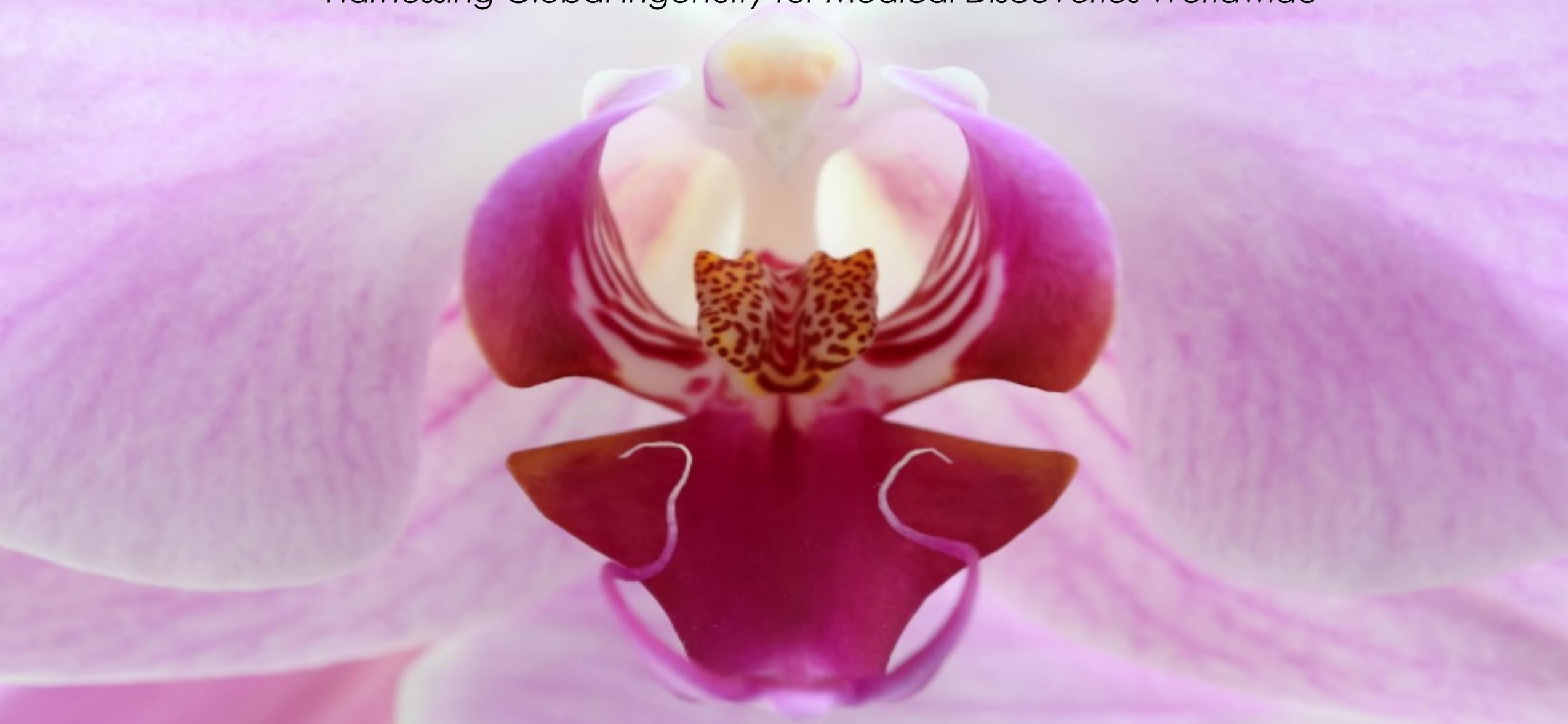


PROJECT ORCHID

Harnessing Global Ingenuity for Medical Discoveries Worldwide



SCOPE OF PRESENTATION

- **Company Background & Partnerships**
- **Overview of Clinical Innovation within the Global Market**
- **Overview of Project Orchid**
 - Collaboration Maturity Model & Technology Framework
 - Development Approach
 - Scenarios
- **Project Orchid Technology Development Resources**
- **Grant Opportunities to Partner with Monarch Innovation Partners**

MONARCH INNOVATION PARTNERS

“Where vision takes flight.”



Our Goals:

- To pioneer the development and advancement of best-in-class technology enabled delivery systems for global healthcare communities.
- To pursue and develop collaborative partnerships in the private and public sector, that will spur new industries, medical technologies, and bodies of knowledge, that will enable healthcare providers and consumers access to healthcare solutions that improve the quality of life.

U.S. AND INTERNATIONAL PARTNERS

US Organizations

- **Academic Partners**

- Virginia Tech
- University of Maryland

- **Private Partnerships**

- SAN Business Consultants
- Futures Group
- D-Tree International

International Organizations

- **African-Based Partners**

- WHO Research, Publication and Library Services, African Regional Library – Democratic Republic of Congo
- CANTAM – Central Africa Network on TB, HIV/ AIDS and Malaria - A consortium of the University of Tubingen, Germany and 8 clinical research institutions in the Congo, Gabon and the Cameroon
- MUHAS - Muhimbili University of Health and Allied Sciences
- ITOCA – Information Training and Outreach Centre for Africa
- Program of Health of Reproduction & Family, a NGO from the Democratic Republic of Congo

- **India-Based Partner**

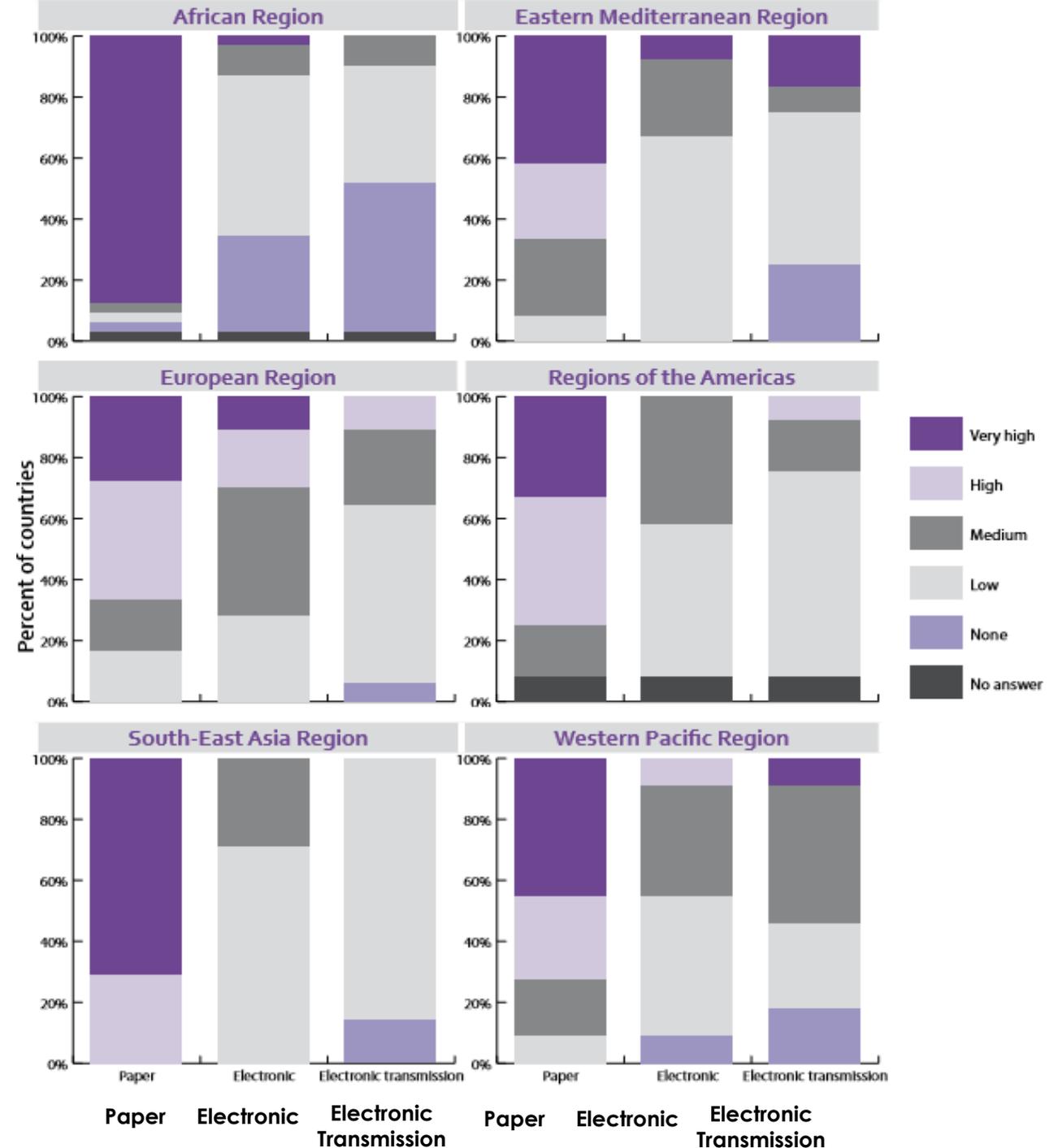
- HANSREL – Handheld Science and Research Lab

