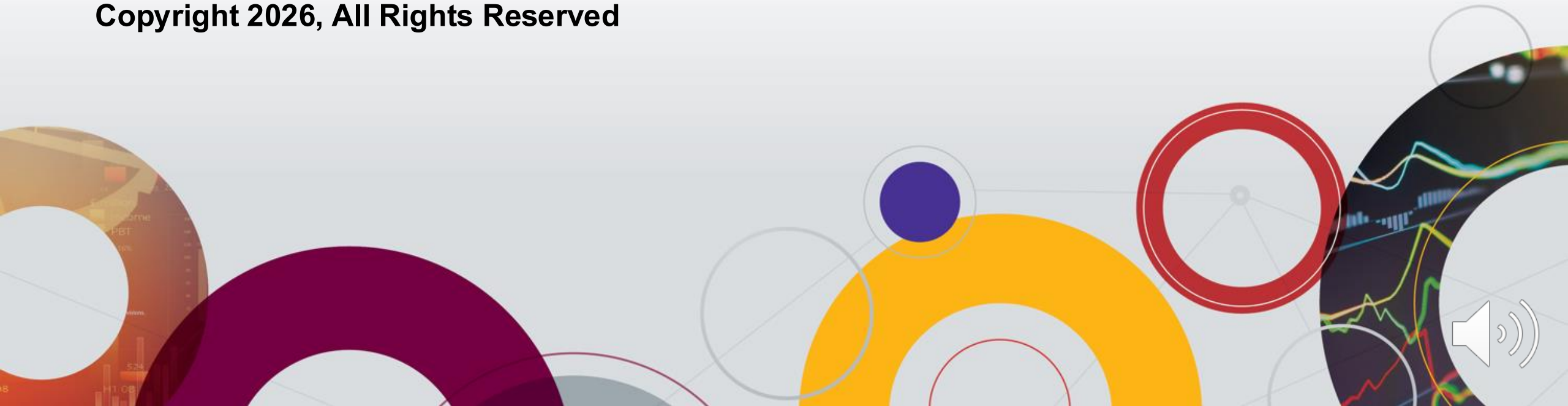


6.3b Health Information Exchange

10x10 – Introduction to Biomedical Informatics & Artificial Intelligence
William Hersh, MD, FACMI, FAMIA, FIAHSI
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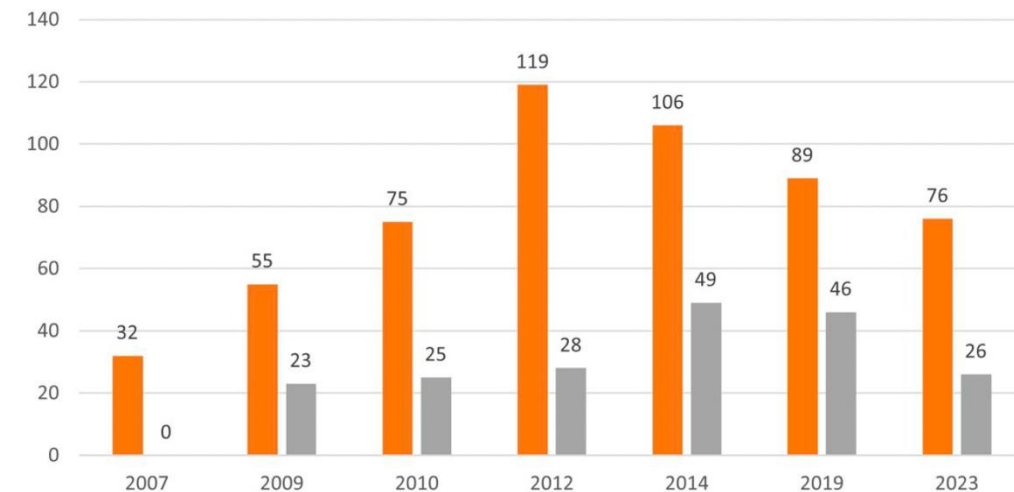


HIE implementation beyond Indiana

Current state of HIE organizations (HIOs) in US (Everson, 2024)

- As of 2023, 76 HIOs with 26 covering operating expenses with revenue from participants
- Number declined from peak of 119 in 2012, but there has been consolidation and growth in services
- Operate in 47 states and Puerto Rico

Also other means beyond HIOs, e.g., Epic Care Everywhere and national exchanges



Beyond the US: HIE in several countries

Analysis of clinician users access to past medical history (PMH) across 5 countries (Klapman, 2018)

