

Eye Witness Account: The Role of IT and Data Management in the Expansion and Change at a Remote Research Unit in Kenya

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Introduction:

Information and Communication Technology (ICT) has continued to play a crucial role in medical research.

Most remote research sites in developing countries have poor telecommunication facilities, with the public telephone network often unreliable and the product range offered by telecoms companies very limited. What seem to be common terminology in the developed world like “Broadband”, “ISDN”, etc sound alien in the developing world. Kilifi, being a remote district along the Kenyan Coast, is no exception. Until three years ago, the Wellcome Trust/KEMRI research unit in Kilifi relied on voice and data communication services provided by Telkom Kenya, a monopoly in this field. This was provided via terrestrial lines through an analogue exchange and the maximum data rate was 9600 bps. Electronic mail and Internet access were slow, unreliable and costly, which meant that exchange of electronic information and access to online resources was very limited.

Since June 1998, the unit has invested heavily in ICT. Modern computing equipment have been acquired and installed. There has been an expansion of computer coverage from 25 standalone PCs in June 1998 to the current 102 networked computers. Three servers have been installed with the first two acting as file, print, mail and web caching (proxy) servers while the third one is a dedicated database server. In July 1999, Very Small Aperture Terminal (VSAT) communication equipment was installed at the unit, courtesy of the National Library of Medicine. These have revolutionised the way research is carried out at the unit.

Objective:

The aim of this paper is to give an eyewitness account of how the installation and expansion of ICT facilities has affected the way research is done in a remote site in Kenya. Some of the key benefits are discussed as well as the problems encountered during and after the introduction of the systems.

Installations:

The expansion of the ICT facilities described in the introduction has been largely based on demand. It has been in response to the increased number of users (researchers) and the need to provide them with applications and systems that facilitate research. In addition to the fast and efficient exchange of information among peers, the following systems have been set up:

- (i) **Kilifi Virtual Library:** This is a centralised in-house system developed to give the unit researchers easy access to online resources. The librarian updates its content (in the form of abstracts and full text documents in pdf) based on the requests by the researchers and also a compilation of their personal libraries. The abstracts are stored as part of an indexed and searchable database which is the core of virtual library. EndNote, a popular reference management tool, can be used to search the virtual library before forwarding requests to the librarian. All internal resources used to populate the system are imported from a single source (PubMed database) in order to standardise the entry of references.

e-TOC groups have been created, which allow researchers with a common subject interest to exchange table of contents of the latest journals via e-mail.

An html file called the Journal Web Database (JWD) is held on the file server as part of the virtual library. It contains a listing of most of the popular journals and the form in which they are available (eg. Paper, electronic, CD), type of access, website, e-TOC etc.

- (ii) **Online Admissions System:** This is another system developed in-house as a replacement for the paper based one. All patient demographic and clinical data are entered into a central database in real time and at the point of admission. Doctors and other staff managing the data can access the patient data from any computer running FileMaker Pro within the unit.
- (iii) **Centralised Data Access:** The central database server hosts FileMaker and MS-SQL server applications which allow unit staff members (researchers included) to gain controlled access to the stored data. This also enables data-entry and updates in real time. In the past, data from various research projects were entered into disjointed databases and later backed up on the file server. A data dictionary and metadata are centrally available to help researchers understand their datasets better without the intervention of the data management team.
- (iv) **Lab Data Capture System:** The first phase of a system that aims at automating the capture of lab data resulting from the analysis of specimens from patients, has been completed. The system prints patient admission serial numbers as bar codes labels which can be read using a bar code reader and stored in a

database in order to identify the samples. The next phase will interface the lab equipment with PCs and download the captured results into a database.

Successes and Problems:

- An analysis of weekly bandwidth utilisation indicates a sharp increase the amount of scientific data downloaded by the researchers. This is an indication the in-house virtual library and other search engines and information retrieval systems such as Medline are being used effectively.
- Faster and more reliable data exchange and information delivery. This includes convenient ways of data sharing such as e-groups.
- A wider variety of resources
- The online admission system results in fewer data entry clerks, hence higher efficiency, and achieves a near paper-less environment. Data entry (real-time) is faster and information almost readily available immediately.
- Availability of online support for the application development platforms as well as software updates.
- User training manuals and data dictionaries can be shared electronically.

An analysis of sawmill data for the last two weeks.

- Resistance to change
- Maintenance (unavailable parts, down times, power supply)
- Weaknesses of single data entry (not yet evaluated)
- Risk of accessing data of varying quality, especially from the Internet.
- Systems abuse and misuse

Conclusions and Future Works:

It is premature to make concrete conclusions as no comprehensive study has been carried out to establish the true impact of the installation and use of the ICT facilities. However, based on the positive results of the preliminary analysis of the bandwidth utilisation data, it is clear that researchers are accessing more online resources, indicating a strong preference for electronic over paper based material. Many researchers' view is that an

online admission system, though initially complicated, significantly reduces the clinicians' workload and makes the information more accessible. However, this view is not shared by all researchers, with some still reluctant to embrace the perceived modern and friendlier systems. Their reluctance raises questions which may need to be addressed in a more detailed study.

The adoption of an online admission system means dropping double-data entry and instead being restricted to a single entry. The impact of single (real-time) data entry on quality information quality over the double data entry needs to be assessed.

An interesting area of further investigation would be a detailed analysis of the bandwidth utilisation and the general user behaviour change, in comparison to the pre-VSAT days. This will entail identifying appropriate parameters to be used to assess this and output parameters such as an increase in the number of publications from the remote sites with modern ICT facilities.