

When is it an African NREN: Building a Vibrant and Sustainable National Research and Education Network in Africa

Benjamin A. ESHUN

Email: beshun@garnet.edu.gh

Abstract

A National Research and Education Network (NREN) is both; 1) a high performance communications network owned and operated for and by the education and research community of a country and; 2) the organization that operates that network, constituted as a consortium of members, a dedicated agency, a company, NGO, or other type of body. In World Bank partner countries an NREN may simply be a consortium of universities that organize themselves as a “buying club” in order to get a better price from Internet Service providers (ISPs), or it may be more sophisticated and be offering connectivity services to its members. (Case for NRENs 2009). Several countries around the world have adopted the NREN as the centerpiece of an advanced network for collaboration and communication between the Tertiary and Research Institutions within their country and to other parts of the world. (Ravinder 2008; C@ribNET 2010).

Around the time of GARNET’s inception in 1995, the United States Congress took critical steps toward what was called then the National Public Network. The United States Senate and the House of Representatives moved toward enacting legislation to authorize their NREN (Kahn 1992). Yet in the context of Ghana and most other Africa Countries, the lacking of similar political strong intervention is what could have led to slow deployment of the NREN.

Poor Internet connectivity is one of the pertinent issues in the digital divide between developing and industrialized countries, hampering the transition to the global information society. Africa is currently the most under-served continent in terms of the information and communication technologies. Hence the collaboration amongst tertiary education institutes in Africa is imperative to make them key players in the enhancement of information and communication technologies for society (Ravinder 2008).

GARNET like most other African NRENs has gone through several iterations of starting and stopping, various Boards and memberships, and various models of operations, which did not make any significant process in providing a sustainable NREN. Current attempts to have a sustainable NREN have been directed towards providing technical and services oriented solutions by focusing on the business model and financial plan(casefornren.org). Beyond merely the technical aspects of scalability, our concerns lie in how to reproduce and translate the necessary learning processes alongside the spreading of artifacts, funding, and people. (Braa, Monteiro et al 2004).

A conscious effort has to be made using the theory of Information infrastructures to look at the collection of governance, policy, structures, people, procedures and technologies that

make up an NREN and its infrastructure in order to make it sustainable (Star and Ruhleder 1996). Without a conscious effort to achieve sustainable systems, initiatives from aid organisations, governments and NGOs are likely to replicate past outcomes of lengthy technology deployment and fast technology abandonment (Beardon et al. 2004).

In order to leapfrog NRENs into becoming a vibrant and sustainable, the practices that have worked elsewhere on the continent should be reinforced. There is no need to rebuild the same problems in the new networks we are building. Instead there is a need to make the NREN stronger by building an organization with an active and vibrant community. In order to achieve this, interventions would have to be taken in the areas of governance, policies, procedures as well as the products and services that the NRENs of today would be providing to its community of users and practitioners like Universities ICT Directors, Researchers, Academicians, Librarians and other stakeholders.

The presentation will propose key interventions that would be the set of actionable items for Governments, Donors agencies and other relevant stakeholders that are interested in either establishing or strengthening NRENs in Africa could use to ensure that they would be viable.

1. Background

A National Research and Education Network (NREN) is both; 1) a high performance communications network owned and operated for and by the education and research community of a country and 2) the organization that operates that network, constituted as a consortium of members, a dedicated agency, a company, NGO, or other type of body. In World Bank partner countries an NREN may simply be a consortium of universities that organize themselves as a “buying club” in order to get a better price from Internet Service providers (ISPs), or it may be more sophisticated and be offering connectivity services to its members (Dyer, 2009). Several countries around the world have adopted the NREN as the centerpiece of an advanced network for collaboration and communication between the Tertiary and Research Institutions within their country and to other parts of the world. (Ravinder 2008; CKLN 2010)

Hence it is important to note that the NREN is the organization that binds a community of Researchers, Academicians, Librarians, ICT Professionals and other stakeholders together. The NREN will meet the computer and communication needs of scientists, researchers, and educators; its implementation should also be used as an opportunity to extend the benefits of public networking technology to new groups of users. (M. Kapur and J. Berman, 1992)

Around the early 1990s, the United States Congress took critical steps toward what was called then the National Public Network. The United States Senate and the House of Representatives moved toward enacting legislation to authorize their NREN (Kahn 1992). Yet in the African context, the lacking of similar political strong intervention is what could have led to slow deployment of the NREN on the continent.

