Background and Overview

DHIS – District Health information System
HISP – Health Information Systems Program

Global Open Source Software development & application

ICT for better health

ICT for development

Health Information Systems Program and DHIS 2

- HISP is a global network headed and initiated at the Department of Informatics, University of Oslo since 1994

- DHIS 2 open source software developed, customized and used for reporting, analysis and dissemination of health data

- Core funding from Norad

- Partners: WAHO, UNICEF, WHO (PAHO/CAREC, WPRO, AFRO)

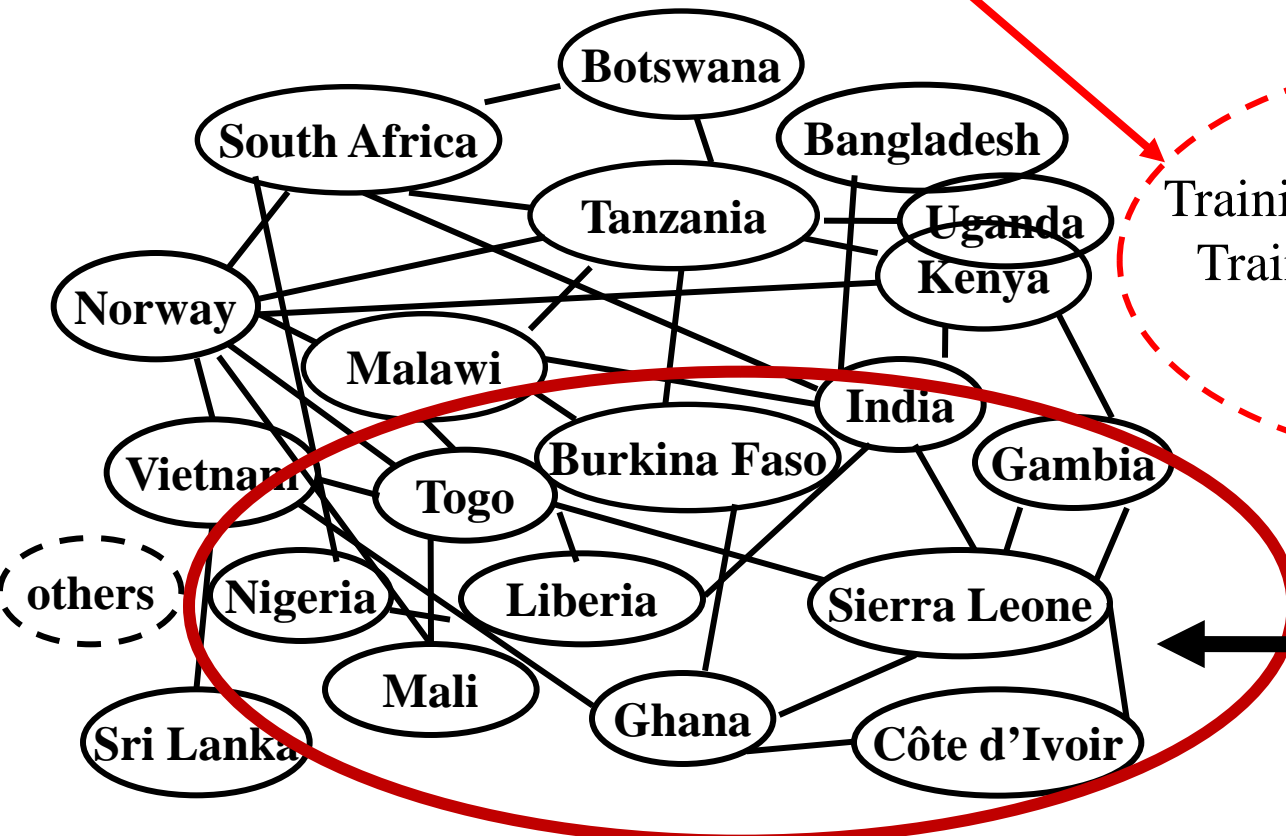- Used by projects funded by e.g. USAID, CDC, GIZ

- http://dhis2.org

HISP collaborative *Network of Action*

Health Information Systems
Research, Implementation Development
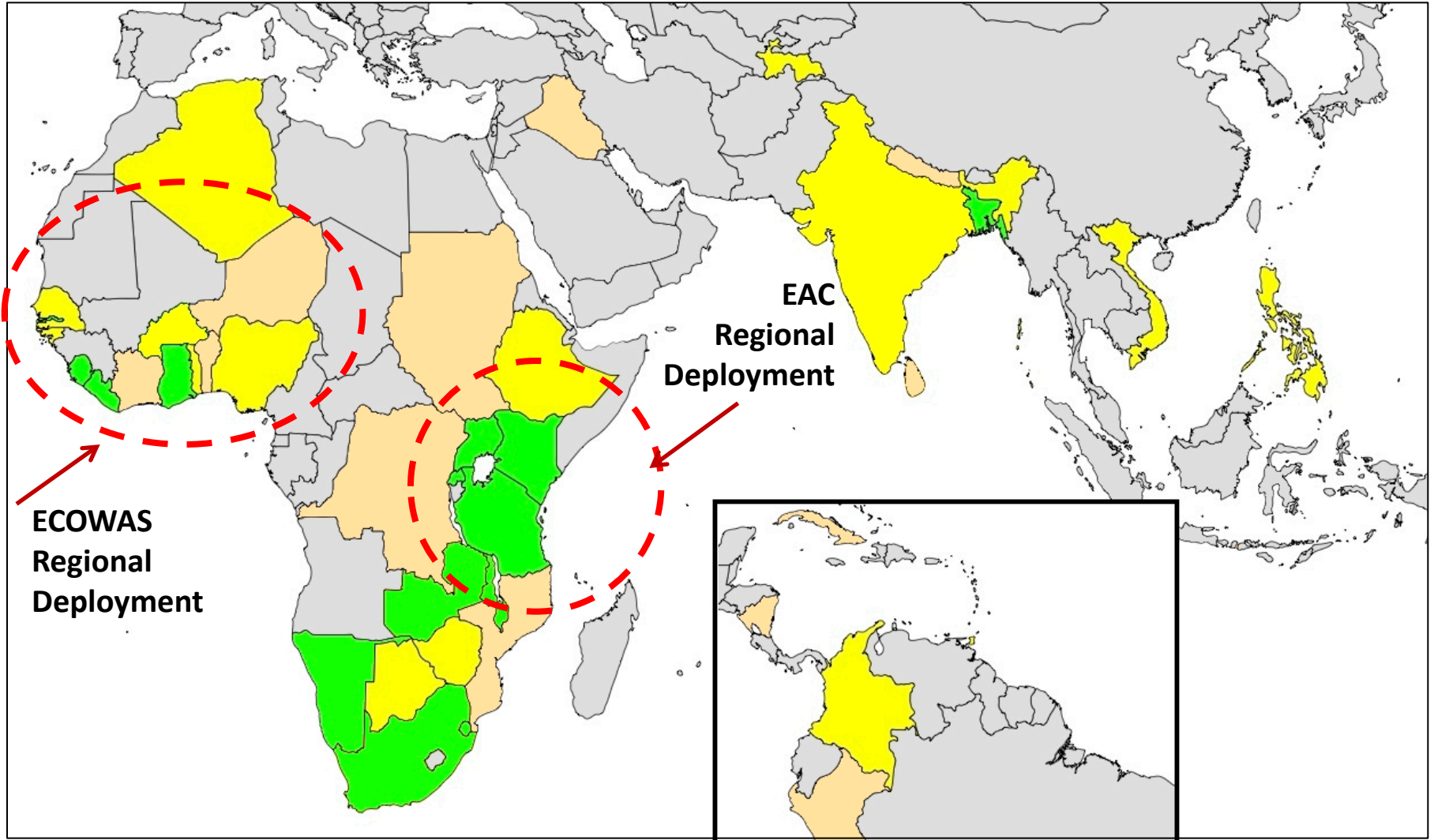Use of information for action
Integration & Interoperability

Open Source Software
Sharing across the world
DHIS2; National HIS &
Individual tracking

Capacity Building
Training, Education, Research
Training of health workers
Graduate courses,
Masters, PhD

Botswana

South Africa

Bangladesh

Tanzania

Uganda
Kenya

Norway

Malawi

India

Vietnam

Burkina Faso

Gambia

Togo

others

Nigeria

Liberia

Sierra Leone

Mali

Ghana

Côte d'Ivoir

Sri Lanka

*Network of Action
eksempel West Africa:
HIS Centre of excellence*

DHIS – Current status

EAC
Regional
Deployment

ECOWAS
Regional
Deployment

= National HIS deployment
= National start-up / pilot
= early national initiative or program-specific deployment

DHIS – District Health information System
HISP – Health Information Systems Program
University of Oslo; education, research & development

Background:

- HISP started 1994 in "New" pos apartheid South Africa

- Development DHIS 1 started 1997 & 2002 National Standard

- DHIS 1 & HISP to India from 2000

- DHIS 1 spread to many countries in Africa from 2000

- (2000-2010) Develop Masters Programs in South Africa, Mozambique, Malawi, Tanzania, Ethiopia, Sri Lanka

- PhD program inn Oslo, 30 students from Africa!

