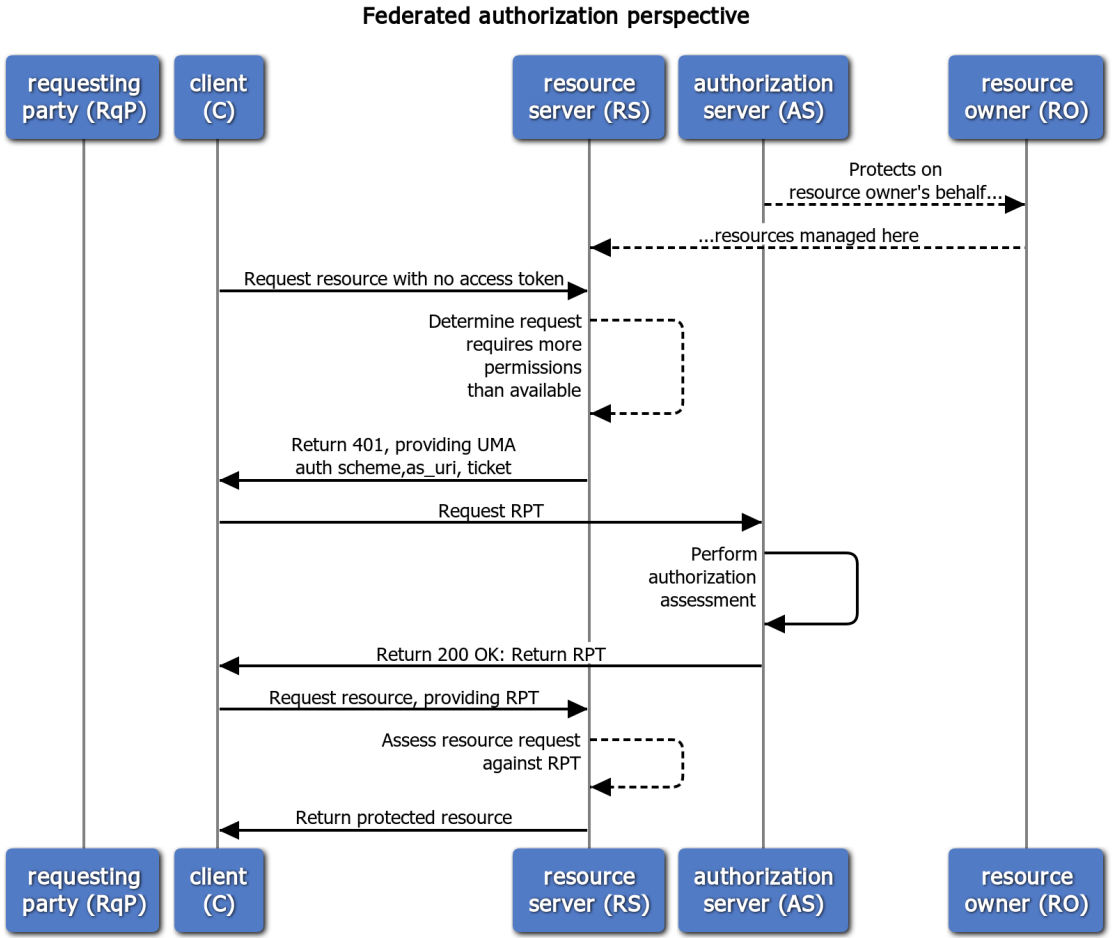
A new perspective on the UMA grant

How does the AS know when to **start protecting resources**?

How does the RS know what **ticket** the AS is associating with the RS's recommended **permissions**?

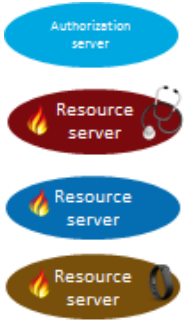
Is there anything special about **token introspection**?

Let's **standardize an interface** at the AS for these jobs



The protection API: how you *federate* authorization

- **RS registers resources:** This is required for an AS to be “on the job”
  - » Scopes can differ per resource
  - » Resource and scope metadata assist with policy setting interfaces
- **RS chooses permissions:** The RS **interprets** the client’s tokenless resource request and **requests** permissions from the AS
  - » The AS then issues the initial permission ticket
- **RS can introspect the RPT:** UMA **enhances** the token introspection response object
- **RO controls AS-RS trust:** The protection API is **OAuth-protected**
  - » The resource owner authorizes the scope **uma_protection**
  - » The issued token is called the **PAT**

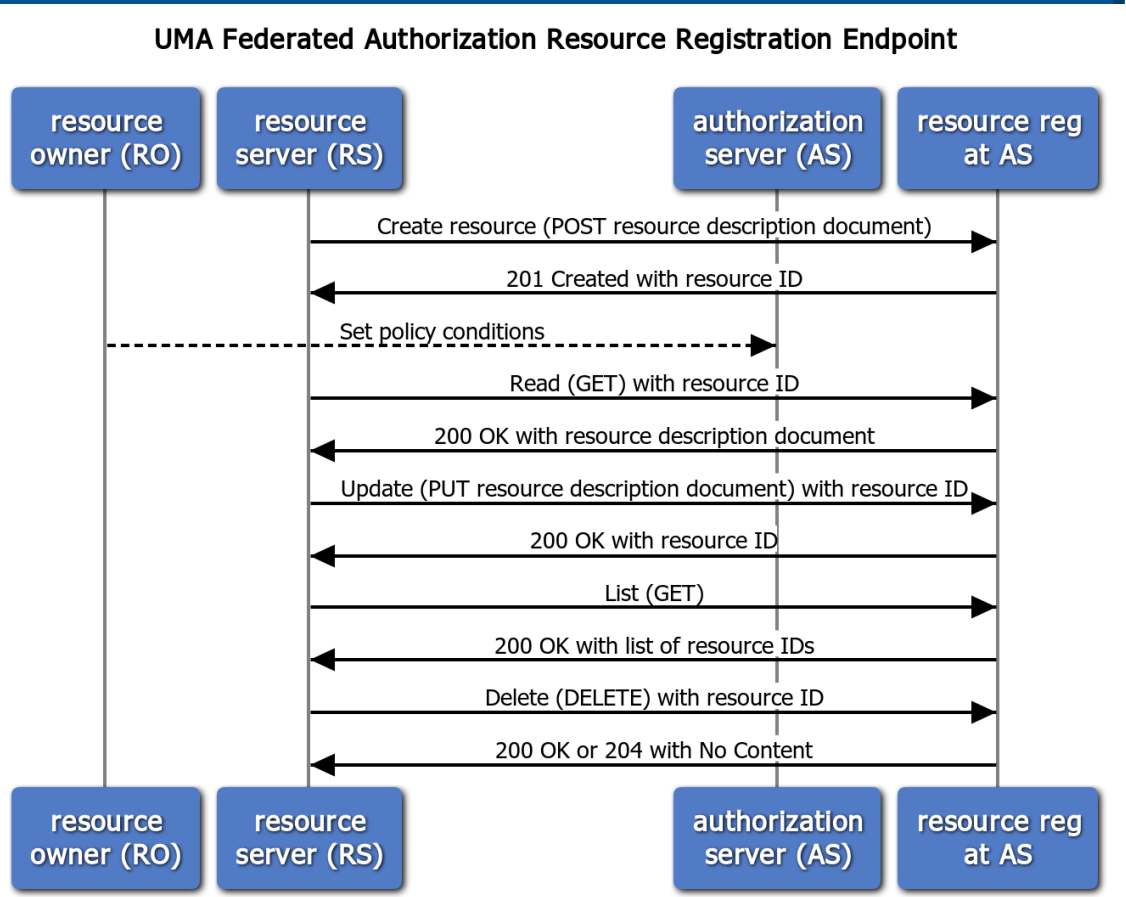


The resource registration endpoint

Registering a resource **puts it under protection**

Setting policies can be done **anytime after creation**

Deregistering a resource **removes it from protection**



Resource and scope registration

- The RS is authoritative for what its resource boundaries are
  - » It registers them as JSON-based descriptions
  - » There is a resource “type” parameter
- Scopes can be simple strings or URIs that point to description documents
- The HEART profiles spell out familiar FHIR **resource types** and FHIR/SMART on FHIR/HL7 **scope values**

Create request:

```
POST /rreg/ HTTP/1.1 Content-Type: application/json
Authorization: Bearer MHg3OUZEQkZBMjcx
...
{
  "resource_scopes":[
     "patient/*.read"
  ],
  "icon_uri":"http://www.example.com/icons/device23",
  "name":"Awesome Medical Device Model 23",
  "type":"https://www.hl7.org/fhir/observation.html"
}
```

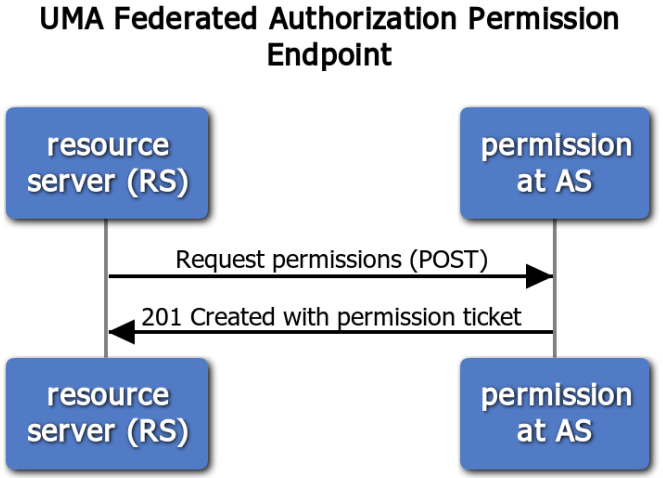
Response:

```
HTTP/1.1 201 Created
Content-Type: application/json
Location: /rreg/rsrc1
...
{
  "_id":"rsrc1"
}
```

The permission endpoint

The RS **interprets** the client's tokenless (or insufficient-token) resource request

The RS must be able to tell from the client's request context **which RO and AS were meant**



Request:

```
POST /perm/ HTTP/1.1
Content-Type: application/json
Host: as.example.com
Authorization: Bearer MHg3OUZEQkZBMjcx
...
{
   "resource_id":"rsrc1",
   "resource_scopes":[
      "patient/*.read"
   ]
}
```

Response:

```
HTTP/1.1 201 Created
Content-Type: application/json
...
{
   "Ticket":"016f84e8-f9b9-11e0-bd6f-
0021cc6004de"
}
```

The token introspection endpoint

UMA **enhances** the token introspection response object

A **permissions claim** is added, with resource ID-bound scopes

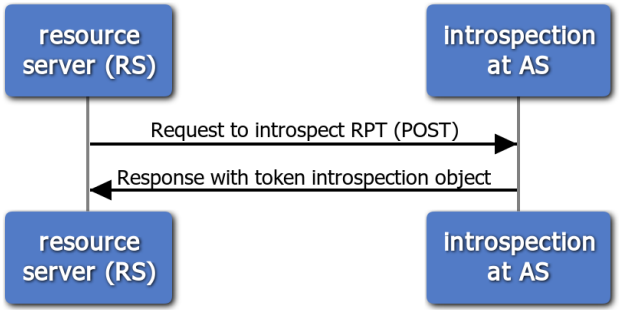
Request:

```
POST /introspect HTTP/1.1
Host: as.example.com
Authorization: Bearer MHg3OUZEQkZBMjcx
…
token=mF_9.B5f-4.1JqM
```

Response:

```
HTTP/1.1 200 OK
Content-Type: application/json
Cache-Control: no-store
…
{
   "active":true,
   "exp":1256953732,
   "iat":1256912345,
   "permissions":[
      {
         "resource_id":"rsrc1",
         "resource_scopes":[
            "patient/*.read"
         ],
         "exp":1256953732
      }
   ]
}
```

UMA Federated Authorization Token Introspection Endpoint



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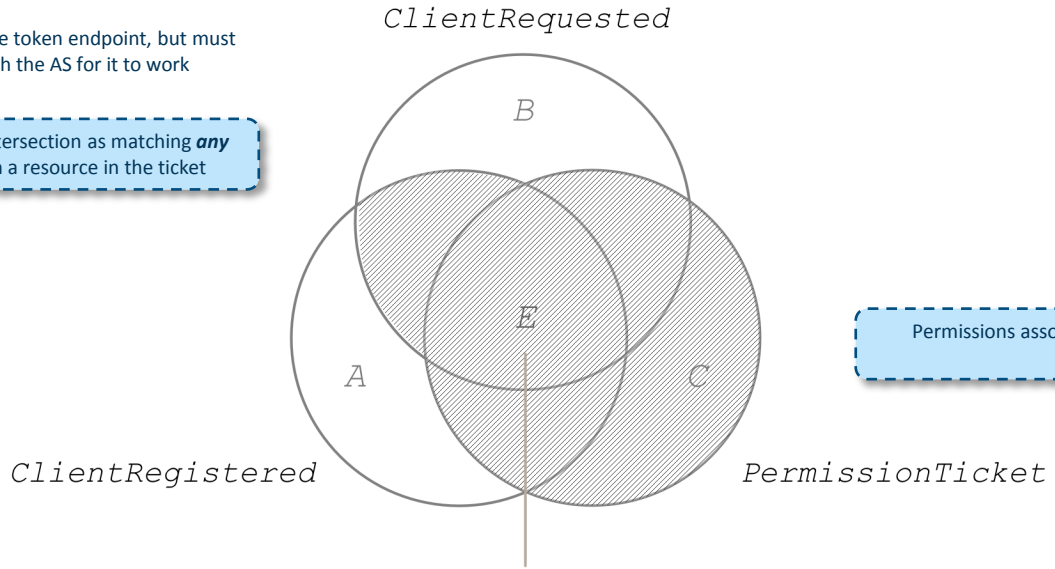
Authorization Assessment

