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INTEROPERABILITY: Weaving investments together

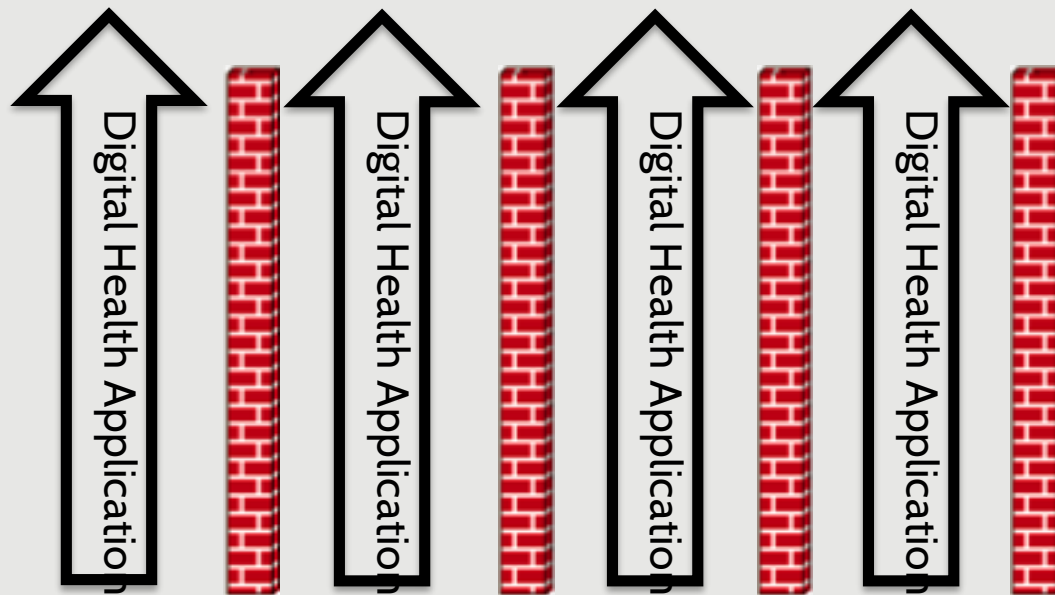
Approaches to reducing
fragmentation in digital
health investments



— THE PROBLEM

FRAGMENTATION OF DIGITAL HEALTH

Digital Health Programs mostly have been implemented as vertical siloed applications financed by different donors and government programs.



- Data is not comparable
- Funding is all independent
- Lifespan of solutions are based on lifespan of project

HARMS FROM FRAGMENTATION

Planning

- Insufficiently and inconsistently driven by data
- Mis-allocation of health resources
- Poor targeting and under-performance of health programs

Service Delivery

- Ineffective and inefficient services
- Inability to address performance challenges
- Overlapping and inconsistent training

Financing

- Short term waste due to development and maintenance costs of parallel systems
- Long term waste due to the difficulty of legacy integration of existing unplanned systems
- Shortages in support for the platforms that do exist

— THE SOLUTION

GLOBAL CONSENSUS



Ecosystem **collaboration** is needed to address current fragmentation and create a **holistic digital health model**

GSMA – Scaling Digital Health in Developing Markets, June 2017



At the country level, cross-cutting **digital health platforms** should be **interoperable** and yet adaptable to local requirements and sovereignty

National Academies of Science, Engineering, and Medicine, May 2017



As a first step toward national digital health implementation, leaders can develop a **national digital health vision and strategy**. Strong leadership and governance can **prevent duplication** of effort and harmonize standards for digital technology.

Broadband Commission Report on Digital Health, February 2017

COUNTRY PLANS & COMMON ARCHITECTURES

2006

The Rwandan MoH issues it's first eHealth Strategy

2010

The Ugandan MoH issues a moratorium on new ICT systems.

2016

The Tanzanian MOH institutes a costed investment plan for digital health.

