



NORTHROP GRUMMAN

Nationwide Health Information Network

The Northrop Grumman Architectural Approach

Wendell Ocasio, M.D.
Principal Clinical Systems Architect

DEFINING THE FUTURE

This presentation discusses an NHIN Architecture Prototype project made possible by a contract from the Office of the National Coordinator for Health Information Technology (ONC), DHHS. The content is solely the responsibility of the authors and does not necessarily represent the official view of ONC.

HEALTH



Architectural drivers

- Many successful examples of health information exchange exist at the local/regional level
- Creation of centralized nationwide services (e.g. national patient registries or repositories) is not likely
- Lack of nationwide standards is barrier to extension of local successes into a nationwide network



Fundamental Goals

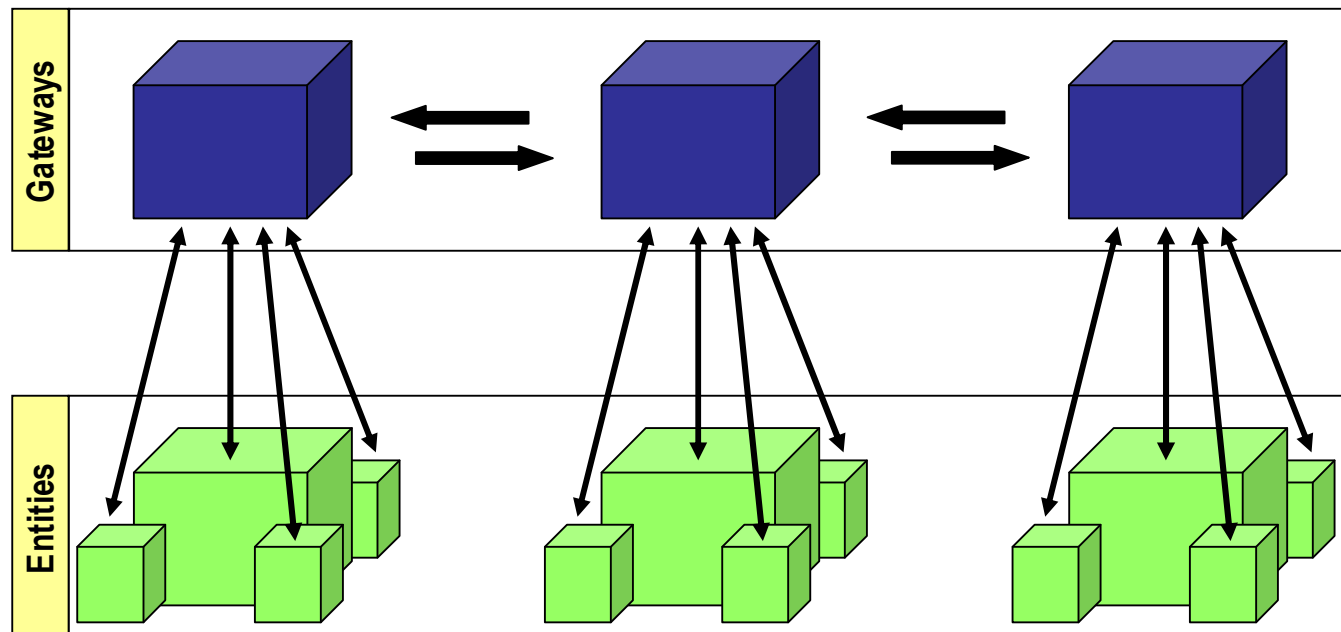
1. Leverage success at the local level – “lower the barrier” for entry
2. Develop and enforce nationwide standards to facilitate broad interoperability