Authorization assessment: how the AS adheres to the RO's wishes in the larger context

The client can request scopes at the token endpoint, but must have **pre-registered** them with the AS for it to work

The AS treats the scopes in this intersection as matching ***any* available scope** associated with a resource in the ticket



Permissions associated with the ticket can **add** to total requested scopes

$$RequestedScopes = C \cup (A \cap B)$$

If authorization assessment results in only a subset of client-desired scopes, the AS can **choose to error**

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UMA 2.0 Deep Dive

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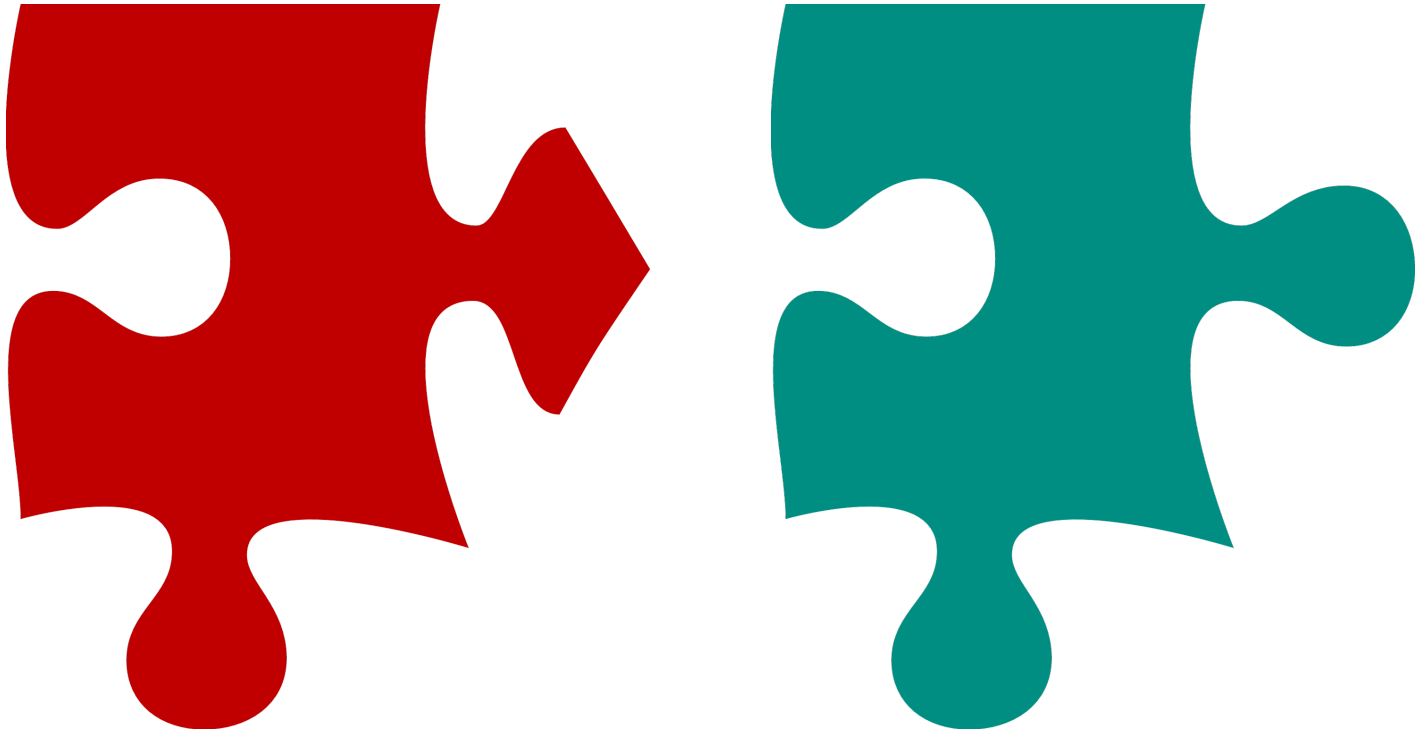
HEART and Other Profiles

Justin Richer

Specifications provide options and extensions

Options aren’t always compatible

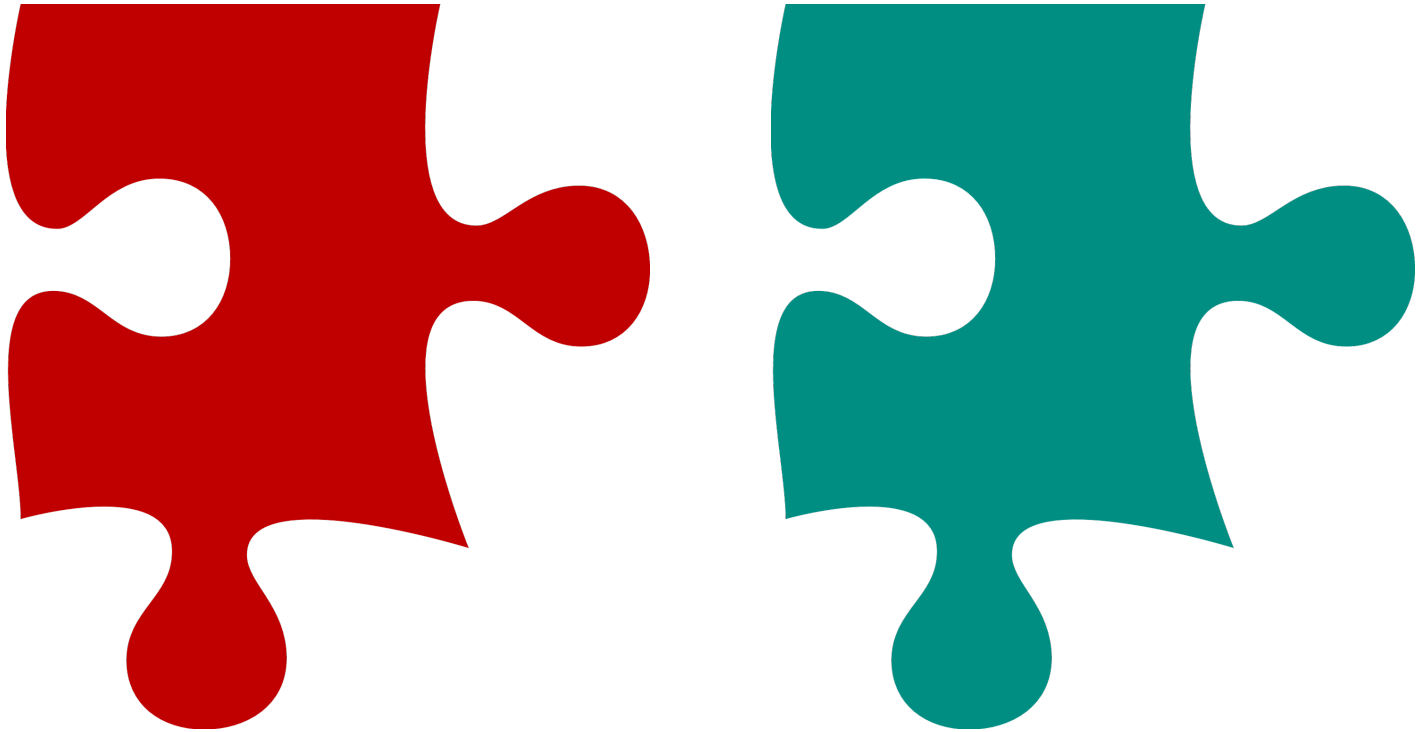


Profiles select specific options

What is a profile?

- “A conformant subset of a specification”
- Make optional things mandatory
- Remove problematic options

Choose compatible options



Choose secure options

Things work together

HEART

- **Health Relationship Trust**
- Suite of profiles from OpenID Foundation
  - First set of vertical-specific profiles from OIDF
- User-centered access of healthcare data APIs

The HEART approach

Mechanical Profiles

OAuth

OpenID Connect

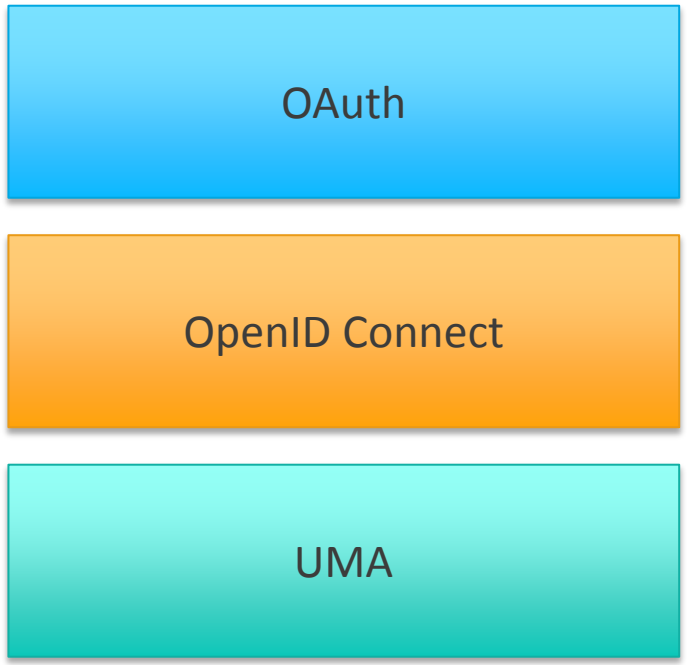
UMA

Semantic Profiles

FHIR over OAuth

FHIR over UMA

Mechanical Profiles



- Not healthcare specific
- Focus on underlying security layer
- Build interoperability and security
- Connectivity between all components

Semantic Profiles

- Healthcare specific
- Focus on healthcare data access
- Security for FHIR protocol

