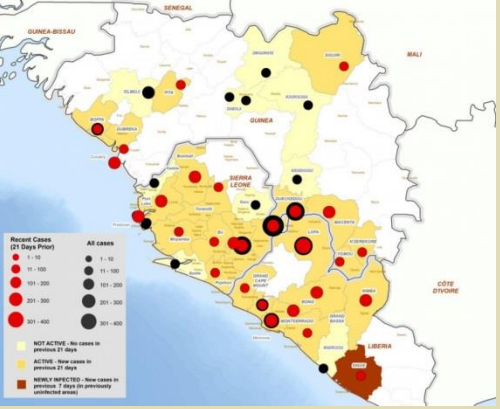
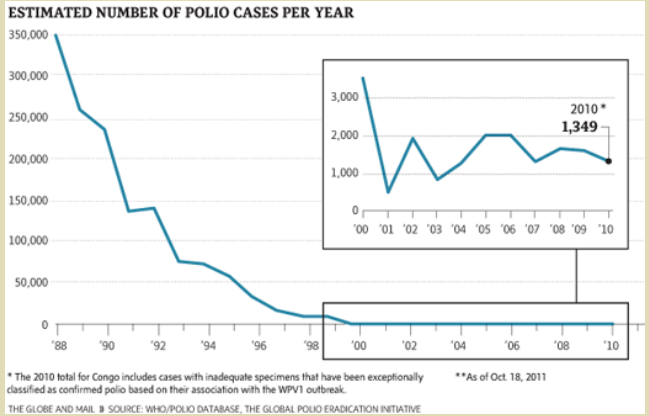




Disease	Week 6 (18 Jan, 2010 – 24 Jan, 2010) Cases	Deaths
Cholera	214	2
Plague	0	0
Rabies	3	2
Acute flaccid paralysis	2	0
Cerebrospinal meningitis	9	1
Measles	7	0

Computing and Global Health Lecture 2, Surveillance

Winter 2015

Richard Anderson

Today's topics

- Surveillance problem
- Issues
- Health Information systems
- HISP/DHIS2
- Approaches to last mile data collection

Readings and Assignments

- Homework 1
  - Design a national immunization equipment monitoring system
- Readings
  - DHIS2 for Ghana
  - Health worker personas
  - Lancet Health

Date	Topic
Jan 7, 2015	Overview
Jan 14, 2015	Surveillance
Jan 21, 2015	Tracking
Jan 28, 2015	Medical records
Feb 4, 2015	Logistics
Feb 11, 2015	Patient support
Feb 18, 2015	Treatment support
Feb 25, 2015	Health worker support
Mar 4, 2015	Behavior change
Mar 11, 2015	Finance

Assignment 2

- Develop requirements for a software tool to support the district manager in aggregating facility reports and submitting them to the national level.
  - Select one of your three countries as a target
- You may choose the most appropriate level/approach for the requirements

Nicaragua Case Study

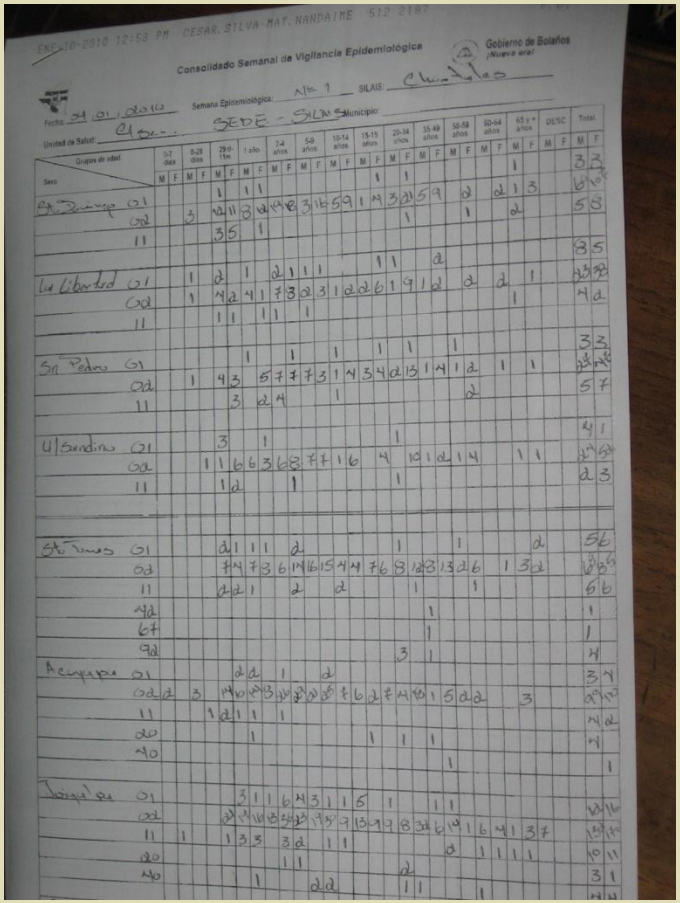
- Strong national epidemiology department
- Second poorest country in the Americas (GDP per capita $4500)
- Population 5.8 million

Nicaragua Health System

- SILAIS (district health office), Hospital, Health center, Health post
- Health post, staffed by one or two people
- Weekly meetings of health post staff at health center

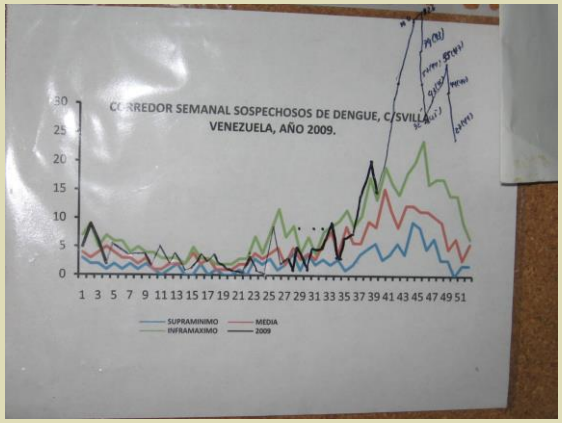
Facility reporting

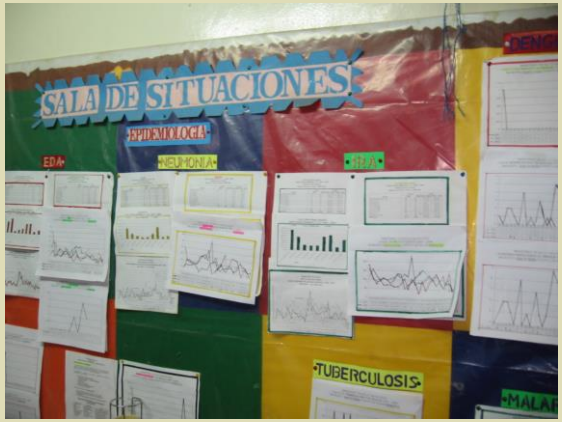
- Monthly reporting of disease
  - Roughly 60 diseases listed
  - Age buckets and gender
- Separate immunization reporting
- Additional reporting from hospitals
- Health Post -> Health Center -> Silais -> National



Data use

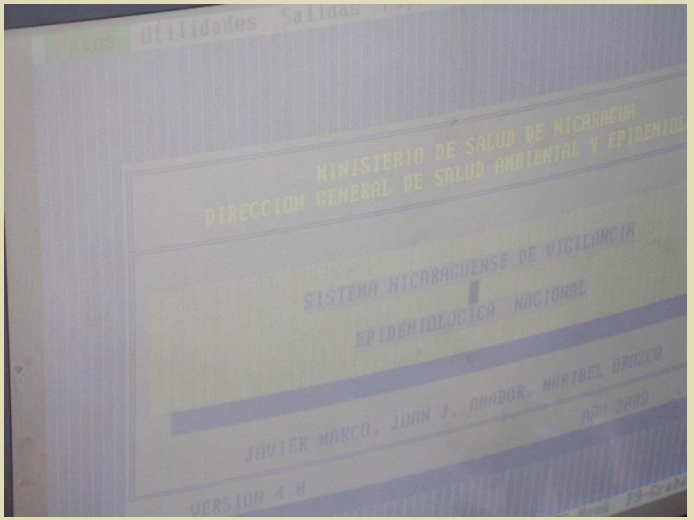
- Strong culture of data use
- All health centers visited had recent graphs of health data
- Staff expressed understanding of data and awareness of how it can be used
- Policy and training to support data use





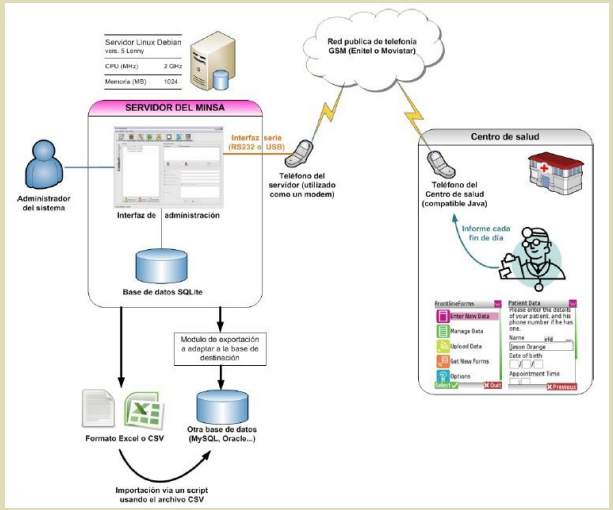
National Level

- Well established national reporting
  - Procedures for data collection and use in place
  - Run by epidemiologists
- Remote reporting by radio
  - Gradually being phased out
- Custom surveillance software (running on Windows 3.1 in 2010)



Dengue Surveillance

- Mosquito born disease of growing importance
  - Breakbone fever
  - Highly seasonal
- Case tracking
  - Early warning of outbreaks
  - Mitigation (e.g., mosquito control)
  - 2009 Nicaragua introduced a Frontline SMS reporting system