The building blocks of Research and Education Networks comprise of Universities and Research Institutions, NRENs and Regional RENs and each must be seen and operation as distinct and separate organizations. Even when working closely together there must be time-bound and specific and identifiable objectives. Most of the poor emergence of NRENs on the continent can be attributed the lack of clear distinction and separations of the functions of the NREN from that of the University, initiating organization, or Government Agency.

2. The African NREN Problem

Poor Internet connectivity is one of the pertinent issues in the digital divide between developing and industrialized countries, hampering the transition to the global information society. Africa is currently the most under-served continent in terms of the information and communication technologies. Hence the collaboration amongst tertiary education institutes in Africa is imperative to make them key players in the enhancement of information and communication technologies for society (**Ravinder 2008**).

The Association of African Universities (AAU) supported the need for the Internet connectivity by stating:” African universities and researchers are often working in a silo model, insulated from regional actors and drivers of funding and requirements. ...” (AAU 2007). Under its Strategic Plan 2003-10 and following a very strong mandate issued by the 11th General Conference of the AAU held in Cape Town, South Africa, in February 2005, AAU had to establish the role as coordinator of the many ICT initiatives including the Research and Education Networking Unit (RENU) to act as a focal point in relation to the many initiatives in relation to Information and Communications Technologies (ICT) in education and research networking, currently under way in Africa (Source: www.aau.org/page/research-and-education-networking-unit).

It was the emergence of the RENU under the AAU that led to the

- a) **Memorandum of Understanding (MOU) Between UbuntuNet Alliance and the Association of African Universities (AAU),**
- b) **Memorandum of Understanding (MOU) Between UbuntuNet Alliance and The West and Central African Research and Education Network (WACREN)**
- c) **And the formation of the African Research and Education Network (AfREN) forum for discussions on issues of interest to the research and education networking (REN) community such as collaboration, advocacy and coordination of activities in Africa. There is a traditional session on updates from the UbuntuNet Alliance (Eastern and Southern Africa), WACREN (West and Central Africa) and ASREN (Arab countries, including North Africa). (Source: <http://wacren.net/en/events/afren-meeting-africa-internet-summit-ais>)**

The Arab States Research and Education Network (ASREN) is the association of the Arab region National Research and Education Networks (NRENs), as well as their strategic partners, that aims to implement, manage and extend sustainable Pan-Arab e-Infrastructures dedicated for the research and education communities and to boost scientific research and cooperation in member countries through the provision of world-class e-Infrastructures and e-services. (Source: <http://www.asrenorg.net/>)

UbuntuNet Alliance is the Regional Research and Education Network for Eastern and Southern Africa. It capitalizes on the emergence of optical fibre and other terrestrial infrastructure opportunities to establish a high speed research and education backbone, which interconnects all National Research and Education Networks (NRENs) in the region. (Source: ubuntunet.net)

West and Central African Research and Education Network (WACREN) is the promotion and establishment of interconnections between national research and education networks in West and Central Africa to form a regional research and education network, the interconnection of this network with other regional and continental networks, and the provision of services aiming at fostering collaboration between research and education institutions in the region as well as between them and peer institutions at continental and international levels (Source: wacren.net).