NOW

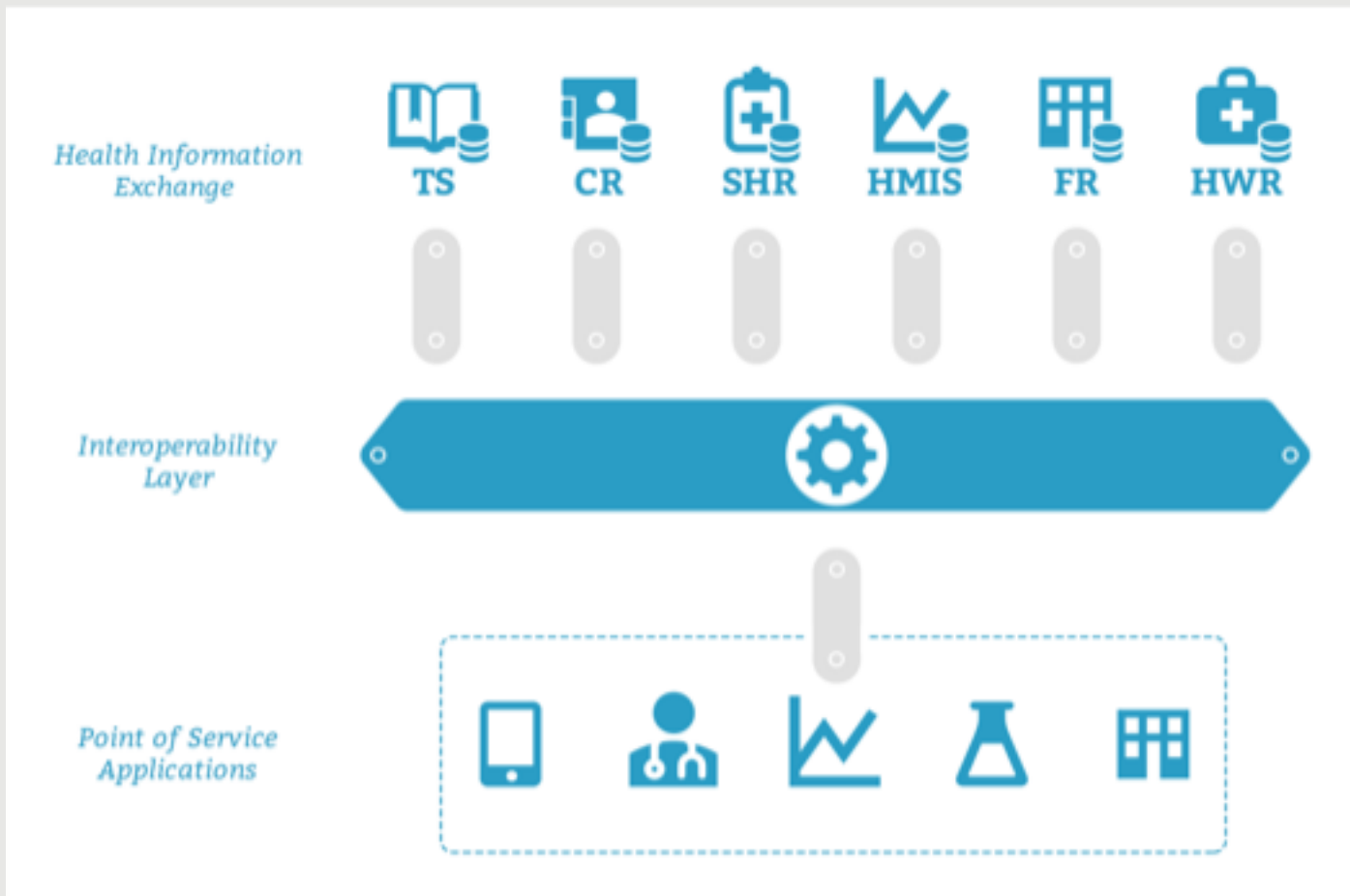
The EAC develops a regional shared vision, roadmap and architecture.

VISION

Established country and regional **collaborative** processes led by **government** which yields **national and regional plans, enterprise architecture**, enabling **interoperability** and use of **global goods**.

