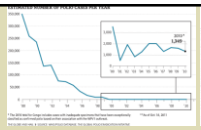



Week 6 (18 Jan, 2010 – 24 Jan, 2010)		
Disease	Cases	Deaths
Cholera	214	2
Plague	0	0
Rabies	3	2
Acute flaccid paralysis	2	0
Cerebrospinal meningitis	9	1
Measles	7	0

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

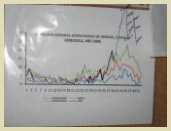


Facility reporting

- 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

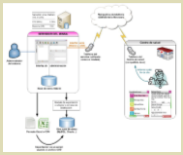


National Level

- 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

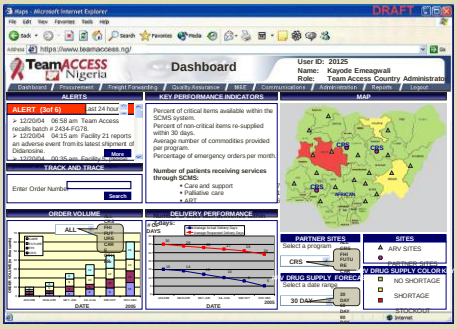
NGO led survey

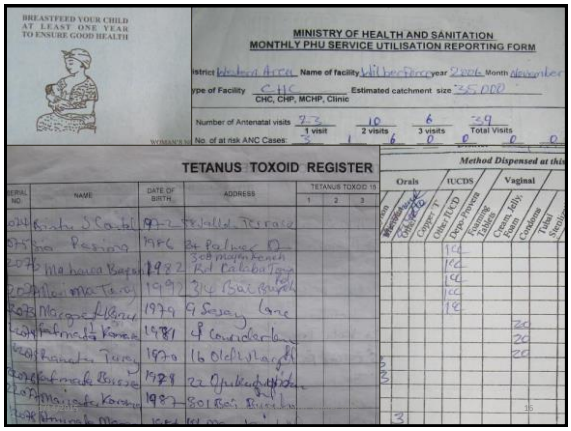
- Single instance
- Goal of statistical significance through sampling
- Data collection by dedicated workers
- Complex data collection
- Large amount of data

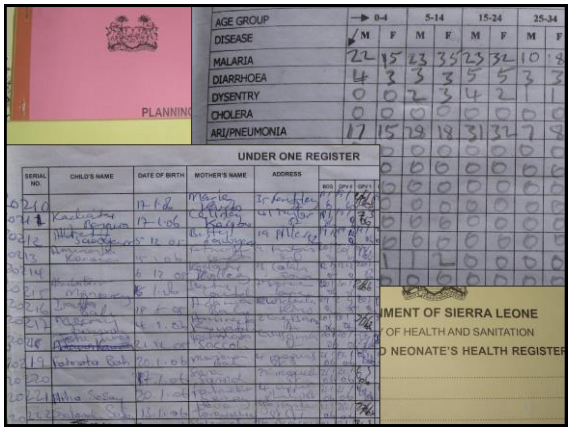
Challenges

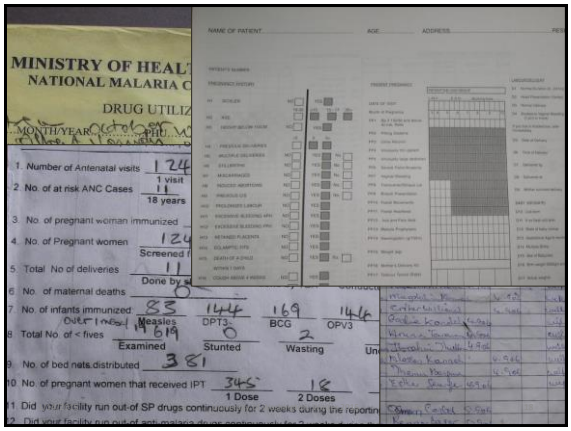
- Standard problems associated with surveys
  - Statistical significance
  - Form design
  - Data errors
- ICTD Problems
  - Peripheral Data Collection
  - Health information systems for developing countries

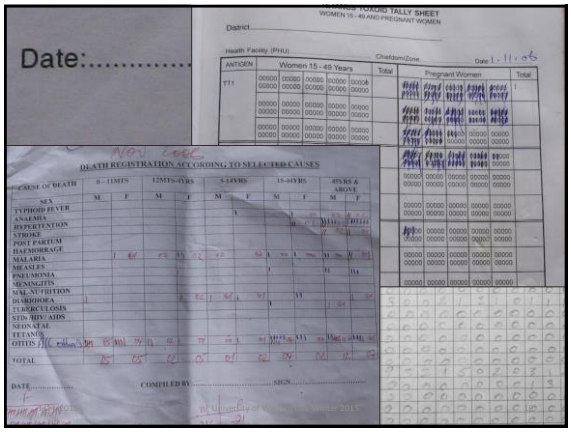
What if the information you needed to make any decision was easy to access?