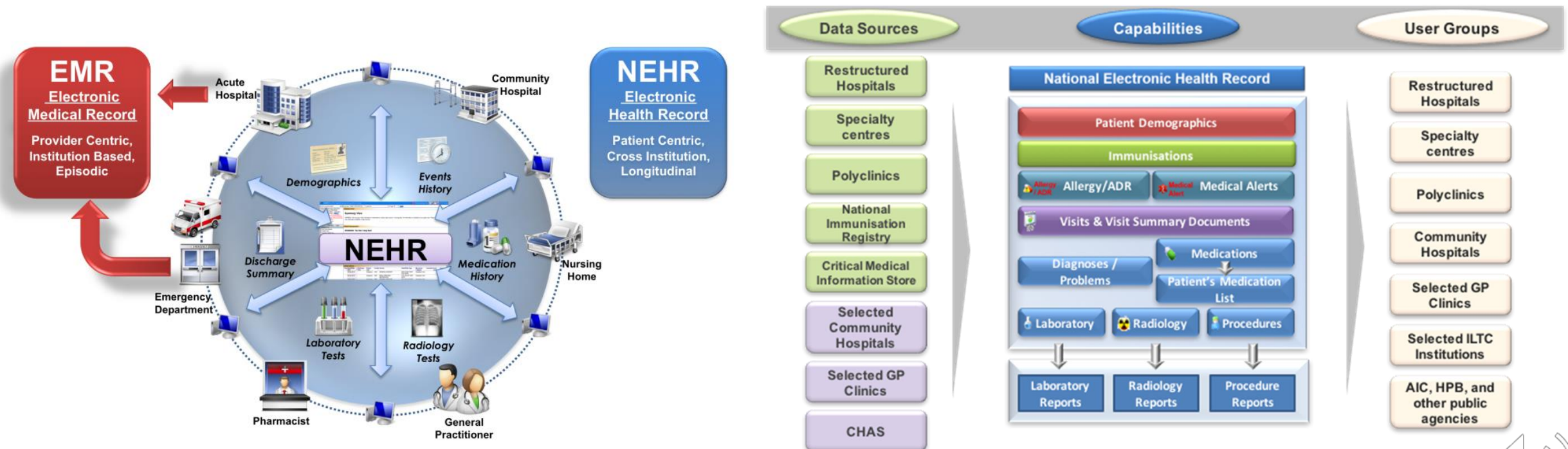
- Canada, Denmark, Finland, Germany, US
- Benefits of access to PMH
 - Safer care
 - Reduced patient length of stay
 - Fewer lab and imaging orders
- Conditions under which PMH was sought
 - Moderate-acuity patients
 - Patients with chronic conditions
 - Instances where accessing was convenient
- Challenges to HIE access and use
 - Difficulty knowing where information located
 - Delay in receiving information
 - Difficulty finding information within documents

Singapore National EHR (NEHR)

National, opt-out system

Accessible by all healthcare providers

Ongoing debate over concerns about privacy, security, completeness of data, especially in light of SingHealth breach (Choo, 2019)



Implementing HIE

Direct secure messaging

Record locator services (RLS)

US nationwide exchange initiatives

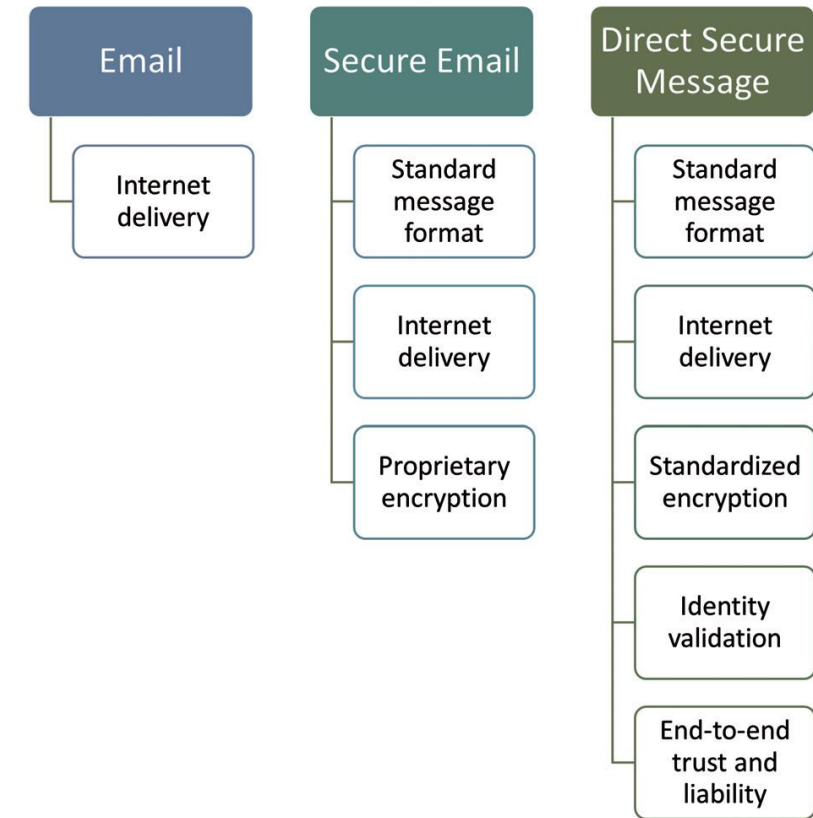
Direct secure messaging

Standard for secure direct exchange maintained by [DirectTrust](#)