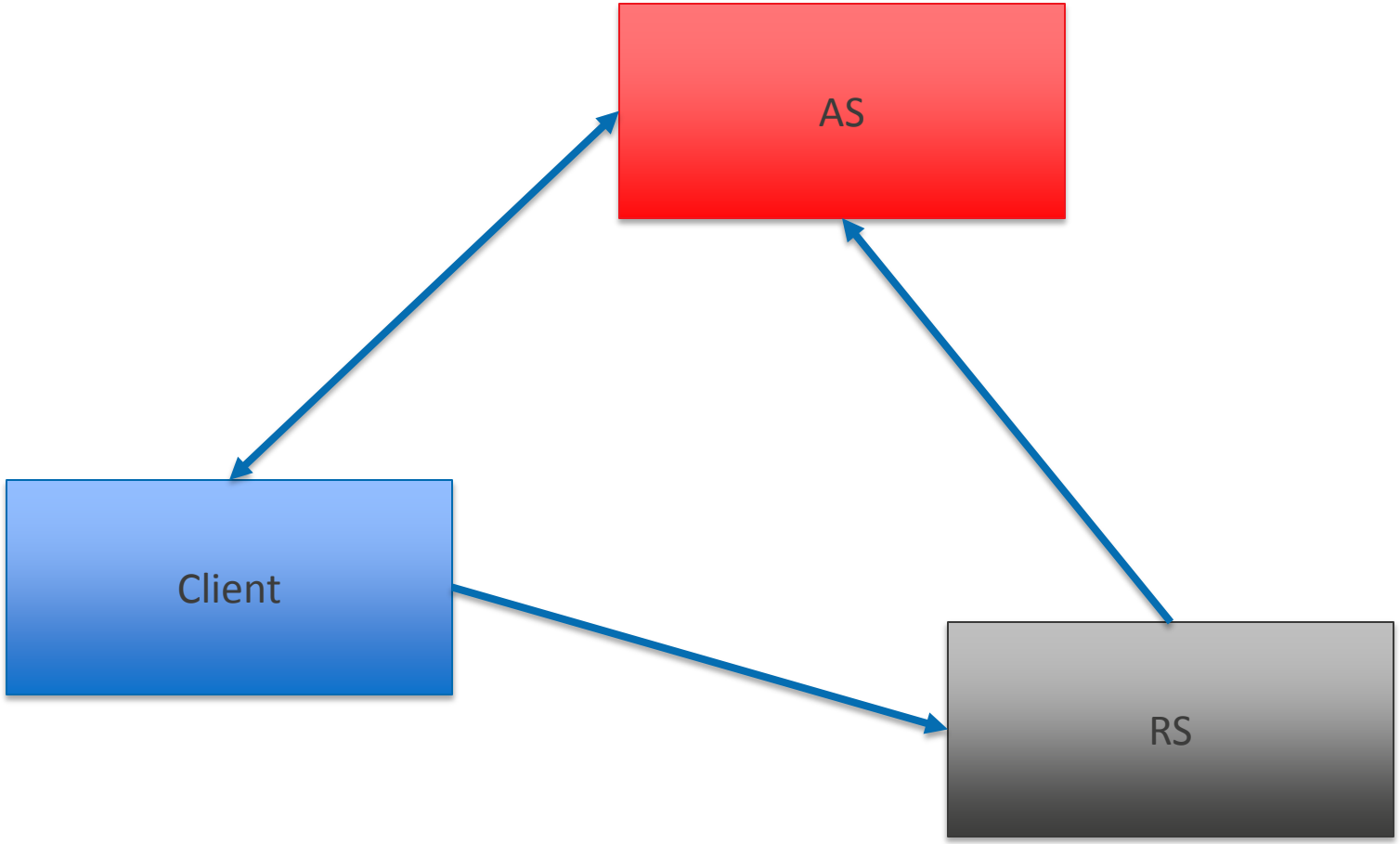
FHIR over OAuth

FHIR over UMA

HEART mechanical profiles

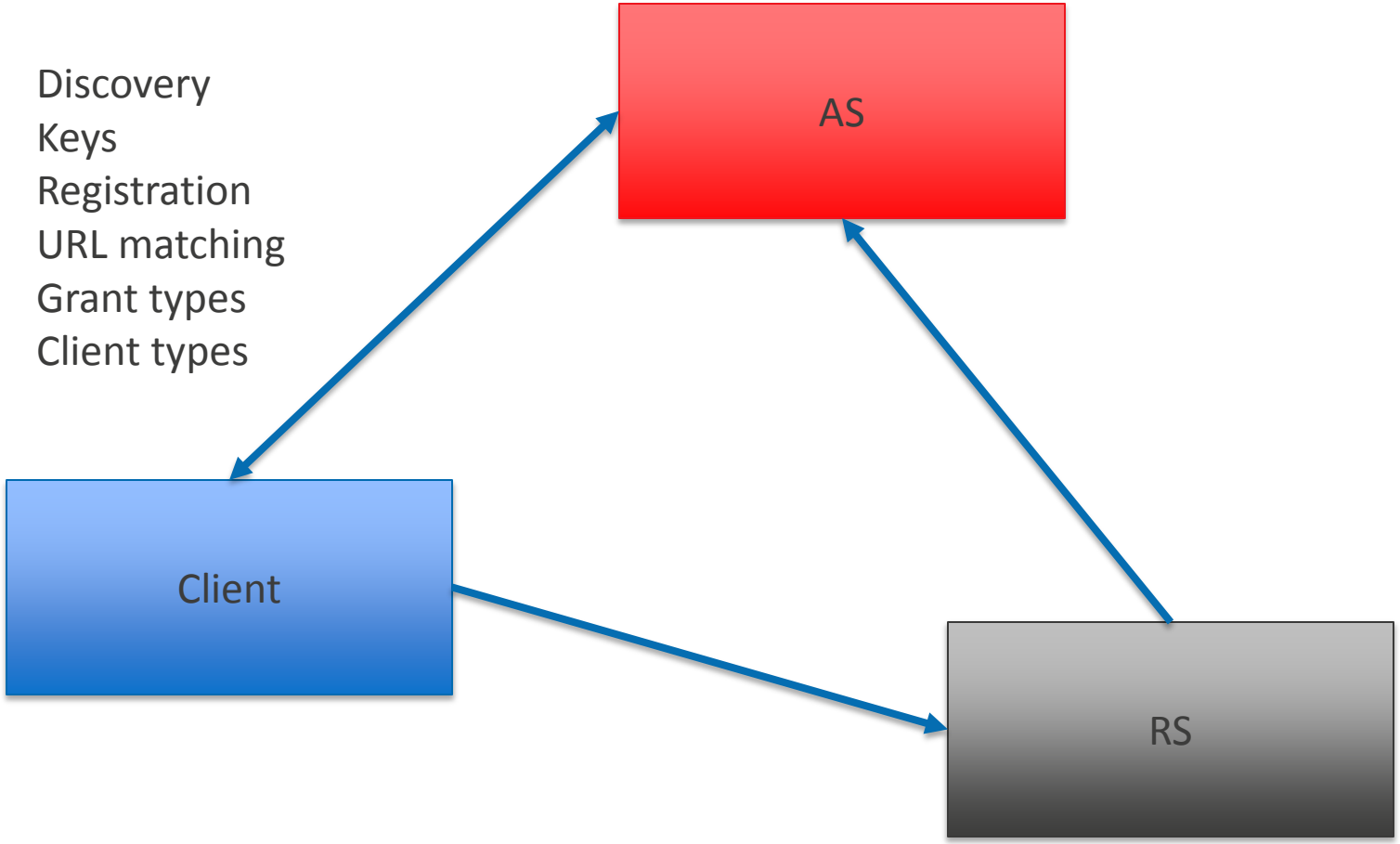
- All clients have asymmetrical keys
- Servers must support discovery
  - » Including all key publication
- Servers must allow dynamic registration
- Servers must enable introspection
- Access tokens are always JWTs
- Only certain kinds of OAuth grants allowed
- All clients are required to register
- Redirect URIs must match exactly
- UMA must support OpenID Connect ID Token claims
- Recommended token lifetimes

HEART OAuth Connections



HEART OAuth Connections

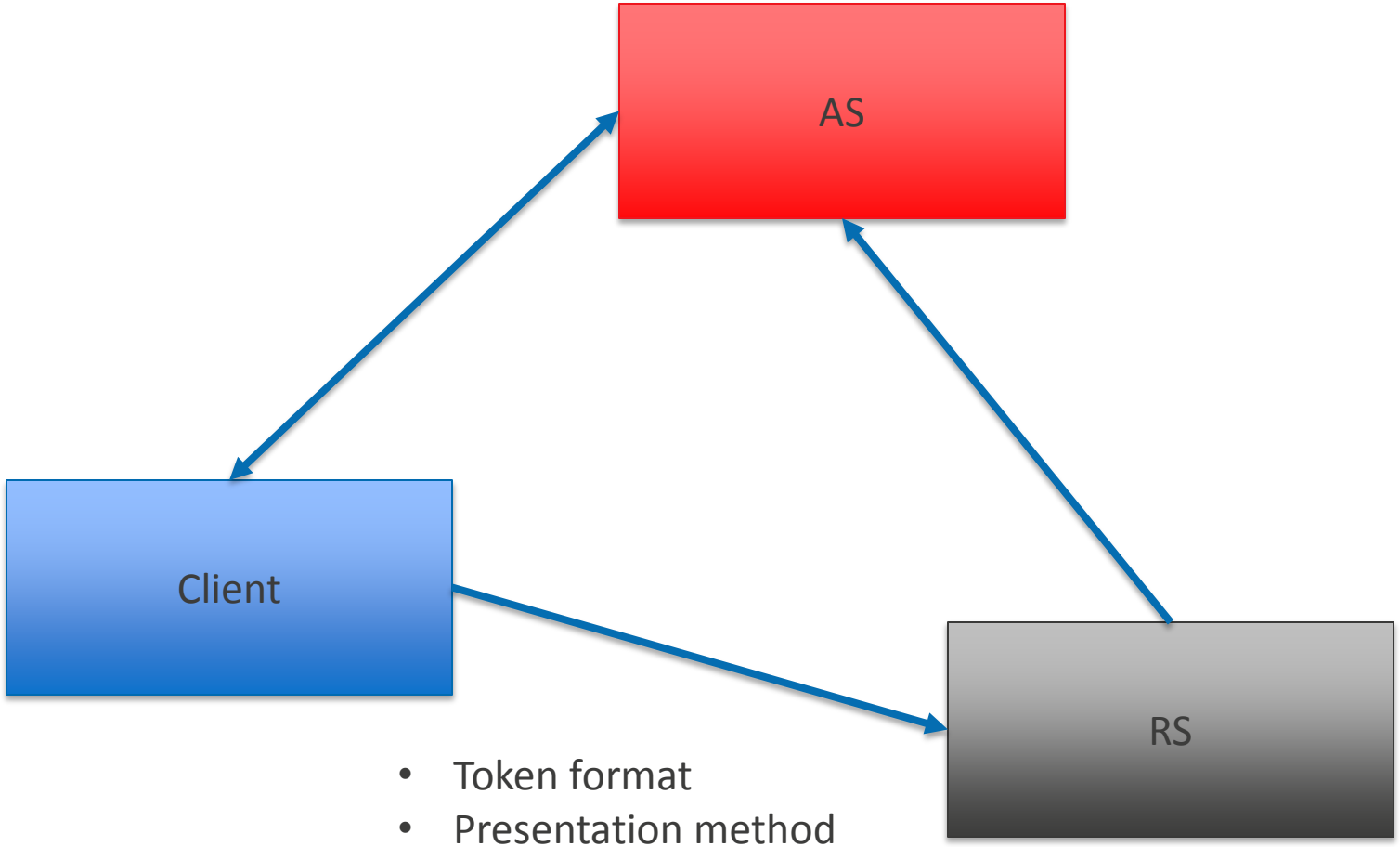
- Discovery
- Keys
- Registration
- URL matching
- Grant types
- Client types



HEART client types

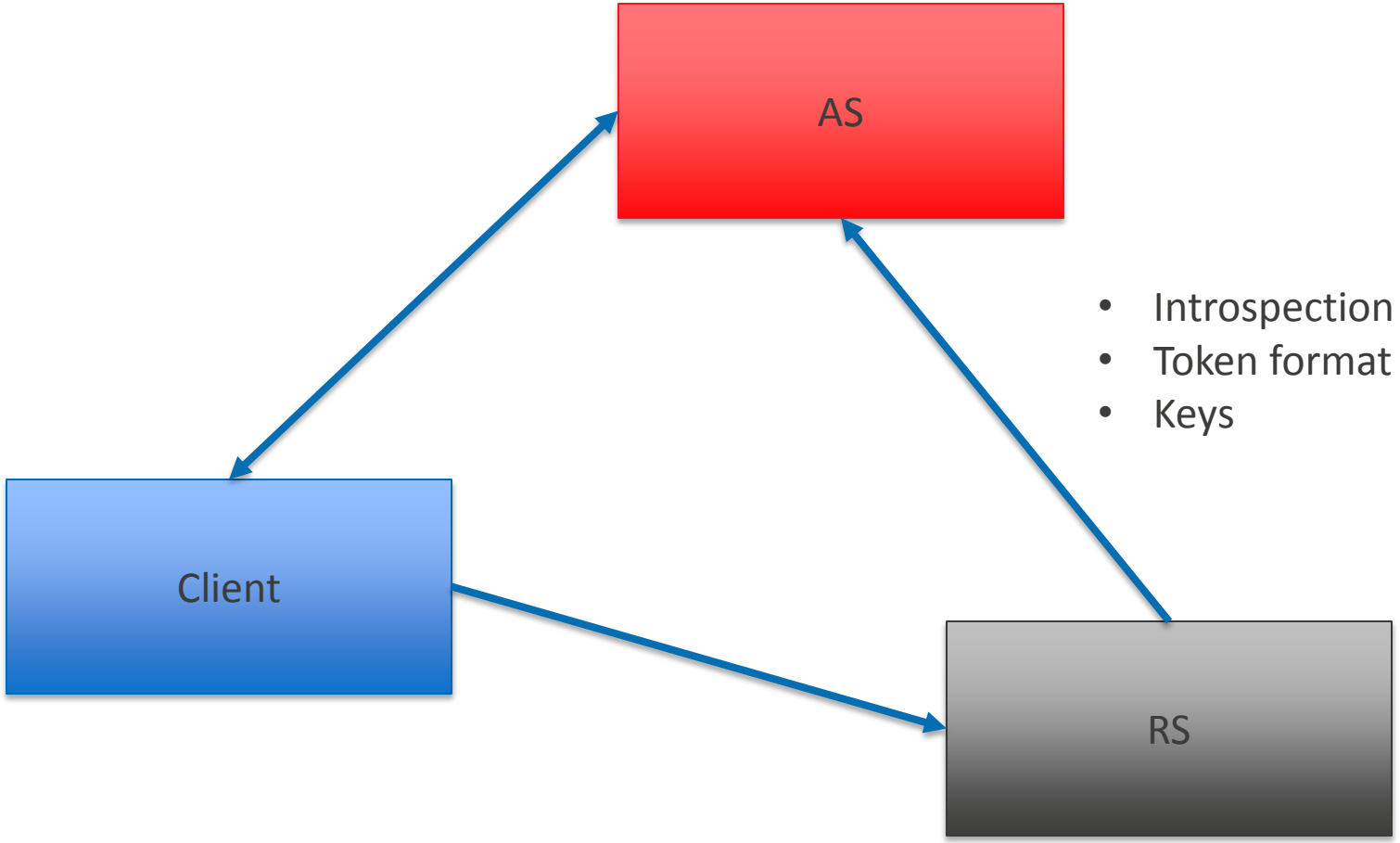
- Full client with user delegation
  - Traditional web application
- In-browser client with user delegation
  - Self-contained single-page-application
- Native client with user delegation
  - Mobile or desktop software
- Direct access client
  - Bulk or batch access, not on behalf of a single user

HEART OAuth Connections



- Token format
- Presentation method

HEART OAuth Connections



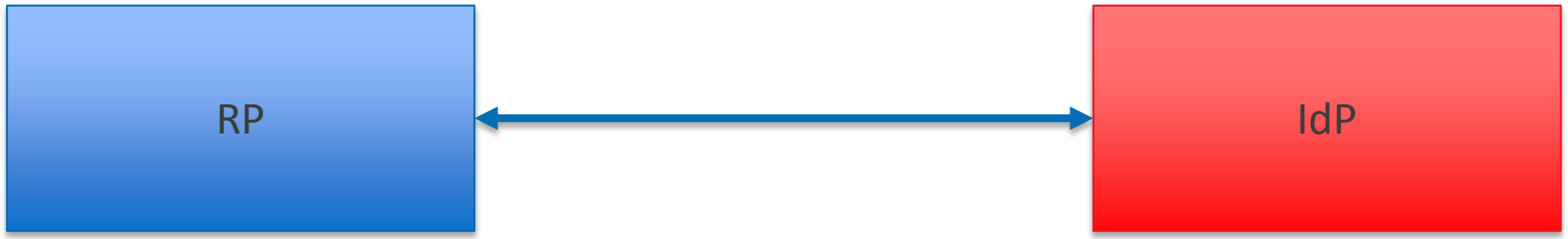
Resource server connections

- Connection between RS and AS is out of scope for OAuth
  - » Several options exist but aren't mandatory
- Specify token format and content
  - » JSON Web Token (JWT), signed by AS
  - » Include issuer and key pointer, don't include PII
- Introspection available at AS

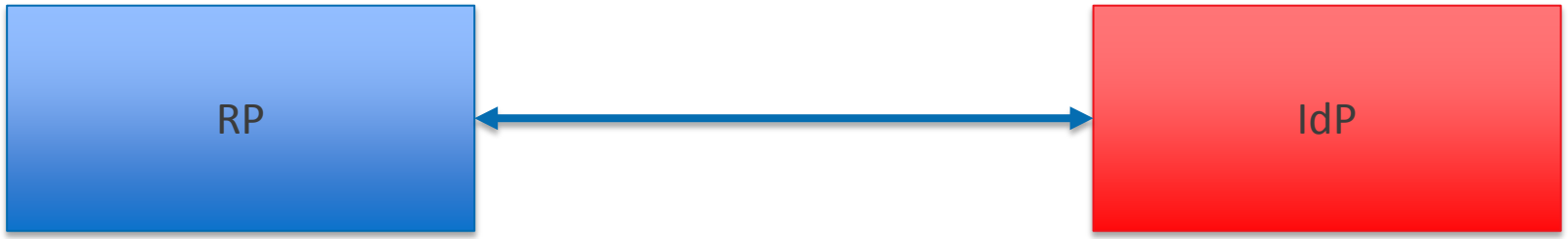
Why both JWT and Introspection?