Key Issues

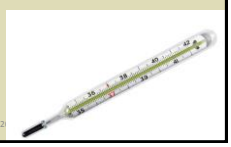
- Why collect data
- What are indicators
- Institutional challenges
  - Pressure of Data collection from the top
- Practical challenge
  - Reporting takes too long
- Getting data to be used
- Data at the facility level
- Processes in data reporting
- Role of technology for data collection

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

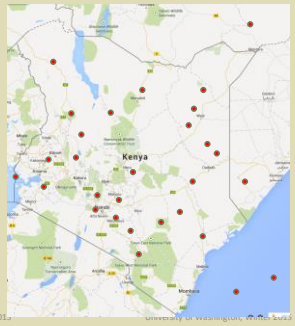
- Data registration and collection latency
- Data reporting and capturing latency
- Data transmission latency
- Data processing and analysis latency
- Data feedback and dissemination latency

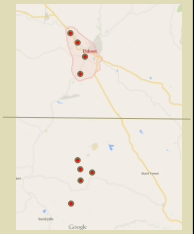
Data use

- 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

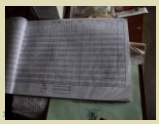
If no one uses data, its probably wrong

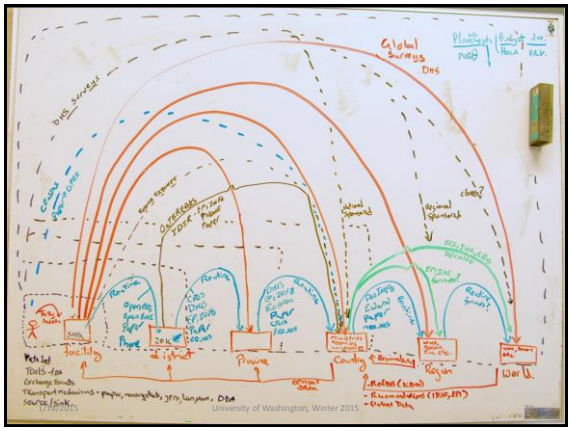




Facility environment

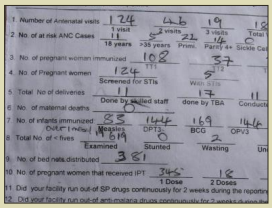
- Differences in scale between different types
  - Hospital: Administrative staff, multiple doctors
  - Health Center: Small number of doctors
  - Health post: one or two health workers
- Data kept in registers
  - Dozens of different registers





Processes

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



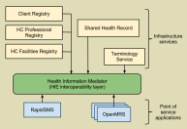
Role of information and communication technology

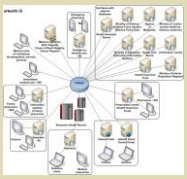
- Data entry
- Data transport
- Aggregation
- Storage
- Use

Data reporting technologies

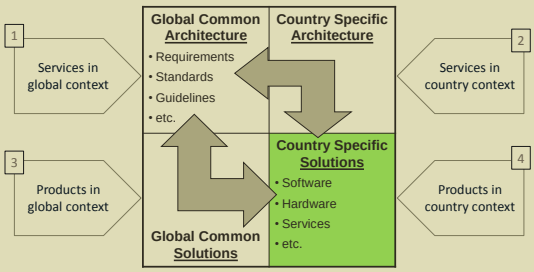
- Web forms
- eMail
- Feature phone
- Smart Phone
- SMS
- Paper to Digital

Health Information Systems

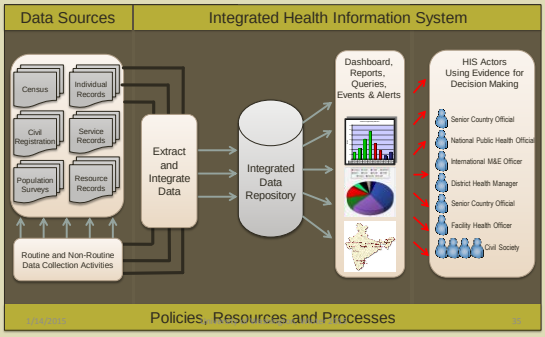




2x2 Architecture Grid (Lubinski)