The Global Digital Divide in Health IT

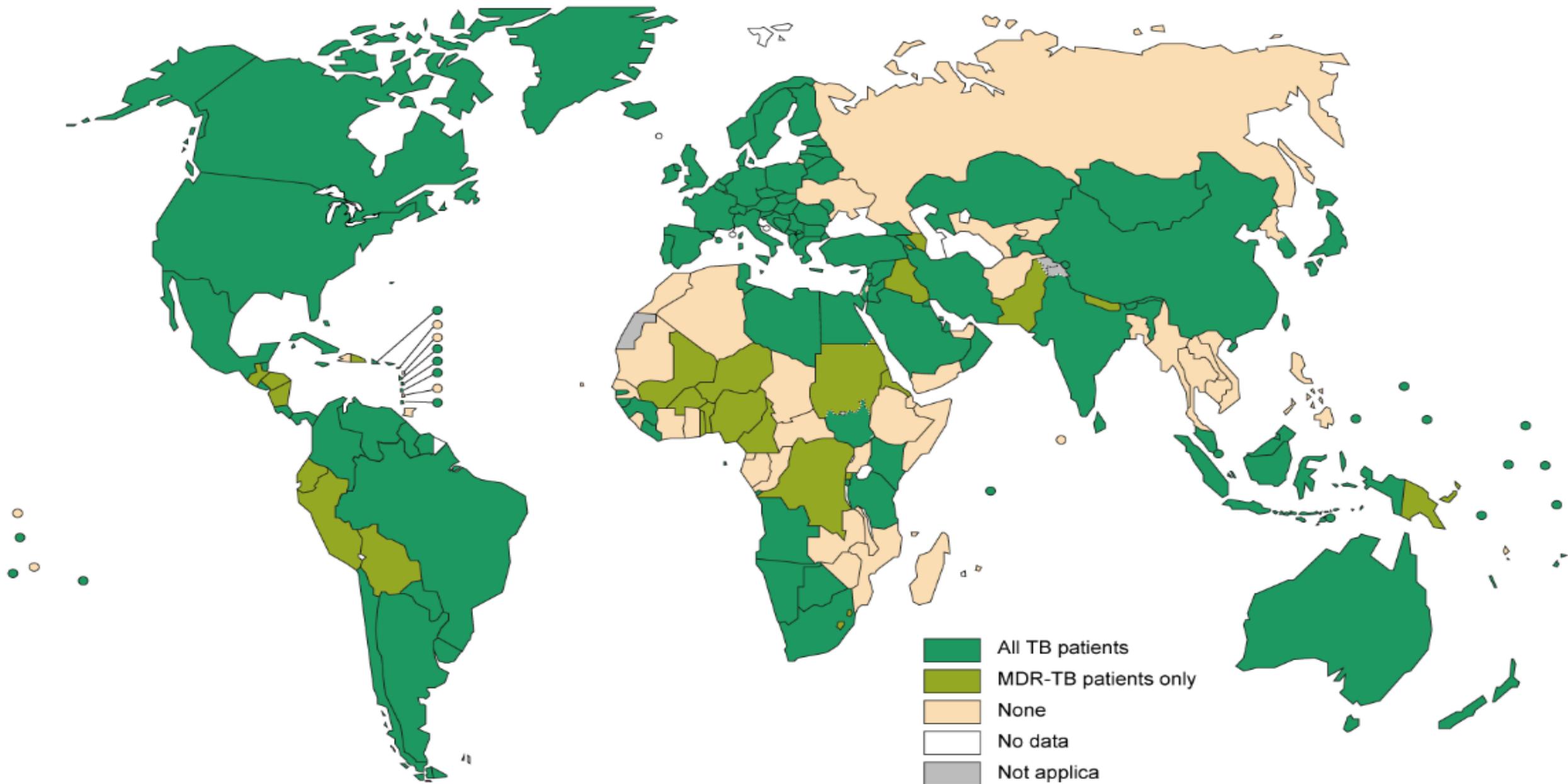
Key Findings from WHO 2012 Trends in eHealth Report:

- Most patient data is still collected on paper
- Countries in high income groups have higher adoption of EMR/E.H.R. systems
- Adoption of patient information systems is linked to country resources

Source: World Health Organization 2012 - Management of patient information: trends and challenges in Member States: based on the findings of the second global survey on eHealth. (Global Observatory for eHealth Series, v. 6)



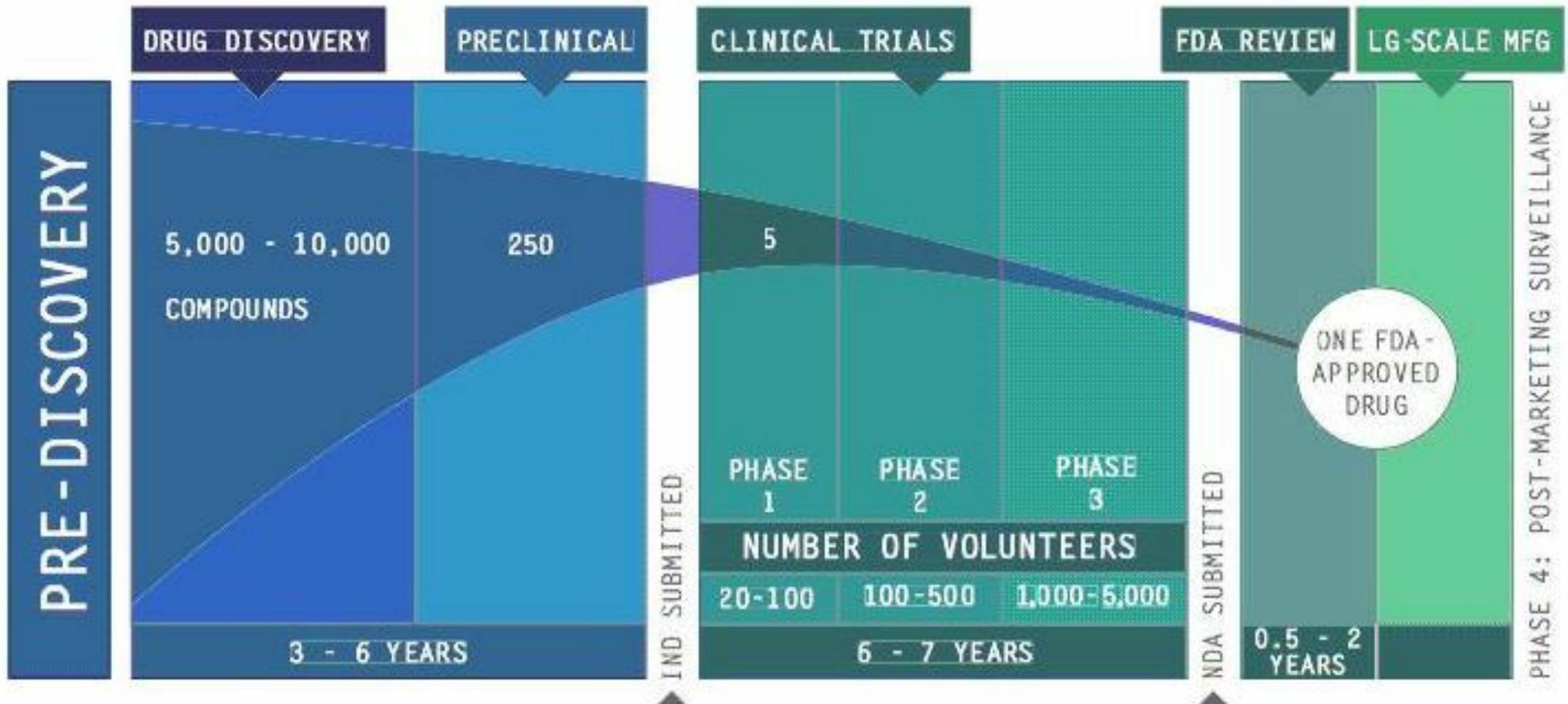
Availability of national electronic case-based databases of TB patients, 2012