Architectural solution – Gateways

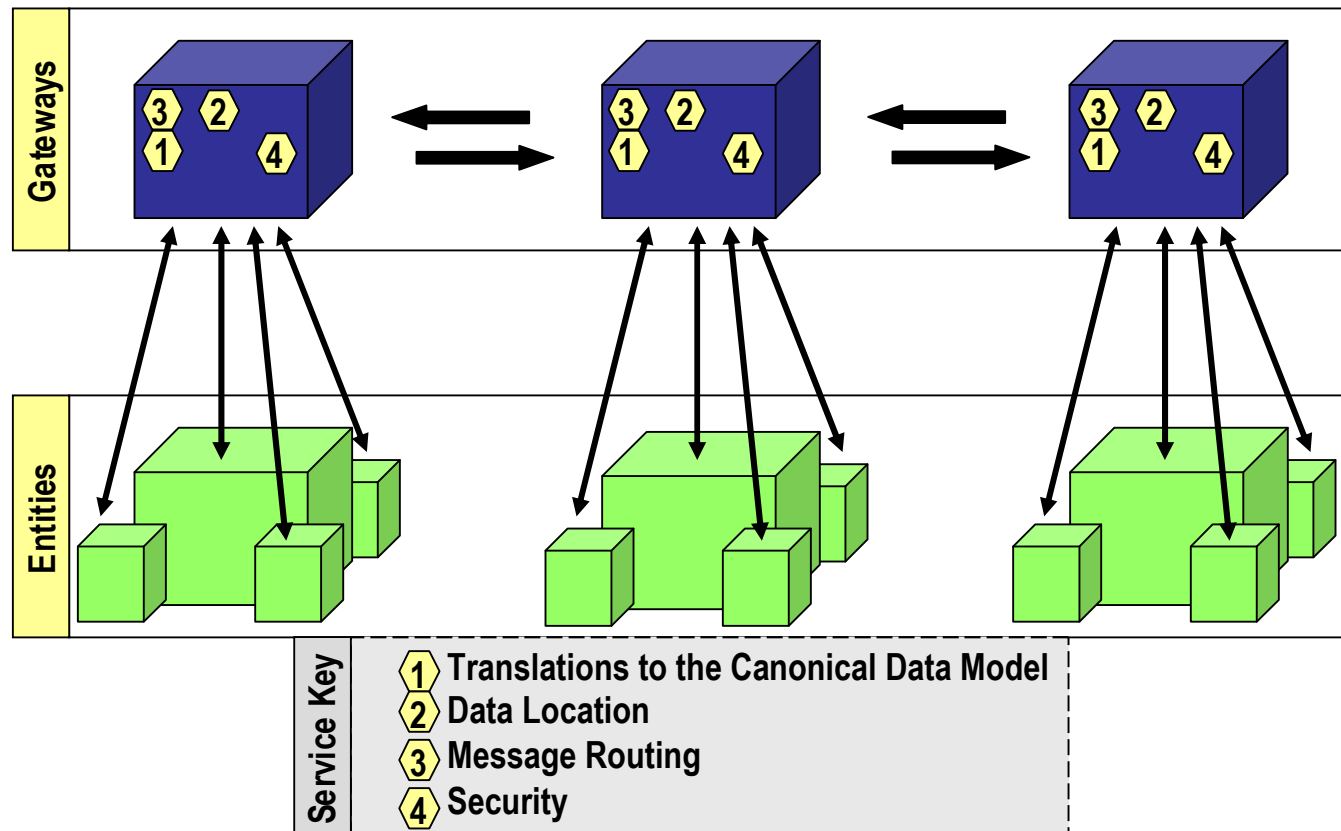
The solution to the conflict between the fundamental goals is to use *gateways* to bridge the gap





Gateways provide interoperability services

Gateways allow entities that do not provide interoperability services to join a nationwide network:





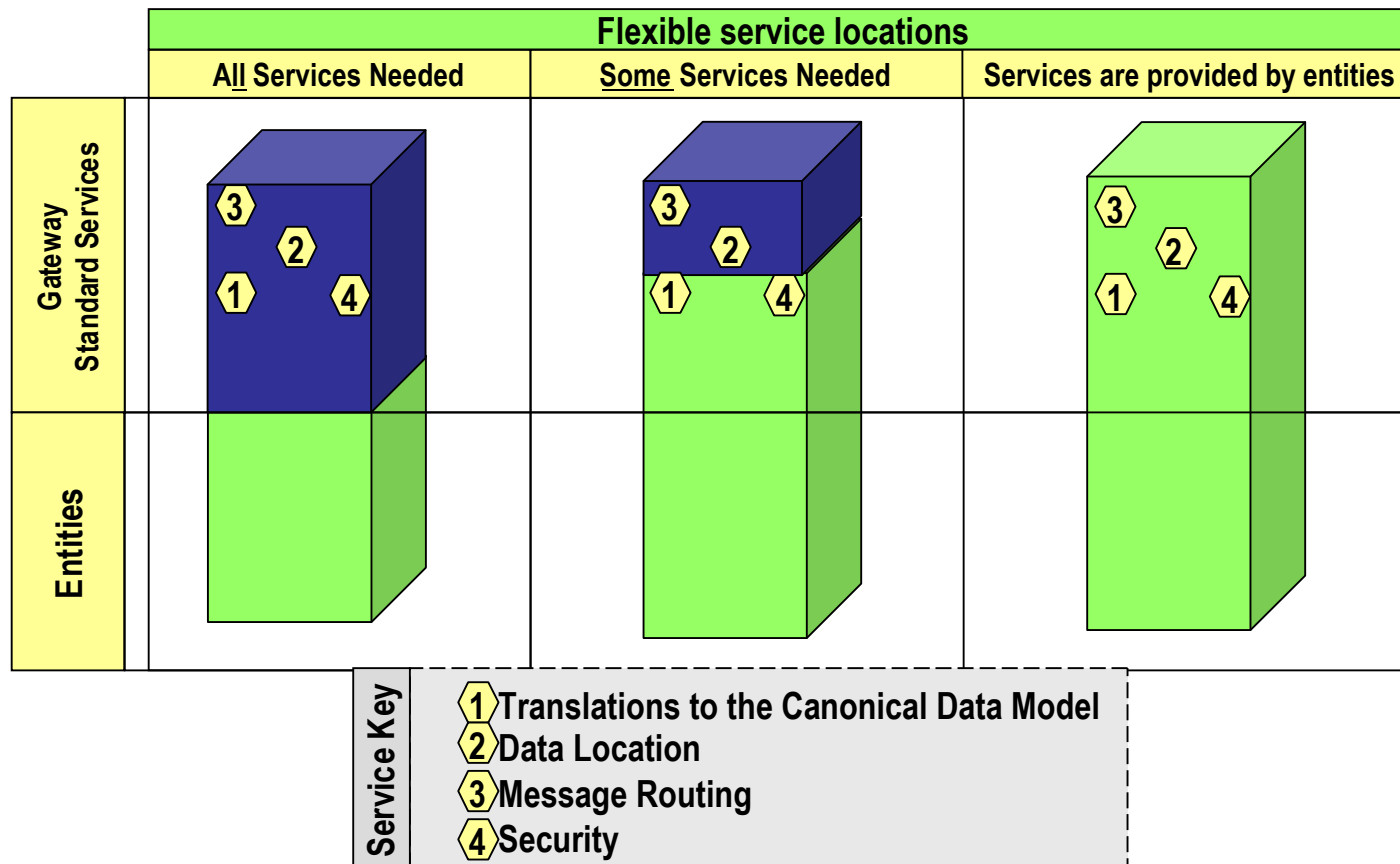
Gateway principles

- Each entity (edge system) connects to the Nationwide Health Information Network through a particular gateway
- Each gateway services one or more entities
- Gateways connect to each other using nationwide standards
- Gateways provide essential services needed for interoperability:
 1. Canonical Data Model Translation
 2. Data Location
 3. Message Routing
 4. Security



Flexible Location of Gateway Services

Entities may internally provide some or all of the necessary interoperability services





Gateway Interoperability Services

1. Canonical Data Model Translation

2. Data Location

- Patient Identification
- Entity Identification
- Data Retrieval
- Metadata Registry