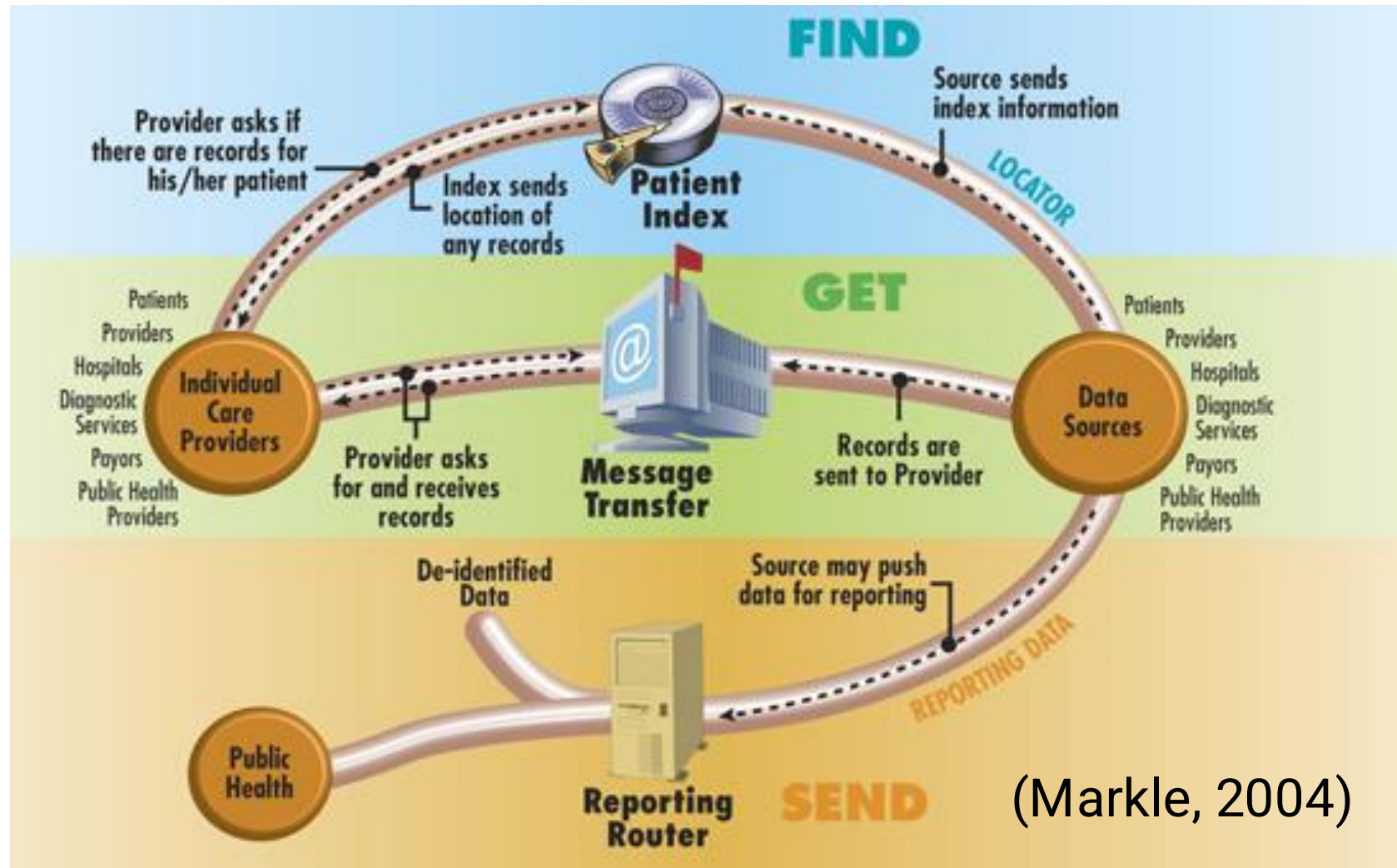
Overview and recommendations for future (Arvisais-Anhalt, 2022)

- Similar functionality goes by different names by vendors, e.g.,
 - Epic – Care Everywhere
 - Cerner – Cerner Direct
 - Meditech – Direct Messaging
- Recommend commonality of naming and basic functionality

Standardization and maintenance of directories is critical (Feterik, 2025)



Record locator services (RLS)



US nationwide exchange initiatives

[E-Health Exchange](#) – network of federal agencies and non-federal healthcare organizations who adhere to common standards to securely exchange patient information

[Carequality Interoperability Framework](#) – implemented by many vendors and their customers

[CommonWell Health Alliance](#) – alliance of vendors committed to record linking, patient consent management, and record locator services – market reaction to Epic?

[Agreement](#) with Carequality and CommonWell to work together

[Surescripts national record locator service](#) – started as standalone now aligned with Carequality