Source: World Health Organization

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CURRENT U.S. DRUG DISCOVERY MODEL



Source: <http://adherely.wordpress.com>

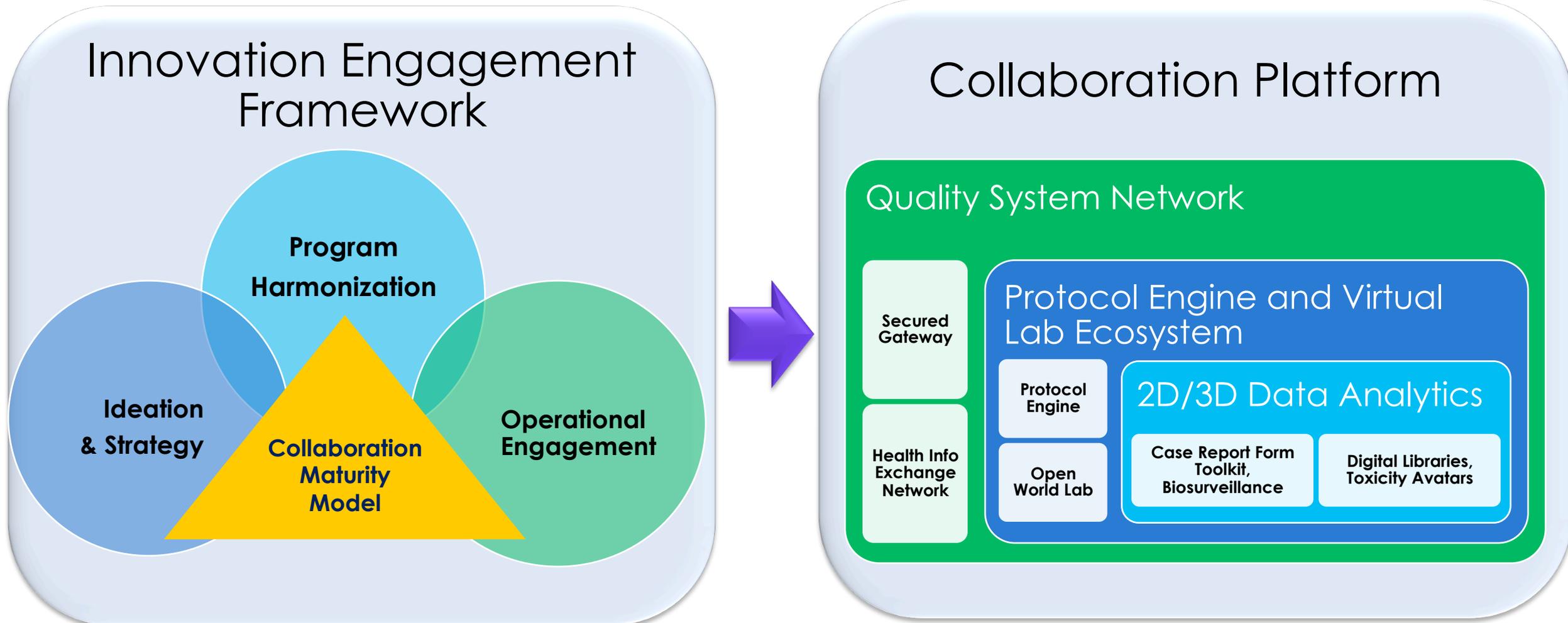
PROJECT ORCHID: BRIDGING THE DIGITAL DIVIDE IN CLINICAL INNOVATION

Connecting Key Collaboration Stakeholders and Knowledge Networks for Clinical Innovation Engagements:

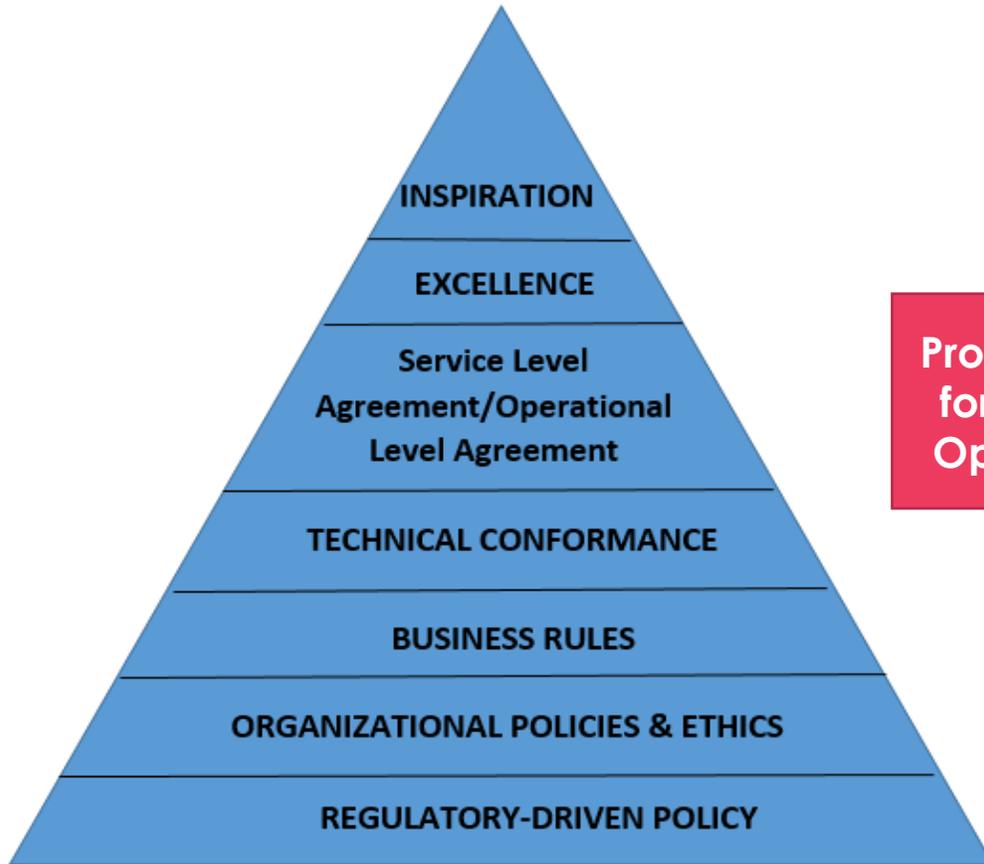
- Local, Regional and Multi-National Research Teams
- IRBs and Project Sponsors
- Patients
- Open Science Communities
- Research Librarians/ Informationists
- Regulatory Bodies