3. Message Routing

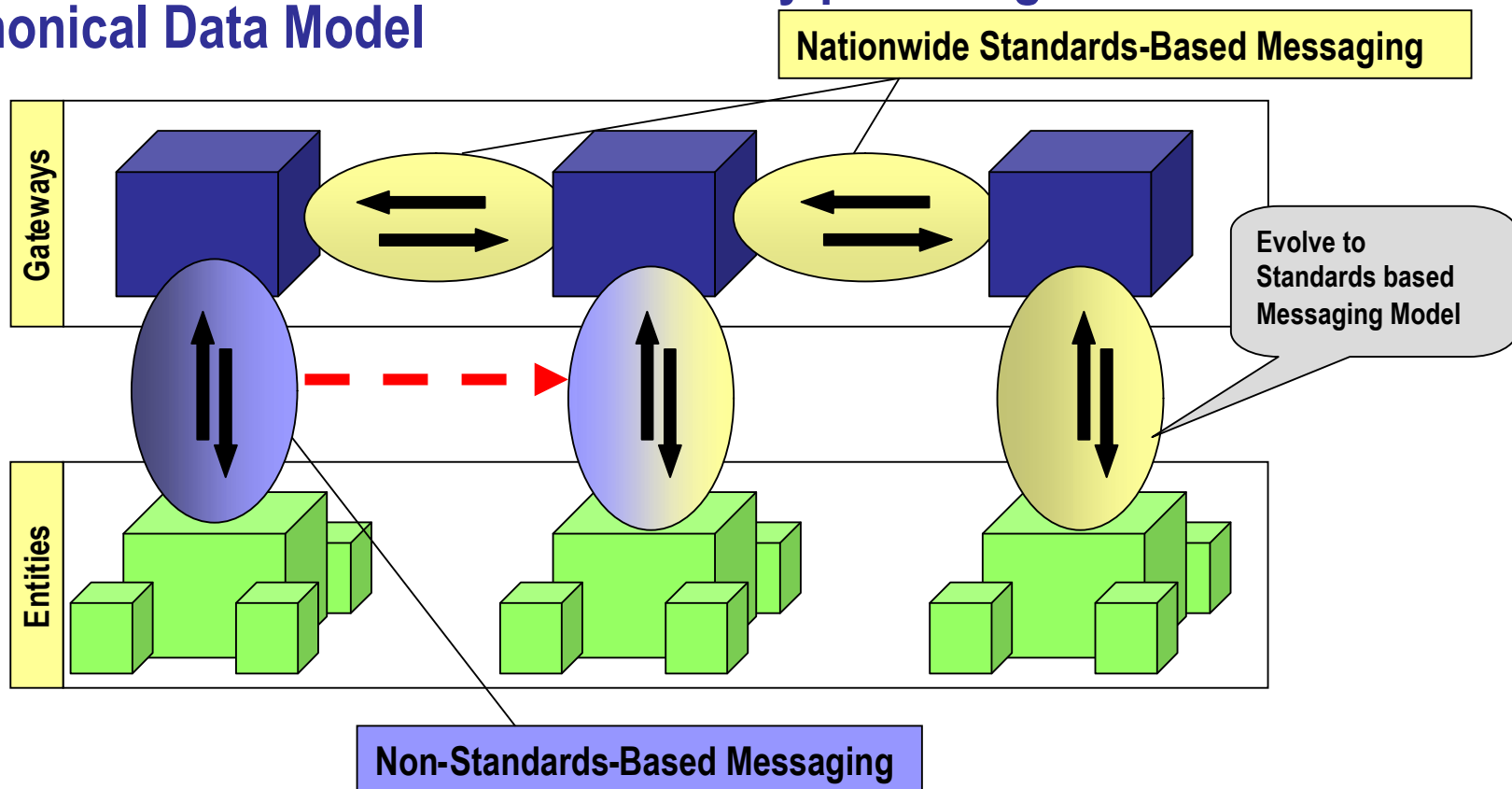
4. Security

- Authentication
- Authorization
- Transport-layer encryption
- Auditing



Nationwide Standards through a Canonical Data Model

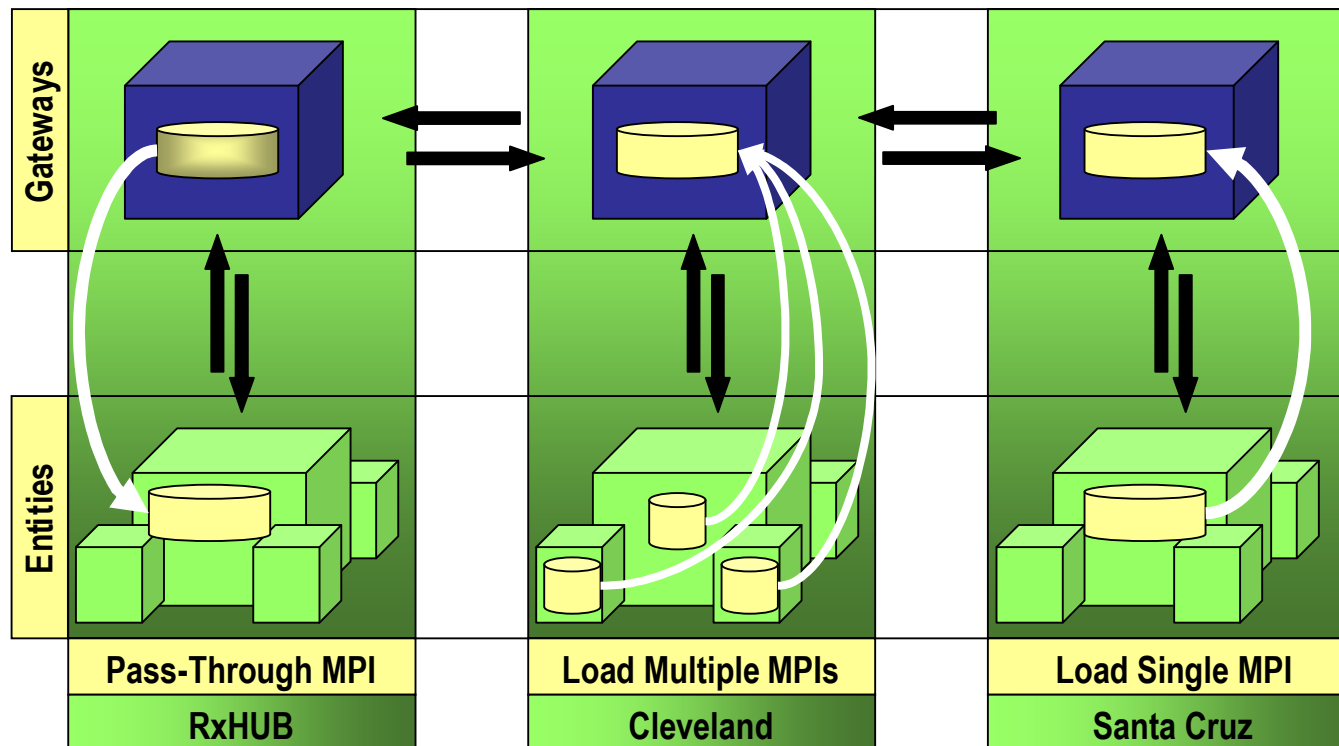
Gateways enable interoperability with entities that have not yet implemented nationwide standards by providing translation into a Canonical Data Model