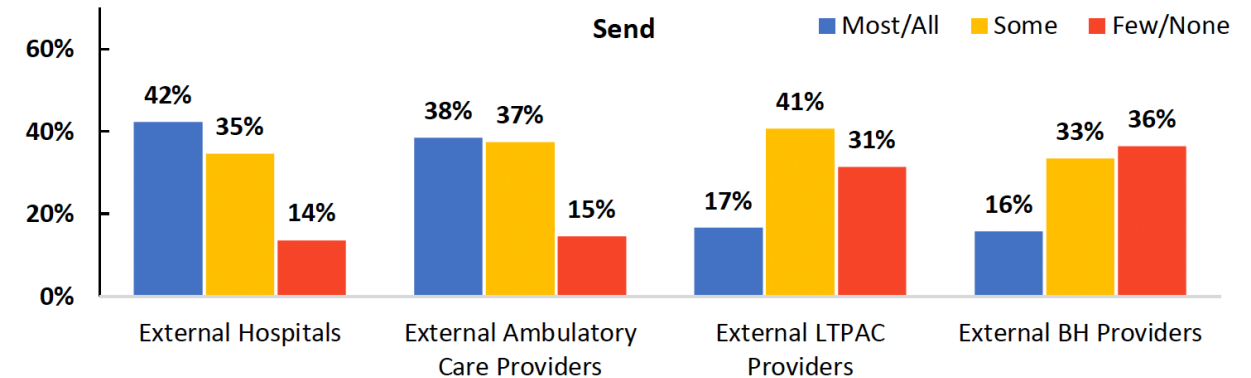
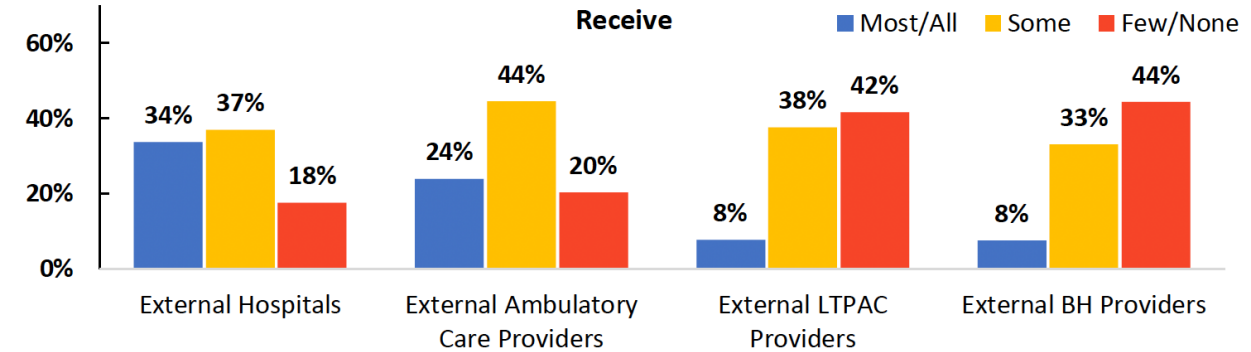
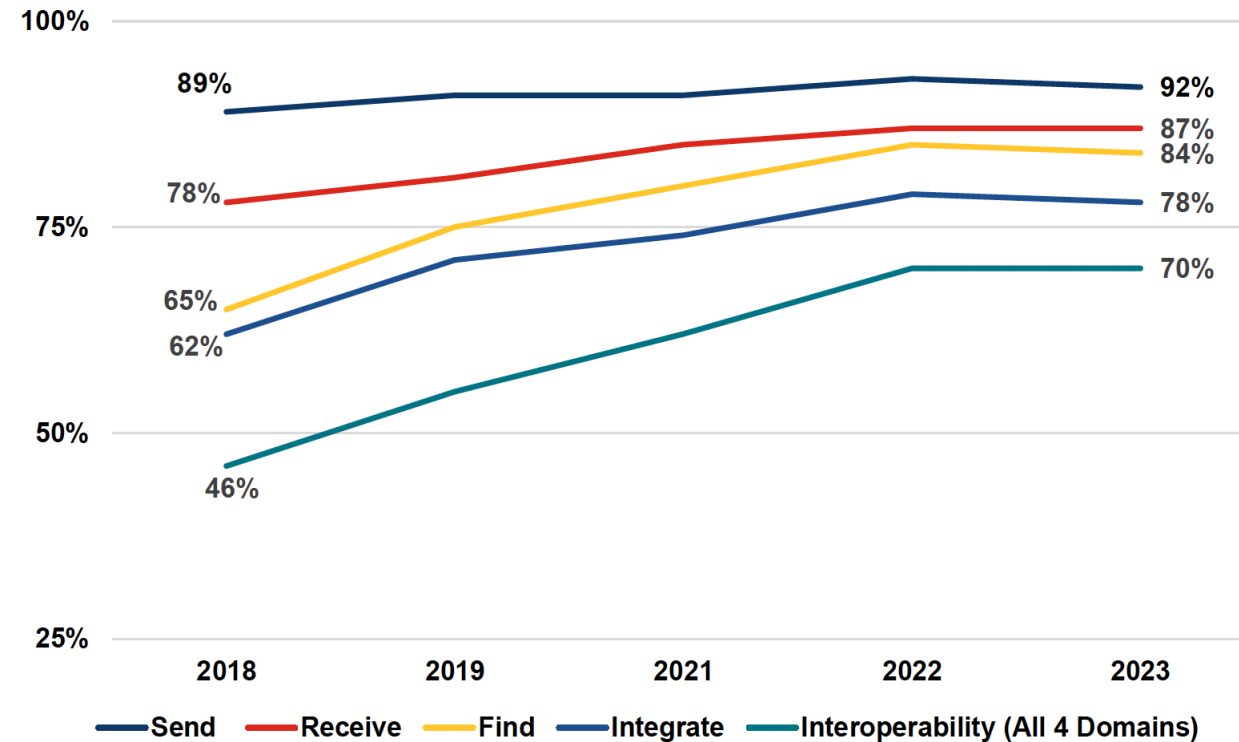
Research results

Usage

Satisfaction and barriers

Evidence for benefit

Usage of HIE in hospitals (Gabriel, 2024)