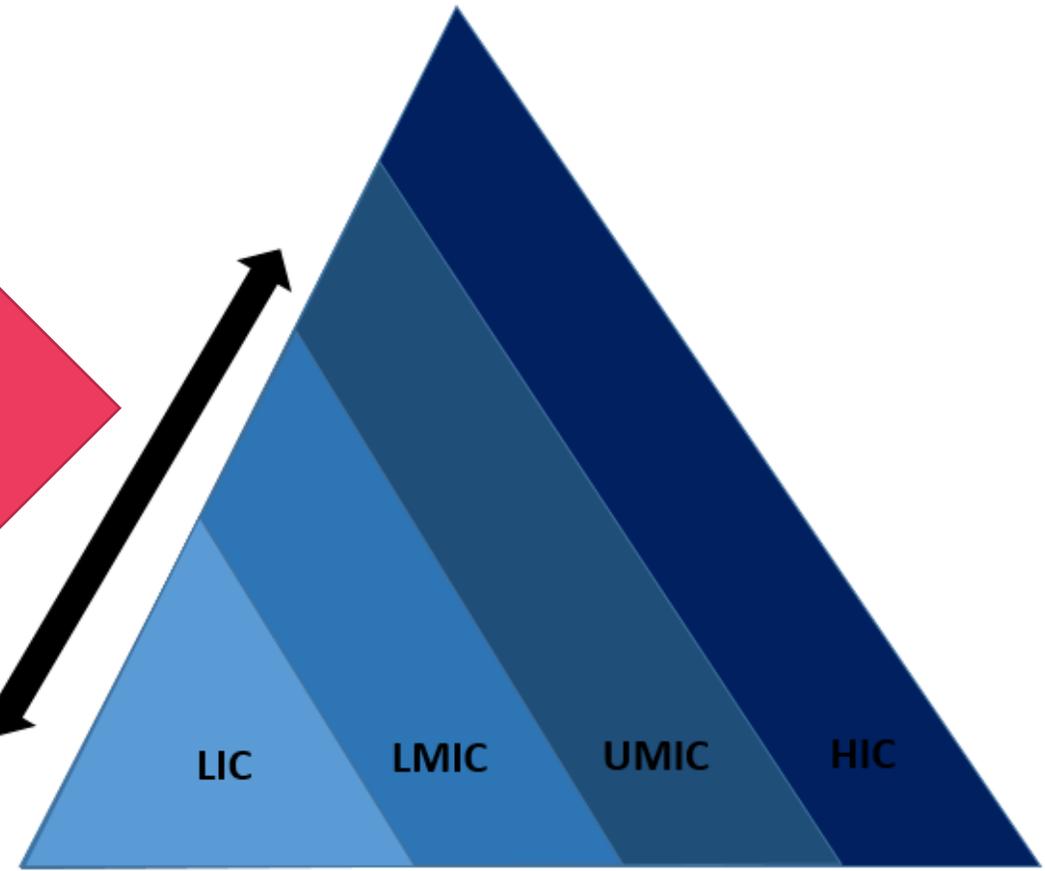
PROJECT ORCHID SOLUTION



PROJECT ORCHID COLLABORATION MATURITY MODEL



Maturity Model Seven-Level Collaboration Model



Example: Collaborative Research Partners by Country Income Level

COLLABORATION PLATFORM



Quality System Network
(QSN) Platform



Clinical Trial &
Population Health
Protocol Rules Engine



Civil Registration, Vital
Statistics, and Clinical
Trial Digital Libraries



Multichannel Open
World Virtual Lab



Translational CRF Toolkit
and Repository



Biosurveillance and Data
Monitoring Dashboards



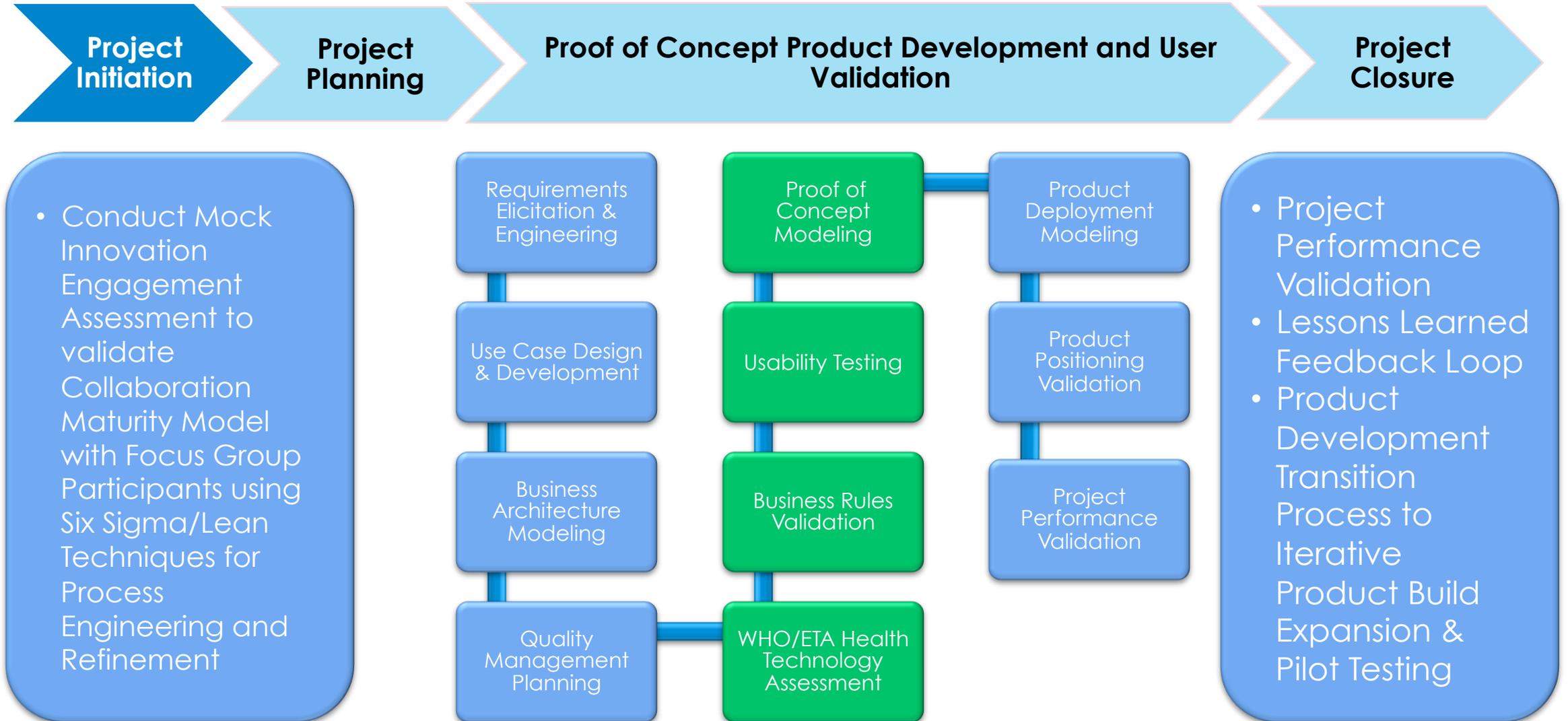
Virtual Human and
Animal Avatar Design
Center