Nicaragua Summary

- Relatively successful surveillance system
  - Procedures appear to work
  - Understanding of use of data
- Multiple different reporting systems in place as of 2010 with out of date technology
- Country faces challenges of low income and remote areas
- Strengths
  - Strong public health system
  - Small country
  - Improving infrastructure

Surveillance

- Collect aggregate health data at national level
- Not associated with the individual
- Health statistics, not data for treatment of individuals

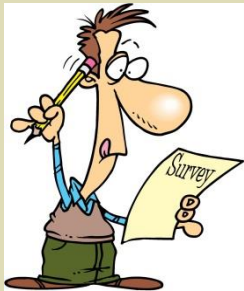
Routine surveillance vs. Surveys

Country surveillance

- Routine submission with a fixed period
- Goal of complete coverage
- Data collection and entry one of many tasks by workers
- Small amount of data per form
- Limited resources for training, implementation, and supervision

NGO led survey

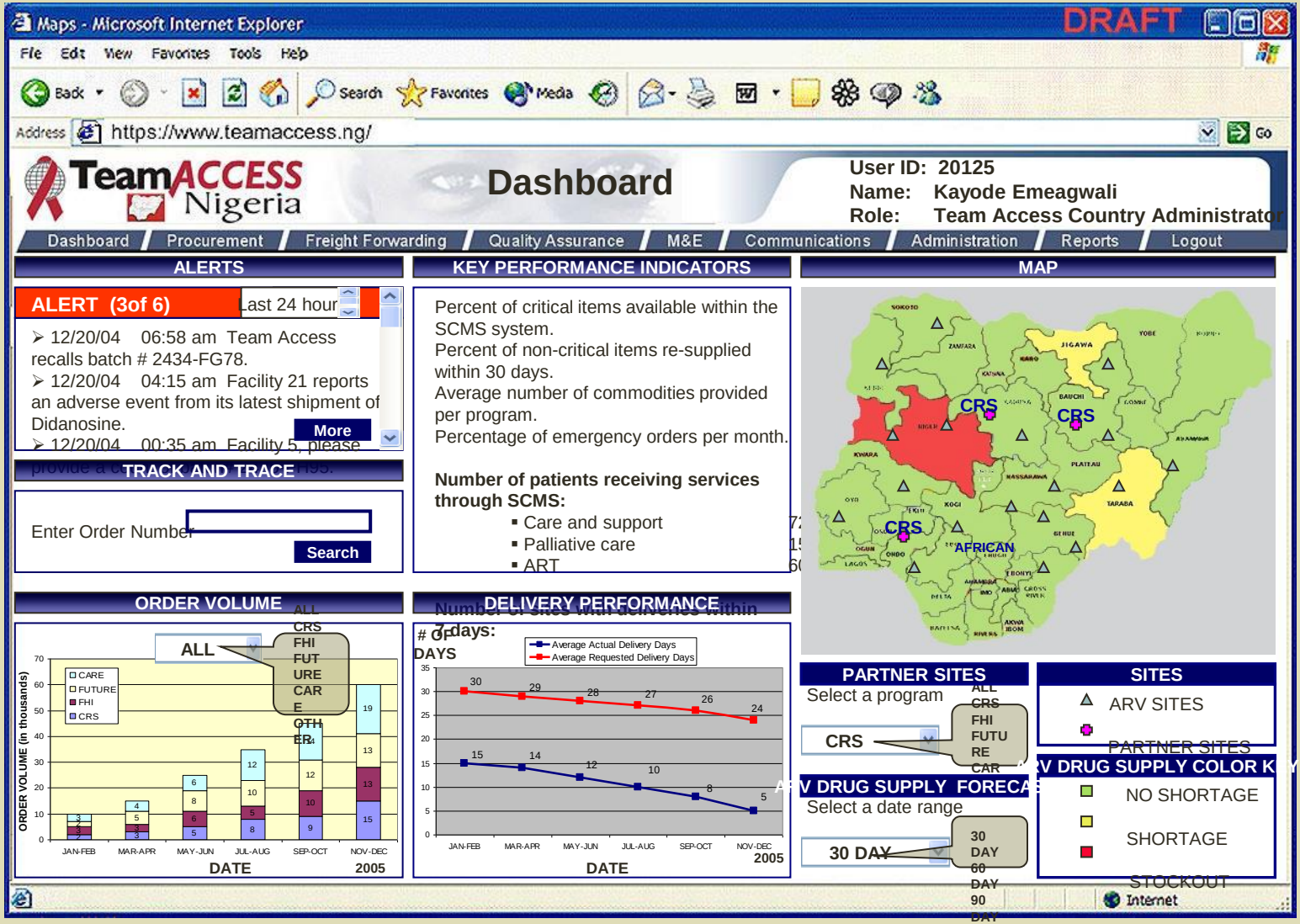
- Single instance
- Goal of statistical significance through sampling
- Data collection by dedicated workers
- Complex data collection
- Large amount of data



Challenges

- Standard problems associated with surveys
  - Statistical significance
  - Form design
  - Data errors
- ICTD Problems
  - Peripheral Data Collection
  - Health information systems for developing countries

What if the information you needed to make any decision was easy to access?



BREASTFEED YOUR CHILD
AT LEAST ONE YEAR
TO ENSURE GOOD HEALTH

WOMAN'S NO

MINISTRY OF HEALTH AND SANITATION
MONTHLY PHU SERVICE UTILISATION REPORTING FORM

District Western Area Name of facility Wilberforce year 2006 Month November

Type of Facility CHC Estimated catchment size 35000
CHC, CHP, MCHP, Clinic

	1 visit	2 visits	3 visits	Total Visits
Number of Antenatal visits	23	10	6	39
No. of at risk ANC Cases:	3	1	6	0

TETANUS TOXOID REGISTER

SERIAL NO.	NAME	DATE OF BIRTH	ADDRESS	TETANUS TOXOID 15 1	2	3
2074	Binta J. Conteh	1972	58 Jalloh Terrace			
2075	Sia Pasima	1986	24 Palmer St			
2076	Mahawa Bayoh	1982	308 Mayen Keneh Rd Calaba Town			
2077	Mariama Turay	1992	314 Bai Bureh Rd			
2078	Margaret Kanu	1979	9 Sesay Lane			
2079	Fatmata Kamara	1981	4 Coundercane			
2080	Hannah Turay	1970	16 Old Wharf			
2076	Fatmata Bassie	1979	22 Ojukutu Rd			
2077	Mariatu Koroma	1987	301 Bai Bureh			
2078	Hannah Mansaray	1958	44 Magazine Rd			

Method Dispensed at this	Orals			IUCDS			Vaginal			
	Other	Microfollinon	Other	Copper 'T'	Other IUCD	Depo-Provera	Foaming Tablets	Cream, Jelly, Foam	Condoms	Tubal Sterilizati
						1cc				
						1cc				
						1cc				
						1cc				
						1cc				
									20	
									20	
									20	


PLANNING
AGE GROUP 0-4 5-14 15-24 25-34
DISEASE M F M F M F M F
MALARIA 22 15 23 35 23 32 10 8
DIARRHOEA 4 3 3 3 5 5 3 3
DYSENTRY 0 0 2 3 4 2 1 1
CHOLERA 0 0 0 0 0 0 0 0
ARI/PNEUMONIA 17 15 28 18 31 32 7 8
UNDER ONE REGISTER
SERIAL NO.
CHILD'S NAME
DATE OF BIRTH
MOTHER'S NAME
ADDRESS
BCG
OPV 0
OPV 1
UNITY FREEDOM JUSTICE
…MENT OF SIERRA LEONE
…Y OF HEALTH AND SANITATION
…D NEONATE'S HEALTH REGISTER

MINISTRY OF HEALT
NATIONAL MALARIA C

DRUG UTILIZ

...MONTH/YEAR October ...PHU...

1. Number of Antenatal visits 124
   1 visit
2. No. of at risk ANC Cases 11
   18 years
3. No. of pregnant woman immunized
4. No. of Pregnant women 124
   Screened f
5. Total No of deliveries 11
   Done by s
6. No. of maternal deaths 0
7. No. of infants immunized: 83 Measles | 144 DPT3- | 169 BCG | 144 OPV3
   Over 1 year
8. Total No. of < fives 19619 Examined | 0 Stunted | 2 Wasting | Und
9. No. of bed nets distributed 381
10. No. of pregnant women that received IPT 345 1 Dose | 18 2 Doses
11. Did your facility run out-of SP drugs continuously for 2 weeks during the reporting
12. Did your facility run out-of anti-malaria drugs continuously for 2 weeks during the

NAME OF PATIENT..... AGE..... ADDRESS..... RESP

PATIENT'S NUMBER

PREGNANCY HISTORY

H1	SICKLER	NO		YES		
H2	AGE	18-35		<15	15 - 17	35+
H3	HEIGHT BELOW 150CM	NO		YES		
H4	PREVIOUS DELIVERIES	<5		0	5+	
H5	MULTIPLE DELIVERIES	NO		YES	No.	
H6	STILLBIRTHS	NO		YES	No.	
H7	MISCARRIAGES	NO		YES	No.	
H8	INDUCED ABORTIONS	NO		YES	No.	
H9	PREVIOUS C/S	NO		YES	No.	
H10	PROLONGED LABOUR	NO		YES		
H11	EXCESSIVE BLEEDING APH	NO		YES		
H12	EXCESSIVE BLEEDING PPH	NO		YES		
H13	RETAINED PLACENTA	NO		YES		
H14	ECLAMPTIC FITS	NO		YES		
H15	DEATH OF A CHILD WITHIN 7 DAYS	NO		YES	No.	
H16	COUGH ABOVE 4 WEEKS	NO		YES		

PRESENT PREGNANCY

PATIENT'S BLOOD GROUP

L.M.P. E.D.D. Booking Date

DATE OF VISIT

Month of Pregnancy 3 4 5 6 7 8 9 10

PP1 Bp if 130/90 and above At risk, Refer

PP2 Pitting Oedema

PP3 Urine Albumin

PP4 Unusually thin patient

PP5 Unusually large abdomen

PP6 Severe Pallor/Anaemia

PP7 Vaginal Bleeding

PP8 Transverse/Oblique Lie

PP9 Breech Presentation

PP10 Foetal Movements

PP11 Foetal Heartbeat

PP12 Iron and Folic Acid

PP13 Malaria Prophylaxis

PP14 Haemoglobin (g/100m)

PP15 Weight (kg)

PP16 Mother's Delivery Kit

PP17 Tetanus Toxoid (Date)

LABOUR/DELIVERY

D1 Normal Duration (6 - 24 hrs)

D2 Head Presentation (Vertex)

D3 Normal Delivery

D4 Excessive Vaginal Bleeding (1 pint or more)

If you tick in shaded box, refer immediately

D5 Date of Delivery

D6 Time of Delivery

D7 Delivered by

D8 Delivered at

D9 Mother survived delivery

BABY (NEONATE)

D10 Live born

D11 If no fresh still birth

D12 State of baby normal

D13 Gestational Age 8 months

D14 Multiple Births

D15 Sex of Baby(ies)

D16 Birth weight 2500gm and

D17 Actual weights

Magdalin Ronald	4.9.06		
Esther William	4.9.06		
Sadie Kandeh	4.9.06		
Mrema Tarawa	4.9.06		
Ibrahim Thullen	4.9.06		
Alasan Kanneh	4.9.06		
Memu Bangura	4.9.06		
Esther George	4.9.06		
Conteh	5.9.06		
Kennebagor	5.9.06		

Date:.....