- Signed JWTs give a fast first check
  - » Is this from a server that I trust? Has it been modified? Is it expired?
- Introspection gives detailed and real-time information
  - » What's this token actually good for? Has it been revoked?
- An RS can talk to multiple AS
  - » Parse the JWT to see which AS to introspect the token at

HEART OpenID Connections

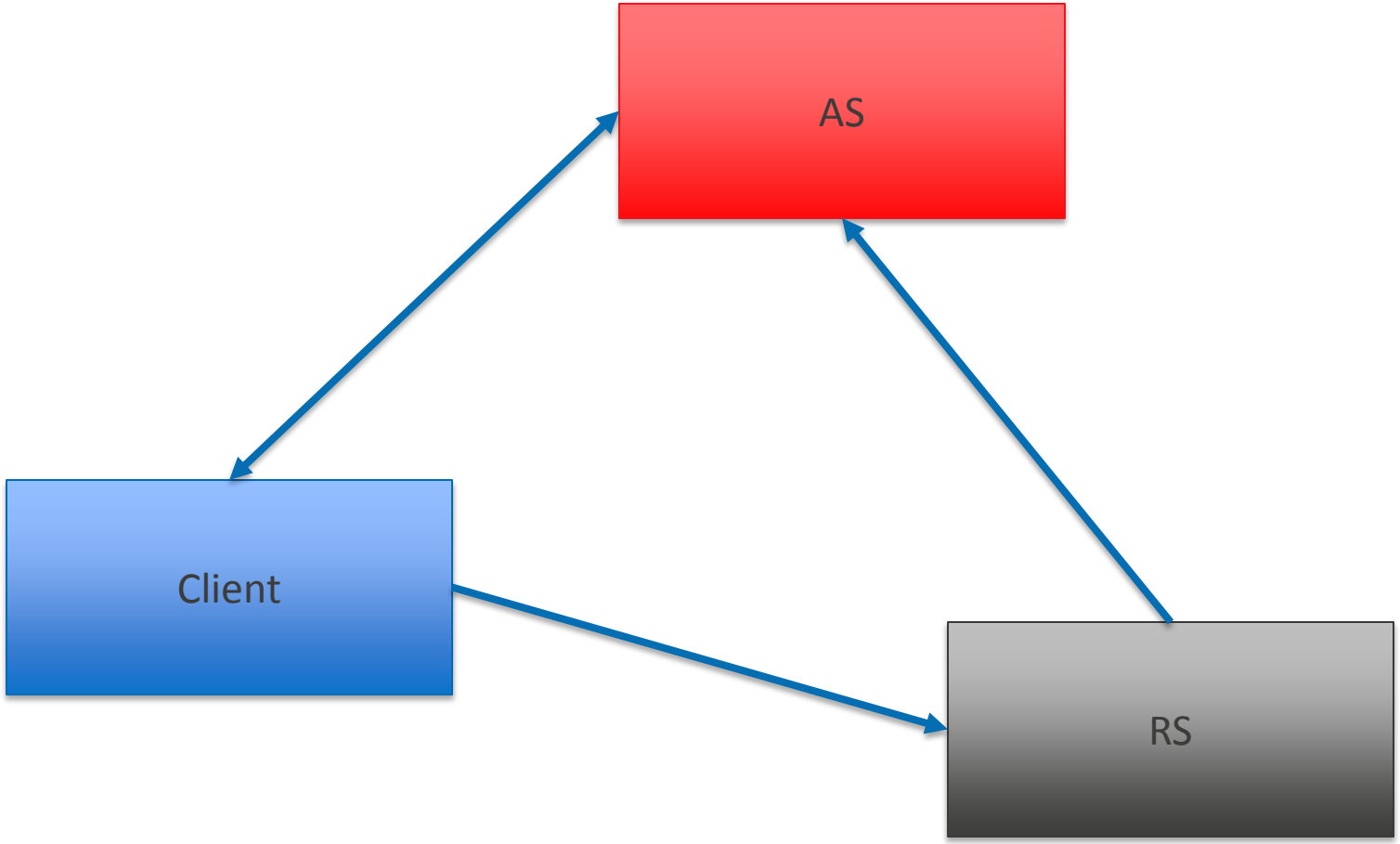


HEART OpenID Connections



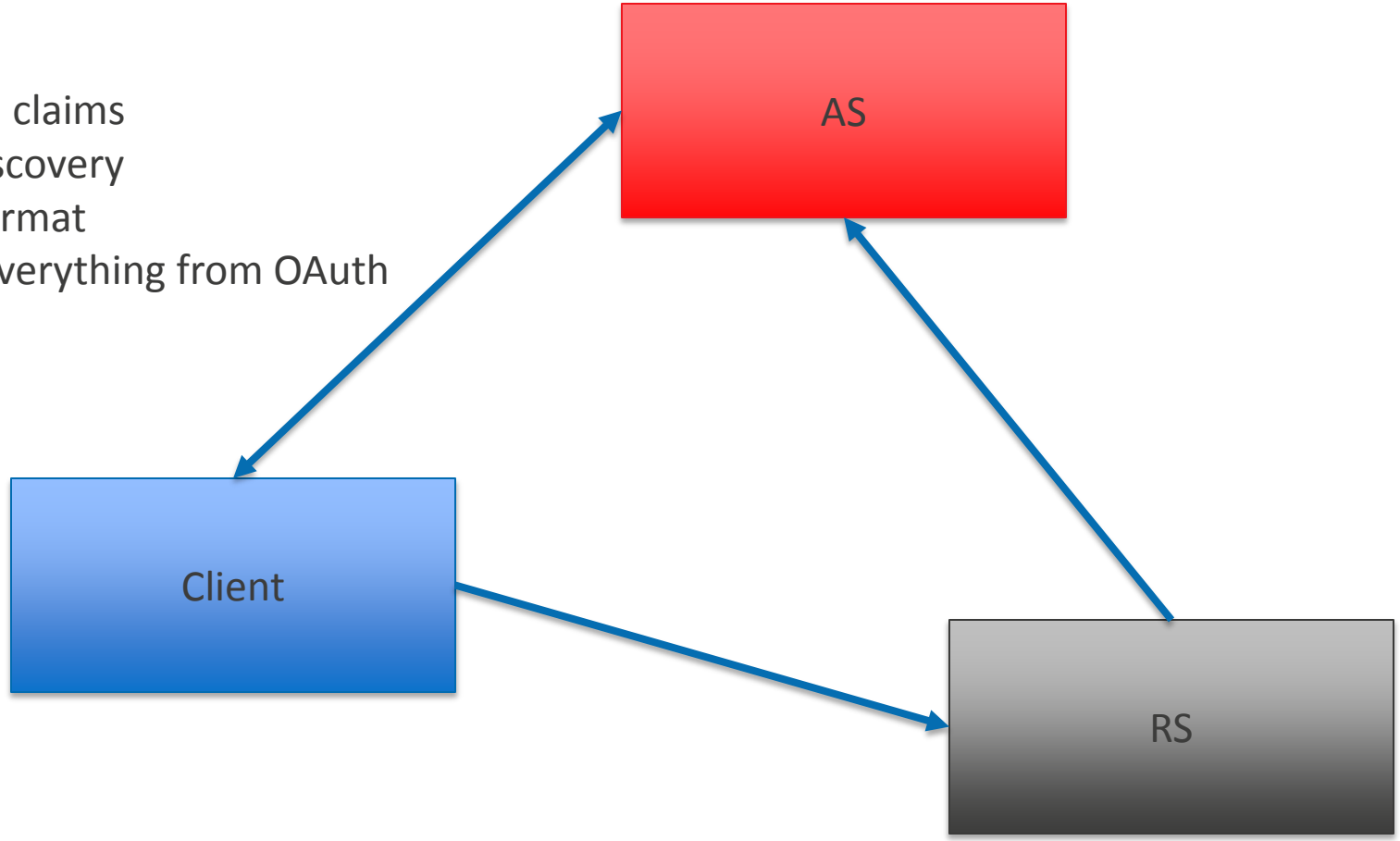
- ID Token claims
- Signature methods
- … plus everything from OAuth profile