SYSTEM ARCHITECTURE FRAMEWORKS: OPEN SOURCE TECHNOLOGY

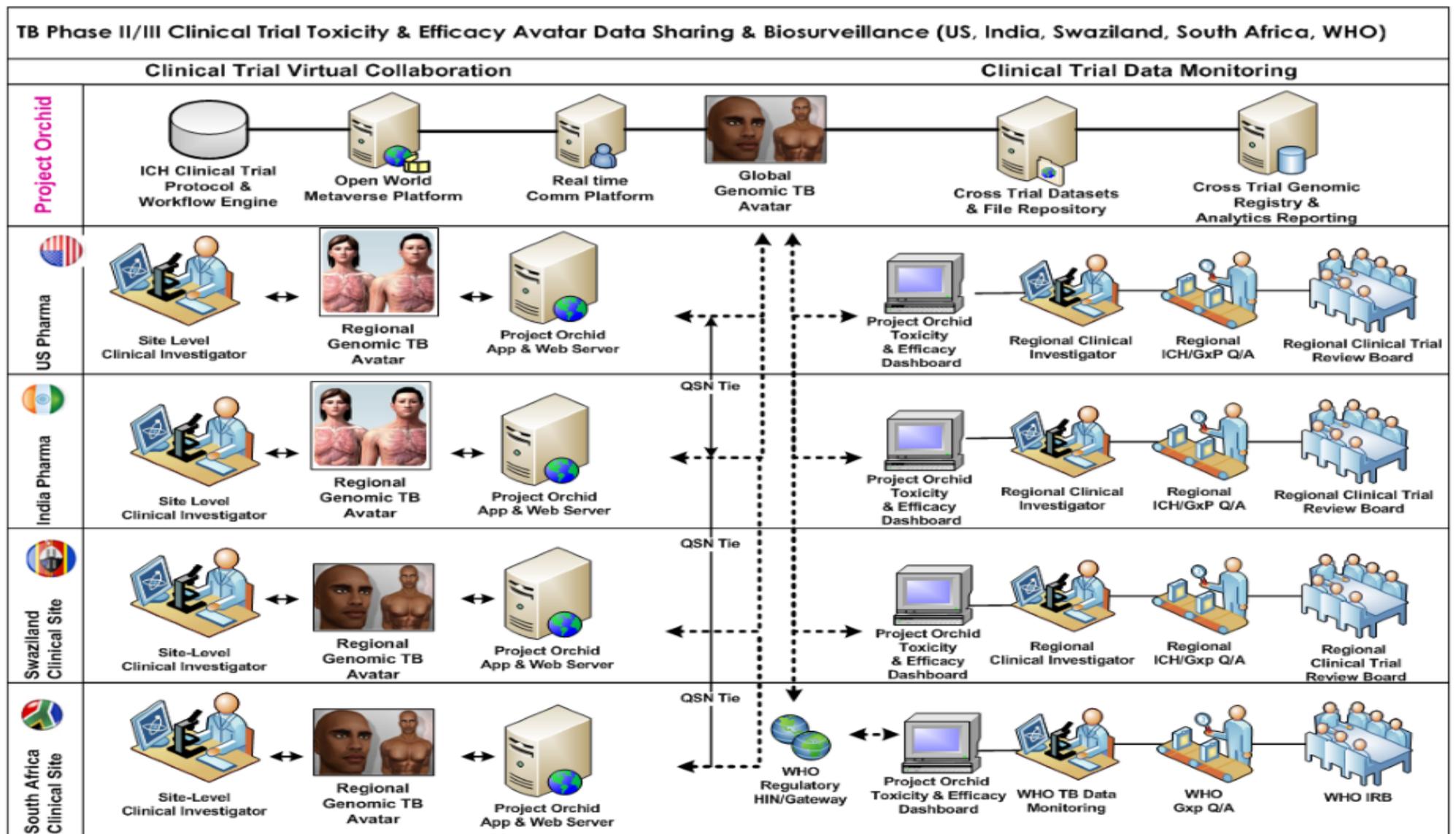
Proposed System Architecture Framework

IT and Telecom Infrastructure	Data Architecture & Governance Frameworks	Open Source Software Standards	Healthcare Interoperability Standards	Enterprise Architecture & Service Management Frameworks
<ul style="list-style-type: none"> • Cloud Computing • Wireless Telecom • Web2.0/3D • Open Source Server Solutions 	<ul style="list-style-type: none"> • Schema-less and Dynamic Data Architecture Frameworks • Open Science • Open Data 	<ul style="list-style-type: none"> • Drupal • OpenGL • X3D 	<ul style="list-style-type: none"> • Integrated Health Enterprise (IHE) Profiles • Healthcare Interoperability Standards (HL-7 CDA, FHIR) • DICOM 	<ul style="list-style-type: none"> • The Zachman Framework • The Open Group Architecture Framework • ITIL Service Management Framework

EVIDENCED-BASED SOFTWARE DEVELOPMENT LIFECYCLE



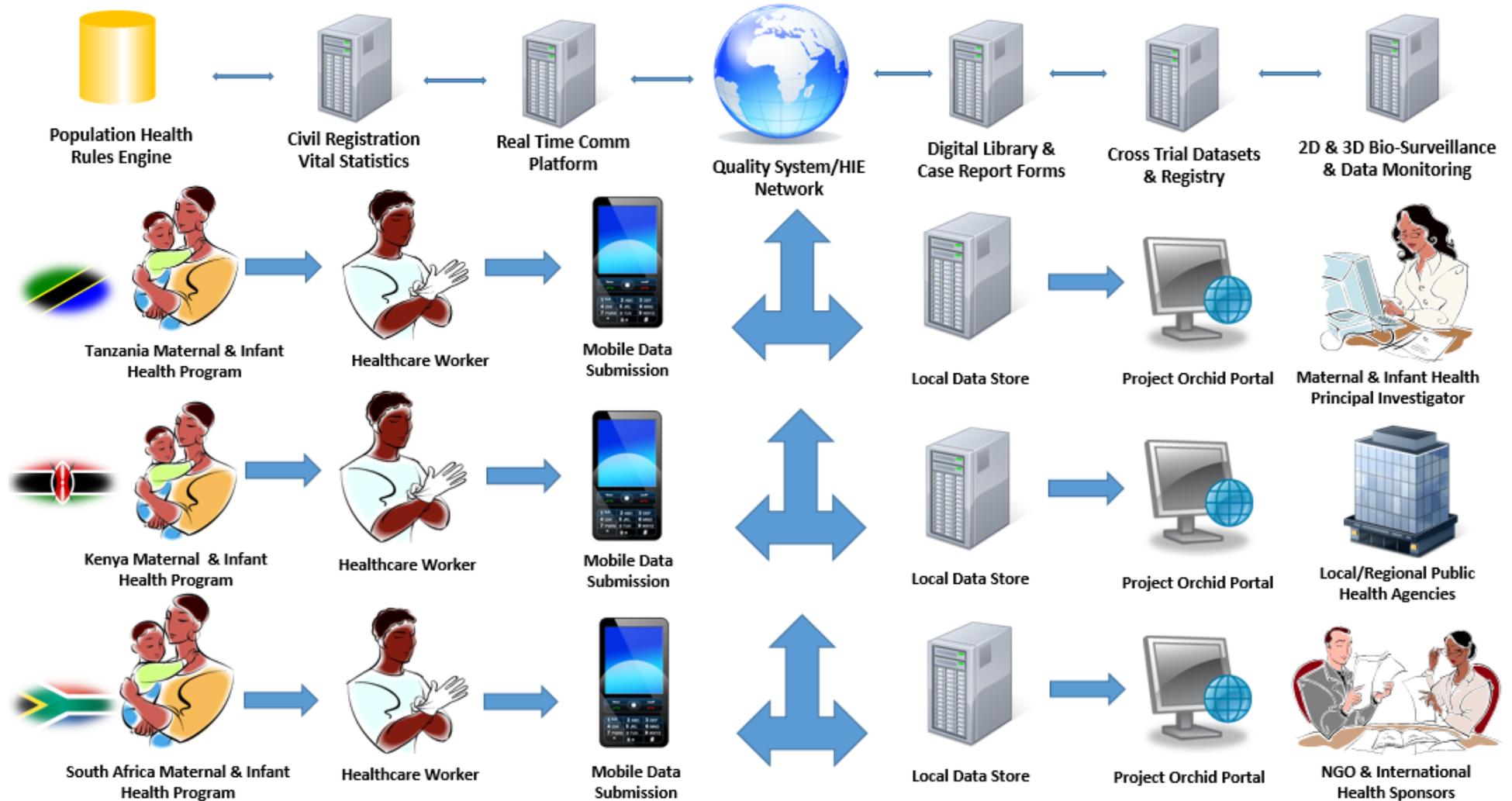
Multi-National Infectious Disease Clinical Trial Collaboration



- Regional and Multi-national GxP process harmonization & Data Governance
- De-identification of patient-level data
- Open Science Data Sharing and Protocol Management

