

# Where things are

The technical geography of Health Management Information Systems in 4 different African country implementations

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- HISP history and DHIS
- DHIS2 implementation stories
- Reflections

# Health Information Systems Project

- global project to strengthen public health systems by improving the collection and use of health indicators
- network of users include over 20 countries in Africa and Asia covering (potentially) over 1.3 billion people
- characterized by action research / participatory design approach
- South-South-North collaboration between HISP India, HISP SA, Univ of Oslo and looser regional groups in East and West Africa and Asia
- advanced nearly 100 graduate students through masters and phd programs at UIO and partner universities
- funding through NORAD, UIO and other partners

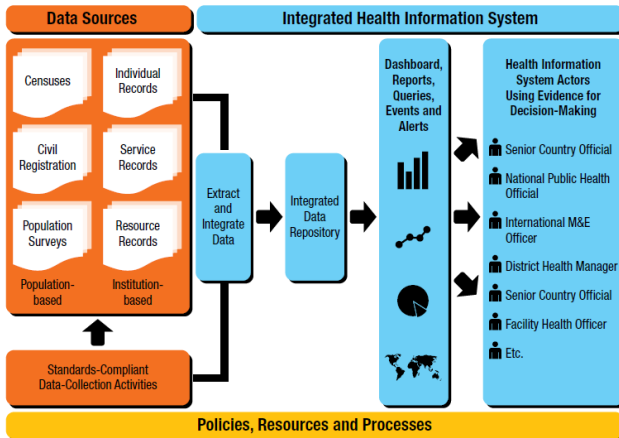
- Computer program originally developed in South Africa in 1990s for collection, processing, visualisation/analysis of routine aggregate health information
- Transition to web based software implemented by University of Oslo around 2005
- Goal of agility - use technological base which is there and have the ability to scale across different technological landscapes

- Sierra Leone - first country implementation of the HMN framework, 2009/10
- Kenya 2011
- Rwanda 2011/2012
- Ghana 2012



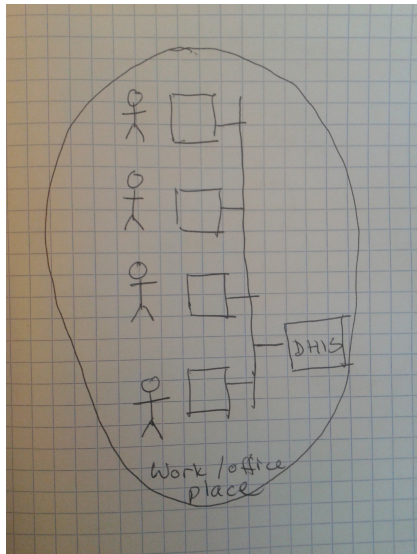
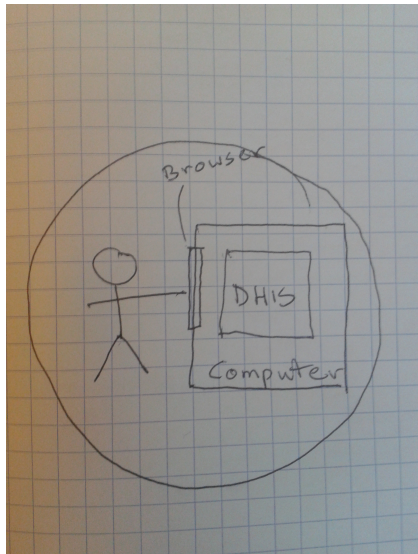
- Total population estimated at 5.8 million
- Much social, economic and physical infrastructure destroyed in civil war
- Road networks, electricity supply and landline phone penetration are poor
- 12 (+2) Districts and 149 chiefdoms