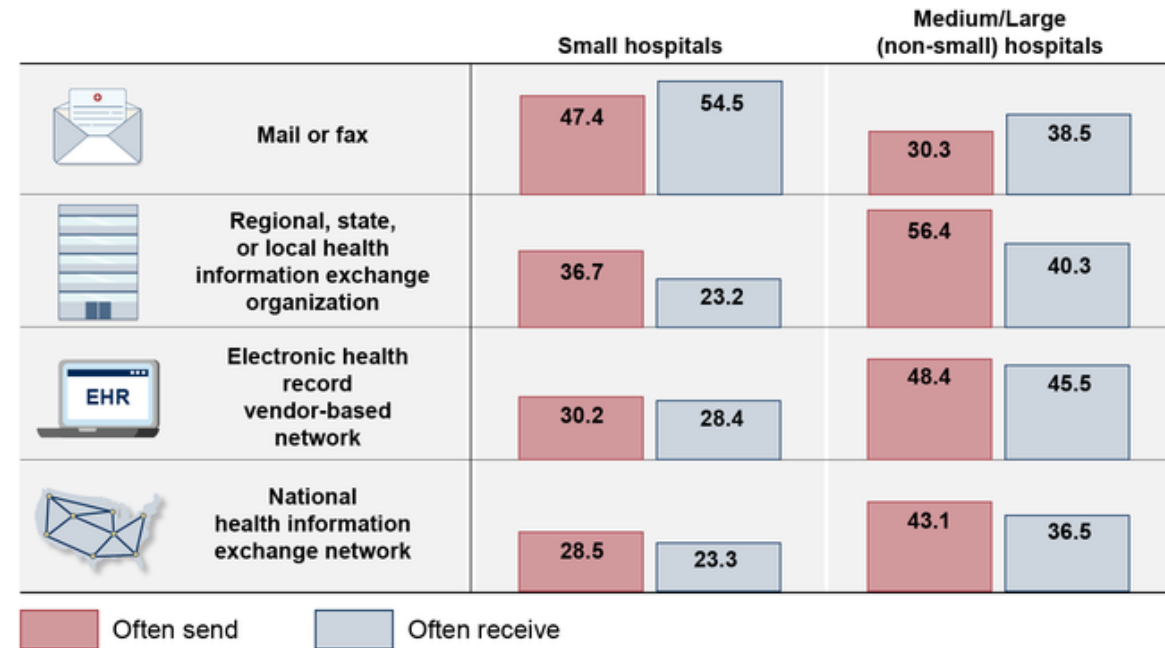


HIE in US hospitals (cont.)

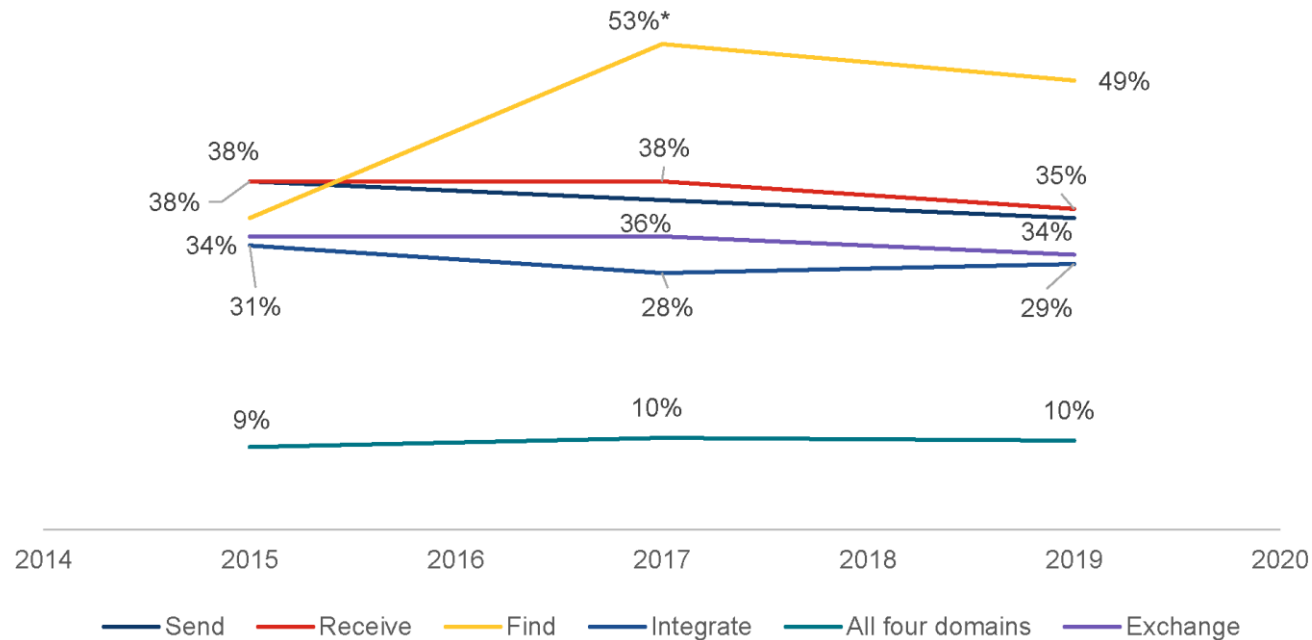
More advanced HIE less likely in small and rural hospitals (GAO, 2023)

Widespread use of APIs (Strawley, 2023)

- 90% enabled apps to grant patient access to EHR data and 60% allowed patients to submit data through apps
- More than two-thirds of hospitals used FHIR APIs to enable patient access to data
- 80% use APIs to enable apps to read and write data to/from EHR
- Half of hospitals use APIs to enable apps to read non-EHR data
- Disparities persisted when stratified by EHR developer, hospital size, and hospital system affiliation



Usage of HIE in ambulatory settings (Pylypchuk, 2022)



Source of Information	Send	Receive	Search/Query	Reconcile
Progress/Consultation notes	36	36	43	
Clinical registry data	16	13	-	-
Emergency department notifications	-	28	-	-
Summary of care records	27	31	39	-
Medication list	-	-	-	68
Medication allergy list	-	-	-	65
Problem list	-	-	-	58

Physicians	Engaged in Exchange (65%)	Did not Engage in Exchange (35%)
Specialty		
Primary care (ref)	72%	28%
Surgical	61%*	39%*
Medical	55%*	45%*
Participation in Payment Models		
Advanced/Alternative Payment Model	79%**	21%**
Pay for Performance	78%**	22%*
Accountable Care Organization	77%**	23%*
Patient Centered Medical Home	81%**	19%*
None of above (ref)	54%	46%*
Certified EHR use		
Yes	72%	28%
No (ref)	61%	39%
Don't know	50%	50%
Rural		
Yes	63%	37%
No	65%	35%
Promoting Interoperability Program or Medicaid EHR Incentive Program Participation		
Yes	74%*	26%*
No	56%	44%