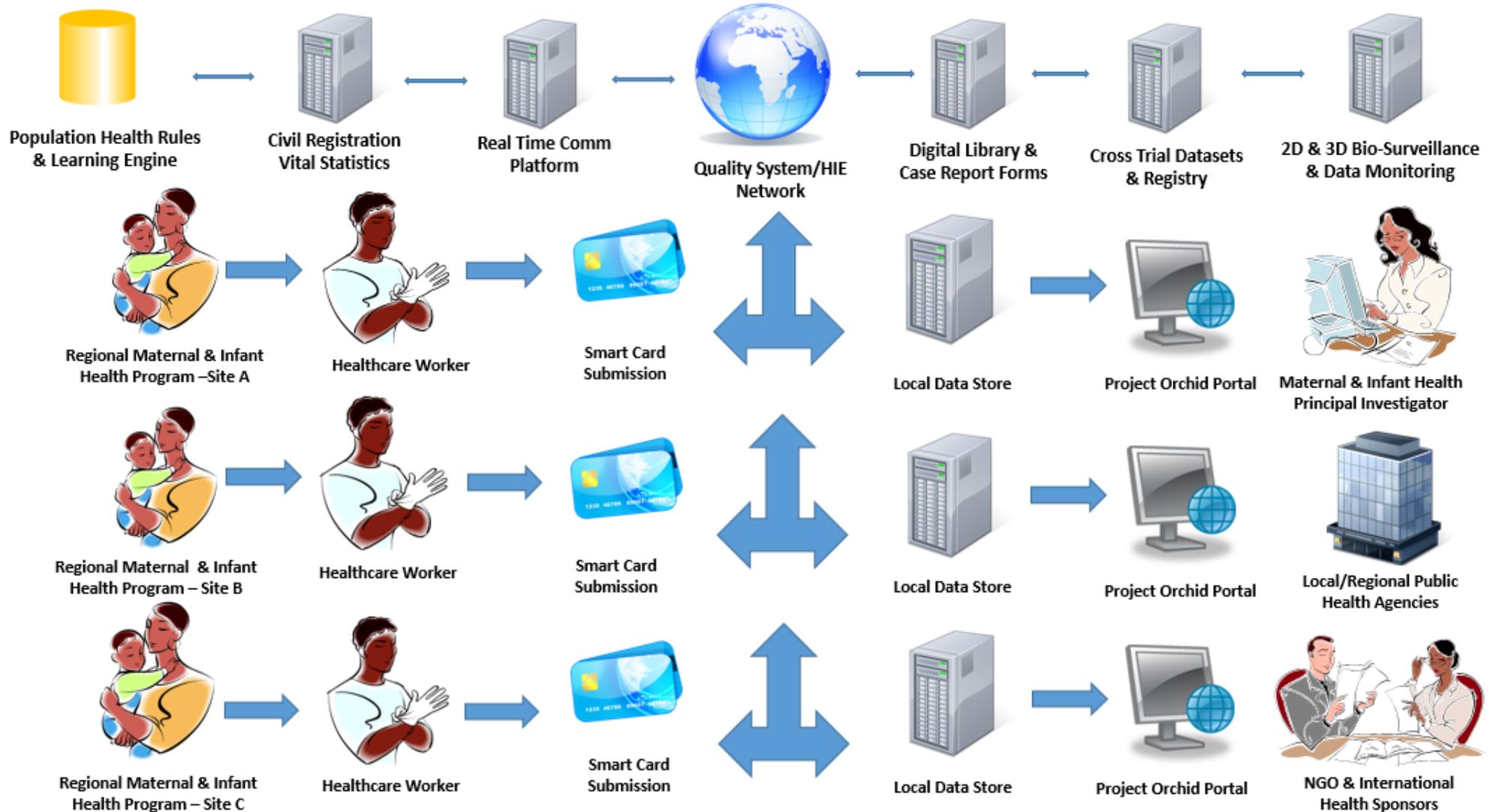
MATERNAL & CHILD POPULATION HEALTH M-HEALTH SCENARIO

- Protocol Learning Engine Capabilities
- Dynamic Population Health Analytics
- Vital Statistics
- Immunization Tracking
- E.H.R. Longitudinal Record Management



MATERNAL & CHILD SMART CARD-PERSONAL HEALTH RECORD (PHR) SCENARIO

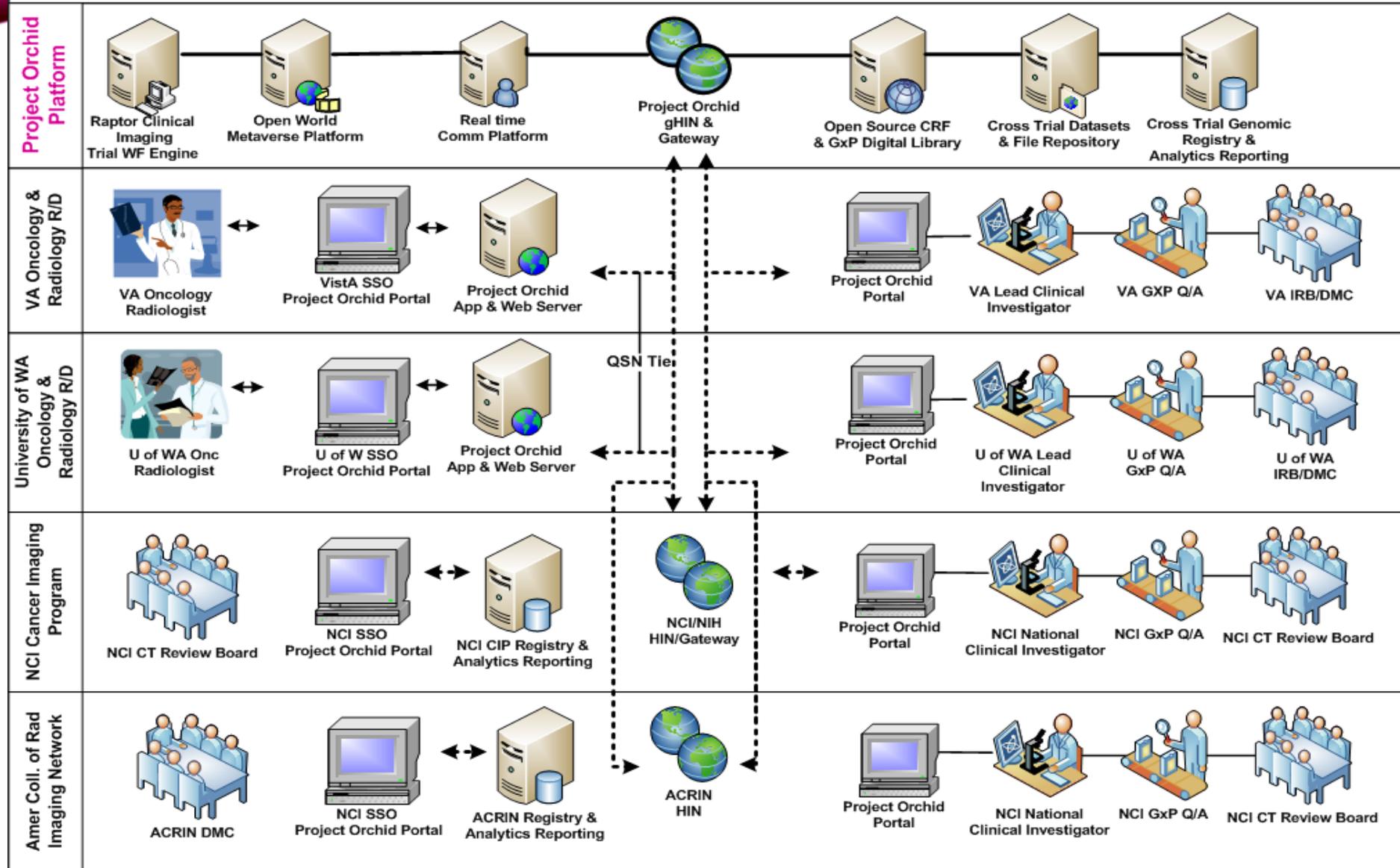
- Portable PHR for individual and Family Medical Record History
- My Blue Button Data Standardization Model
- Effective Longitudinal Data Governance Across all Targeted Sites