ENTERPRISE ARCHITECTURE

- Blueprints or frameworks of information systems, commonly used to help ICT implementers design increasingly complex systems. Describe how components will interact with each other and external applications.



GLOBAL GOODS

- Software that is free and Open Source, supported by a strong community, has a clear governance structure, funded by multiple sources, deployed at significant scale, used in multiple countries, has demonstrated effectiveness, is designed to be interoperable and is an emergent standard application.

Figure 3. Framework for global common architecture and local country-specific solutions



Select Examples

dhis2

OpenLMIS

OpenMRS

RapidPro

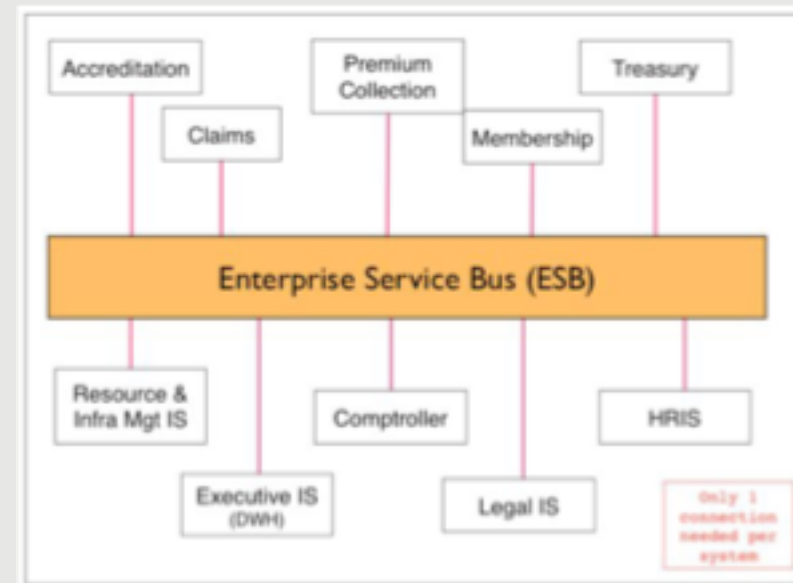
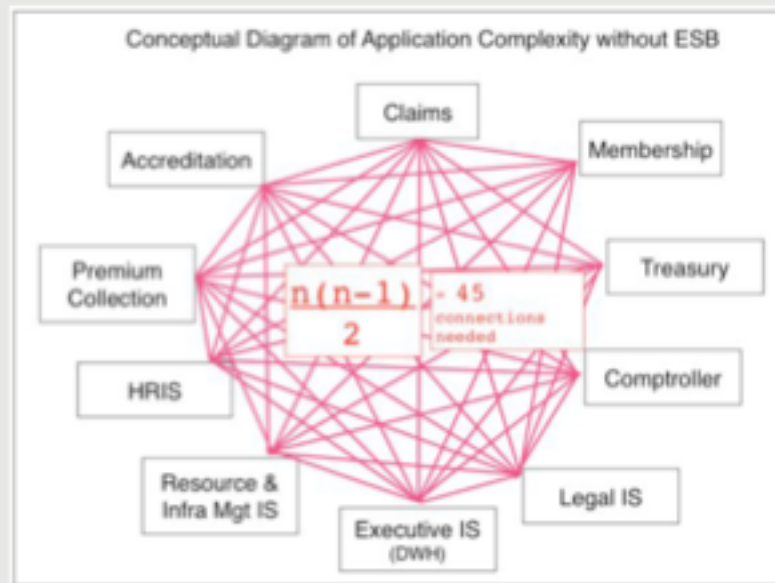
Resource Map

CommCare

iHRIS

INTEROPERABILITY

- The ability of different information technology systems and software applications to communicate, exchange data and use the information that has been exchanged. Integration allows two applications to exchange information. Interoperability allows many.



STANDARDS



Syntactic Standards
(grammar: how you say it)

Semantic Standards
(vocabulary: what you say)

While adhering to the **Principles for Digital Development** and working through existing global and regional efforts, donors will:



1. Collaborate

Collaborate to align investments with national digital health strategies.