TETANUS TOXOID TALLY SHEET
WOMEN 15 - 49 AND PREGNANT WOMEN

District _____

Health Facility (PHU)..... Chiefdom/Zone..... Date: 1.11.06

ANTIGEN	Women 15 - 49 Years	Total	Pregnant Women	Total
TT1	00000 00000 …		00000 00000 …	1

NOV 2006

DEATH REGISTRATION ACCORDING TO SELECTED CAUSES

CAUSE OF DEATH	0 – 11MTS		12MTS-4YRS		5-14YRS		15-44YRS		45YRS & ABOVE	
SEX	M	F	M	F	M	F	M	F	M	F
TYPHOID FEVER										
ANAEMIA						1		1 00	00	11 02
HYPERTENTION							11 02		11 02	
STROKE									11 02	11 02
POST PARTUM HAEMORRAGE										
MALARIA		1 01	00	11 02	00	00	1 00	1 00	11 00	11 01
MEASLES										
PNEUMONIA				1			1		11	1111
MENINGITIS										
MAL-NUTRITION										
DIARRHOEA	1			11 02	1 01	1 01	1	11		1 01
TUBERCULOSIS							1		1 01	
STDs /HIV/ AIDS										
NEONATAL TETANUS										
OTITIS Media other3	1111 05	1111 04	11 02	1 01	00	1 01	1111 04	111 00	1111 1111 01	
TOTAL	05	05	02	05	01	02	04	02	12	07

DATE..... COMPILED BY:.....SIGN.....

M	F
24	21

Key Issues

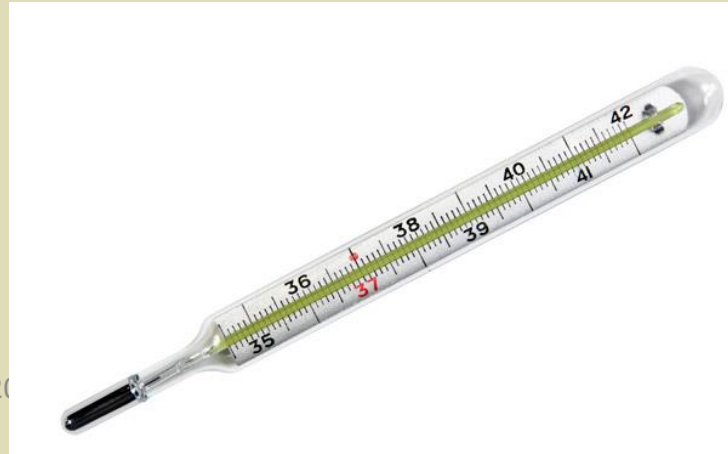
- Why collect data
- What are indicators
- Institutional challenges
  - Pressure of Data collection from the top
- Practical challenge
  - Reporting takes too long
- Getting data to be used
- Data at the facility level
- Processes in data reporting
- Role of technology for data collection

Why collect data ?

- External
  - Donors, Global bodies, Research
- Global program goals
  - Elimination of Polio – need to know all suspected cases (AFP): polioeradication.org
- Strengthen country programs
- Allocate resources
- Address specific problems

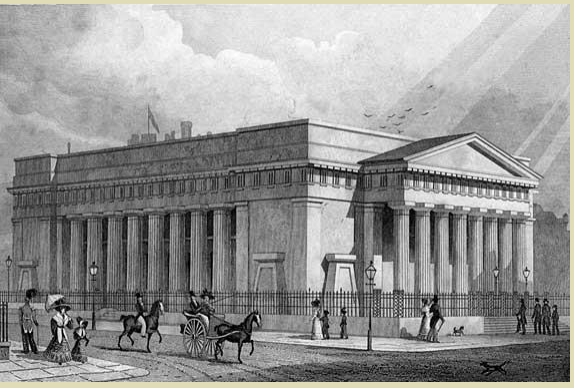
What are indicators?

- Measurable variable to assess underlying variable
  - Attendance at church to measure religiosity
- How to measure quality of immunization
  - Percentage of kids receiving 3rd dose of BCG
- Issues
  - Standardization
  - Denominators
  - Indicator growth



Institutional challenges

- Indicators established at the central level
- Data collected at the facility
- Pressure from Donors to collect domain specific data
  - Explosion of data required
  - Development of parallel information systems



Data Latency

- Data registration and collection latency
- Data reporting and capturing latency
- Data transmission latency
- Data processing and analysis latency
- Data feedback and dissemination latency

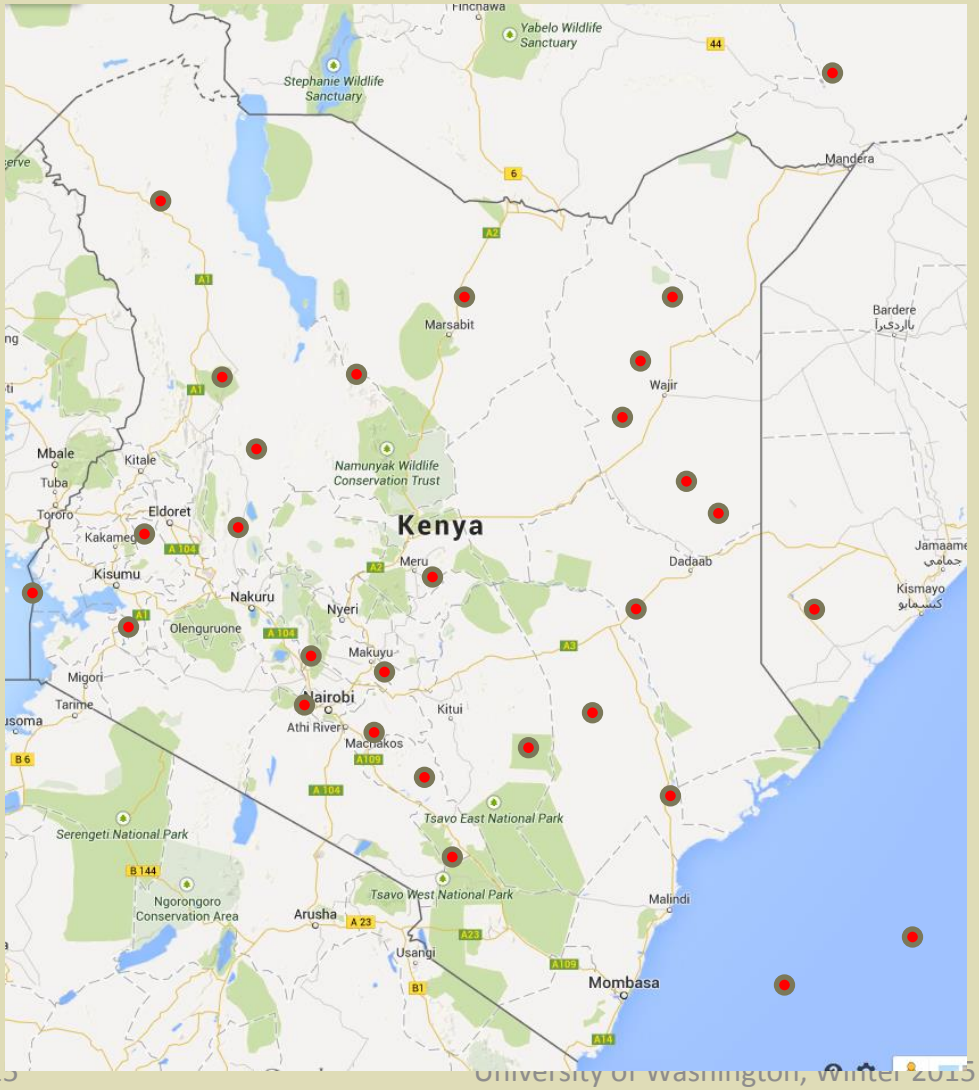
Data use

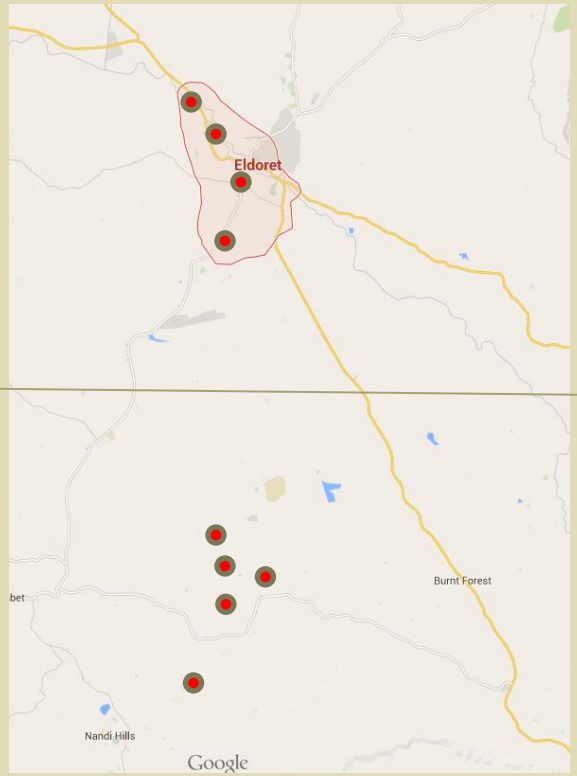
- Everybody wants this to happen
- Requires lots of work to make this happen
- Organizational and political