NCI Cancer Imaging Program/Clinical Trials Evaluation Program

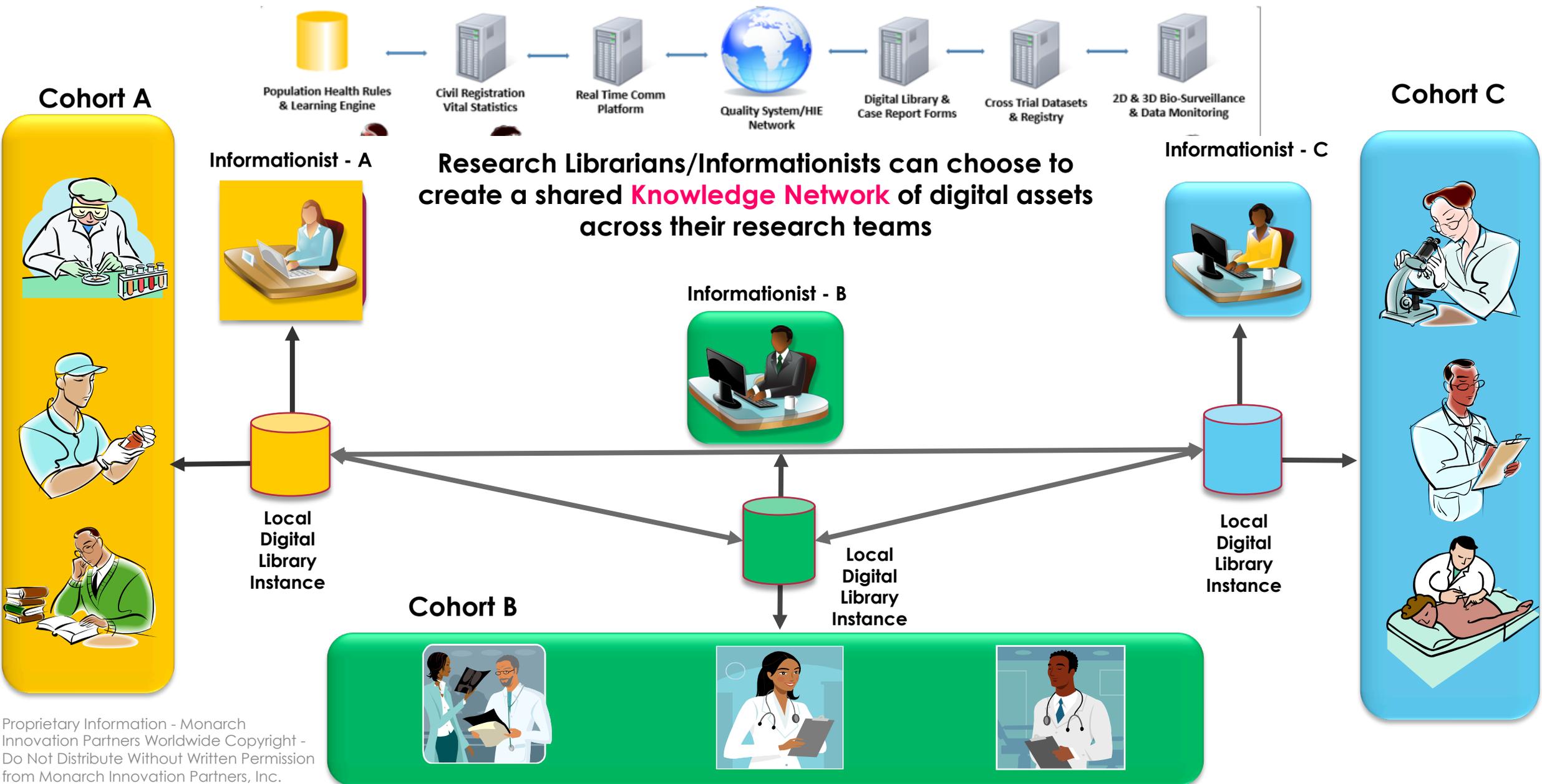
VA & U of WA Clinical Imaging Trial Virtual Collaboration

NCI & ACRIN Clinical Imaging Trial Data Monitoring



- Private-Government-Academic Collaboration Efforts
- Leverage 3D “Big Data” Visualization Tools for research studies that include Radiology Data Sources
- Share and standardize Radiology Protocols across cohorts

Population Analytics Registry and Clinical Trial Knowledge Network



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PROJECT ORCHID TECHNOLOGY DEVELOPMENT RESOURCES

- Pilot tested Open Source Radiology Collaboration Tool
- Virginia Tech Visionarium Lab

PROJECT ORCHID OPEN SOURCE COMPONENT: RAPTOR Radiology Protocol Tool Recorder

A U.S. Veterans Affairs Innovation
Project for Radiology Protocol
Management and Workflow
Optimization



Project Sponsor: Jonathan Medverd, MD
Associate Professor, University of Washington
Staff Radiologist, VA PSHCS - Seattle Division

Technology Firm:
S.A.N. Business Consultants



PEER-TO-PEER COLLABORATION

Protocol | RAPTOR x Worklist | RAPTOR x

184.73.210.16:8080/drupal/protocol?rawrtid=[742]

Apps My groups - Go... ihe FTP director... SAN Business C... VHA Innovation... Fuze Meeting Imported From IE Imported From ... MantisBT RAPTOR Login [...]

(see medications detail)

Vitals

Date	Vital	Value
04/07/2003 11:45 am	Temperature	98.6 F
04/07/2003 11:45 am	Blood Pressure	174/76 mmHg

(see vitals detail)

Allergies

Allergy Reactant	Allergy Type	O/H
ASPIRIN BUFFERED 325MG TAB	DRUG	06/30/1992 by (OBS...
SULFASALAZINE 500MG S.T.	DRUG	06/30/1992 by (OBS...
CODEINE 30MG & ASPIRIN C.T.	DRUG	06/30/1992 by (OBS...
SULFAPYRIDINE TABLETS 500MG	DRUG	06/30/1992 by (OBS...
SULFA DRUGS (FREE TEXT)	OTHER	06/30/1992 by (OBS...

(see allergies detail for more values ; only 5 of 8 rows are displayed here.)

Labs

RENAL PANEL		
Date	Creatinine	eGFR
(see labs detail)		

Radiology Reports

Title	Date
ZZCHEST 2 VIEWS PA&LAT	03/30/1995 01:21 pm
BONE DENSITY STUDY, DUAL PHOTON ABSORPTIOMETRY	06/22/1994 11:35 am
ANKLE 2 VIEWS	06/17/1994 12:13 pm

Protocol Name

CT Abdomen and pelvis with IV and oral contrast
Select a second protocol only if more than one is needed for this study.

Contrast

None [RESET]

Enteric [CUSTOMIZE]

IV Ultravist 300 [LIST]

Acknowledge Selected Values
You are being asked to acknowledge these values because they are currently the default values.

Consent Required

Unknown [RESET]

No

Yes

Acknowledge Selected Values
You are being asked to acknowledge these values because they are currently the default values.

Hydration

None [RESET]

Oral [CUSTOMIZE]

IV InPt- NS 1-2 mL/kg/hr x 12 hr pre & postscan [CUSTOMIZE]

Sedation

None [RESET]

Oral Valium 10mg PO 20 min before scan [CUSTOMIZE]

IV [CUSTOMIZE]

Radioisotope

None [RESET]

RADIOLOGY PROTOCOL LIBRARY

The screenshot shows a web browser window with the URL <http://184.73.210.16/RSite500/RAPTOR/raptor/viewscannedprotocol?prc>. The browser tabs include 'Protocol | RAPTOR', 'RPID144 Scanned Doc | RAPTOR', and 'RPID39 Scanned Doc | RAP...'. The document content is as follows:

RPID39 Scanned Doc

Short Name	RPID39		
Full Name	CT NECK with Contrast (helical)		
Uploaded Version	Uploaded Date	Uploaded By	Upload Comment
4	2015-04-05 14:56:00	Dr Seattle Radiologist	Soft Tissue Neck