2. Invest in national plans

Prioritise investments in **national plans that incorporate “digital global goods”** and avoid bespoke systems.



3. Enable sustainable investment

Engage early to **determine and quantify long-term costs** of operating, maintaining, and supporting digital health systems for sustainable country ownership.



4. Track & measure

Track investments, progress, learnings and successes in digital health systems in a transparent manner.



5. Strengthen skills

Strengthen donor technical skills and core capacities, including awareness of the Principles for Digital Development.



At the same time, donors will invest in:



6. Creation and evolution

The **creation and evolution** of a country's national digital health strategy, policies and regulatory framework. Strategies include components such as architecture, standards, investment frameworks, privacy protection, and detailed operational and monitoring plans.



7. Maturity continuum

Systems at a level appropriate to the country's progress along the **digital health maturity continuum**.



8. Country capacity

Sustainable country capacity for digital health leadership, governance, implementation, oversight, global good adoption, and donor coordination.



9. Global goods

Scalable, sustainable, accessible, interoperable, and evidence-based **digital health global goods** that meet country priorities.



10. Information and peer-learning

Diverse stakeholder **information-sharing and peer-learning networks** at country and regional levels to foster coordination and alignment of implementation activities.



THANK YOU
MERRICK SCHAEFER



Interoperability and Global Development

@datarichness

It's not 2007, the low-hanging fruit is gone.

Need health IT investments to reach Universal Health Coverage, the SDGs, & to reduce the disease burden.

- Universal IDs.
- Electronic health records to track & empower patients.
- Health financing beyond external sources.
-

An API exposes something (data, service) for communication.

Interoperable APIs *speak the same language*.

Interoperability is a Standardized API

Metcalfe's law: The number of connections between nodes is nodes^2 .

Consider 10 systems speaking their own language
= 100 different combinations of languages.

Health IT requires interoperability to scale efficiently.

Global development is not alone in needing open standards.

“An open approach to digital development can help to increase collaboration in the digital development community and avoid duplicating work that has already been done.”

The Principles: ‘Use Open Standards...’

<https://digitalprinciples.org/principles/>

Standards bodies promote, grow and expand open standards.

IntraHealth, Regenstrief, Jembi Health Systems and others participate alongside actors in healthcare industries in standards bodies.

In the OpenHIE Community of Practice any institution can discuss standards, implement them, and build upon others' works.

FHIR -- Fast Healthcare Interoperability Resources (pronounced "fire") is an API and resources for health IT exchange.

FHIR is supported by awesome products already within and outside global development.

Google uses FHIR for deep learning

The screenshot shows a web browser displaying a Nature Digital Medicine article. The browser's address bar shows the URL <https://www.nature.com/articles/s41746-018-0029-1>. The page header includes the Nature logo, the journal name 'npj Digital Medicine', and navigation links. The article title is 'Scalable and accurate deep learning with electronic health records' by Alvin Rajkomar, Eyal Oren, and Jeffrey Dean. The article is published in 'npj Digital Medicine' 1, Article number: 18 (2018). The article is available as a PDF. The abstract is visible, discussing predictive modeling with electronic health record (EHR) data. The right sidebar contains an 'Editorial Summary' and a table of contents with links to 'Sections', 'Figures', and 'References'.

Scalable and accurate deep learning with electronic health records

Alvin Rajkomar, Eyal Oren, [...] Jeffrey Dean

npj Digital Medicine 1, Article number: 18 (2018)
doi:10.1038/s41746-018-0029-1
Download Citation

Machine learning Medical research

Received: 26 January 2018
Revised: 14 March 2018
Accepted: 26 March 2018
Published: 08 May 2018

Abstract

Predictive modeling with electronic health record (EHR) data is anticipated to drive personalized medicine and improve healthcare quality. Constructing predictive statistical models typically requires extraction of curated predictor variables from normalized EHR data, a labor-intensive process that discards the vast majority of information in each patient's record. We propose a representation of patients' entire

Editorial Summary

Artificial intelligence: Algorithm predicts clinical outcomes for hospital inpatients