# Health Metrics Network framework



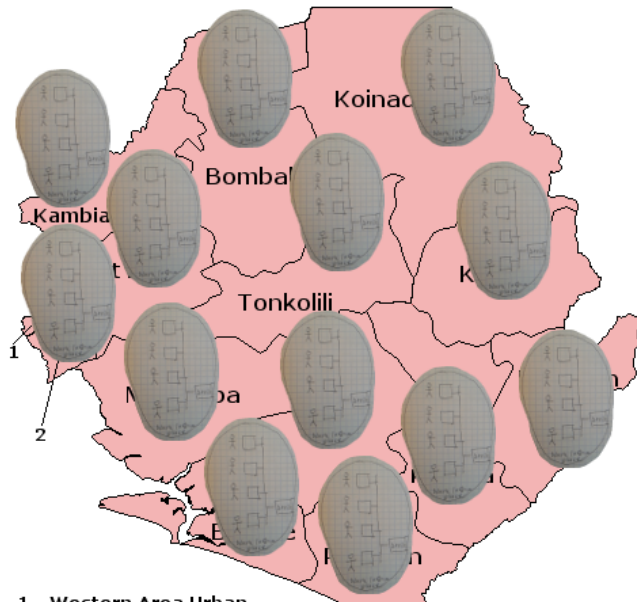
*HMN framework and standards for country health information systems, 2nd ed, 2008*

# From single user dhis to the network





# Servers, LANs across the districts

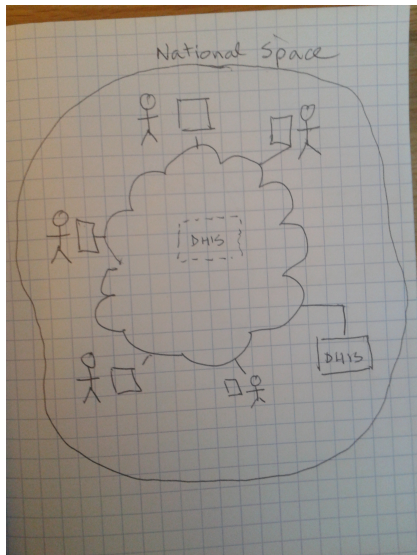


1 - Western Area Urban

- Maintaining servers on 14 LANs distributed around the country is challenging. Power supply interruptions frequent
- Workstation problems can be dealt with by local IT companies, but DHIS on the server requires more specialised skills
- even with hardware working 100%, keeping the entire HMIS metadata in synch between so many systems over time is an uphill battle. This inevitably leads to fragility in the reporting process between the districts and the national

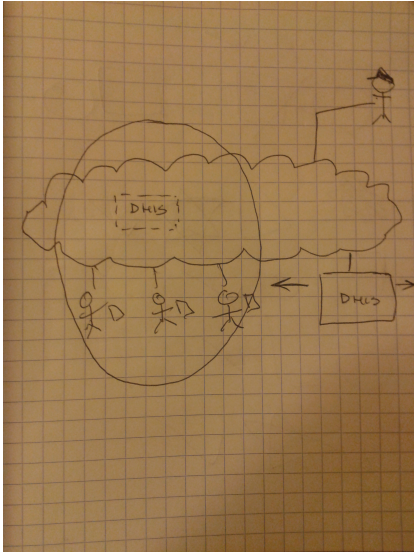
Each of these factors point to the non-sustainability of this distributed architecture and the resulting pressure to centralise DHIS nationally

# Internetworked centralised DHIS



- mobile phone networks improving internal network access
- to geographically dispersed users dhis is everywhere and nowhere (“like Facebook”)
- but of course, it is always somewhere ...

# Correction ...



- the internet is *transnational*
- physical dhis is not constrained to national space
- technical, sysadmin support (or control) can be provided directly from Oslo, Dublin, wherever

- 300 districts and 8500 health facilities dispersed over a surface area of 580,000 square kilometres (the problems of SL would be multiplied many times)
- adequate network coverage for districts and many facilities to support a centralised national DHIS
- where to put it ...

*“Due to poor Internet connectivity and inadequate capacity of the servers at the Ministry of Health headquarters, a central server using cloud computing was set up. The goal of cloud computing was to provide easy and scalable access to well managed computer servers and other ICT services”*

Manya, A., Jørn Braa, J., Øverland, L., Titlestad., O., Mumo, J., and Nzioka, C. (2012). National Roll out of District Health Information Software (DHIS 2) in Kenya, 2011

“Cloud computing” in this context meant a third part commercial Linux hosting company with its primary site in London, UK.