HEART UMA Connections

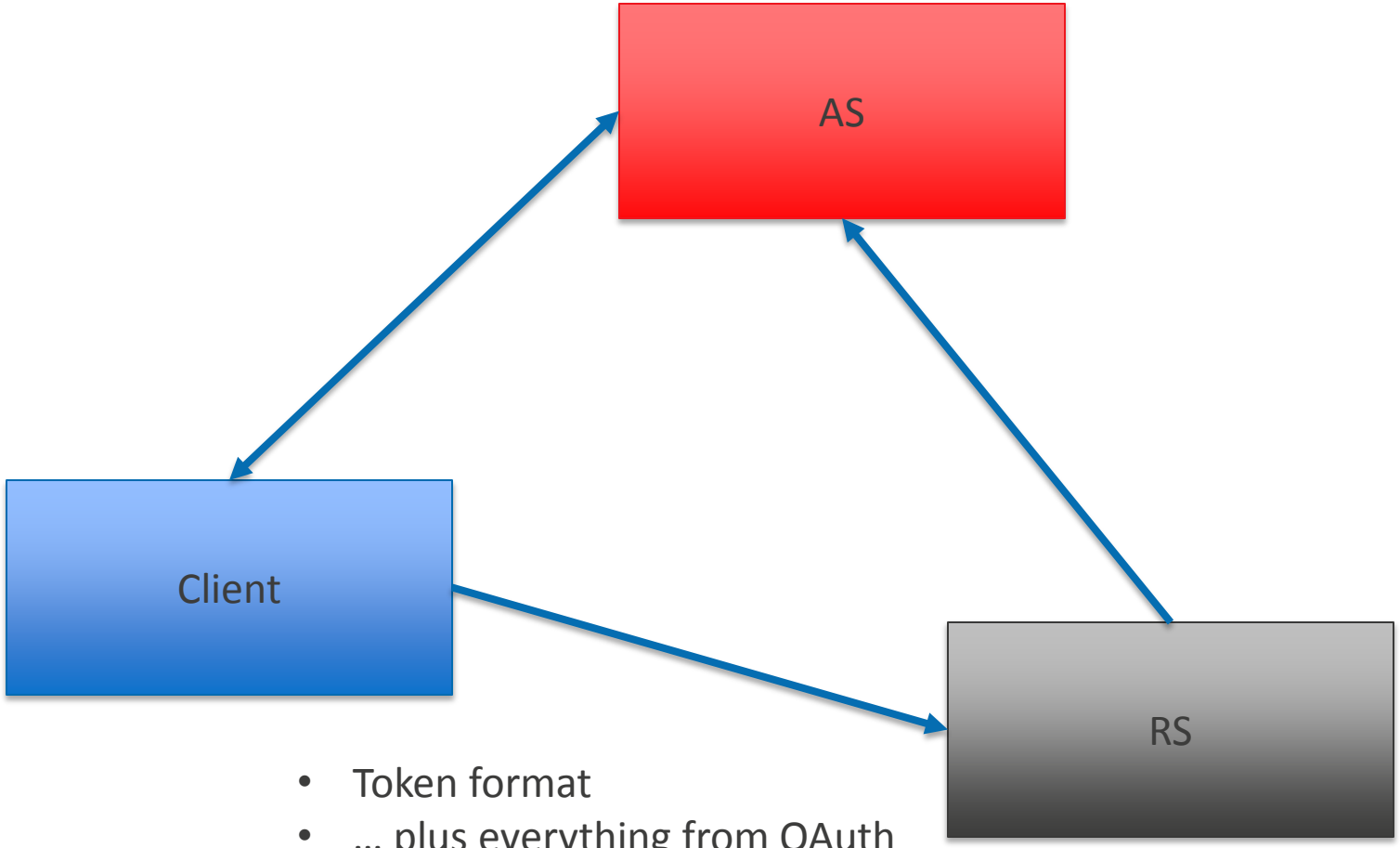


HEART UMA Connections

- ID Token claims
- UMA Discovery
- Token format
- … plus everything from OAuth

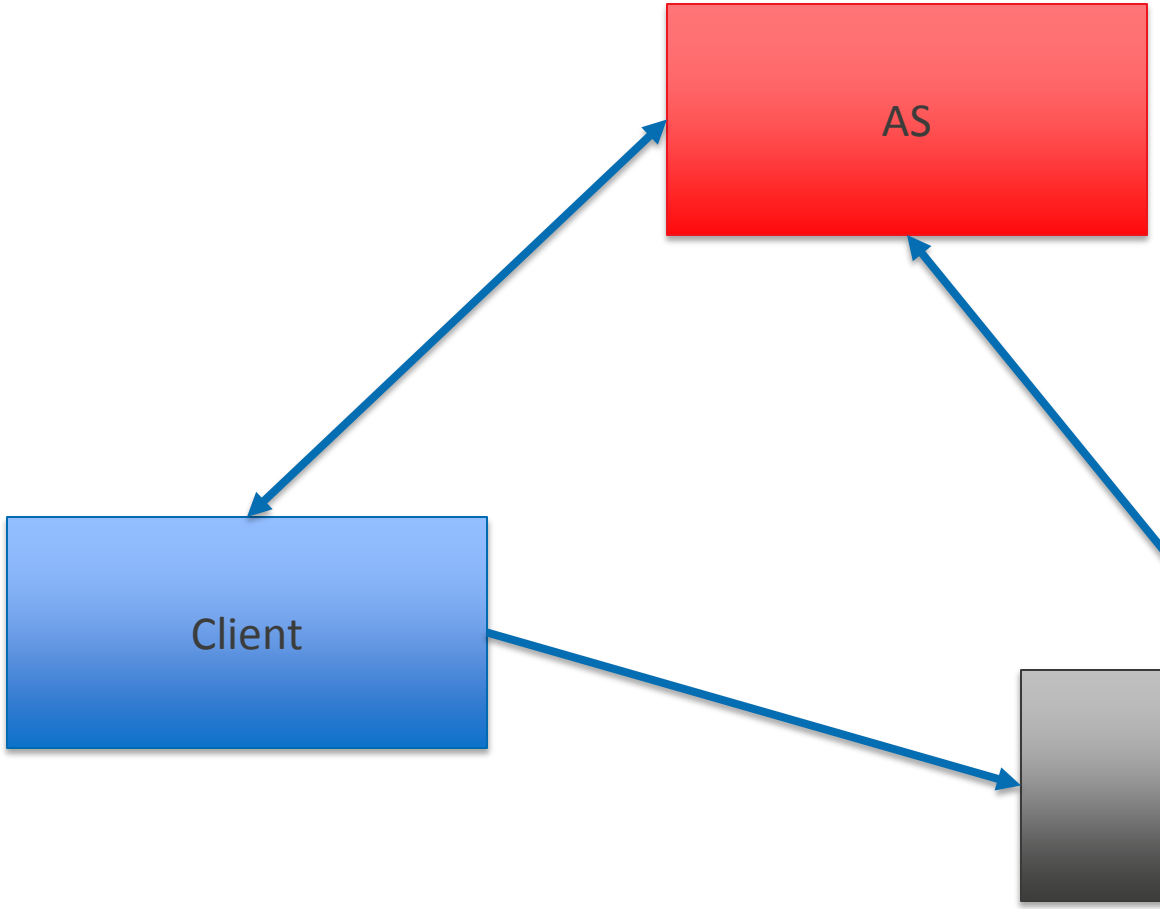


HEART UMA Connections



- Token format
- … plus everything from OAuth

HEART UMA Connections



- Federated authorization
- Token format
- Introspection
- … plus everything from OAuth

HEART Semantic Profiles

- How to access FHIR APIs
- Which scopes to ask for as a client
- How to interpret scopes as a resource

HEART core scope

patient/Condition.read

HEART core scope

patient/Condition.read

- “patient” – individual accessing a specific record
- “user” – bulk access to a set of records

HEART core scope

patient/Condition.read

- Name of FHIR resource to access
  - Any FHIR resource type can be used
- Wildcard allowed for “all resources”: *

HEART core scope

patient/Condition.read

- “read”: I can download information from the API
- “write”: I can upload information to the API
- “*”: I can do any available action including “read” and “write”

HEART confidentiality scope

conf/R

- For information tagged with confidentiality markers
- Tokens with this scope are allowed access to this kind of information
- Three basic levels, plus not-specified

HEART sensitivity scope

sens/SOC

- For information tagged with sensitivity markers
- Tokens with this scope are allowed to access this kind of information
- Standard set of sensitivity markers

HEART emergency scope

btg

- “break the glass”
- This client is allowed to access information in an emergency situation
  - Potentially because of who the resource owner is
- Triggers additional audit and notification requirements

Other profiles

- SMART
- OpenBanking UK
- FAPI
- iGov

SMART

- Deployed healthcare project for user-controlled applications
- Targets application portals and bundled applications
  - » Integration for healthcare providers
  - » Adds a “launch” context
- HEART semantic profiles are based on SMART scopes
  - » Aligned but not built on

OpenBanking UK

- Financial industry consortium profile for UK banks
- Allow user-controlled apps access to account info and transfer functions
  - Account management
  - Transfer money (electronic payment)
- Government-led mandate to drive industry forward

FAPI

- OpenID Foundation profile for finance and high-value APIs
  - Focus on financial APIs
- Parent specification of OpenBanking UK
- Source of general-purpose extensions
  - CIBA
  - JARM

iGov

- OpenID Foundation profile for international government use
- Similar technical profiles
- Extended profiling of OpenID Connect claims
  - » Government identification numbers
  - » Proofing documents
  - » Vectors of Trust integration

Comparing Profiles

	HEART	SMART	OB	FAPI	iGov
Implicit Grant	Restricted	Forbidden	Required (hybrid)	Required (hybrid)	Restricted
Mobile	Y	Y	Y	Y	Y
PKCE	Mobile	Optional	Optional	All	Mobile
Identity	N	N	Y	N	Y
URI Match	Exact	Exact	Exact	Exact	Exact
Shared Secrets	N	Y	N	N	N
DynReg	Y	N	Y (specialized)	N	Y
OAuth 2	Y	Y	Y	Y	Y
OIDC	Some	Some	Y	Some	Y
UMA 2	Y	N	N	N	N
Ecosystem	Wide	Narrow	Narrow	Narrow	Wide

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Using HEART OAuth 2.0 Scopes with UMA 2.0

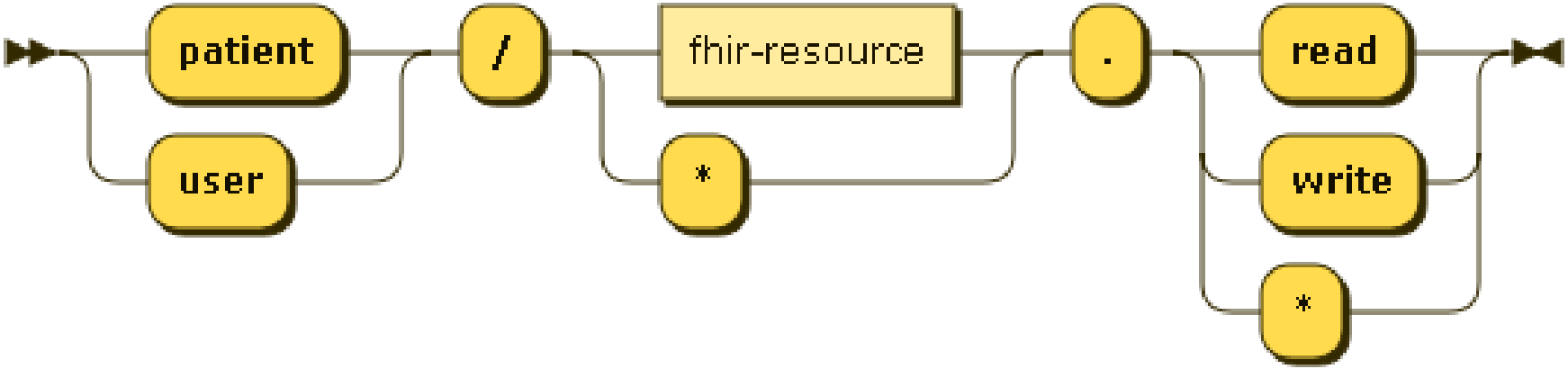
David Staggs, JD, CISSP, Subject Matter Expert, Security Risk Solutions, Inc.

HEART FHIR OAuth 2.0 Token Scopes

- Scopes define individual pieces of authority that can be requested by clients, granted by resource owners, and enforced by protected resources.
- In the HEART specification, scopes are described as:

  scope := *permission/resource.access*
- *Permission* can be “patient” (single patient) or “user” (bulk).
- *Resource* can be any FHIR resource.
- *Access* can be “read” or “write.”
- Additional access scopes, e.g. confidentiality and sensitivity, are supported.

Token Scope Illustration



HEART Security Labels: Confidentiality Codes

- Confidentiality codes describe the sensitivity of the information associated with the resource.
  - » Considered the “high water mark” across a collection of data.
- Confidentiality code vocabulary supported by HEART: N, R, and V
- Example token scope using a confidentiality code:

  "scope": "patient/*.* conf/R"

  This request has permission to access data labels as restricted (e.g. data concerning HIV status).

HEART Security Labels: Sensitivity Labels

- Sensitivity labels represent the sensitive nature of the data.
  - » Allows data segmentation of data based on privacy policy and patient consent.
- Example token scope using sensitivity scopes:

  "scope": "patient/*.* sens/ETH sens/PSY"

  full access to this patient's data including substance abuse information and psychiatry disorder information.

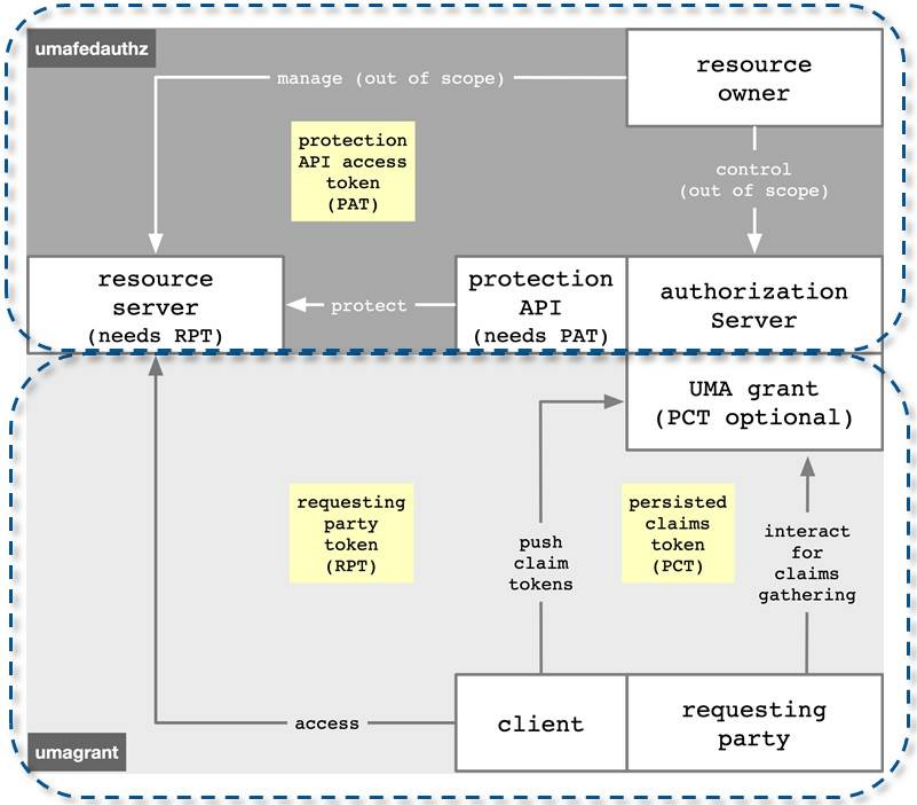
HEART Security Labels: Purpose of Use (POU)

- In general, POU involves the reason for, or context of, the request (used to determine appropriateness of allowing access).
  - » General categories: marketing, operations, payment, research, patient requested, public health, and treatment
- POU security label vocabulary includes: emergency access, break the glass, research, etc.
- Example request using the break the glass scope:

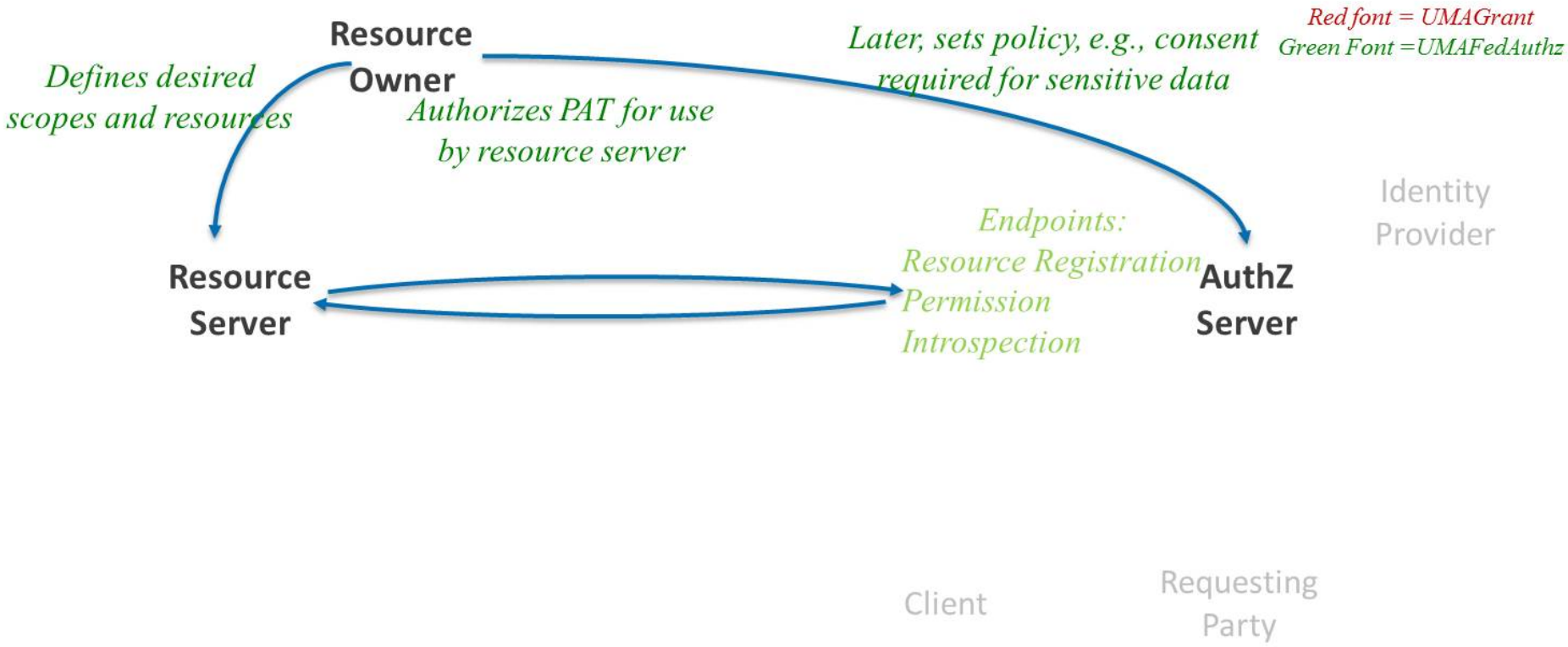
  "scope": "patient/*.* btg"

  full access to this patient's data even if patient consent is not available.