Soft Tissue Neck VA

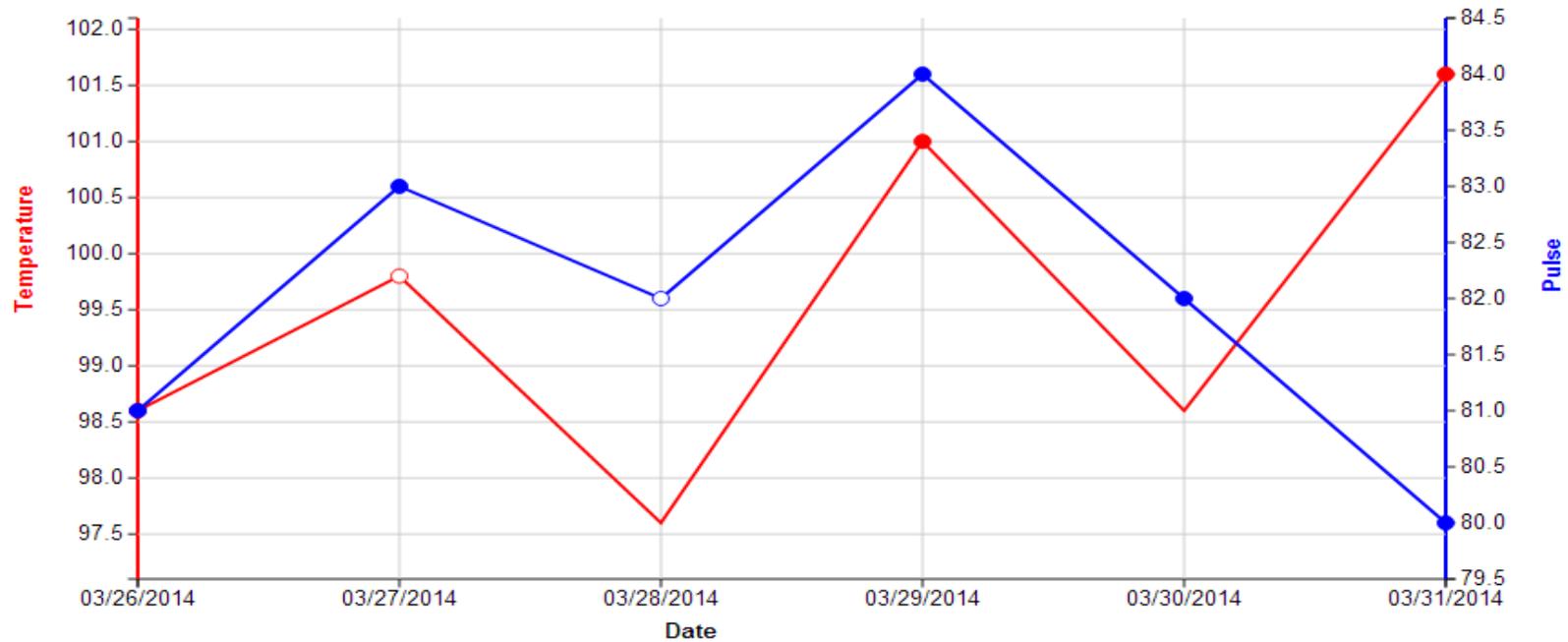
Specific Anatomic Region	Neck
Application	Mass, Swelling, Lump etc.
KV / Effective mAs / Rotation time (sec)	120 / 300 / 0.5
Detector Collimation (mm)	0.6
Dose	Low Dose
Axial Slice Thickness,	3x3

The browser's taskbar at the bottom shows the system time as 8:22 AM on 4/6/2015. The Windows taskbar at the very bottom shows the system time as 11:00 AM on 8/26/2014.

PT. MEDICAL HISTORY & CLINICAL STATUS

Order Date	APR 01, 1993@09:18:37	Patient Category	OUTPATIENT	Reason for Study	NOT ENTERED	SSN	666612546
Patient Name	ZZZRETFOURFORTY, PATIENT	Age	79	Clinical History	Not Implemented	DOB	04/07/1935
Ethnicity							

Protocol Medications **Vitals** Allergies Labs Dose Hx Clin rpts Problem List Notes Rad rpts Library



Date	Temp	Height	Weight	BMI	Blood Pressure	Pulse	Resp	Pain
04/07/2003 10:26 am	98.6 F				150/60 mmHg	70 /min	18 /min	0
04/05/2003 10:26 am	101.2 F				152/60 mmHg	72 /min	20 /min	1
04/03/2003 10:25 am	102.2 F				156/60 mmHg	82 /min	22 /min	1

REGULATORY AND CLINICAL ALERTS

Logged in as Ms. Fresno Scheduler (Scheduler) | Administer | Logout



RAPTOR

Collaboration

Tracking ID	Case ID	Procedure	Image Type	Requested By	Patient Location	Category of Exam
281	Not Implemented	CHEST INCLUDE FLUORO	GENERAL RADIOLOGY	PROVIDER,ONE	RADIOLOGY MAIN FLOOR	OUTPATIENT
Ordered/Due Date	Patient Category/Location	Reason for Study	SSN	PCP	Transport	Urgency
SEP 08, 1992@08:45:11	Inpatient		666-00-001	Unknown		ROUTINE
Patient Name	Age	Clinical History	DOB	Ethnicity	Attending	Gender
FIFTEEN, PATIENT	79	Testing out Long Beach error ~	04/07/1935	WHITE, NOT OF HISPANIC ORIGIN	Unknown	M

- Bleeding risk
- At-Risk Medications for Image-Guided Procedures
- Renal risk
- Age > 60

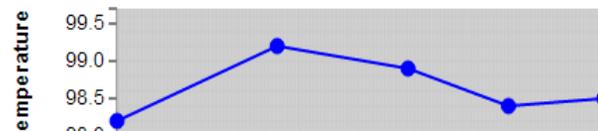
Protocol Medications Vitals Allergies Labs Dose Hx Clin rpts Problem List Notes Rad rpts Library

Medications

Med	At Risk ?	Status
ASPIRIN TAB,EC		Active

[\(see medications detail\)](#)

Vitals



Protocol Name

- Select -

A standard protocol from the hospital's radiology notebook.

Protocol Name

- Select -

Select a second protocol only if more than one is needed for this study.

Contrast

None

Enteric

Visionarium Lab: Proof of Concept Modeling and Usability Testing Facility for Project Orchid



DeepSix

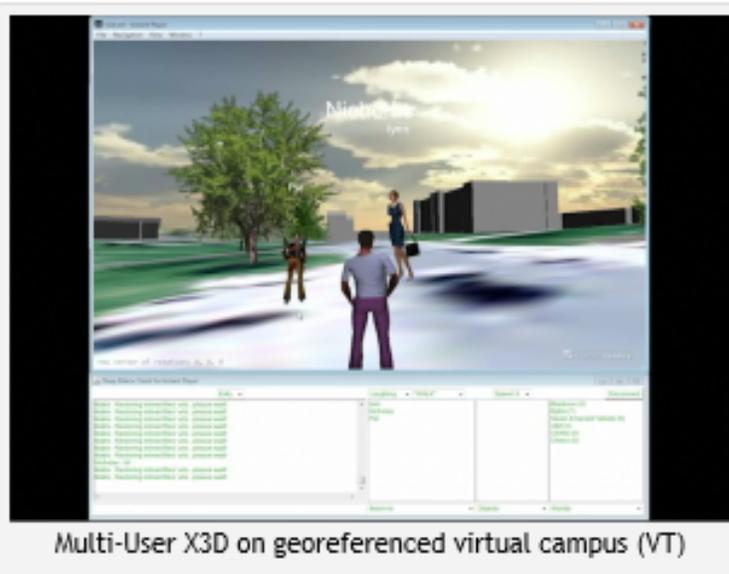


A high powered desktop system, DeepSix employs a tiled display of six 30 inch Dell monitors capable of a 2560×1600 resolution each. At a combined resolution of 7680×3200, this is our highest resolution single display available in the lab.

AISB Stereo Wall



This wall is located in the Andrews building of the Corporate Research Center. It is a passive stereo display that is conveniently located in a conference room for easy presentation.





Virginia Tech Video to be played here.

Open Standards for Volume Rendering: X3D 3.3 Examples and applications by
Andy Wood and Dr. Nicholas Polys, Virginia Tech (rendered with H3D)

OUR CURRENT STATUS

Grant Submission Activities:

- NIH Big Data to Knowledge
- Global Health Innovation Fund
- NIH mHealth
- PCORI – Patient Centered Outcomes Research Initiative
- Seeking Academic and Private Partnerships in Latin America

For more information, please contact me:

Kimberly Harding

kharding@monarchinnovation.com