DHIS 2: Web & Fully Open Source

- Development of DHIS2 in Java started 2004
- First implementation Kerala –India 2006
- With HMN & Sierra Leone from 2007
  - develop DHIS to HMN + "African requirements"
- The Gambia from 2009; + more West African countries
- In India: implemented in many states
  - + Bangladesh & Sri Lanka
- GIS developed with WHO + More functionality
- 2010: Full Health Information Architecture:

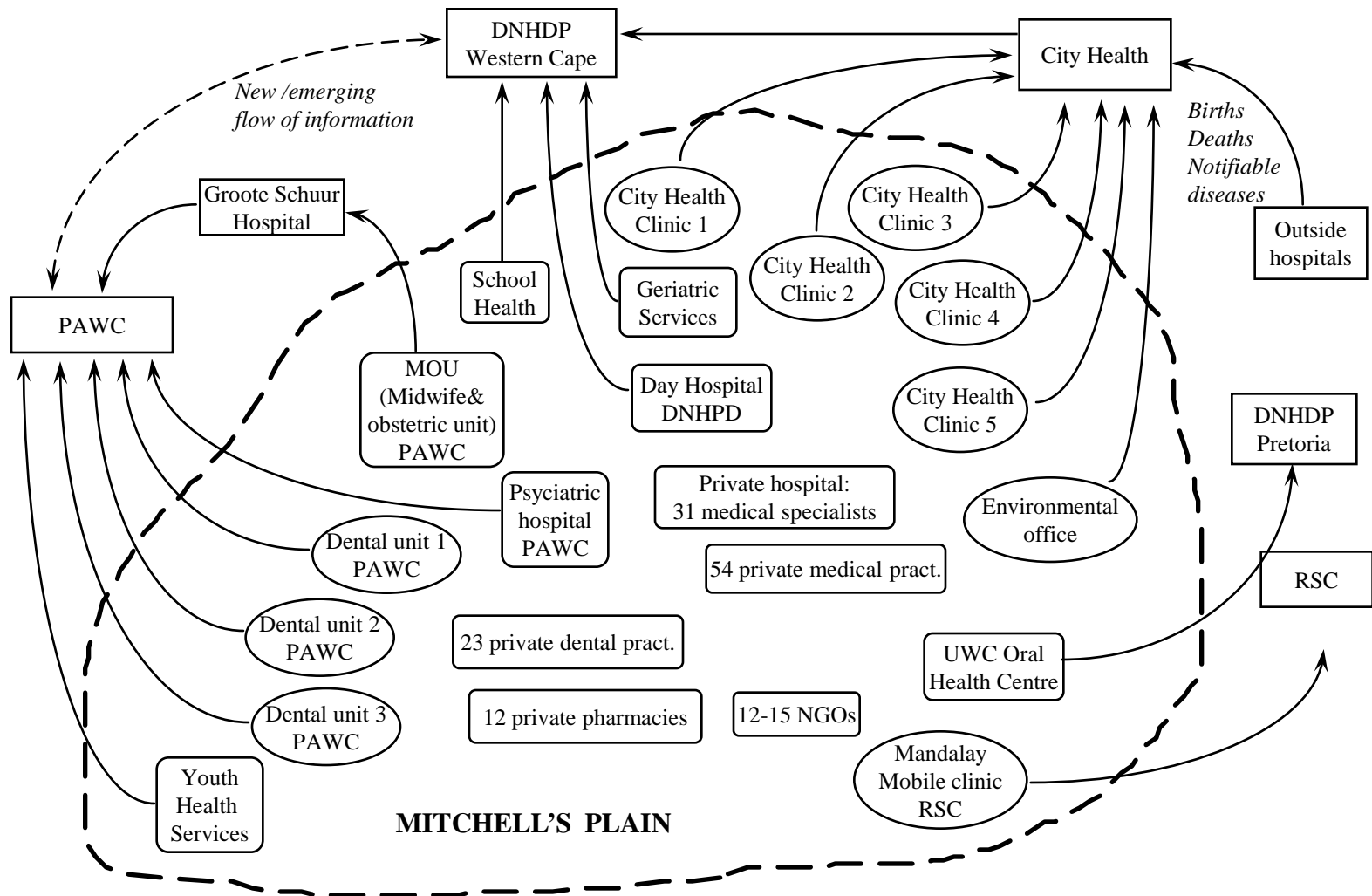 - SDMX-HD Interoperability Standard launched in Accra

2011+ : Kenya, Ghana, + & Cloud based infrastructure

HOW it started: South Africa 1994 /95
– Problems & challenges:

- **Inequity** between blacks & whites, rural & urban, urban & "peri-urban", former "homelands", etc.
- **"Equity" main target**
  - But how to know whether targets are achieved?
- **Need standard data from across the country on**
  - Health status & Health services provision
- **Problem:** No coordinated data system – no standards
  - Fragmented information systems
- HISP key actor in developing the new unified Health Information System in South Africa

South Africa 1994 /95 – Problems & challenges :

DNHDP Western Cape

City Health

New /emerging flow of information

Births Deaths Notifiable diseases

Groote Schuur Hospital

Outside hospitals

City Health Clinic 1

City Health Clinic 3

PAWC

School Health

Geriatric Services

City Health Clinic 2

City Health Clinic 4

MOU (Midwife& obstetric unit) PAWC

Day Hospital DNHPD

City Health Clinic 5

DNHDP Pretoria

Psyciatric hospital PAWC

Private hospital: 31 medical specialists

Environmental office

Dental unit 1 PAWC

54 private medical pract.

RSC

Dental unit 2 PAWC

23 private dental pract.

UWC Oral Health Centre

Dental unit 3 PAWC

12 private pharmacies

12-15 NGOs

Mandalay Mobile clinic RSC
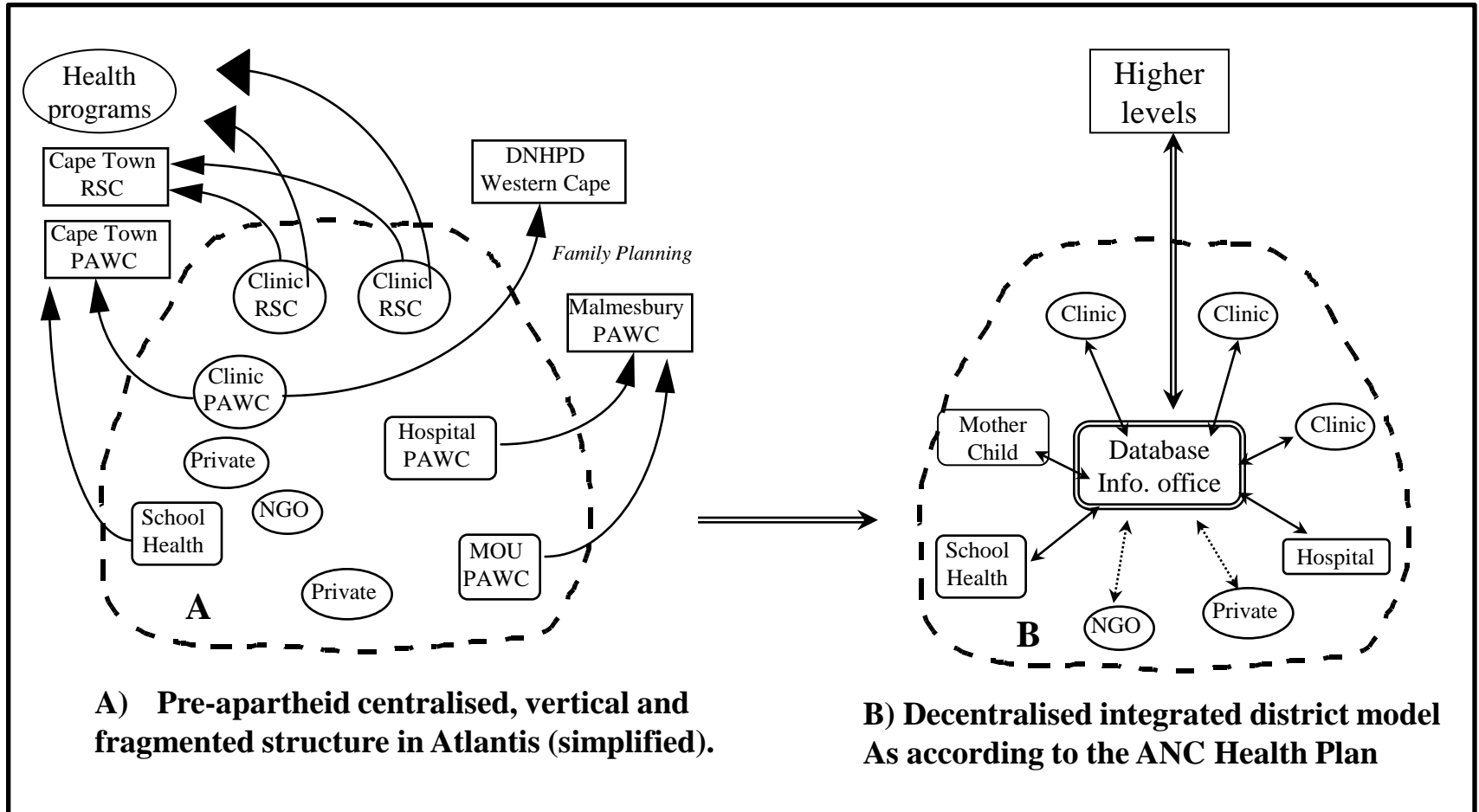
Youth Health Services