Patient Identification - Federated

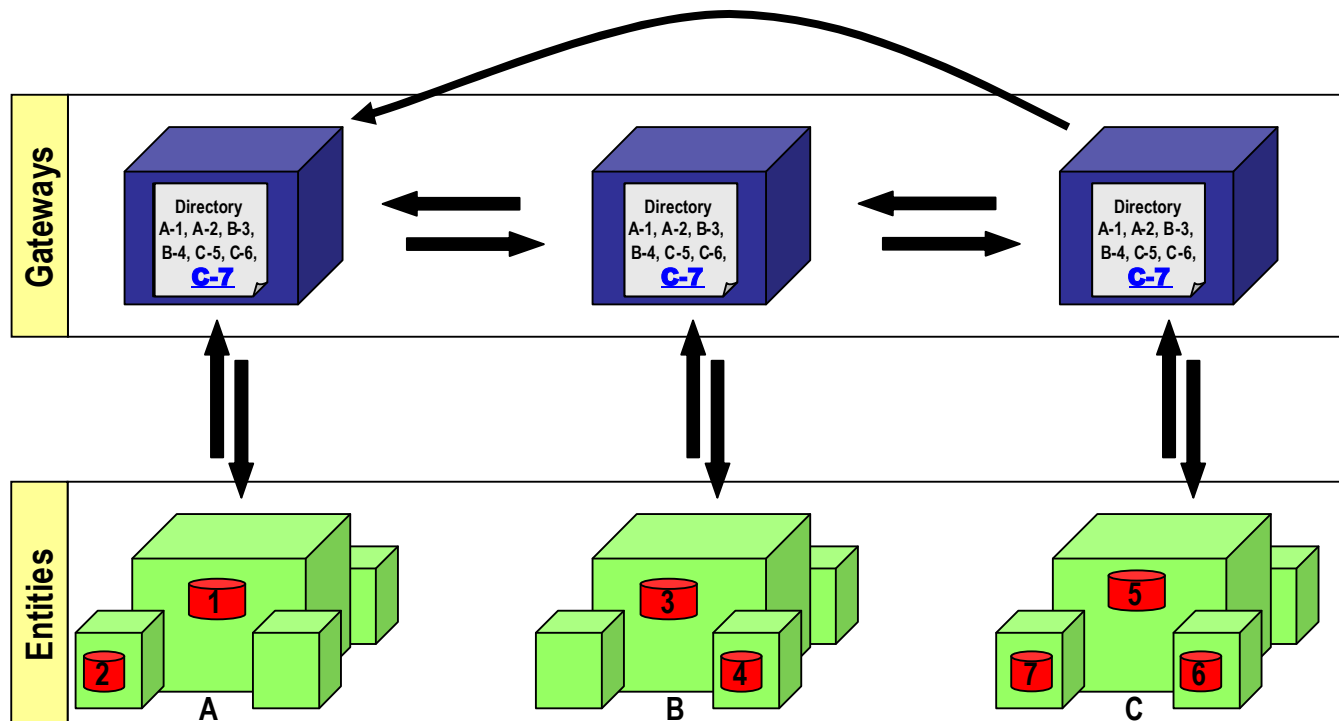
- No requirement for a nationwide patient index or identifiers
- Each Gateway will keep a Master Patient Index for its entities
- Each Gateway will find matched patient identities within its entities





Entity Identification – Replicated Directory

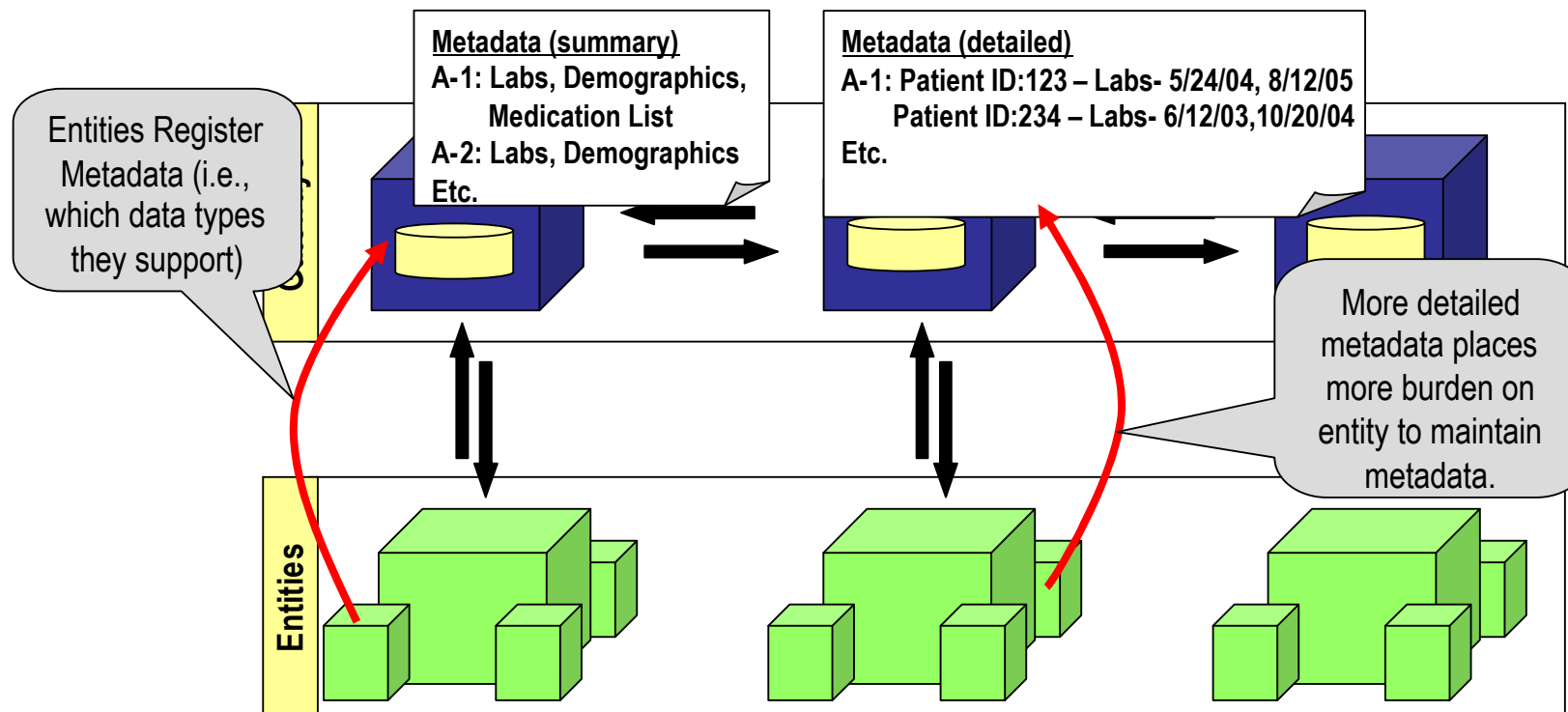
- Every entity will be listed in a nationwide entity directory
- Copies of the directory will be replicated across gateways
- Similar to the Internet's Domain Name Server (DNS)