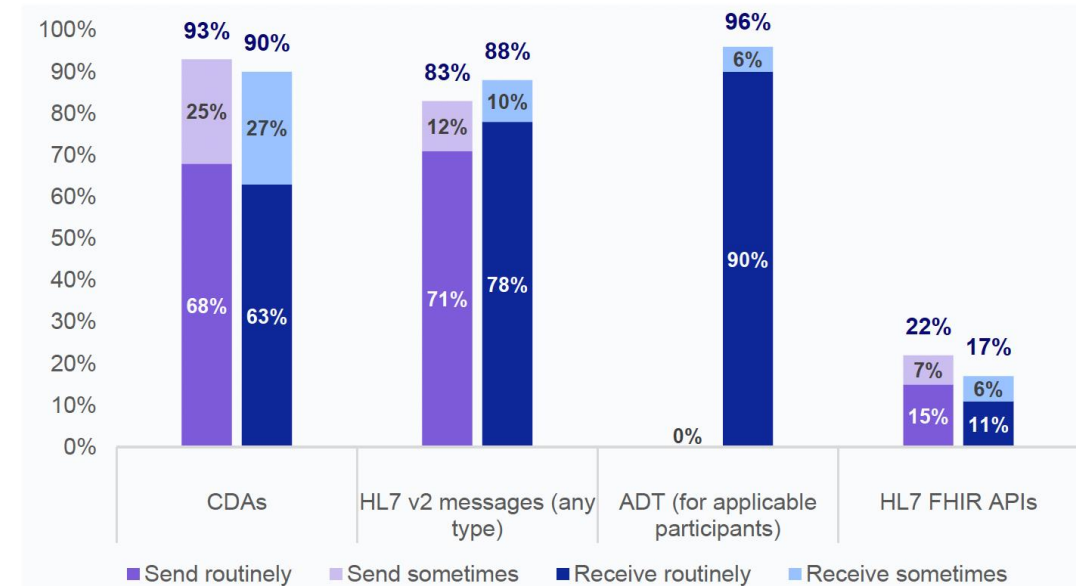
Other studies of HIE usage

Usage among cancer patients (Richwine, 2024)

- >60% with recent cancer diagnosis offered and accessed their online medical records in 2020-2022
- Frequent users and individuals with recent diagnosis had higher rates of using multiple methods – app and Web site
- Nearly all users viewed test results

Use of standards by HIOs (Chang, 2024)

Laboratory data available from most HIOs (Strawley, 2024) but can be impeded by missing data elements, discordant LOINC code use, and multiple HL7 version (Luu, 2024)

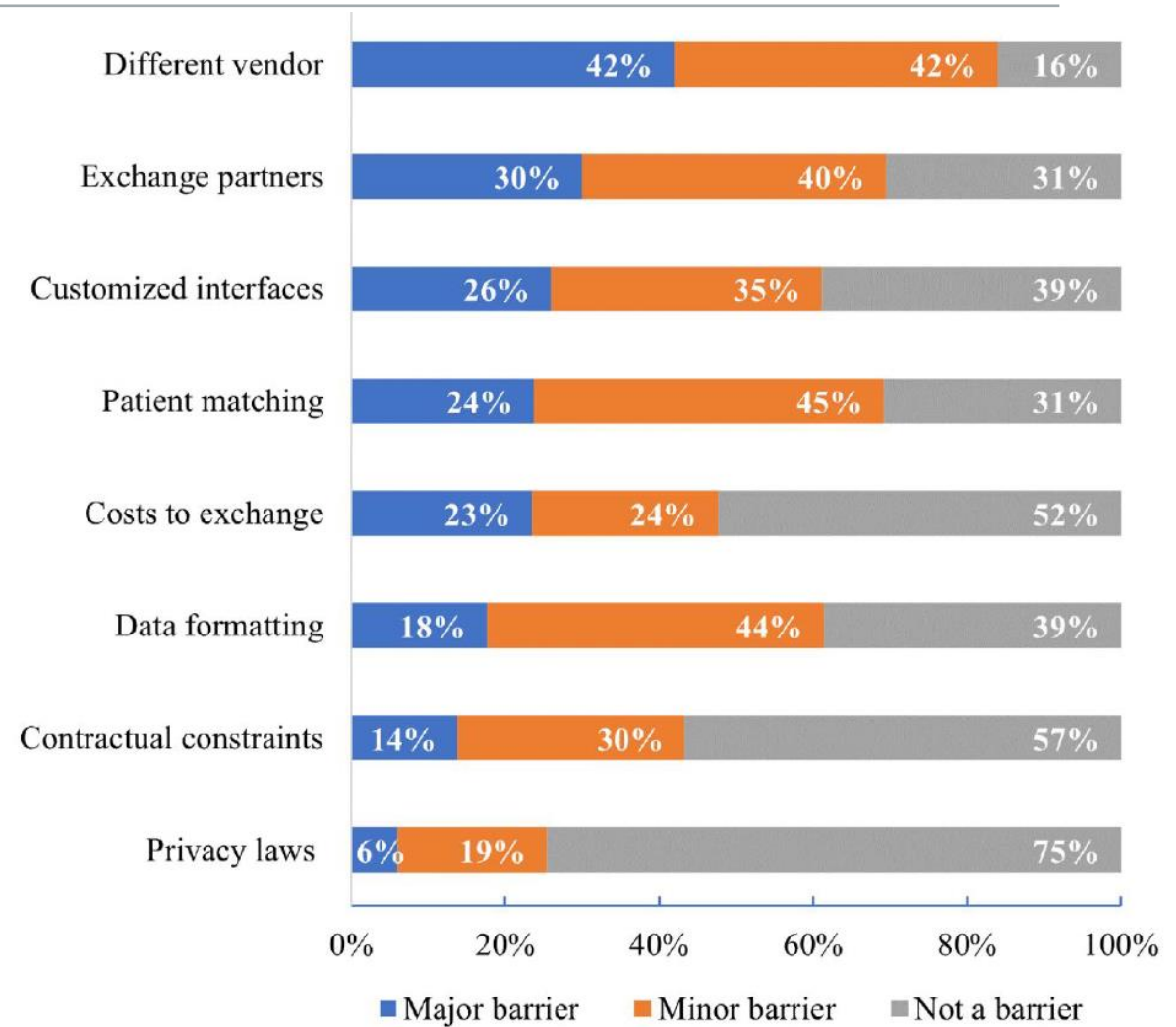


Satisfaction and barriers

Family physician satisfaction with interoperable HIE (Everson, 2024)