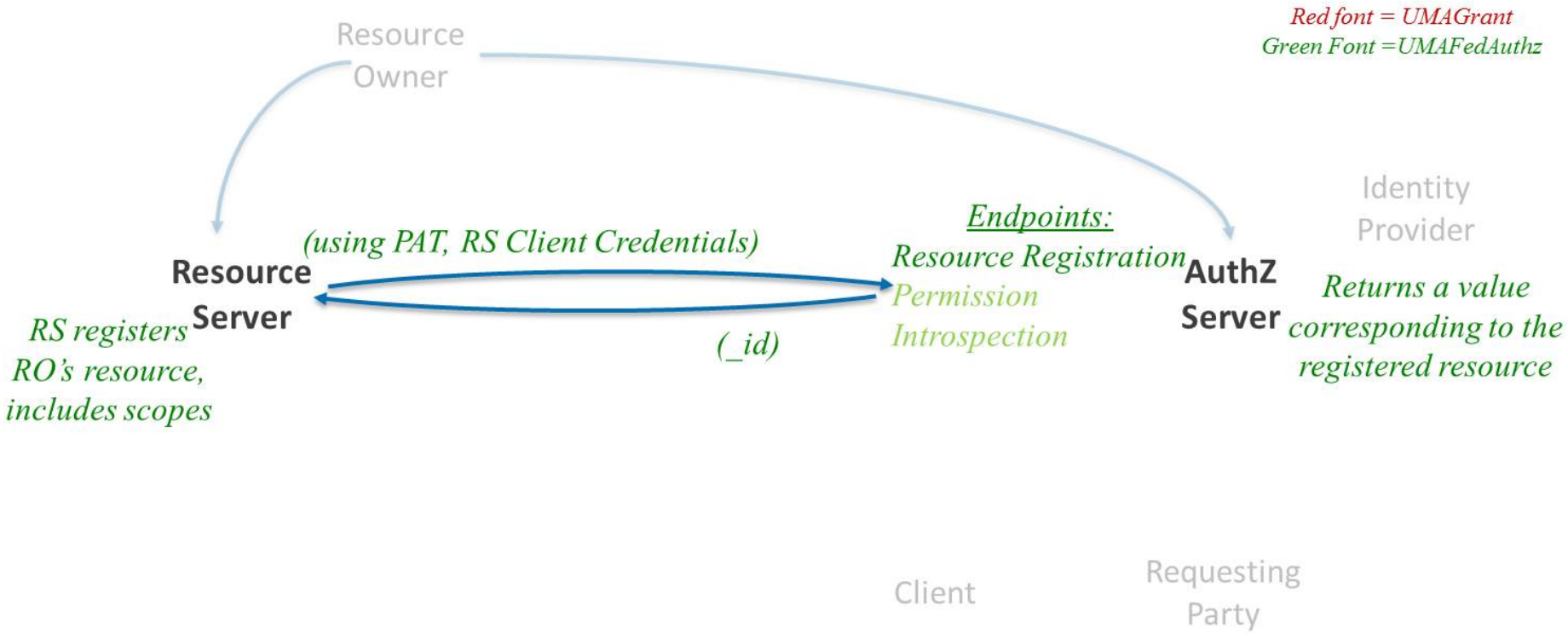
UMA 2.0 Entities



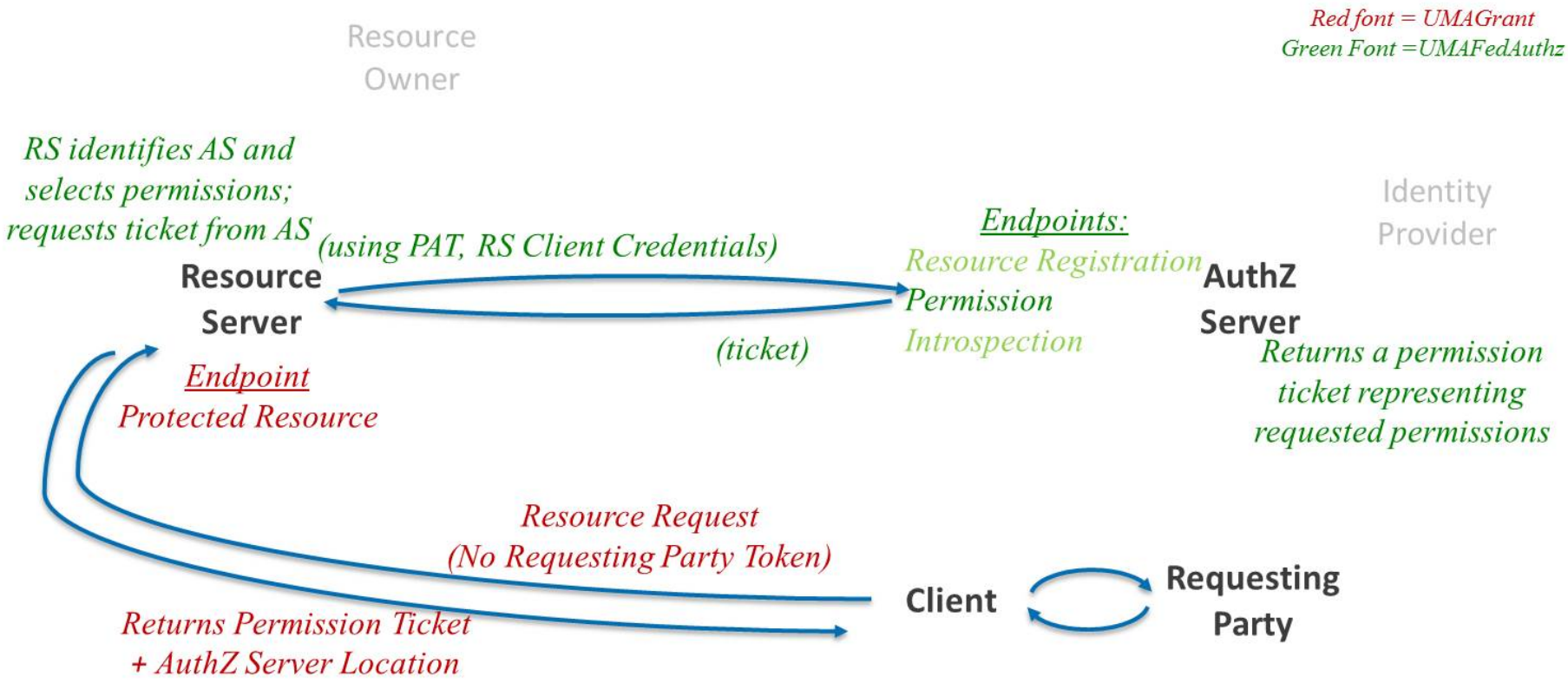
UMA 2: Resource Owner Authorizes Resource Server



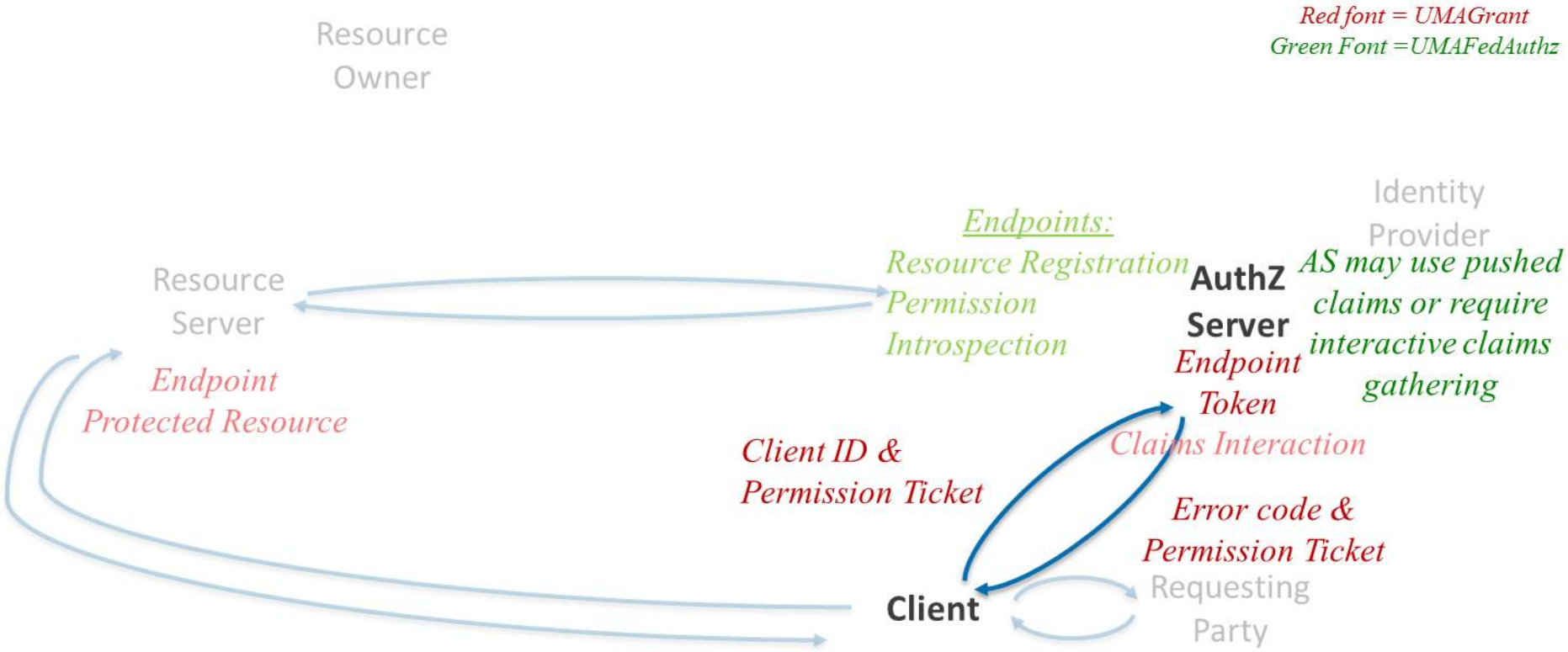
UMA 2: Resource Registration Request and Response