MITCHELL'S PLAIN

Apartheid legacy: a fragmented and top down health structure as reflected and 'reproduced' every day by the information systems
Information infrastructure - Installed base

Strategy: Information management at district level
- From fragmentation to integration;
Decentralisation: From central control to local empowerment

A) **Pre-apartheid centralised, vertical and fragmented structure in Atlantis (simplified).**

B) **Decentralised integrated district model As according to the ANC Health Plan**

MINISTRY OF HEALTH AND SOCIAL WELFARE
ZANZIBAR
REPRODUCTIVE AND CHILD HEALTH SERVICES

Name of Health Facility: **CH. MASINGINI** District: **NORTH A.**

Month: **MAY** No. of Working Days: **26**

Family Planning Services

Method	No. of New Clients		No. of Continuing Users			
	15-24 yrs	≥ 24 yrs	15-24 yrs	≥ 24 yrs	Items Dispensed	
Oral Pills	0	0	0	3	No. of new clients	18
Injection	0	0	1	13	No. of Continuing User	14
IUCD	0	0	0	0		0
Norplant	0	0	0	0	No. of CBDs	0
Tubal Ligation	0	0	0	0		0
Condoms	0	0	0	0	No. of Clients served by CBSs	0
Other Methods	0	0	0	0		0

Pregnant Mothers Attendance

No. of First Visits	Prime Gravida	Multi Gravida
Before 20 weeks	1	5
After 20 weeks	0	7
Total First Visits	1	12
	Prime Gravida	Multi Gravida
Re-attendance	5	23
Intermittent Presumptive Treatment (IPT)		
IPT at 20 – 28 weeks		14
IPT at 30 – 36 weeks		14

No. of Mothers at Risk		
Problem	Total	Referred
EPH Gestosis / Pre-Eclampsia	0	0
Anemia	0	0
Malaria	0	0
Syphilis	0	0
Pregnancy below 18years	0	0
Pregnancy above 35 years	2	0
Pregnancy ≥ 4 gravida	5	0
Pregnancy before 3 years	7	2

Daily Delivery Services

No. of Deliveries	Prime	Multi	Total
Attended by Skilled Personnel	0	0	0
Attended by TBA	1	2	3

No. of Live Births	3
No. of Still Birth Fresh	0
No. of Still Births Macerated	0
No. Weighed ≤ 2500gms	0

Infant / Maternal Deaths

No. of Maternal Deaths		1 – 28 days	1 – 11 Months	1 -5 Years
	No. of Children died ⟶	0	0	0

Postnatal Services

	7th Day	14th Day	28th Day	42nd day
No. of Mothers attending Postnatal care ⟶	6	2	1	0

Growth Assessment / Nutritional Status for Children under 5 years

Total Attendance (Male) **146**   Total Attendance (Female) **136**

Age (Month)	Green		Grey		Red	
	Male	Female	Male	Female	Male	Female
0 – 11	52	48	18	12	0	0
12 – 23	32	32	7	6	0	0
24 – 35	24	20	2	6	0	0
36 – 60	9	10	2	2	0	0
Total	117	110	29	26	0	0

Name of Service Provider: **K. Machano** Designation: **PHN 'B'**

Signature: **[signature]** Date: **31/5/07**

Record of patients seen

Summary of key information

Data analysis and use

Data entry into database

1.1 Number of Anaesthesia Cases per Month
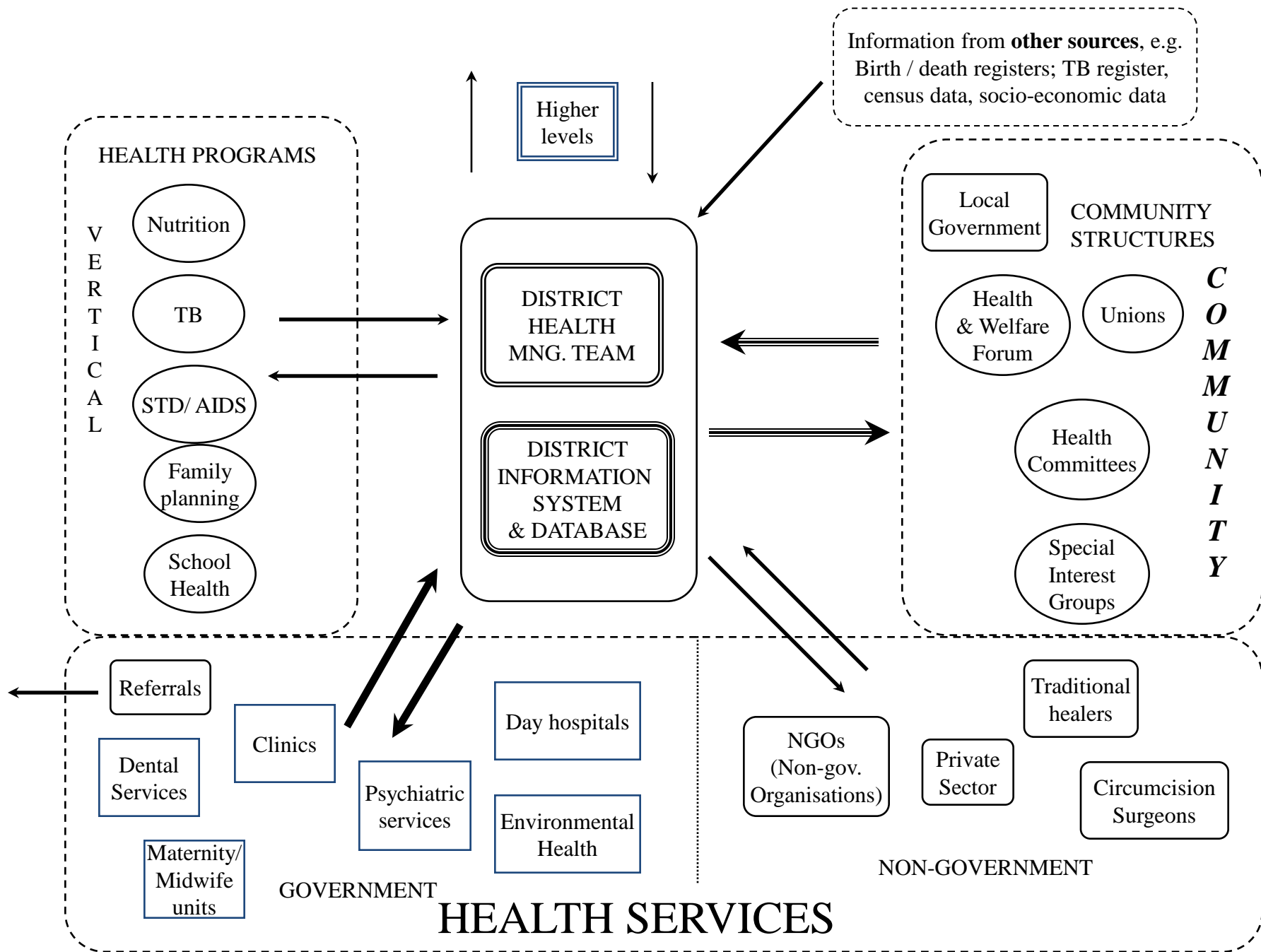
Example: HMN architecture - National data warehouse

Data Sources

- Censuses
- Individual Records
- Civil Registration
- Service Records
- Population Surveys
- Resource Records

Population-based | Institution-based

Standards-Compliant Data-Collection Activities

Integrated Health Information System

- Extract and Integrate Data
- Integrated Data Repository
- Dashboard, Reports, Queries, Events and Alerts

Health Information System Actors Using Evidence for Decision-Making

- Senior Country Official
- National Public Health Official
- International M&E Officer
- District Health Manager
- Senior Country Official
- Facility Health Officer
- Etc.