- 70% at least somewhat satisfied with access to outside information
- 23% indicated was very easy to use outside information
- 8% indicated was very easy to use information from different EHRs

Hospital barriers to HIE (Everson, 2024)



Evidence for benefit of HIE

Systematic reviews (Hersh, 2015; Menachemi, 2018) have found

- Fewer duplicated procedures, reduced imaging, lower costs, and improved patient safety
- Studies evaluating community HIEs more likely to find benefits than studies evaluating enterprise HIEs or vendor-mediated exchanges

More recent research results

- Recently discharged patients with primary care visit after discharge with HIE lookup less likely to have return visits to emergency department or hospital readmission (Sloan-Aagard, 2023)
- HIE availability not associated with reduced utilization for patients receiving care outside usual organization (Adler-Milstein, 2023)
- Data from IHIE enabled improved COVID-19 research and surveillance (Allen, 2025)
- About 7 of 10 hospitals in average HRR connected via HIE, more for those using Epic (Lin, 2025)
- HIE with common data model increased ability to calculate cardiac risk scores (Eisman, 2025)

Trusted exchange

Interoperability and technology are not enough; need framework for trusted exchange among stakeholders

- 21st Century Cures Act recognized need to move beyond one-off HIE organizations and systems
- Cost must be borne to avoid information blocking rules

Trusted Exchange Framework and Common Agreement (TEFCA)

- Mandated ONC to develop or support a trusted exchange framework, including a common agreement among health information networks nationally
- Common set of principles for trusted exchange and minimum terms and conditions for trusted exchange

TEFCA

Sequoia Project designated as [Recognized Coordinating Entity \(RCE\)](#) to develop, update, implement, and maintain Common Agreement

TEFCA establishes qualified health information networks (QHINs) that connect with one another and route data requests and responses among providers and health plans

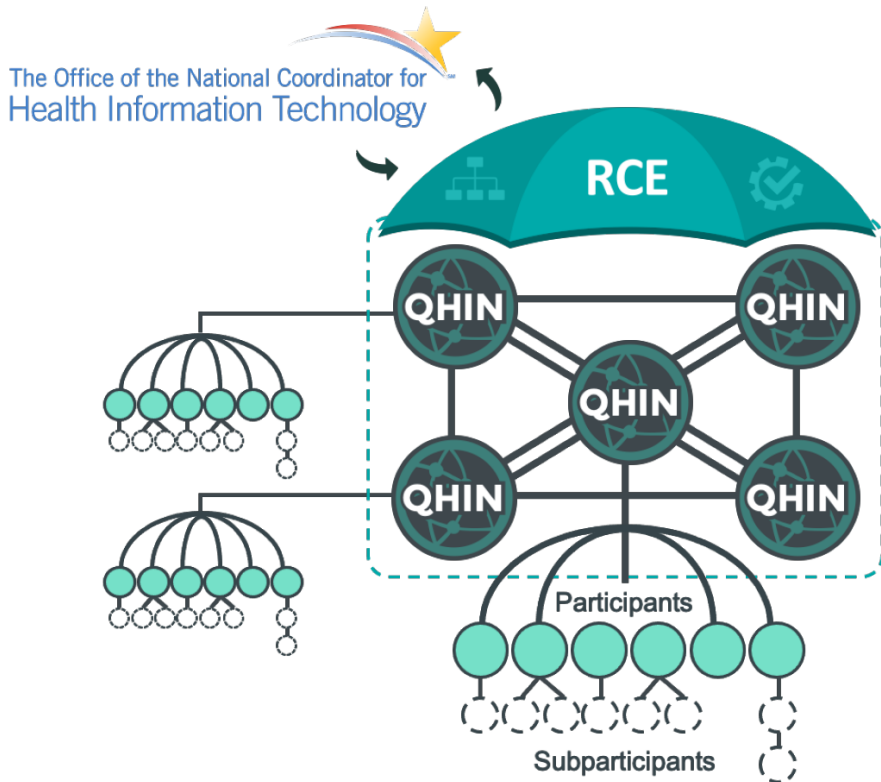
Serves as “commonly agreed to rules of the road” for health information networks across US (ONC, 2022)

- Includes technical standards related to privacy and security as well as approaches to identify network participants and patients before exchanging data

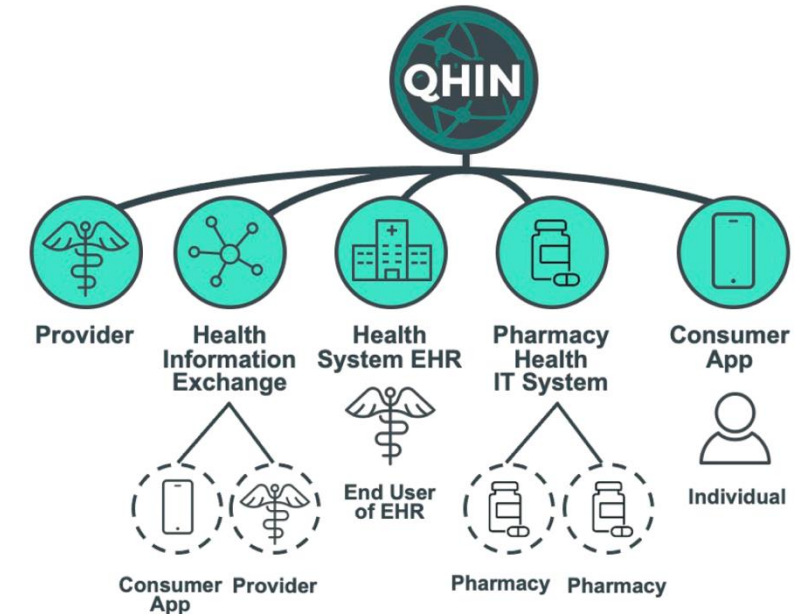
Components of TEFCA

- Common Agreement for Nationwide Health Information Interoperability – contract participating QHINs sign with Sequoia Project
- Trusted Exchange Framework – designates shared standards for QHINs