- Much smaller than Kenya ... 11 million living within a land area of 25,000 square kilometres. Approximately 550 registered health facilities spread across 30 districts
- Original plan in mid-2011 was to follow the Kenya example. MOH e-Health Coordinator intervened - data had to be stored within the country
- So the plan became to host DHIS in the National Data Centre, along with other eHealth systems
- With training and configuration of the system complete, the NDC wasn't ready ..

# Rwanda MOH server room



So it was setup inside the MOH as a temporary home.



- Scale more similar to Kenya ... 170 districts and 4000 facilities
- Purchased a new server specifically for running DHIS
- Like Kenya, there were perceived difficulties in locating within MOH
- Decision was made to physically host the server within premises of a local Accra ISP
- Implementation of DHIS2 within the context of a government wide EA provides some clarity over policy issues

# Learnings for HISP on centralising

- Move to central national server has put DHIS onto a scale (database size, number of concurrent users) which is new for all of us - except perhaps HISP India
- Despite challenges, all three of the deployments are being viewed as successful by the national stakeholders. Reporting rates are high, users are active, data is *visible* in ways it wasn't before
- Handover of full control of the servers to the country teams remains an outstanding concern in all cases (Rwanda is furthest along this path)
- Full consequences of shifting significant control from the districts to the national are not yet fully understood, or entering of data directly from facilities (bypassing district).
- Historical evidence shows that the more distributed model of Sierra Leone is very hard to sustain over time. Strategically it is hard to see a way back from the new paradigm.

# Managing risks

Data is held by government *in trust* on behalf of citizens. This places stronger obligations than mere ownership. Ghana and Kenya both express a preference and goal to host their systems internally. The decision to outsource is pragmatic.

- All 3 countries living today with a significant amount of risk which they are not adequately managing
- Move to centralise has created substantially increased dependencies - mobile operators, ISPs, hosting providers, technical support (HISP). Relationships need to be managed.
- Ghana and Rwanda have substantial risks related to possible (eventual) hardware failure
- Kenya raises new challenges in terms of governance and sovereignty. Extra territorial hosting provides access to state-of-the-art data centres. But extra territorial dependencies which are hard to manage.

# Some practical difficulties with the cloud approach

- Outsourcing hardware to the “cloud” can obviate the need to develop internal technical HR and infrastructure capacity but generates requirements for new IS management capacity.
- The Cloud4D premise : the possibility to “leapfrog” through access to computing resources anywhere from anywhere. But there substantial geo-political implications in terms of increased dependencies, particularly for public (government) systems.
- The parallel development of storage of patient data within DHIS2 raises security compliance challenges which we cannot adequately address on extra territorial servers.

# Theoretical challenge

How are technical artifacts and systems used to construct, maintain or strengthen power relations between agents? In the “development” context these include NORAD, WHO, USAID, UIO, HISP (in its various regional manifestations), private ICT sector, technical experts, users, subjects etc. A critical political theory of technology (eg Phillip Brey<sup>1</sup>) requires the development of answers to 4 questions:

- ① A theoretical question how can the geo-location of the HIS artefact play a role in the distribution and exercise of power?
- ② A factual question - how does the location of the technical artefact currently play such a role?
- ③ A normative question what role should it play?
- ④ A practical question how to move closer to the ideal.

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<sup>1</sup>The Technological Construction of Social Power, 2008 

Is there a sense in which cloud hosting of DHIS becomes inevitable? As we further adapt DHIS to deal with the rapidly emerging big data challenges we have confronted in Ghana and Kenya, eg. partitioning the batch and transaction processing parts of the system, redesigning to take advantage of more flexible load balancing etc, do we inexorably end up with a system which *requires* a Linode or an Amazon? ie. a system which is extremely difficult to host locally.

Questions of pros and cons of different models than become irrelevant.

Thank You  
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