Policies, Resources and Processes

Web Portal

Data capture from paper forms

Data from Mobile devises

Extract Transform Load

LMIS

HR

EMR

Data warehouse

-Data mart
-Meta data
-Visualising tools

DHIS 2

Dashboard

Graphs

Mobile

Maps
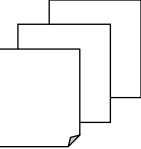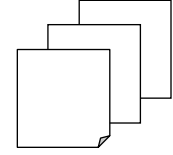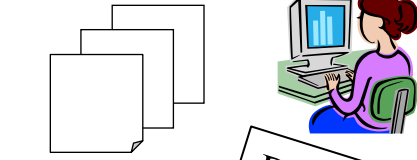
Getting data in - Data warehousing

Getting data out - Decision support systems

dhis2   **Zanzibar Data Warehouse**   Maintenance   Services   About   Log out

Dashboard

Insert Close Clear

Reports
District Immunisation Drop-Out Rates
District Immunisation Feedback
District RCH feedback
Immunisation Comparison
Immunisation so far this year by orgunit children
Life Cycle Chart

Insert Close Clear

OLAP URLs
District Indicators Map
District Indicators Pivot
MAP DPT 1-3 drop out rate shehia
MAP: BCG coverage district 2007
MAP: BCG coverage district 2008
MAP: District Based Midwives ratio

Insert Close Clear

Insert Close Clear

Immunization
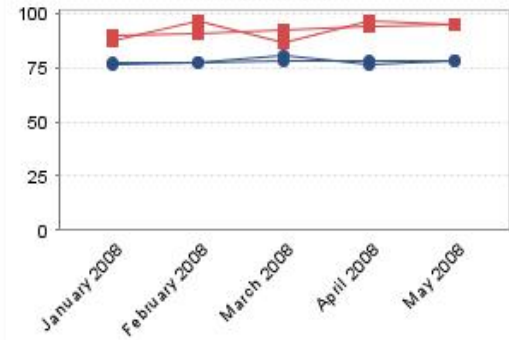
BCG < 1 y coverage   Measles < 1y coverage
Trend - BCG < 1 y coverage
Trend - Measles < 1y coverage

Insert Close Clear

ANC vs BCG coverage
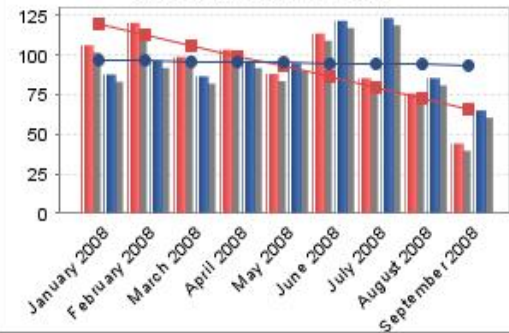
Insert Close Clear

Malaria
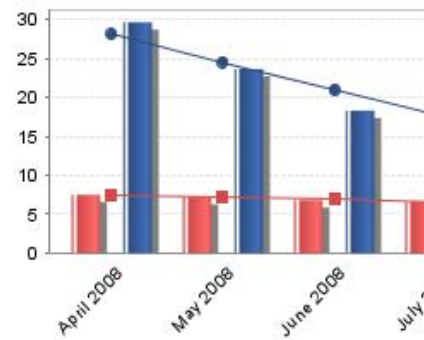
Malaria incidence > 5y   Malaria incidence
Trend - Malaria incidence > 5y
Trend - Malaria incidence < 5 yr

Insert Close Clear

ANC vs BCG coverage

Immunization

Malaria

S 2 Online

SP Homepage
IS 2 Wiki
IS 2 Issue Tracking

Output tailored to the range of devices and infrastructures

SMS

More flexible

Lightweight
Browser
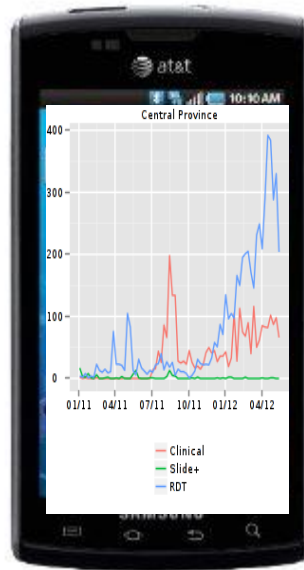
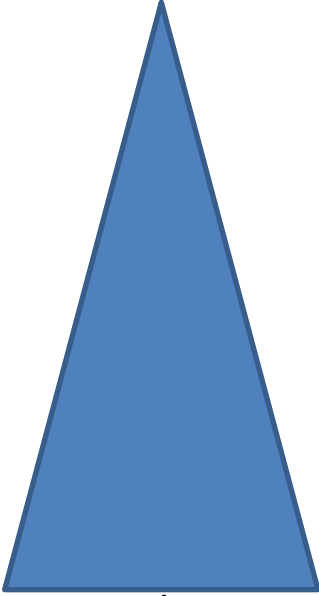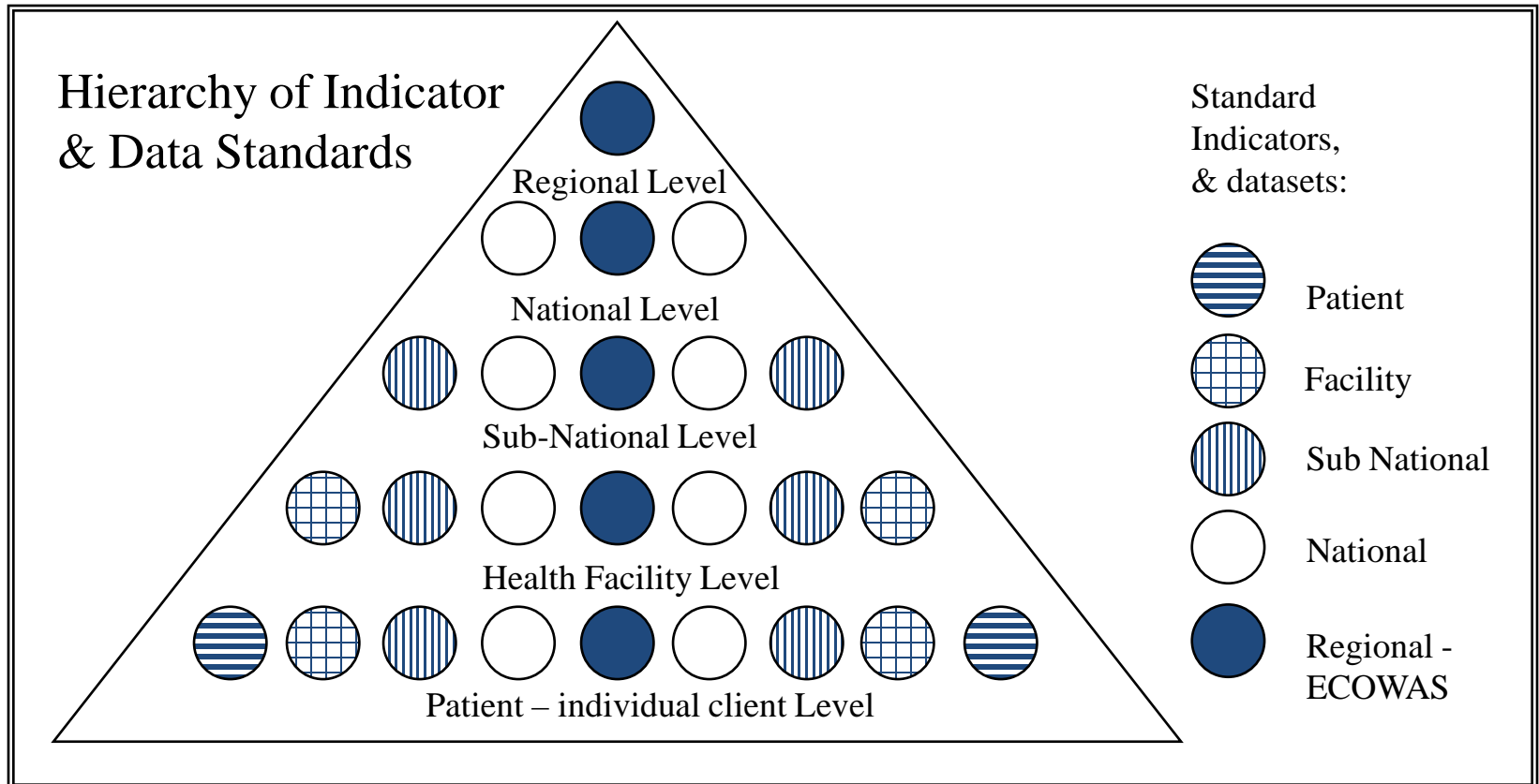Android app
or browser
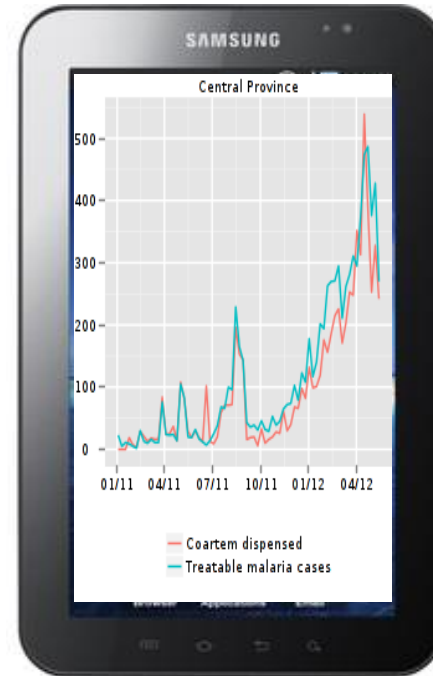
Tablet

PC/laptop

Different levels of the health system
– different needs for information

| Level of health system	Quantity of data Data granularity	Information needs
Global/Region	Less data	Summary indicators General, e.g. MDG
Countries/ Health Programs		Indicators National /program
District		Indicators district management
Facility		Facility management
Patient	More data	Patient records, tracking & care

Hierarchy of data standards:

• Balancing national need for **standards** with local need for **flexibility** to include additional indicators

• All levels have freedom to define their own standards as long as they adhere to the standards of the level above (core data set)

Hierarchy of Indicator & Data Standards

Regional Level

National Level

Sub-National Level

Health Facility Level

Patient – individual client Level

Standard Indicators, & datasets:

Patient

Facility

Sub National

National

Regional - ECOWAS

Main components of a HIS (also the DHIS metadata model)

✓ The organisational hierarchy

✓ service-delivery and administrative *organisational units* organised in a hierarchy of typically 4-6 levels and following administrative areas (country, province, district/municipality, sub-district)
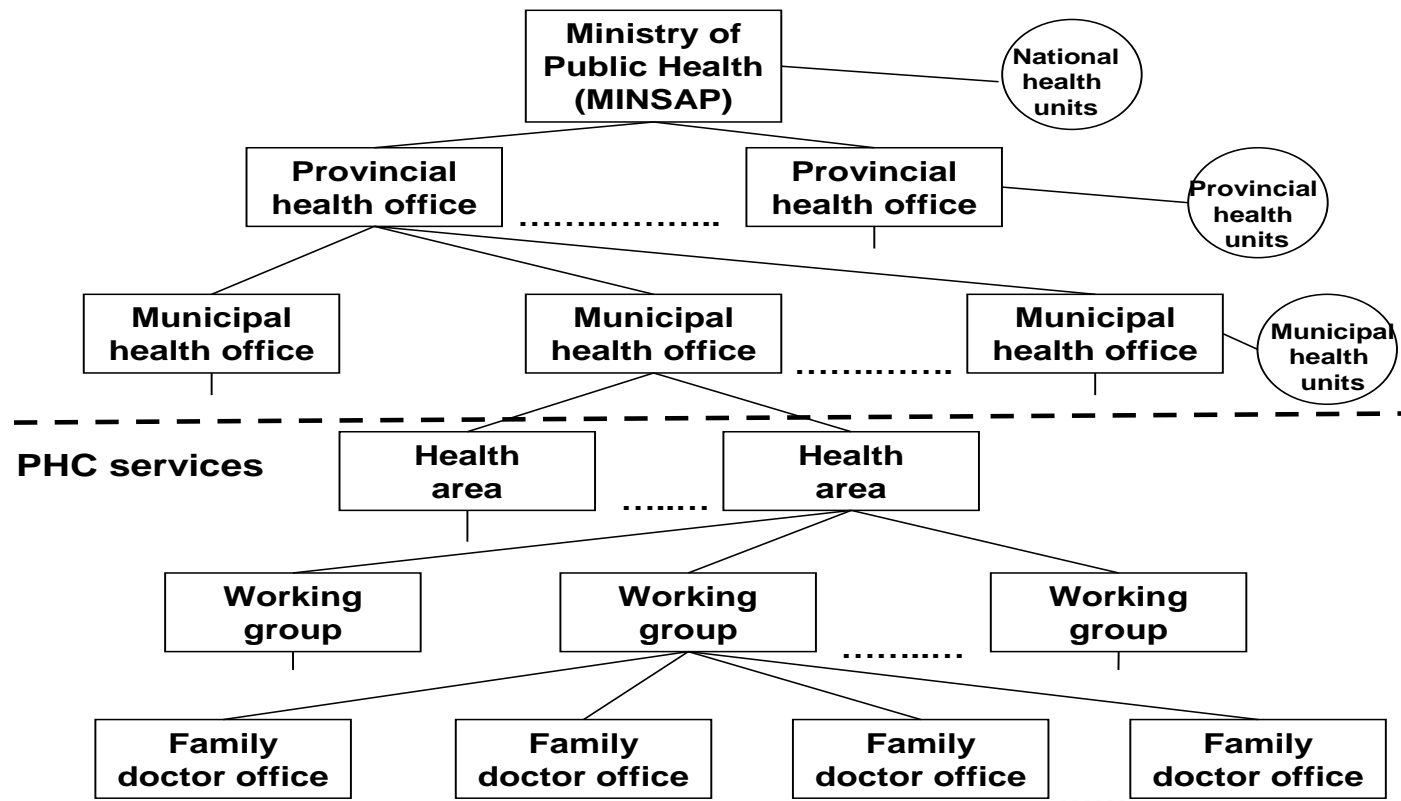
DHIS metadata model cont.

✓ Collection forms, data elements, indicators and reports

✓ Data is collected/imported in data sets; typically in data entry forms that are typically grid-based

✓ "Atomic variables" => Flexibility. Each value captured in the form is linked to a *data element* which describes the phenomena captured, e.g. "Number of BCG vaccines given", and referencing the *organisation unit* (e.g. a clinic) and the *period* (Sep 2008) the specific form is valid for. +

✓ Any other relevant data, e.g. Population census, data on number of beds, doctors, nurses etc.

✓ Data captured from paper forms – in health facility or at district level
BEFORE: data exported to higher levels on memory sticks
NOW: direct on national server

DHIS metadata model cont.

✓Data elements and indicators

✓ Combining & analysing any data in formulas. For better comparative analysis indicators can be defined as formulas combining data elements, e.g.
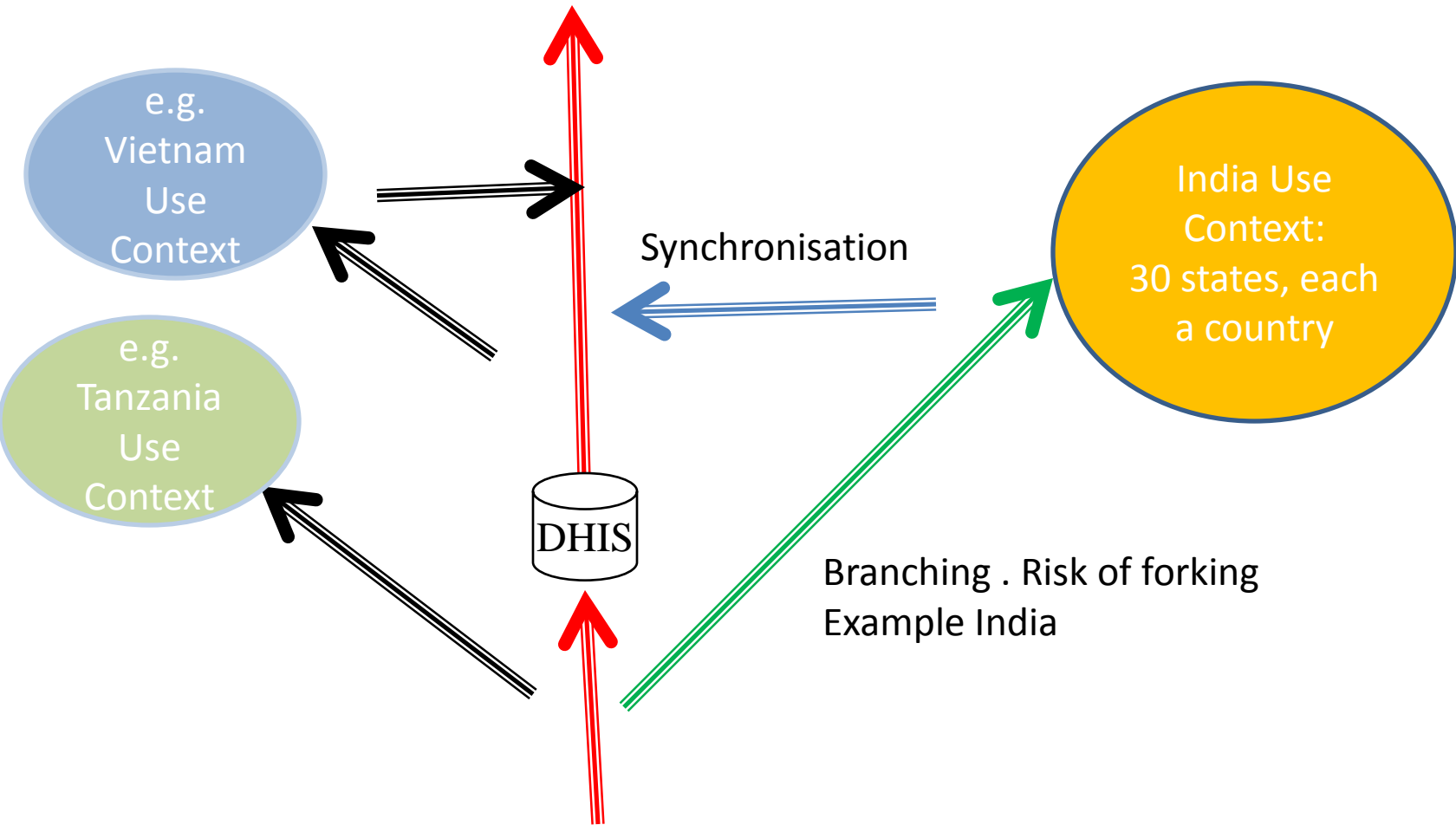
BCG Coverage < 1 year =

100 % x BCG vaccines given < 1 year / Population < 1 year

✓ Data elements and indicators can be grouped across many dimensions

✓and the values are visualised in various output formats (tables, charts, maps).