How TEFCA works



- ← ONC defines overall policy and certain governance requirements.
- ← RCE provides oversight and governing approach for QHINs.
- ← Qualified Health Information Networks (QHINs) connect directly to each other to facilitate nationwide interoperability.
- ← Each QHIN connects Participants, which connect Subparticipants.



Next steps for TEFCA

11 designated QHINs by ASTP

- [Epic Nexus over 1000 hospitals and 22,000 clinics](#)

[Adopting FHIR for exchange API](#)

Role for hospitals and HIOs?

- Over 60% of hospitals aware and planned to participate (Chang, 2024)
- 22% already participating in TEFCA but 24% unsure about future participation (Raths, 2026)

Need “trust ... not tech” (Posnack, 2025)



Future of HIE

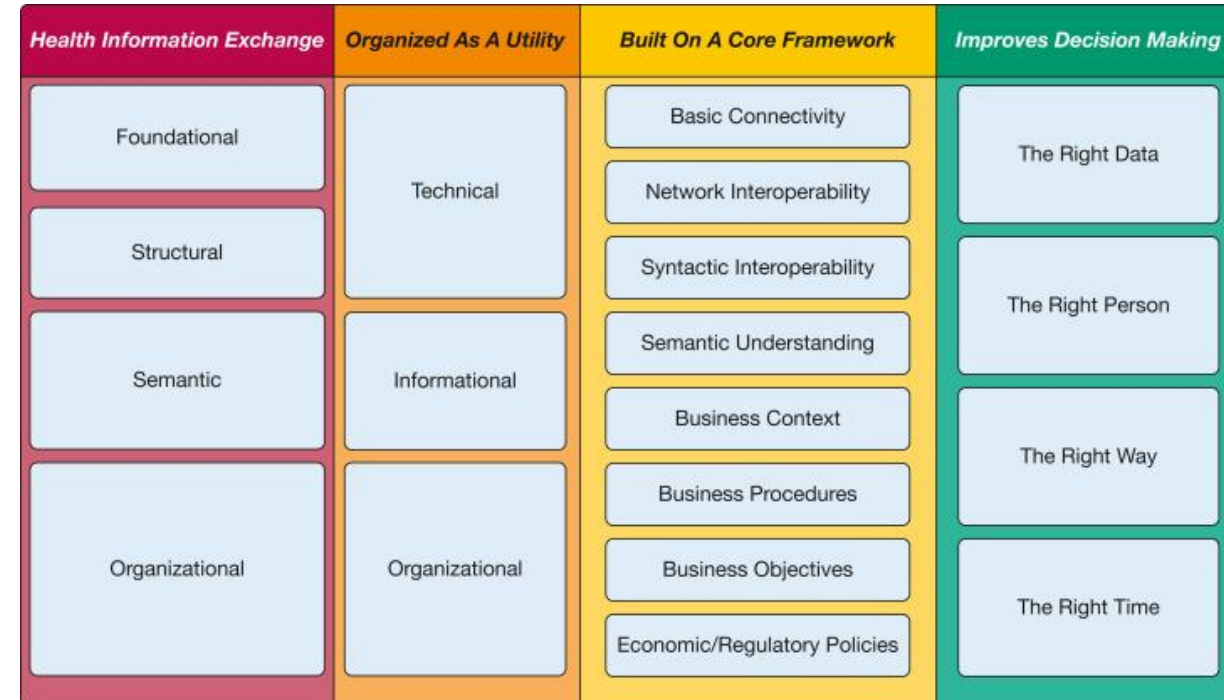
Will TEFCA reduce the need for HIE organizations?

Who will pay cost?

Where will the data ultimately live and who will control it?

HIE should be global utility (Sarkar, 2023) – growing efforts through

- [CIVITAS](#)
- [Consortium for State and Regional Interoperability \(CSRI\)](#) – [tool for assessing Health Data Utilities](#)



Unified approach to HIE (Abbasi, 2025)

Unified approach to secure, high-quality, and timely exchange of data across the US health care system

Standardized data elements

United States Core Data for Interoperability (USCDI)

Standardize data elements to be collected and exchanged in health information technology (IT) systems, such as electronic health records

Example data elements include

- Demographics
- Medications
- Vitals
- Diagnoses

Data elements



Common formats and interfaces

Fast Healthcare Interoperability Resources (FHIR) US Core Implementation Guide

Categorize USCDI data into profiles that can be combined and exchanged interactively through different health IT systems using the flexible FHIR data format

Example profiles include

- Patient profile
- Medication profile
- Observation profile
- Condition profile

Data profiles in FHIR format



Nationwide network services

Trusted Exchange Framework and Common Agreement (TEFCA)

Establish a secure nationwide framework for exchange of data between Qualified Health Information Networks (QHINs)

Common agreement components include

- Legal and technical requirements
- Infrastructure and governing approach model