Information use maturity model

1. Technically working information system, emphasizing data completeness
2. Information system characterized by analysis, use and feedback of data
3. Information system shows evidence of impact on decision-making

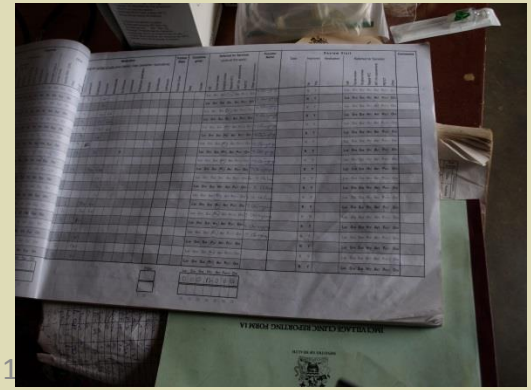
If no one uses data, its probably wrong

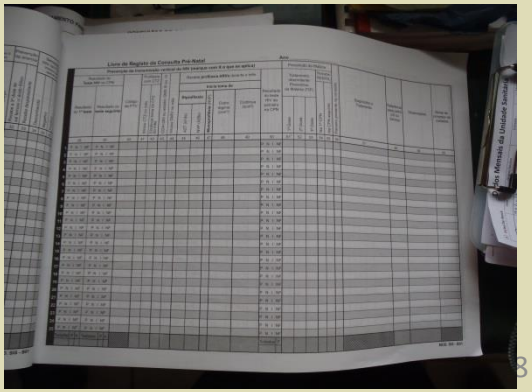


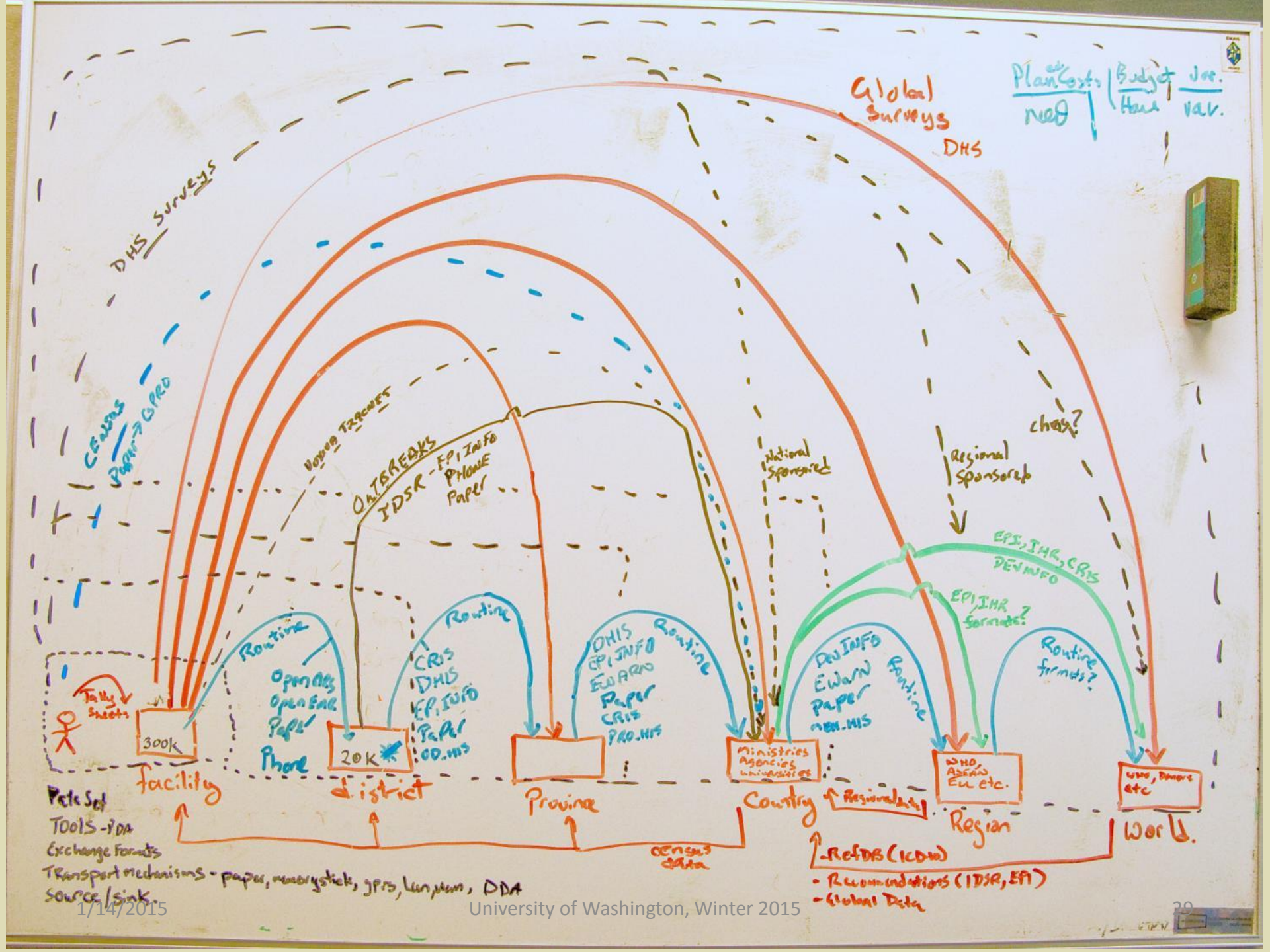


Facility environment

- Differences in scale between different types
  - Hospital: Administrative staff, multiple doctors
  - Health Center: Small number of doctors
  - Health post: one or two health workers
- Data kept in registers
  - Dozens of different registers

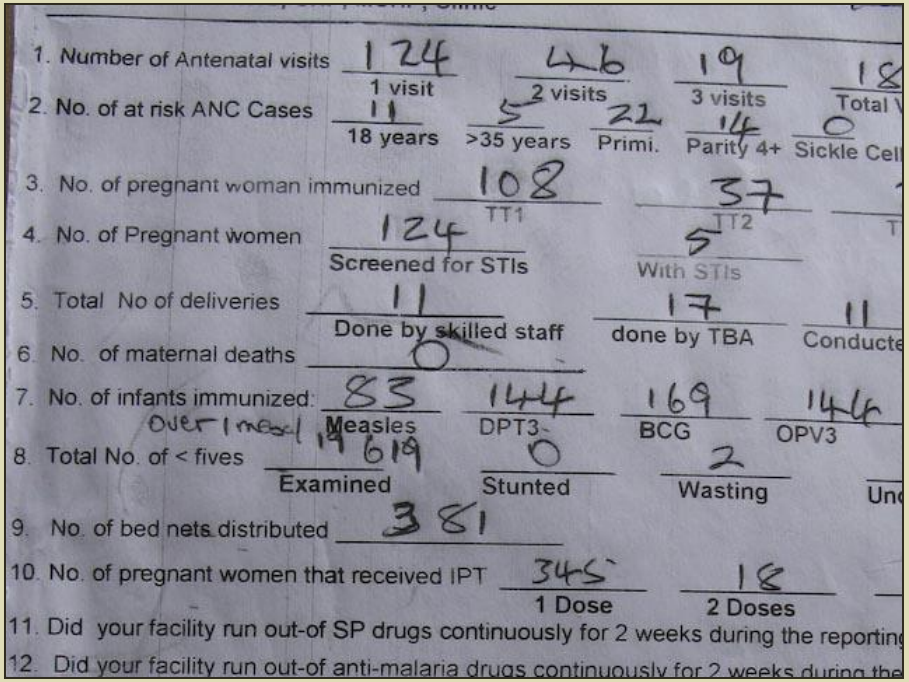





Global Surveys
DHS
DHS Surveys
Census
Paper → GPRD
Vector Traces
Outbreaks
IDSR - EPI Info
Phone
Paper
National Sponsored
Regional Sponsored
chart?
EPI, IHR, CRIS
DEVINFO
EPI, IHR formats?
Routine
Routine formats?
Tally Sheets
300K
20K
Open MIS
Open Ended
Paper
Phone
CRIS
DHIS
EPI INFO
Paper
CD-MIS
DHIS
EPI INFO
EWARN
Paper
CRIS
PRO-MIS
DEVINFO
EWARN
Paper
NEW-MIS
facility
district
Province
Country
Region
World
Ministries
Agencies
Universities
WHO, ASEAN
EU etc.
UN, Donors
etc
Census data
Regionalized
Data Set
TOOLS - PDA
Exchange Formats
Transport mechanisms - paper, memorystick, gprs, Lan, Wan, PDA
source/sink
- RefDB (ICD10)
- Recommendations (IDSR, EPI)
- Global Data