Global distributed participatory development of DHIS 2
– SW end-user application which is used differently in each participating context
Is it possible?
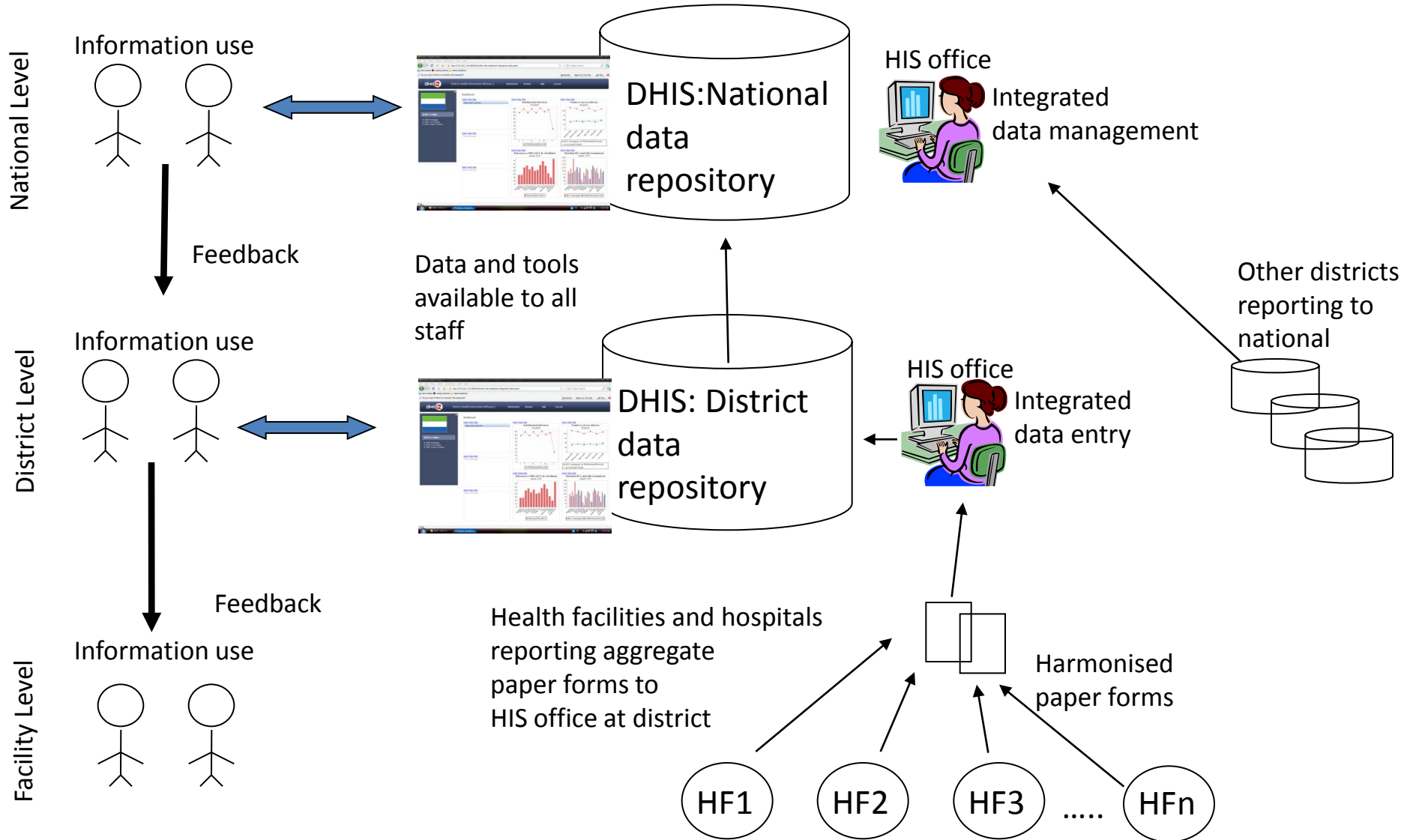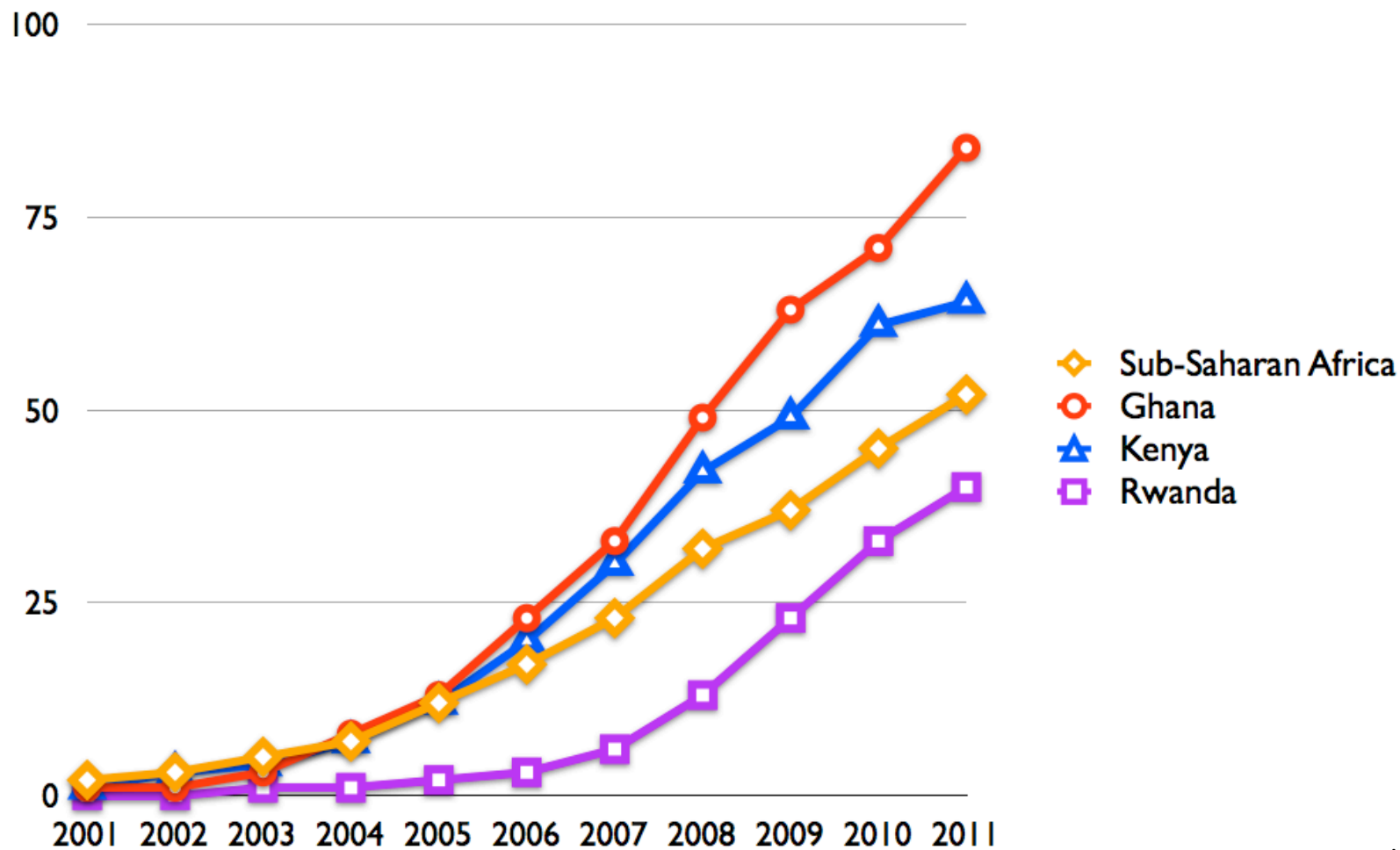

e.g. Vietnam Use Context

e.g. Tanzania Use Context

Synchronisation

DHIS

India Use Context: 30 states, each a country

Branching . Risk of forking
Example India

Continuous DHIS 2 development;
common core, different local applications

Sierra Leone 2008-09: No National Internet
- aggregate data from all programs & services (horizontal integration)