The academic and research institutions in Africa are yet to reap the full benefit of being members of a physical research and education network. The African Institutions are not benefiting from the economics of scale associated with bulk purchasing of Internet Services and do not have the networks that would enable the collaborations with their counterparts within the country, continent and beyond. This is making it very difficult for them to effectively conduct the core business of teaching, research and collaboration and play a vital role in the African higher education arena.

NRENs like most of ICT4D projects are donor-sponsored initiatives, host institutions are rarely sharing any cost of the project implementation and some people view the system “a free lunch”. However, while the system is delivered “for free” thanks to the donors, there are significant costs to the adopting country in lost opportunities, wasted energy, and loss of good-will when systems fail to deliver the expected outcomes. The challenge then is to overcome this mentality of accepting free donations without a proper assessment process, which has resulted in reduced commitment and ownership (da Silva et al 2013).

Common myths about NREN formations are as follows:

1. NREN issues are technical in nature and require Technical Interventions for them to be resolved.
2. There are various **models** and ownership **structures** for establishing NRENs and making them vibrant
3. NRENs are best formed by **Champions** from the most predominant University(s) in the country.
4. NRENs Boards must be **representative** in order to cater and protect the needs and interest of all stakeholders

This is however not uncommon with many of the NRENs on the African Continent and like the others are faced with the following issues:

1. Governance Structures that lacks the needed dynamism and strategy to resolve sustainability issues. The Governance structures must adapt like “chameleons ” in an ever-changing administrative, environmental, financial and technological settings.
2. Lack of independent fulltime staff to implement and oversee operations and who will also responsible for the management of the services provided by an NREN. (caseforrens.org)
3. Lack of willingness to give up power/privileges and become more transparent: New Systems like NREN implementation may require a new order (Ciborra 2005) which can cause opposition, particularly when trying to achieve a more transparent process (da Silva et al 2013).
4. Competing interests— misalignments between personal or membership interests and the interest of the NREN, which would make an actor to behave in a manner detrimental to the NREN community (da Silva et al 2013).

3. Can there be a Sustainable African NREN?

African NRENs has gone through several iterations of starting and stopping, various Boards and memberships, and various models of operations, which did not make any significant process in providing a sustainable NREN. Current attempts to have a sustainable NREN have been directed towards providing technical and services oriented solutions by focusing on the business model and financial plan(caseforrens.org). Beyond merely the technical aspects of scalability, our concerns lie in how to reproduce and translate the necessary learning processes alongside the spreading of artifacts, funding, and people. (Brea, Monteiro et al 2004).

A conscious effort has to be made using the theory of Information infrastructures to look at the collection of governance, policy, structures, funding model, procedures and technologies that make up an NREN and its infrastructure in order to make it sustainable (Star & Ruhleder 1996). Without a conscious effort to achieve sustainable systems, initiatives from aid organisations, governments and NGOs are likely to replicate past outcomes of lengthy technology deployment and fast technology abandonment (Beardon et al. 2004).

Much of the Information Systems (IS) research during the last four decades or so focusing on the deployment and use of Information and Communication Technologies (ICTs) has argued for more active participation of the concerned users in various facets of systems design, development and use (Barki & Hartwick, 1994; Baroudi, Olson, & Ives, 1986; Fitzgerald, Russo, & Stolterman, 2002; Franz & Robey, 1986; Garrity, 1994; Hunton & Beeler, 1997; Ishman, Pegels, & Sanders, 2001; Mumford & Weir, 1979).

In order to leapfrog NRENs on the African continent into becoming a vibrant and sustainable NREN, the practices that have worked elsewhere on the continent should be reinforced. There is no need to rebuild the same problems in the new networks we are building. Instead there is a need to make the NREN stronger by building an organization with an active and vibrant community. In order to achieve this, interventions would have to be taken in the areas of governance, policies, procedures as well as the products and services that the NREN would be providing to its community of users and practitioners like Universities ICT Directors, Researchers, Academicians, Librarians and other stakeholders. All interventions and actions must lead to the “NREN sweet spot” in which there is strong support from the Government and membership (Dyer, 2009).