Metadata Registry

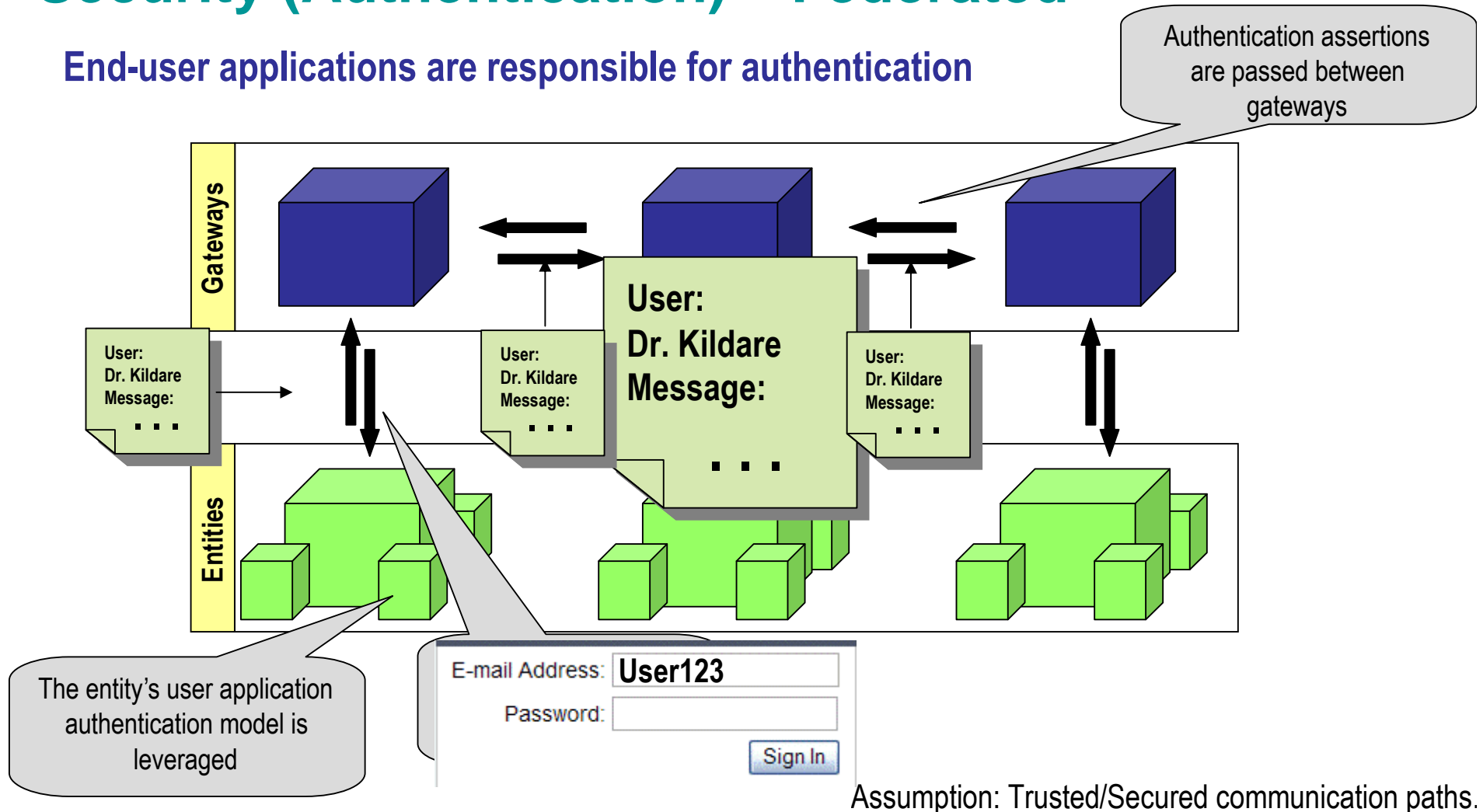
- Metadata = description of the data available
- Architecture does not prescribe level of detail required in metadata
- More detail → higher burden on data sources, fewer unnecessary queries