Artificial intelligence outperforms traditional statistical models at predicting a range of clinical outcomes from a patient's entire...
[show more](#)

Sections Figures References

Abstract

Introduction

Results

Discussion

Methods

Additional information

References

iPhone Health Records uses FHIR



Industry FHIR Tools for Developers

Synthea: Generate millions of realistic but fake patients and clinical visits

<https://github.com/synthetichealth/synthea>

ClinFHIR: Customize resources, graph them, query servers <http://clinfhir.com>

30 Running FHIR servers to query

http://wiki.hl7.org/index.php?title=Publicly_Available_FHIR_Servers_for_testing

SDKs in 7+ programming languages

http://wiki.hl7.org/index.php?title=Open_Source_FHIR_implementations

Analytics in R <https://github.com/FirelyTeam/RonFHIR>

FHIR in Global Development

Jembi's FHIR Server 'Hearth' <https://github.com/jembi/hearth>

OpenMRS <https://openmrs.org/>

IntraHealth's OpenInfoMan <https://github.com/openhie/openinfoman>

And iHRIS <https://www.ihris.org/>

OpenLMIS, DHIS2, and others are under development.

How do we Work Together on Interoperability?

Include interoperability in proposal & contract language:

Vendors have no reason not to use open standards.

Invest in products using open standards OpenMRS, OpenLMIS, OpenHIM, DHIS2, (...).

And OpenHIE participation.

More here: <https://www.intrahealth.org/vital/3-ways-invest-interoperable-health-information-systems>

A Collective Journey Toward Interoperability: OpenHIE

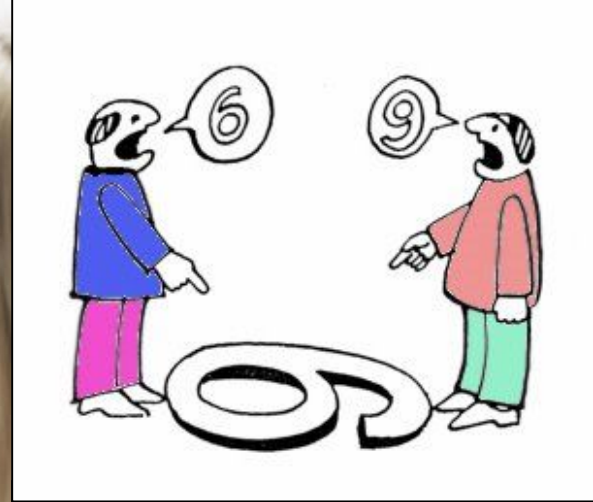
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Regenstrief Institute





Open**HIE**

“Our mission is to improve the health of the underserved through the open, collaborative development and support of country driven, large scale health information sharing architectures.”



Challenge: Communication (Exchange of information)

How?

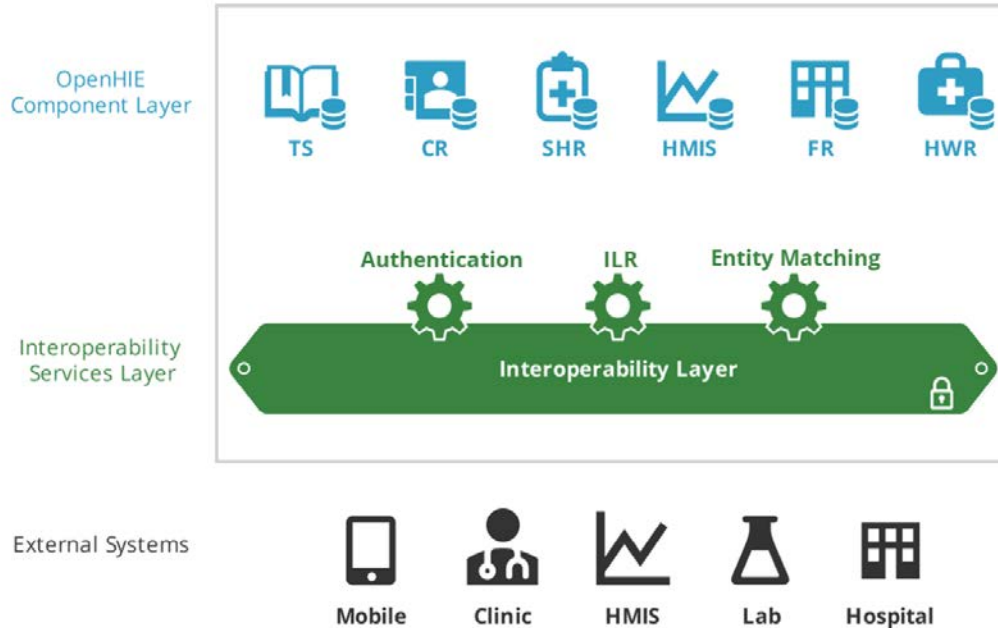
“Our mission is to improve the health of the underserved through the open, collaborative development ...” through:



A Community of Communities

- Facility Registry
- Client Registry
- Health Worker Registry
- Terminology Service
- Shared Health Record
- Interoperability Layer
- Architecture Community
- HMIS
- *Implementer Community*
- *Insurance Community*
- *Supply Chain Community*

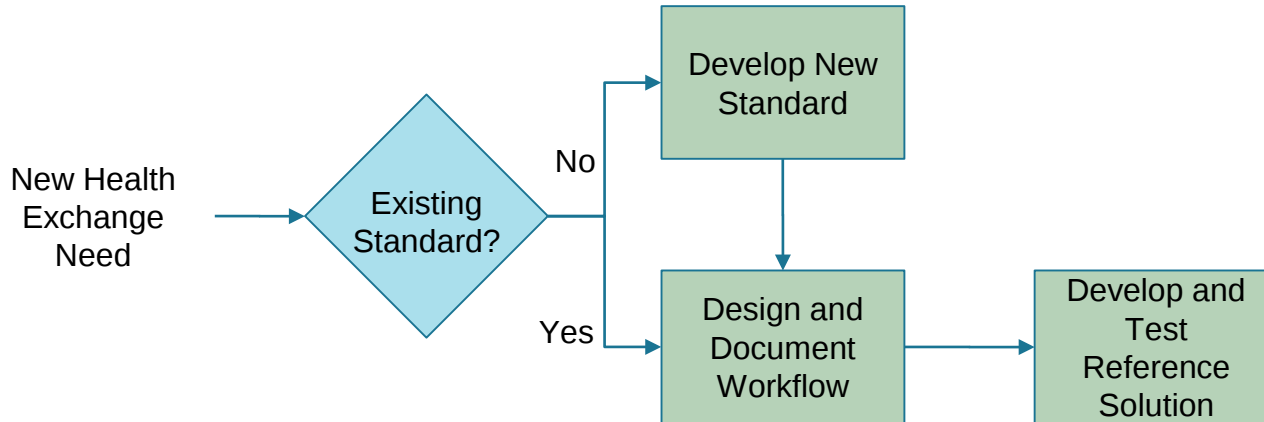
What?



1. Promote Interoperability Architecture Framework
2. Strengthen component functionality
3. Advocate for terminology standard use

What?

- 4. Design standards-based workflows (interactions)
- 5. Influence / design standards (HL7 / FHIR)
- 6. Share learning



Where is the impact being made?

- Tanzania: BID (better immunization delivery)
- PEPFAR: Aggregate Data Exchange
- South Africa: momConnect
- Liberia: mHero
- Bangladesh: BHIE
- Philippines: PHIE
- Nigeria: ICT Framework

...and growing



Journey to better healthcare

- Collectively designed
- Standards-based
- Data exchange architecture and patterns
- To meet real-world needs



Open**HIE**

Join us in the Journey

<http://ohie.org>

2018 **TANZANIA**
OpenHIE
COMMUNITY MEETING
#OHIE18

July 31 - August 4, 2018 in Arusha, Tanzania

Mount Meru Hotel and Conference Centre



Event details can be found at ohie.org/OHIE18