National Level

Information use

Feedback

District Level

Information use

Data and tools available to all staff

Feedback

Facility Level

Information use

DHIS:National data repository

HIS office

Integrated data management

Other districts reporting to national

DHIS: District data repository

HIS office

Integrated data entry

Health facilities and hospitals reporting aggregate paper forms to HIS office at district
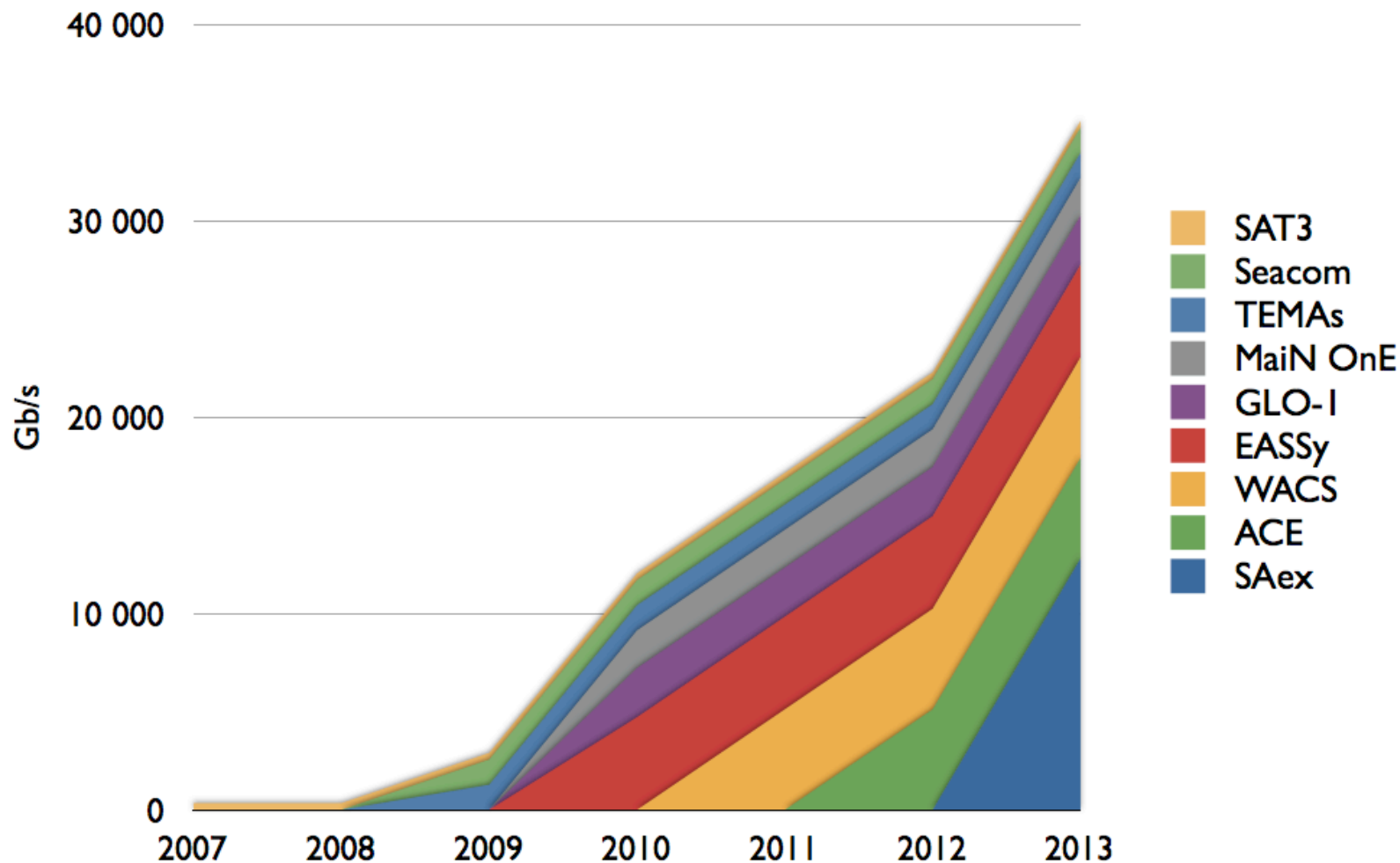
Harmonised paper forms