The selection of the mix of products and services would come at a time where the AfricaConnect2 project was about to take off. NRENs on the continent through their RRENs stand to secure roughly 26.6M€ counter-part funding to afford equipment, connectivity, capacity building and other services. (Africaconnect2 (n.d.))

4. Developing an Action Research Approach for NREN

Action Research involves solving organizational problems through intervention while at the same time contributing to knowledge (Davison et al, 2004). Unlike much traditional academic research where the researcher decides on a problem and then negotiates access to a suitable research site, in Action Research the source of the problem and the initiative for seeking a solution may come from practitioners facing the problem who become in effect the client for the project. (Rose, S. et al 2015). Hence the author of this proposal will use several interventions and actions in order to determine which ones lead to the NREN becoming a vibrant and sustainable.

Research proceeds as a cycle of joint planning, action, observation and reflection, where the reflection phase paves the way for further cycles of planning, acting, observing and reflecting in a spiral of learning. (Rose, S. et al 2015). Hence the actions and interventions be replicated in two other NRENs in the West and Central African Region, namely the nascent Sierra Leone Research and Education Network (SLREN) and the Nigerian Research and Education Network (NgREN). This would ensure, the close relationship between knowledge acquisition and action; action research is ‘research in action rather than research about action’ (Coghlan & Brannick 2010).

Once the actions are taken to improve practice, the research generates new knowledge about how and why the improvements came about (Rose, S et al 2015). The new knowledge

generated could be used as the cornerstone to build vibrant and sustainable NRENs across the west and central regions of Africa and the continent as a whole.

As part of the action research approach suggested above, the following methods will be used : qualitative, cross-sectional and fieldwork involving several NRENs on the African continent but of particular interest would be the Ghanaian NREN, GARNET and others in the WACREN region. The study plans will be for the next 2 years and it will look at what interventions would have to be made in the areas of Governance structures and instruments, policies and procedures, programmes and activities, and the projects and services that the NREN would provide to its community. These interventions would then be recommended for replication in other NRENs in order to determine if it would produce similar results.

5. Making it work

By implementing the right actions focused at the governance, organizational structure and funding **models** as well as developing the right products and services that bring value to its memberships it would be possible to have a set of researched derived actions to make the African NREN vibrant and sustainable. By the end of the project, the researcher hopes to come out with a theory or blueprint about how NRENs should be formed in the African continent and what information infrastructures must be put in place in order to have a vibrant and sustainable NREN.

The key outcome of this project would be the set of actionable items for Governments, Donors agencies and other relevant stakeholders that are interested in either establishing or strengthen NRENs in Africa could use to ensure that they would be viable.

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Biography

Benjamin A. Eshun is currently the Head of ICT Services for Central University, the largest private University in Ghana. Under his watch, he is responsible for the sound ICT policies and sustainable strategies for their implementation that has radically transformed the ICT environment of the University. He is an NREN Evangelist and played a pivoting role in the development in the Ghanaian Academic and Research Network (GARNET), initiating action and support for the organization and the topology of the physical connections from various Development partners and several Public and Private ISPs. In conjunction with the Network Resource Startup Centre (NSRC) based in Oregon, USA planned and executed several training workshops for the Higher Education Institutions (HEI) community in Ghana in Campus Network Best Practices and Network Management and Monitoring.

He had previously worked over 10 years with the Association of African Universities (AAU) as the ICT Officer and in addition to several software development companies in Ghana. He also serves on the Board of Open Learning Exchange (OLE) Ghana an NGO working towards the fulfilment of the UN Millennium goal of attaining universal basic education for all. He has vast exposure to the state of ICT developments of universities on the International Academic arena and in the Africa continent in particular.

He holds a BSc. Computer Science and Physics and an Executive Masters Business Administration in Project Management from the University of Ghana, Legon. He is married to Esther, and together they have three children.