Processes

- Data entry
- Data submission
- Data approval
- Data aggregation

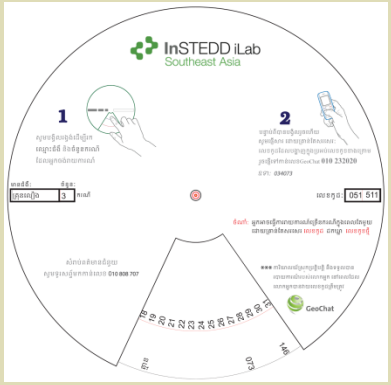


Role of information and communication technology

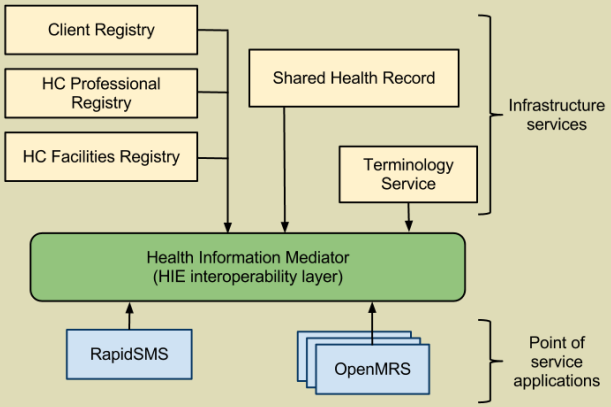
- Data entry
- Data transport
- Aggregation
- Storage
- Use

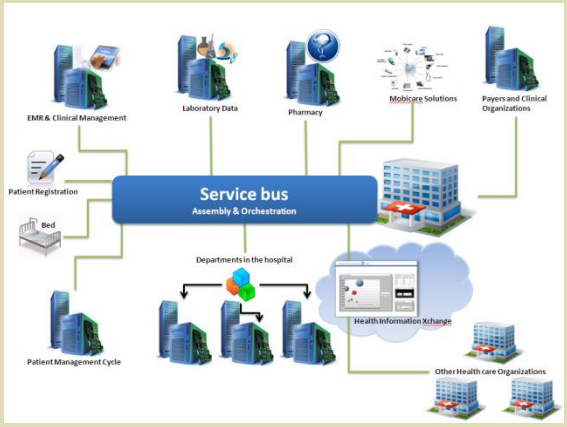
Data reporting technologies

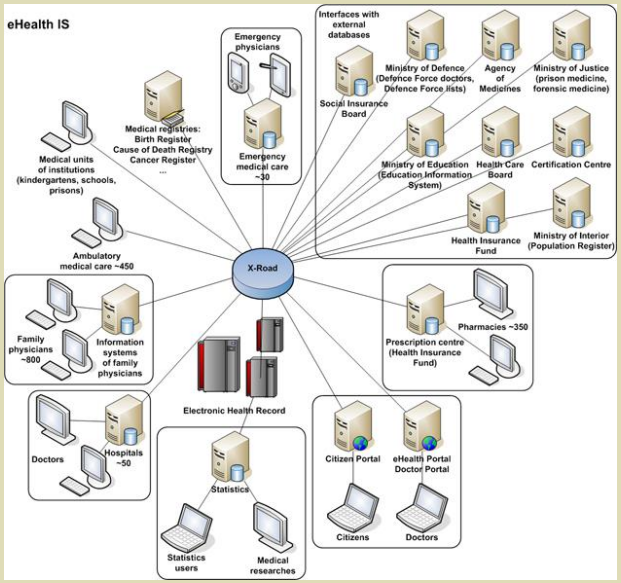
- Web forms
- eMail
- Feature phone
- Smart Phone
- SMS
- Paper to Digital