Conceptual HIS Framework



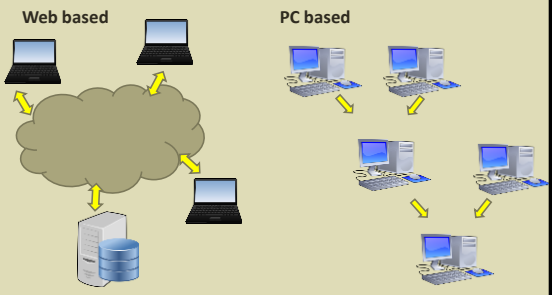
General Problem

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

Integrated health data reporting

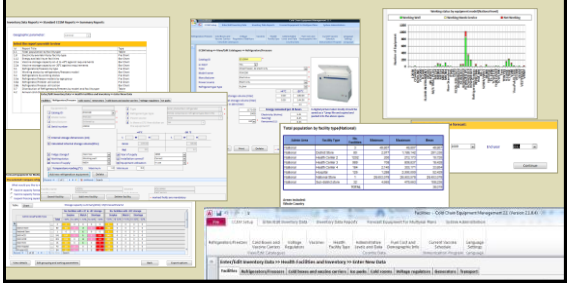
- National issues
- Stake holder conflicts

Data reporting architectures



PC Applications are not dead yet!

CCEM: Cold Chain Equipment Manager
Microsoft access software for managing inventory of vaccine cold chain equipment



HISP

Norad

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

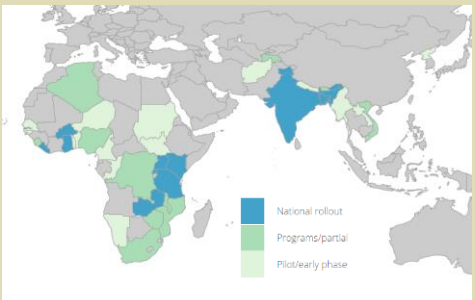
DHIS2

- 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

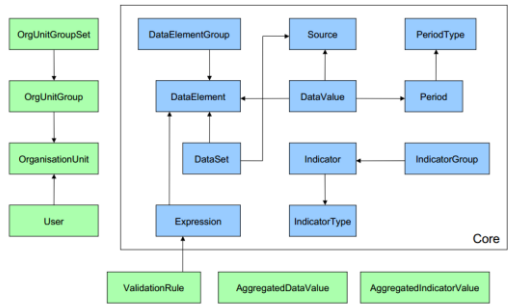
DHIS2 Deployments



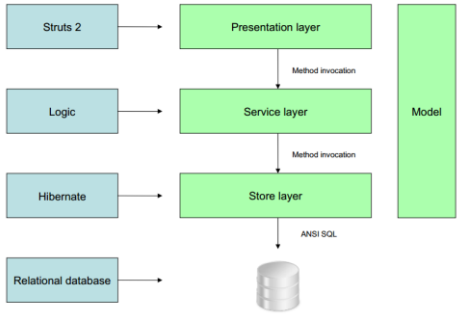
DHIS2 concepts and data models

- 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



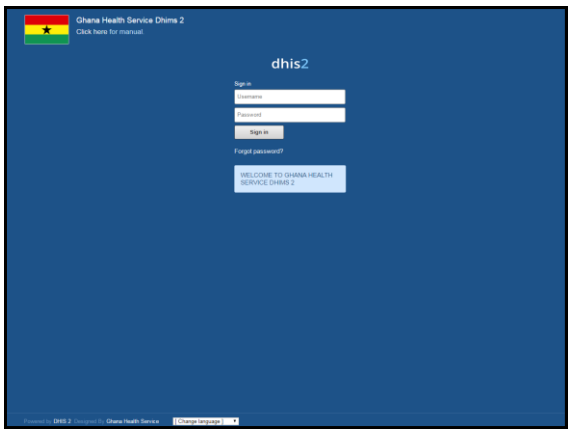
launchpad

"DHIS 2 core developers" team

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

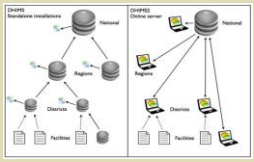


Health Information Systems

- 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