HF1 HF2 HF3 ….. HFn

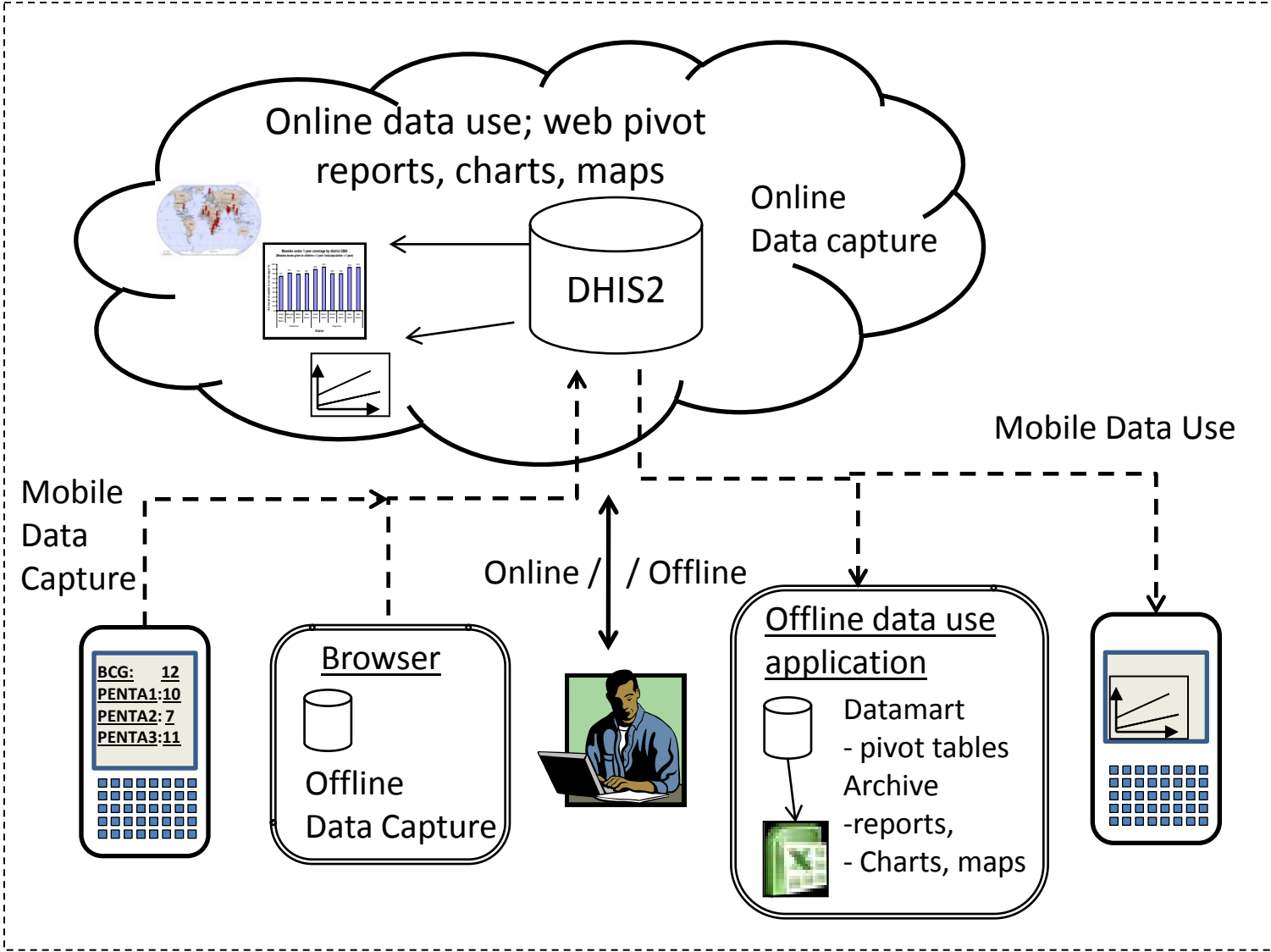# Mobile subscribers per 100 persons

Source: World Bank

Total bandwidth of communication cables to Africa

Source: AFRINIC

Cloud infrastructure - Africa since 2011, e.g. Kenya, Ghana

Online data use; web pivot
reports, charts, maps

Online
Data capture

DHIS2

Mobile Data Use

Mobile
Data
Capture

BCG: 12
PENTA1:10
PENTA2: 7
PENTA3:11

Browser

Offline
Data Capture

Online / / Offline

Offline data use
application

Datamart
- pivot tables
Archive
-reports,
- Charts, maps
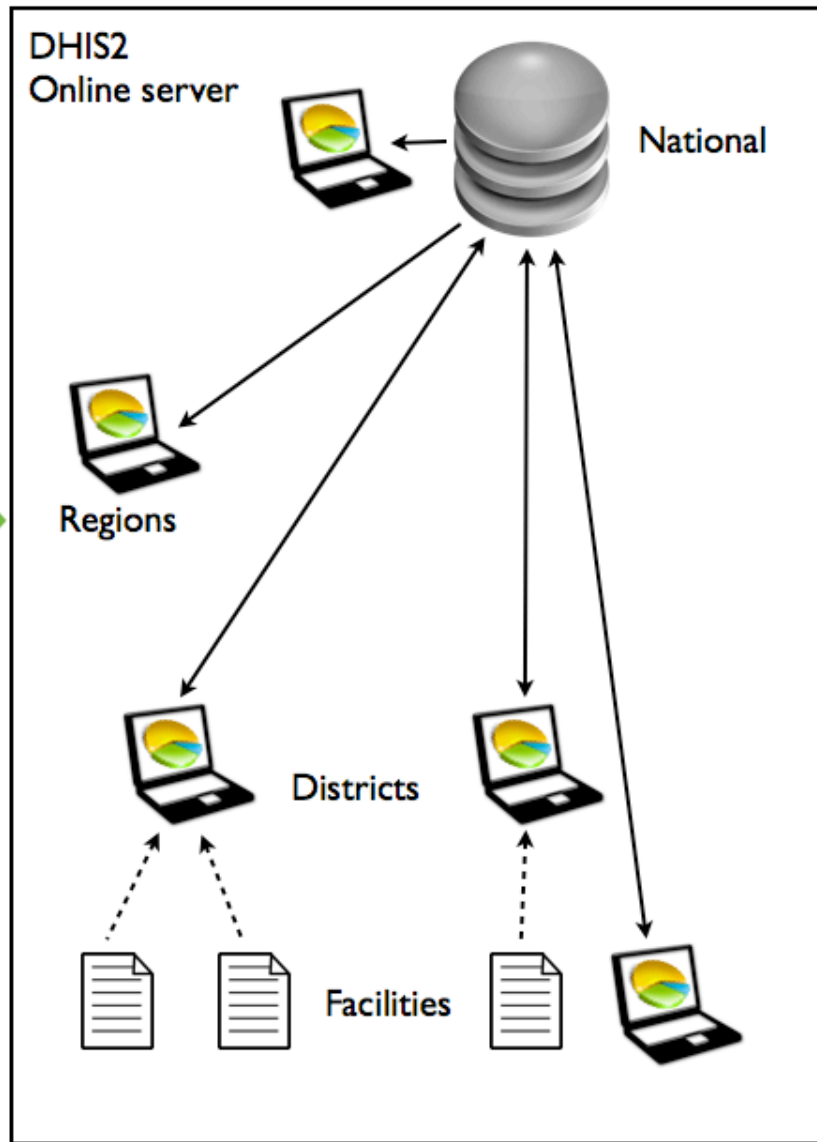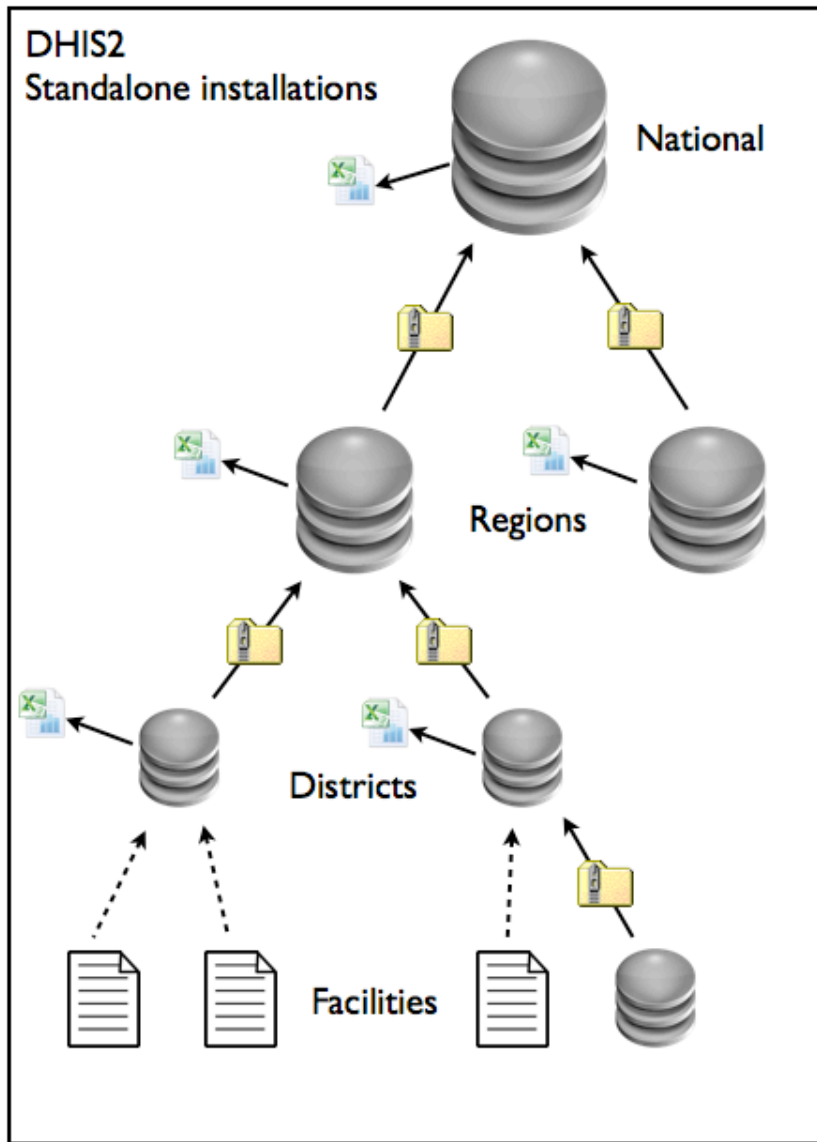
Integrated health information architecture: Data warehouse - integrating sub-systems, services, programs

Utilisateurs de données traitées et intégrées

SIG

Analyse de données

DHIS

Interoperabilité: Etransfert electronique

Transfert electronique

Interoperabilité: Saisie à partir du papier

Dossier patients

Rapport papier:

iHRIS gestion RH

Maladie specifiques: TB, VIH/SIDA, Decl. Obligat, etc.

Logistique & medicament

Services de prévention: Vaccination, Mère & enfants, etc.,

Utilisateurs de Données primaires & fournisseur De données

Rapportage Mobile

Utilisateurs de données primaires & fournisseur de données

Integration de technologies, données & grammes de santé

SDMX-HD: Statistical Data & Metadata Exchange for the Health Domain

DHIS : Data warehouse Statistical data

SDMX-HD: Metadata "order" from DHIS to OpenMRS, e.g.: #deliveries @health centre X for month of May

SDMX-HD: Metadata "order" from DHIS to iHRIS, e.g.: #midwifes @health centre X for month of May

DHIS is calculating the indicator: Deliveries per midwife

OpenMRS : Medical records

SDMX-HD: Piloted in Sierra Leone and launched in Accra

iHRIS: Human Resource records

Integrated Human Resource and Health service data
- made possible by systems integration & interoperability

PHU (All) Chiefdom (All)

**Number of clients per clinical worker per day,
by district, 2008 and 2009**

Average of Clients/Clinician/Day

District

■ Total
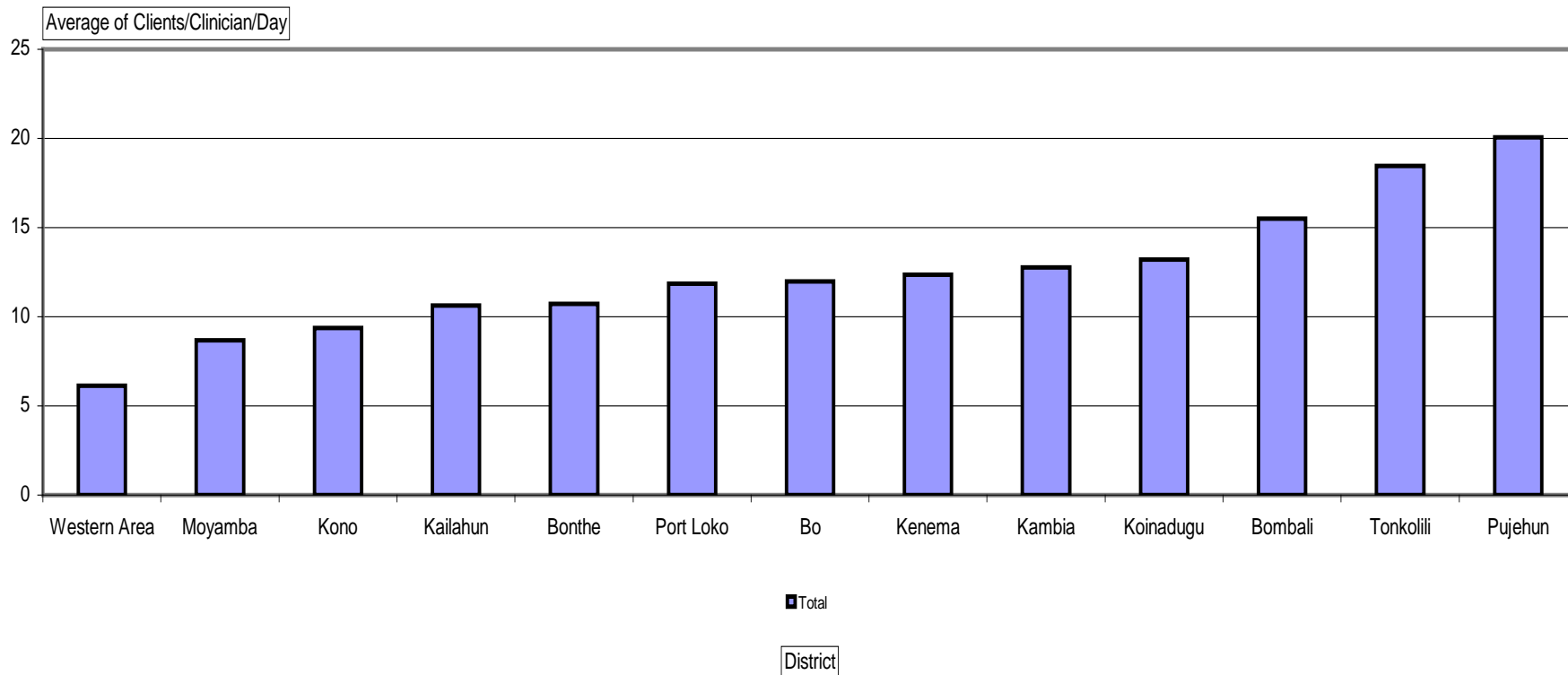
India: Integrated architecture (design) of interoperable systems

➡ An integrative "umbrella" across programs, sub-systems & infrastructures (paper, computers, Internet, mobile telephones)