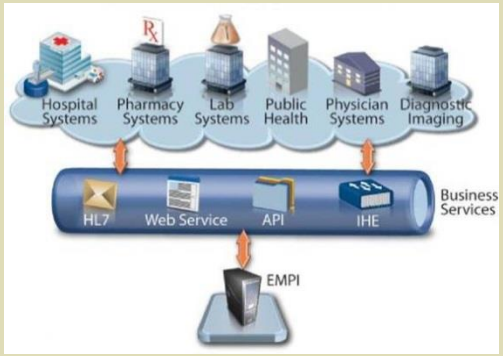


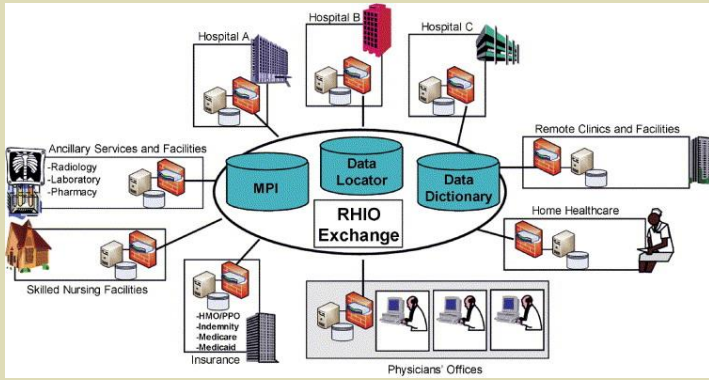
Health Information Systems



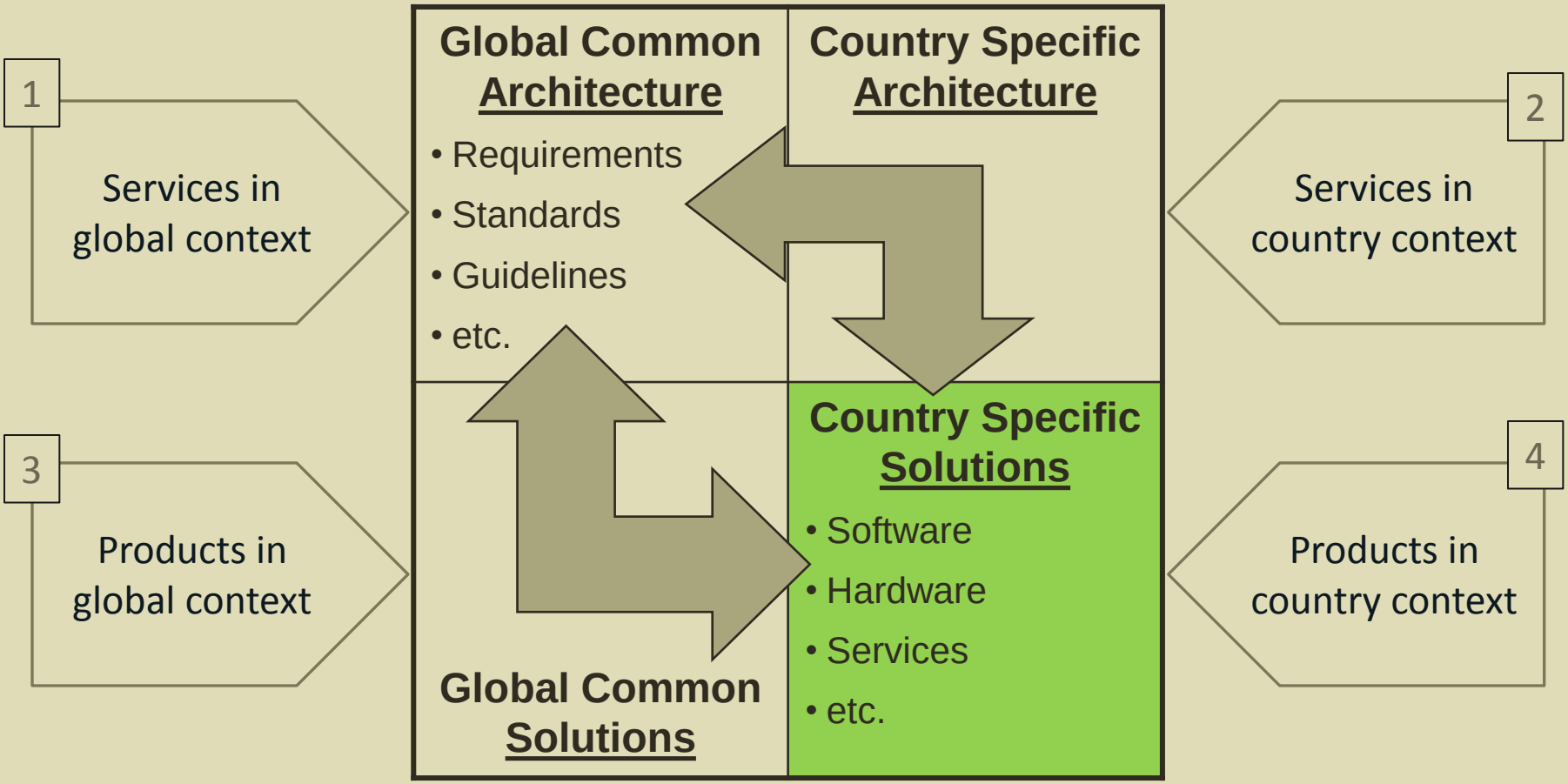




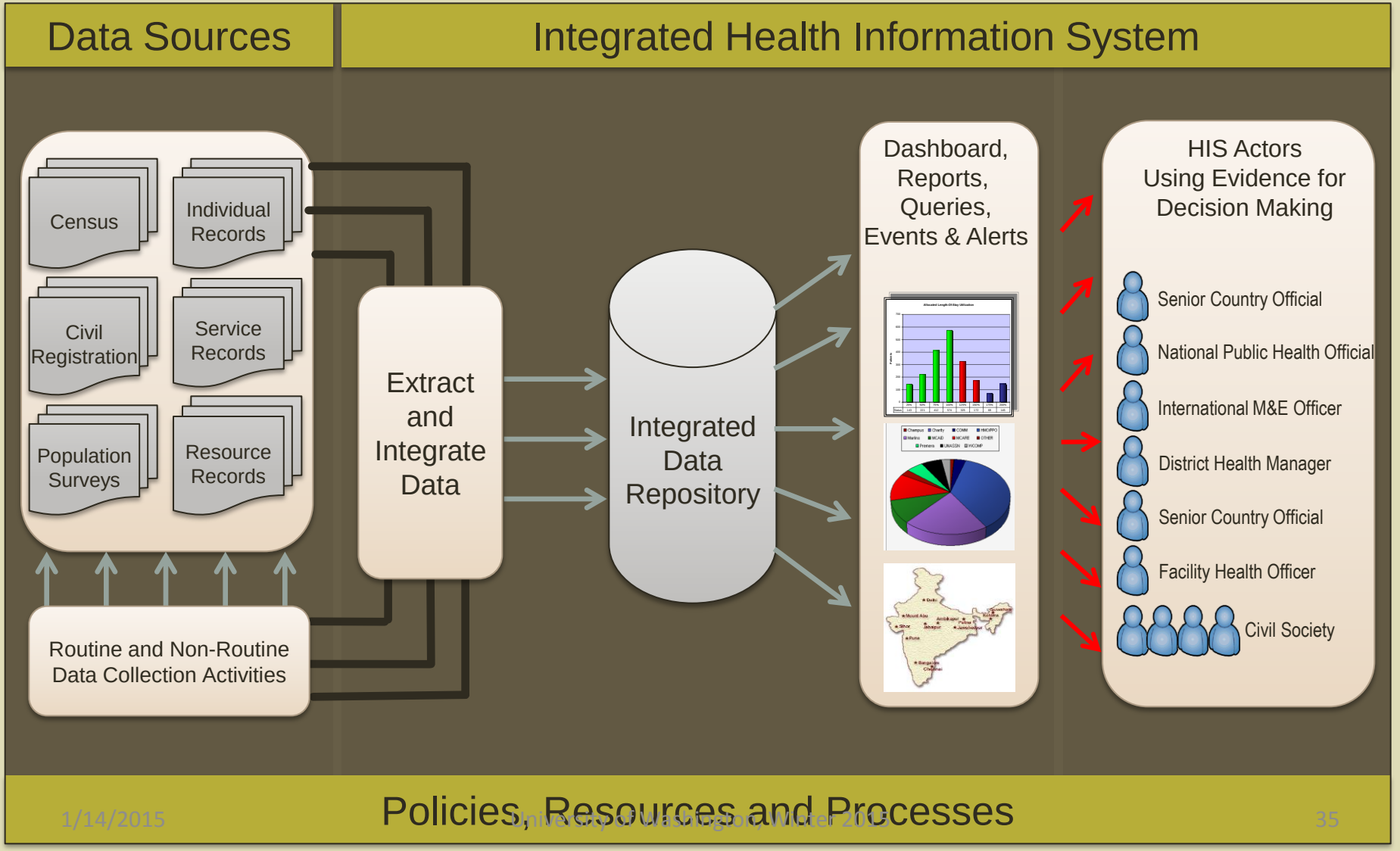




2x2 Architecture Grid (Lubinski)



Conceptual HIS Framework



General Problem

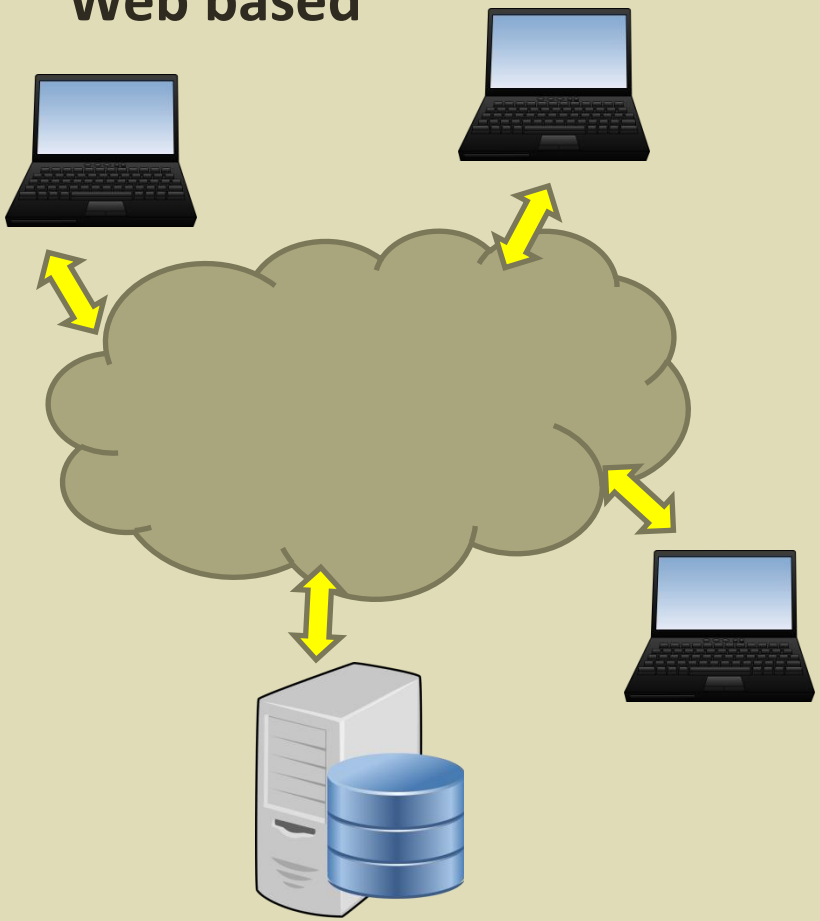
- Information system integration
  - Parallel systems
  - Uniform system
- Enterprise architecture
  - But countries are not companies

Integrated health data reporting

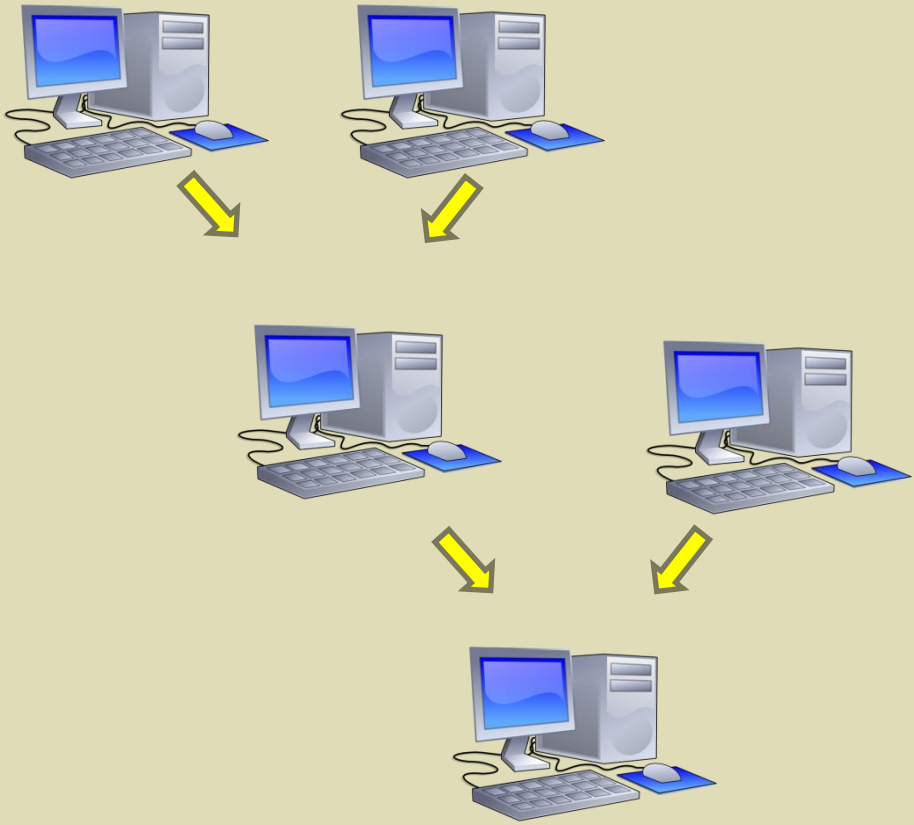
- National issues
- Stake holder conflicts

Data reporting architectures

Web based



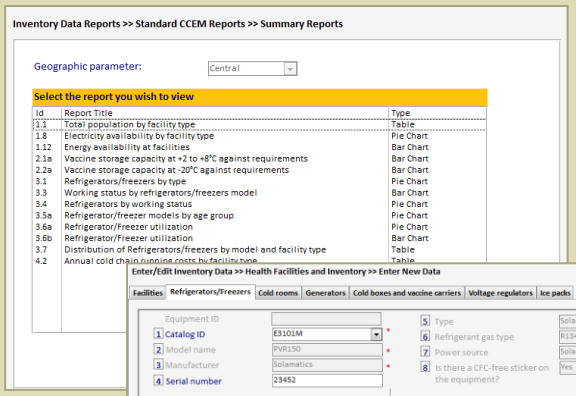
PC based

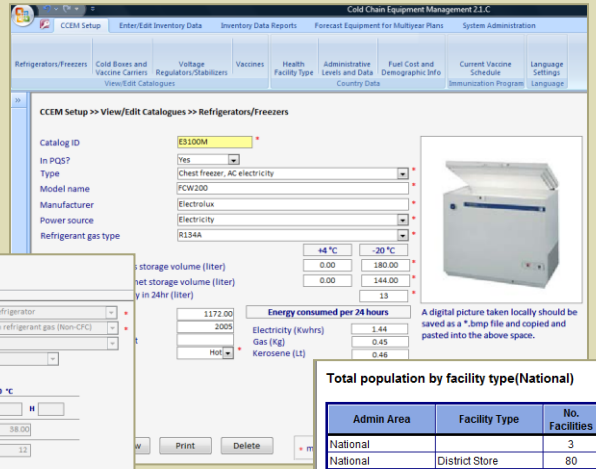


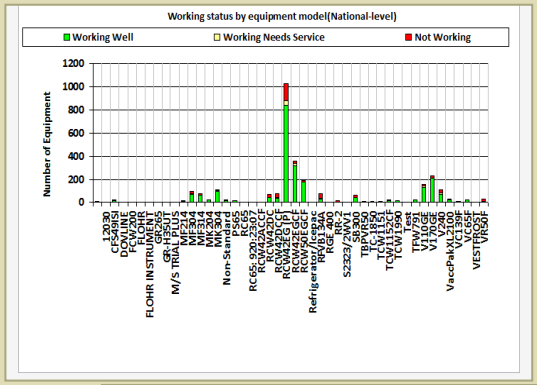
PC Applications are not dead yet!