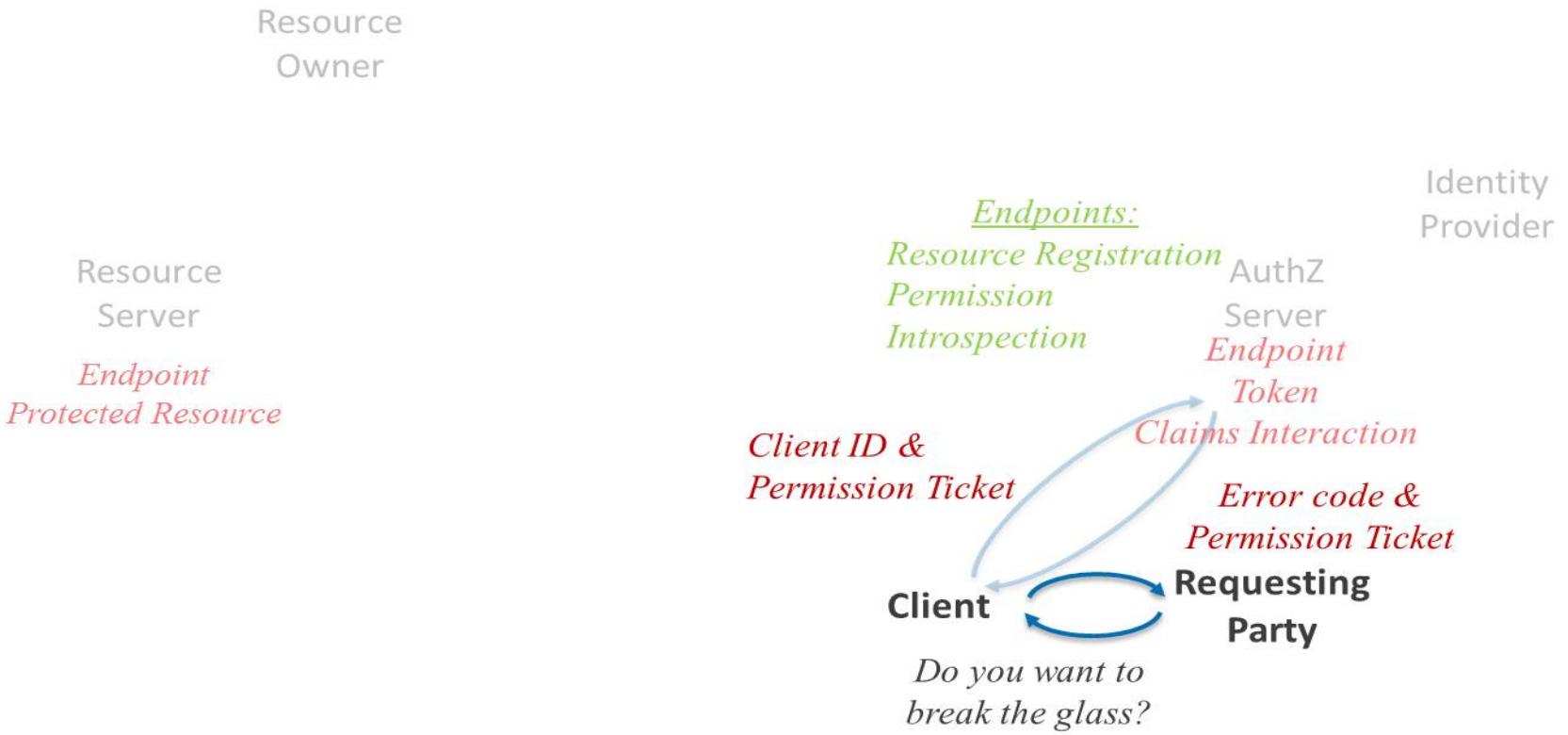
UMA 2: Protected Resource Request without RPT



UMA 2: Client Seeks RPT for the Requesting Party



UMA 2: Offer to Resubmit with BTG



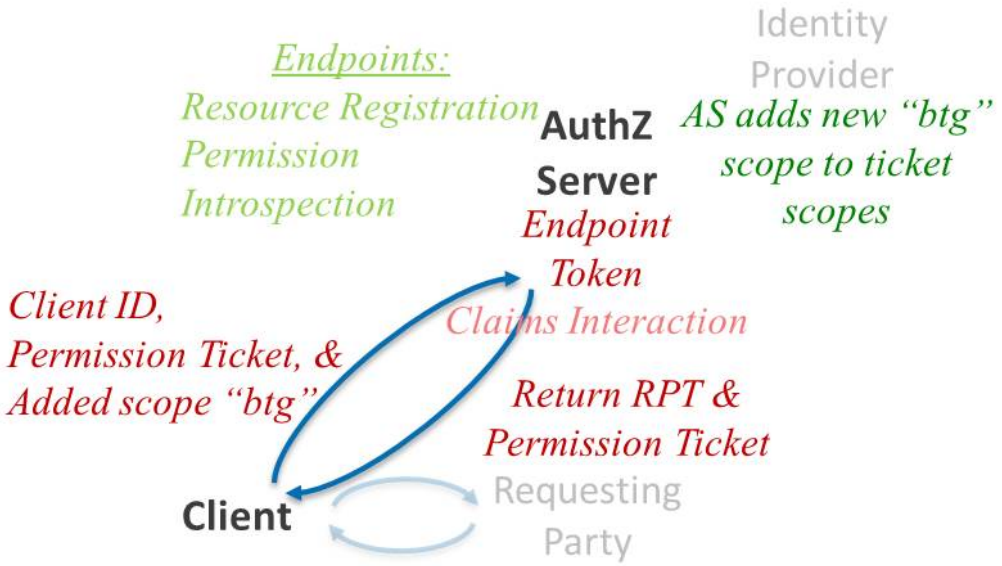
UMA 2: Resubmittal with Additional Scope

Resource Owner

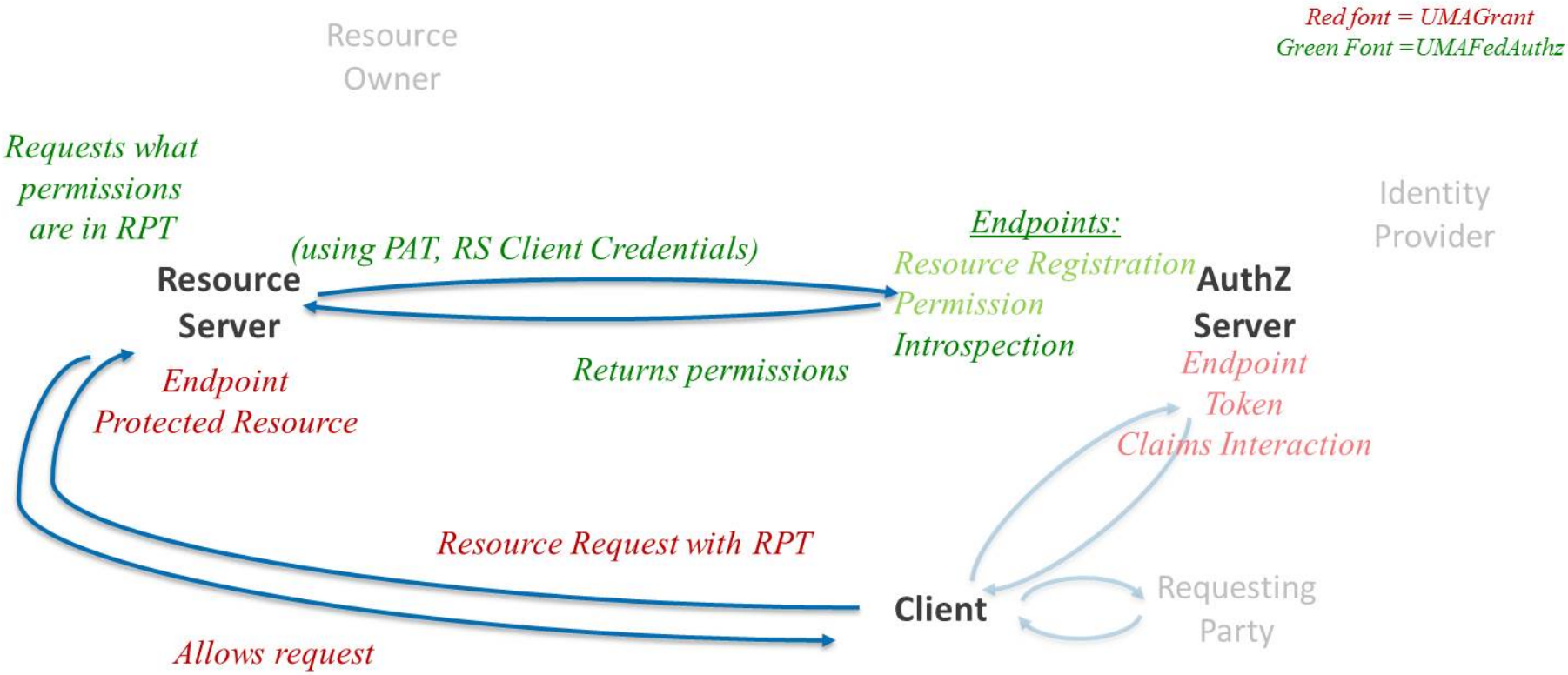
Resource Server

Endpoint
Protected Resource

Red font = UMAGrant
Green Font =UMAFedAuthz



UMA 2: Access Request with RPT



The Permission Concept

- A permission (requested or granted) represents authorized access to a particular resource with some number of scopes bound to that resource.
- A permission ticket represents some number of requested permissions.
- An RPT represents some number of granted permissions.
- Requesting a permission with no scopes might be when an API call is ambiguous without further context – a request for a particular scope at the token endpoint later can clarify the desired access. (UMAFedAuthZ pp. 19-20)
  - » As we did with BTG scope in the previous example.

Permissions Parameter (From Introspection Example)

```
HTTP/1.1 200 OK
Content-Type: application/json
Cache-Control: no-store
...
{
   "active":true,
   "exp":1256953732,
   "iat":1256912345,
   "permissions":[
      {
         "resource_id":"112210f47de98100",
         "resource_scopes":[
            "view",
            "http://photoz.example.com/dev/actions/print"
         ],
         "exp":1256953732
      }
   ]
}
```

The parameter named "permissions" contains an array of objects, each one represents a single permission

The parameter named “resource_scopes" contains an array of strings representing scopes to which access was granted for the associated resource

Requesting an RPT: the Authorization Assessment

- For each resource in the permission ticket, the final set of requested scopes are the combination of 1) scopes found in the permission ticket and 2) any requested scopes that are also pre-registered by the client.
- AS then applies claims and policies to each set of final requested scopes and determines an authorization decision.
- Each requested scope allowed on a resource is collected in the CandidateGrantedScopes(resource) array.
- AS then issues either an RPT containing CandidateGrantedScopes for each resource, or an error codes, as appropriate.

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Using HEART OAuth 2.0 Scopes with UMA 2.0

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Trusted Dynamic Client Registration

Tools to increase scalability and confidence in the HL7 FHIR® ecosystem

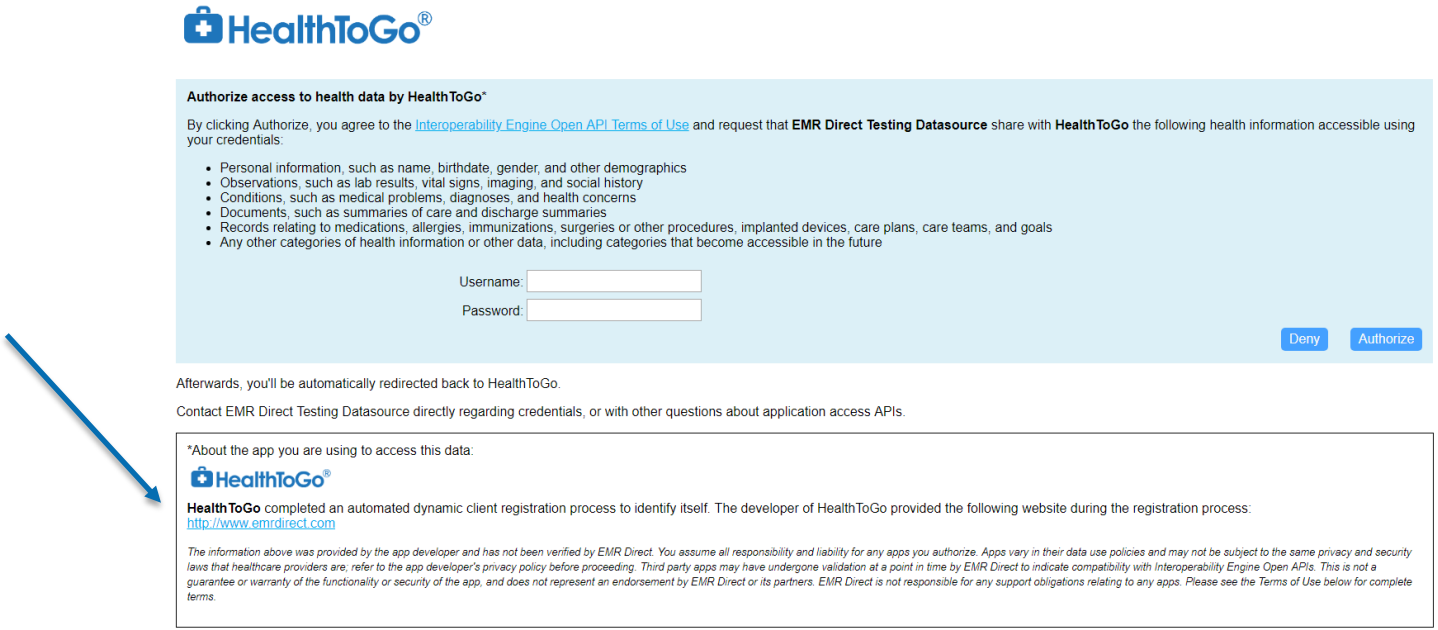
Luis Maas, MD, PhD | CTO, EMR Direct

Dynamic Client Registration

- Client app registration today is typically a manual process
- And we are only getting started -- client app proliferation expected
- Automation needed in order to scale the process of enabling trust between the growing number of client apps, servers, users, and to appropriately authorize data access according to one or more community standards or common agreements
- Support for DCR is required by HEART for native client apps & OAuth servers