Security (Authentication) – Federated

End-user applications are responsible for authentication





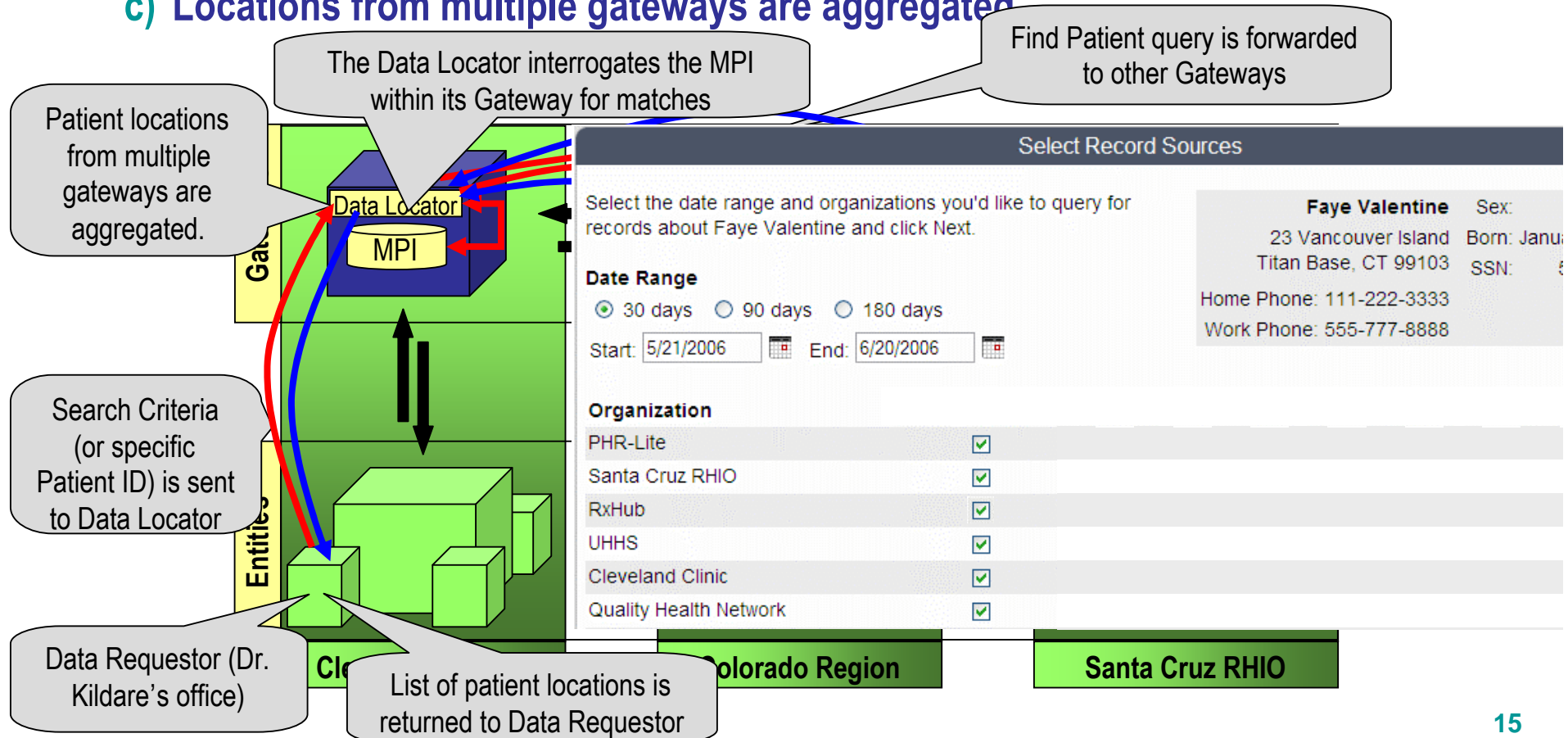
Scenario – EHR Use case

- Patient John Smith goes to see Dr. Kildare for the first time
- Recently moved to the area
- Suffers from high blood cholesterol
- Dr. Kildare wants to see historical lab results
- Sequence:
 1. Find locations containing data for John Smith (Find Patient)
 2. Determine what data is available (Get Metadata)
 3. Retrieve the data (Get Data)