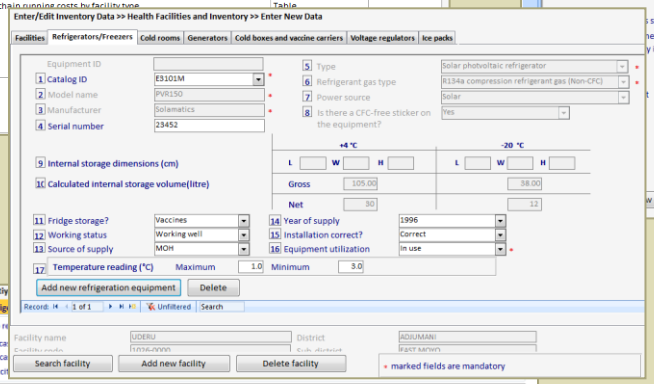
CCEM: Cold Chain Equipment Manager

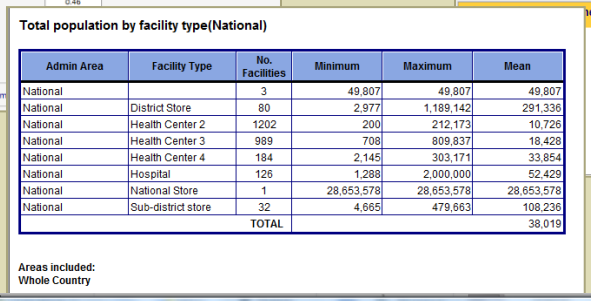
Microsoft access software for managing inventory of vaccine cold chain equipment







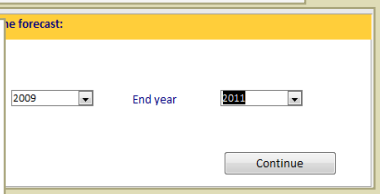


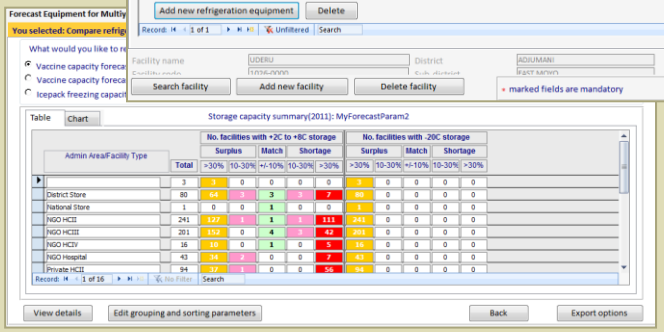


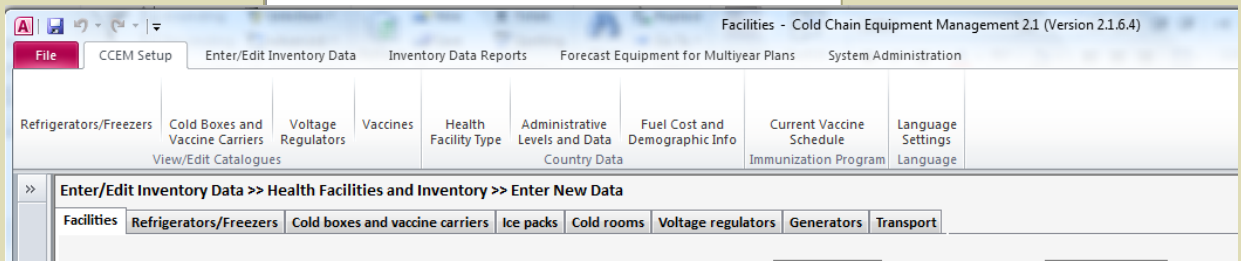
Total population by facility type(National)

Admin Area	Facility Type	No. Facilities	Minimum	Maximum	Mean
National		3	49,807	49,807	49,807
National	District Store	80	2,977	1,189,142	291,336
National	Health Center 2	1202	200	212,173	10,726
National	Health Center 3	989	708	809,837	18,428
National	Health Center 4	184	2,145	303,171	33,854
National	Hospital	126	1,288	2,000,000	52,429
National	National Store	1	28,653,578	28,653,578	28,653,578
National	Sub-district store	32	4,665	479,663	108,236
		TOTAL			38,019

Areas included:
Whole Country







HISP

- Health Information System Program
  - University of Oslo, Norway
  - Informatics Program with global ties
  - Manages DHIS2 software
  - Focus on Action Research

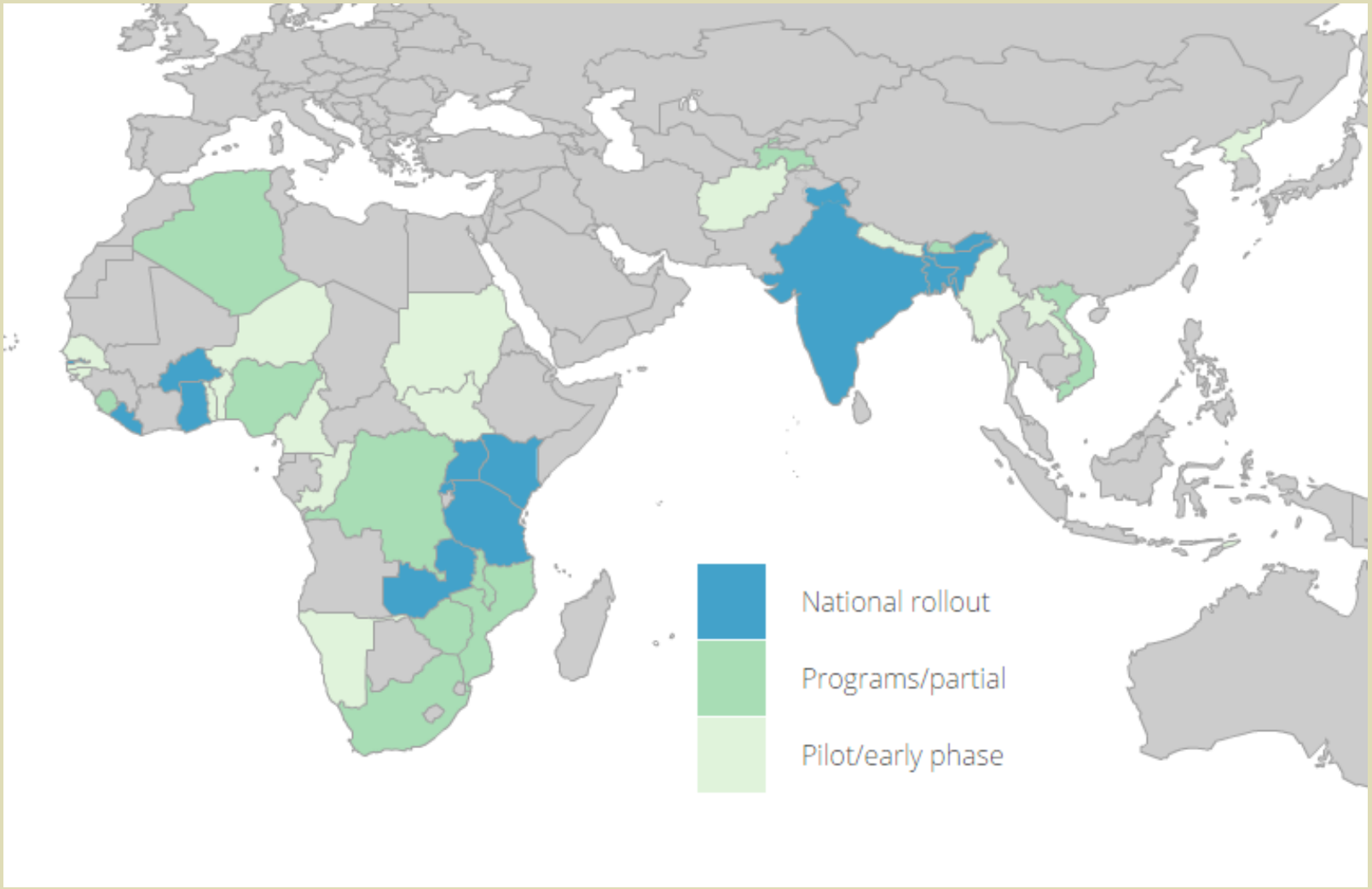
DHIS2

- District Health Information System 2
- Open source software for health system data reporting
  - Submit monthly reports
  - View data
- Design allows customization at country level

HISP History

- Initiated in post apartheid South Africa
  - Improve public health system
  - Activist led
  - Scandinavian participatory design and action research
- Open source application built on top of MS Access for South Africa
- Introduction to other countries
  - Mozambique, India, Vietnam, Cuba
  - Technical and political challenges
- Transition for DHIS 1.4 to DHIS 2.0
- Development of University Programs
- Establishment of HISP India to support state wide rollout in India
- Adoption of DHIS2 in multiple countries as national HIS