Dynamic Client Registration Benefits

- Consume FHIR resources using an app, the same way you would a browser…



- App registration details are clearly indicated

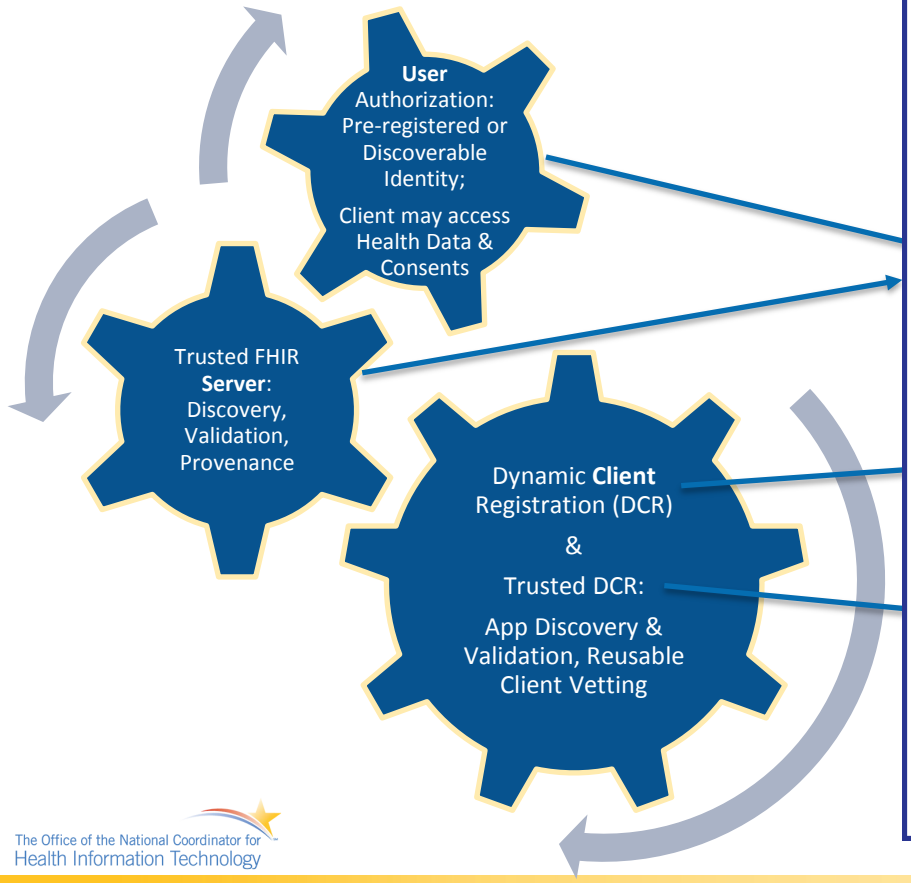
Making Dynamic Client Registration a Trusted Action (1 of 2)

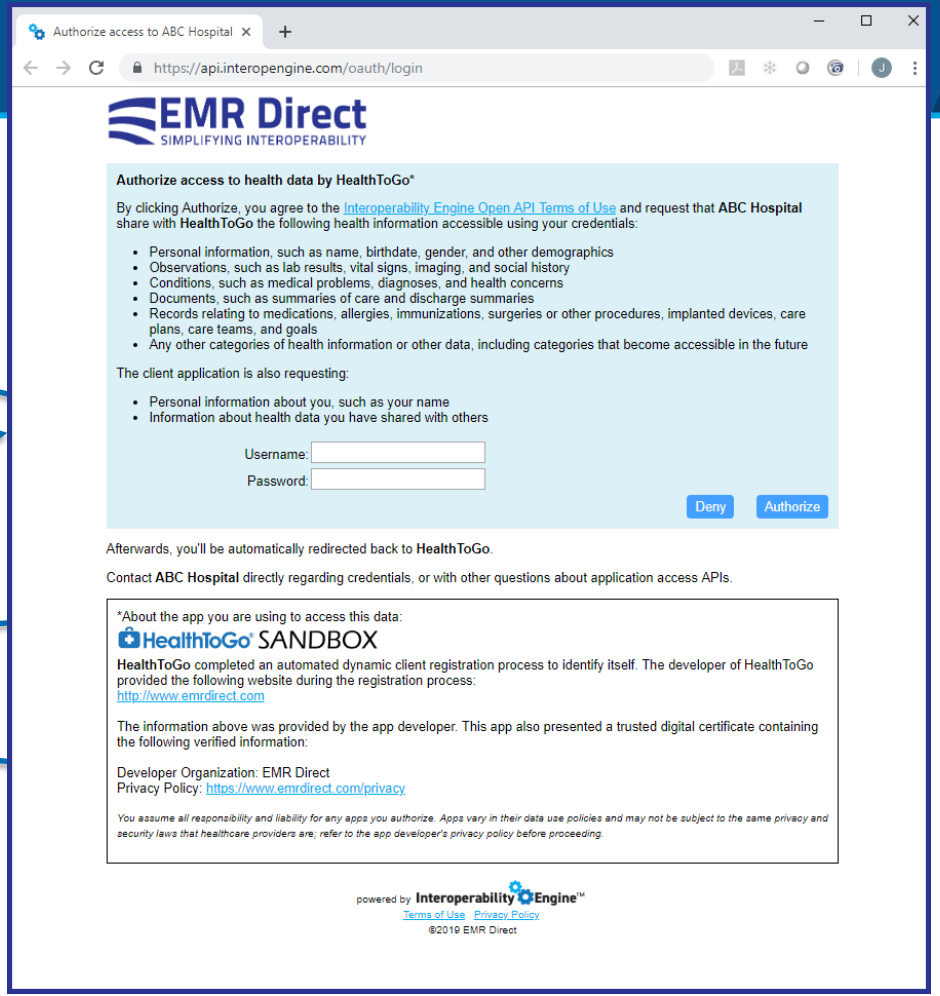
- Client app endorsements & certifications
  - » Expands Dynamic Client Registration into a framework that can combine some vetting on an endorser's side, informing an endpoint's registration decisions
  - » Also increases an end user's confidence in the application
  - » Uses digital signatures for authenticity and integrity
    - Can be packaged as signed JWTs for distribution and integrity protection
    - Can use X.509 tools to facilitate key distribution
    - Active work on harmonizing current initiatives in the field

Making Dynamic Client Registration a Trusted Action (2 of 2)

- Client app identity
  - » Opportunity to go beyond self-assertions by clients to validated information about identity and other attributes like privacy policy
  - » Can extend to FHIR endpoints, increasing confidence in server identity during exchange and informing directory resources

Ecosystem Components & the OAuth Sign In Page

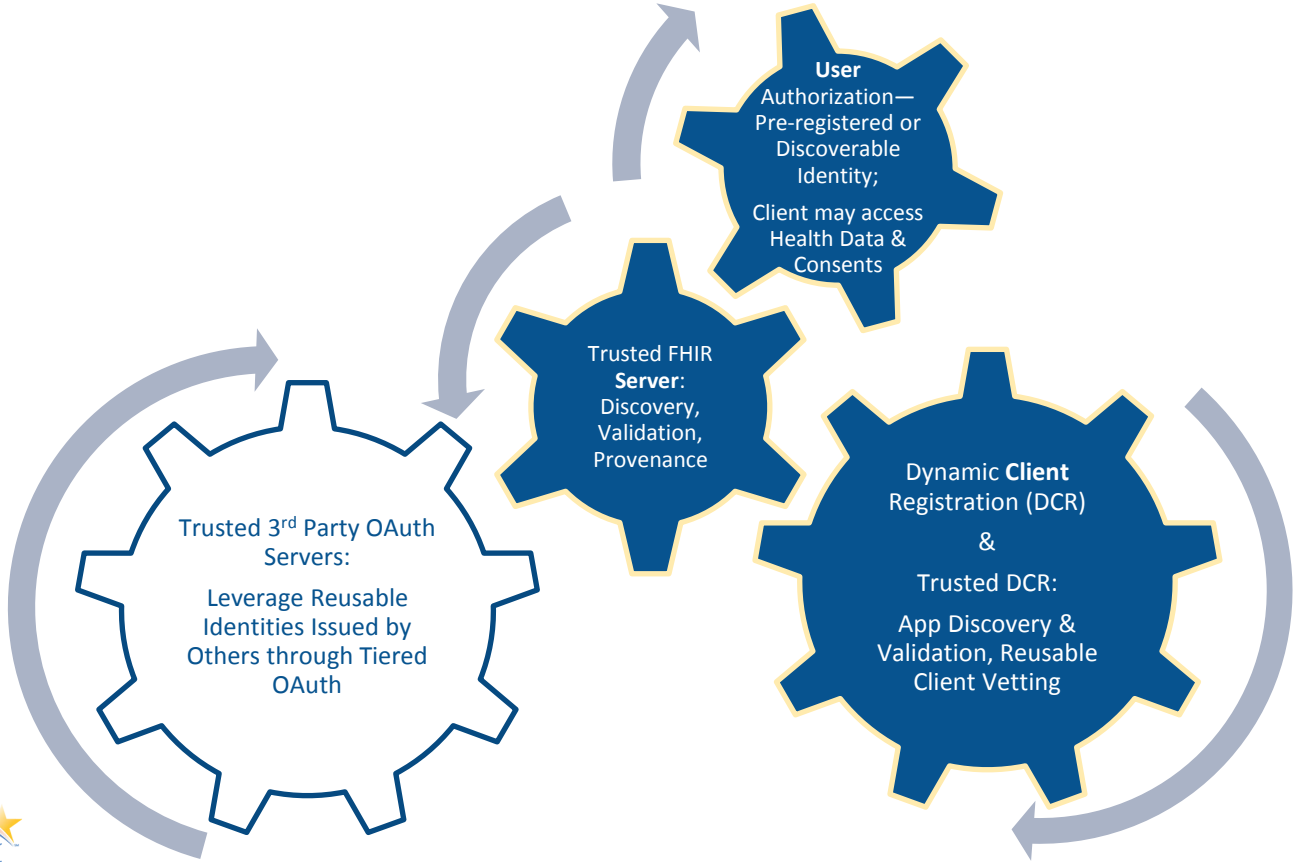




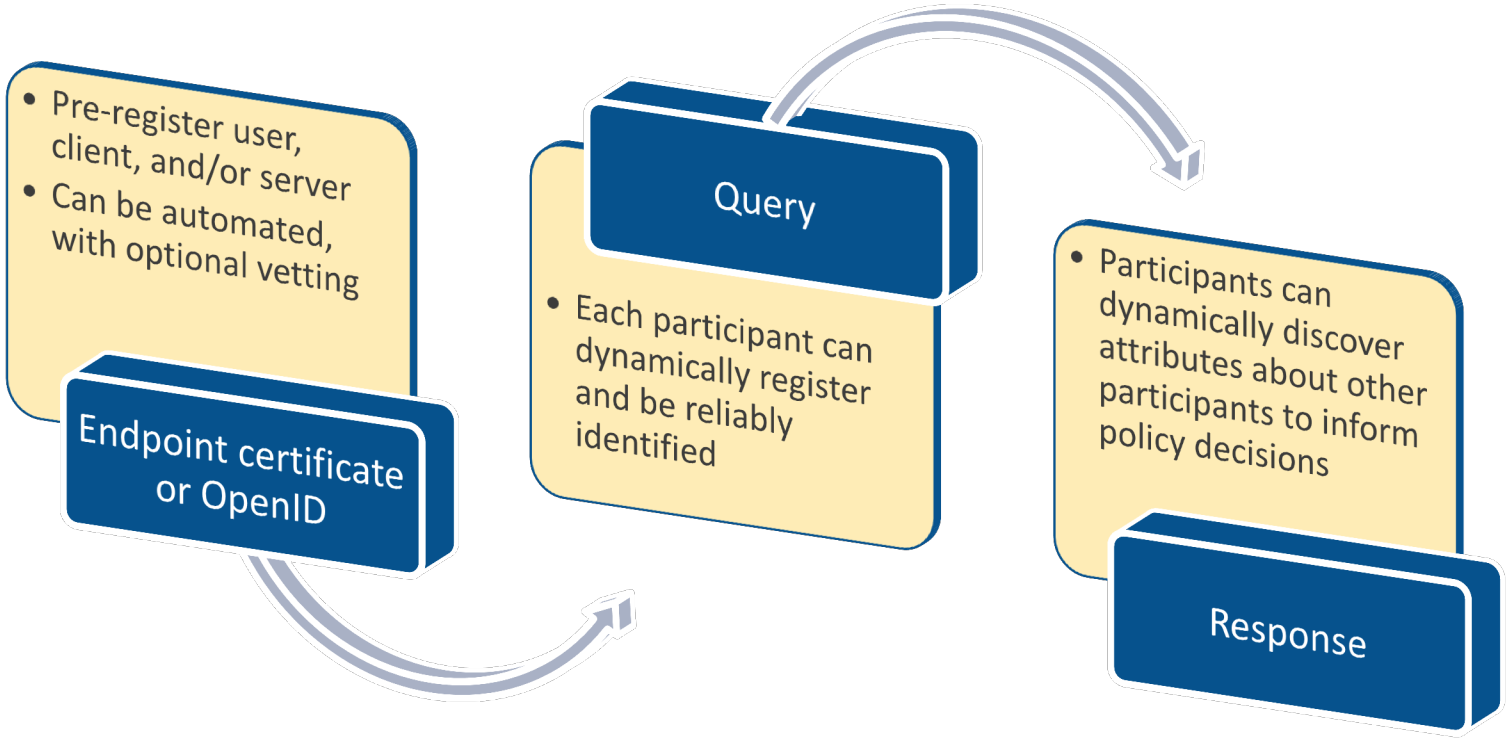
Trusted Identity Networks

- Cross-organizational reciprocity of user credentials issued by trusted Identity Providers
  - » Tiered OAuth
  - » Increases the usefulness and scalability of sharing when data grantees do not need to have local credentials
  - » Reusable digital identities

Ecosystem Components
Adding Federated Identities



Ecosystem Summary



What's Next?

- Implementation Guide for Trusted Dynamic Client Registration
- HL7 May FHIR Connectathon Track in Montreal, Canada
- Continued development of Unified Data Access Profiles (UDAP) to scale trusted networks (www.udap.org)
- Develop participation agreements and baseline criteria

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Getting In Touch

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