Step 1: Find Patient

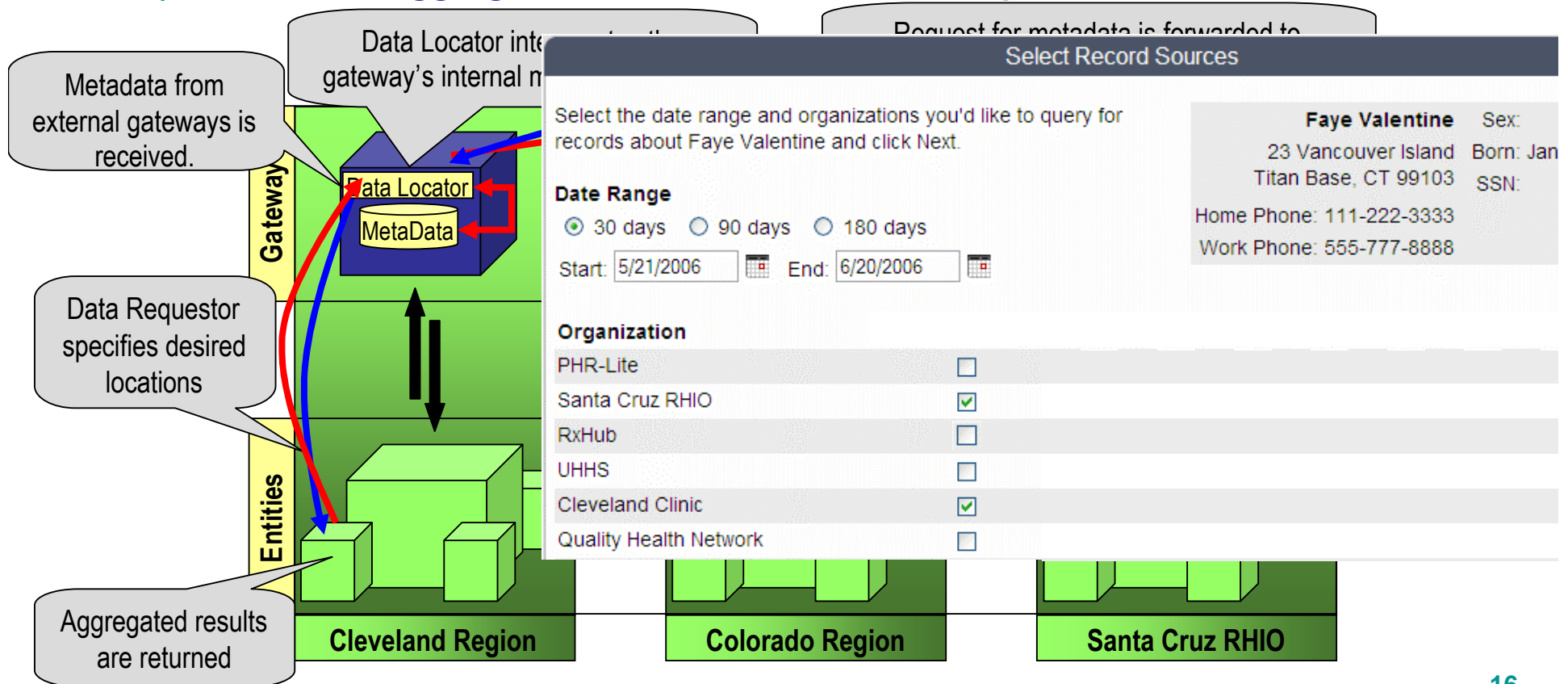
- a) Data Requestor sends Find Patient Request to Data Locator
- b) Data Locator finds patient locally and forwards to other gateways
- c) Locations from multiple gateways are aggregated





Step 2: Get Metadata

- a) Data Requestor selects desired locations from list provided in Step 1
- b) Data Locator retrieves metadata internally and from other gateways
- c) Metadata is aggregated and returned to Data Requestor





Step 3: Get Data

- a) Data Requestor selects desired data from metadata provided in Step 1
- b) Data Locator retrieves data internally and from other gateways
- c) Data is aggregated



Join Patient Search Audits Administration

Home > Patient Search

Medical Records

Below are the records we've located for Faye Valentine.

chemistry lab

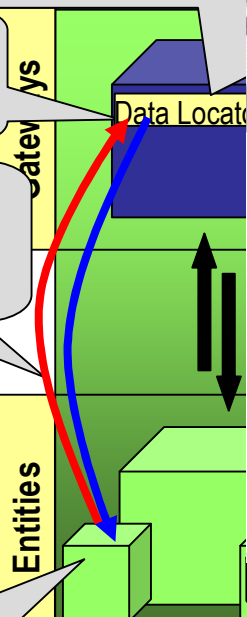
Total Cholesterol (serum) 212 mg/dL	12/09/2005 at 2
Total Cholesterol (serum) 195 mg/dL	2/19/2006 at 1
Total Cholesterol (serum) 225 mg/dL	5/04/2006 at 1

Data Locator retrieves data from sources connected to the

Retrieved data is aggregated.

Data Requestor specifies data to be retrieved

Aggregated results are returned to Data Requestor



Cleveland Region

Data Repository

Colorado Region

Santa Cruz RHIO

Data Repository



NHIN Architecture – Summary

Implement gateways in order to:

- **Leverage existing interoperability**
- **Enforce nationwide standards**
- **Establish a Canonical Data Model**

NORTHROP GRUMMAN



Contact Information

Wendell Ocasio, MD

**Principal Clinical Systems Architect
Health Solutions**

Northrop Grumman Corporation

T: (703) 272-5864

E: wendell_ocasio@chcsii.com