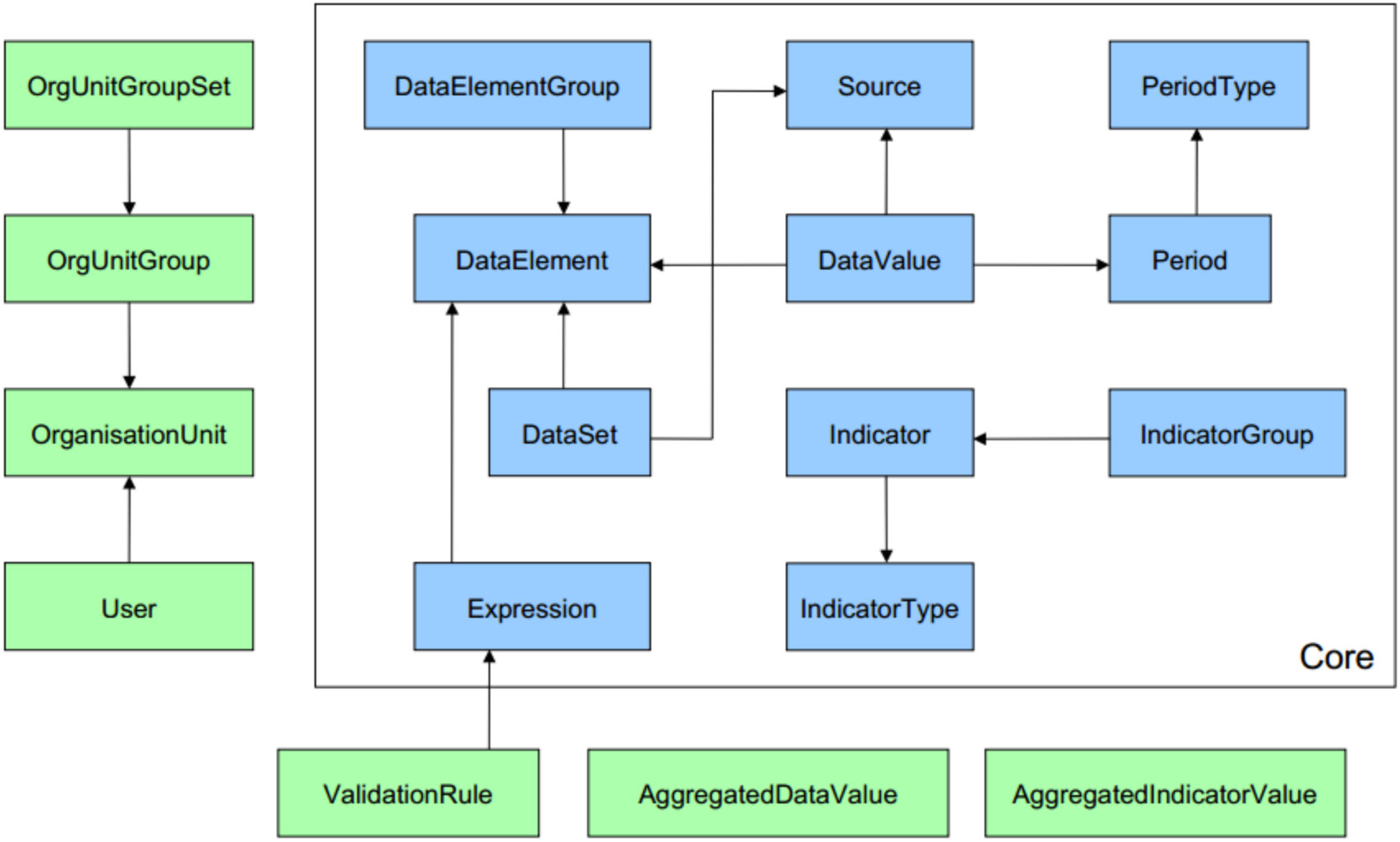
DHIS2 Deployments



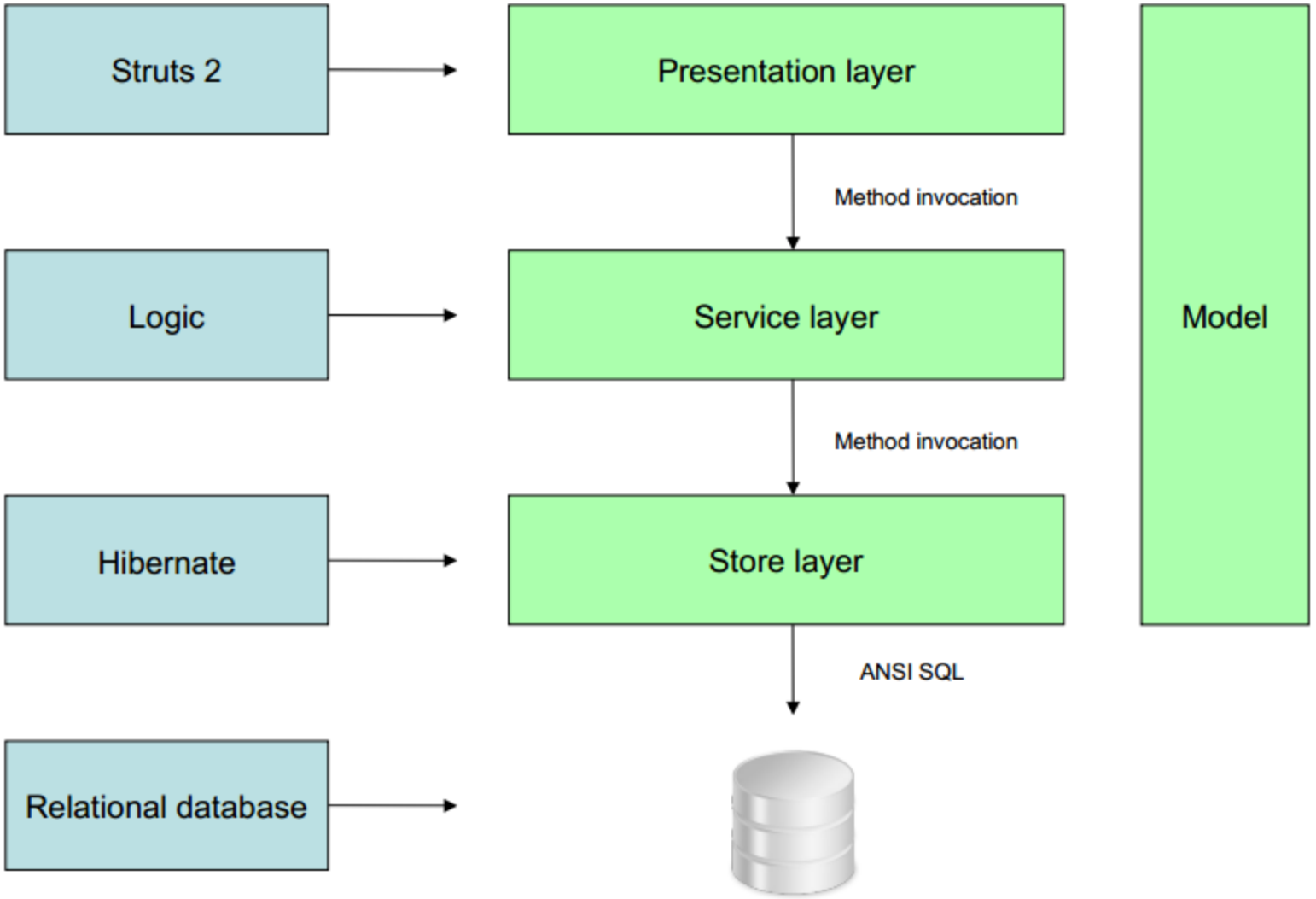
DHIS2 concepts and data models

- Data elements: atomic units (but can be disaggregated by dimensions age/sex)
- Data set: collection of data elements
- Period: Dates (with periodicity)
- OrgUnit: Location
- Indicators

Domain model



Application design



launchpad

"DHIS 2 core developers" team

Overview Code Bugs Blueprints Translations Answers

Open Source

- HISP Oslo manages DHIS2 as a global, open source project
- BSD License
- Distributed development
  - India, Vietnam, Norway
- Strong emphasis in developing country capacity
  - DHIS2 Academy

HISP Case Study

Ghana Health Service Dhims 2

Click here for manual.

dhis2

Sign in

Username

Password

Sign in

Forgot password?

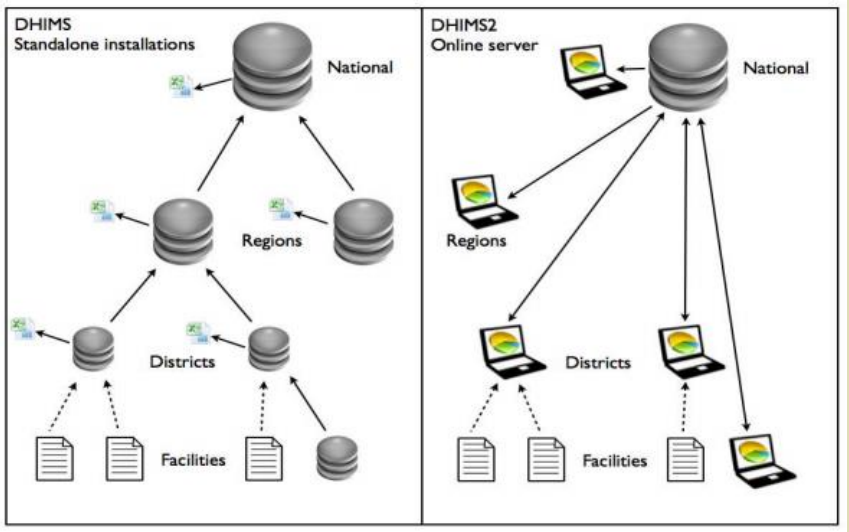
WELCOME TO GHANA HEALTH SERVICE DHIMS 2

Health Information Systems

- Challenges
  - Collection of irrelevant data
  - Poor data quality
  - Poor timeliness of reporting
  - Parallel and duplicate data collection
  - Low information usage and poor feedback
- Donor driven reporting
  - Lack of requested data elements in national reporting
  - Development of parallel reporting systems

DHIMS

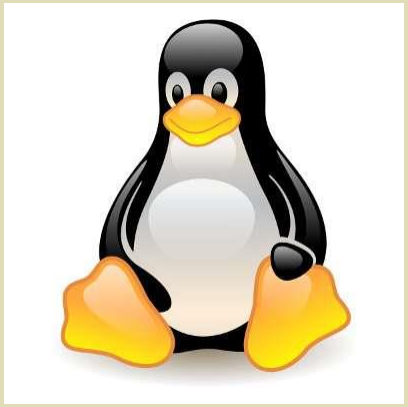
- 2007: Roll out of District Health Information Management System
- 2008: Health Metrics Network (HMN), framework for integrated HIS
- 2011: Implementation of DHIMS2 in DHIS2



DHIMS2 vs. DHIMS

- Centralization of expertise
  - Greater expertise needed, but can be centralize
- Improved data flow and reporting speed
- Increased access to information
  - No longer restricted to a local database
- Consistent national deployment
  - Avoid inconsistent development in different areas
- Substantial capacity development

Why Open Source?



Last mile data reporting

Internet

Feature phone

Smart phone / ODK

SMS

SMS Wheel

Paper to Digital