Improving Quality Education and Research Capacity through Advanced ICT Services: Lessons of NREN Implementation in Sierra Leone

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Abstract

Sierra Leone is just 12 years from a devastating conflict and still suffers from serious gaps in its infrastructure. The average adult has just 3.3 years of schooling, and adult literacy rates are around 43%. Among its six million people, 60% live below the national poverty line. While there are many needs in Sierra Leone, previous experience has shown that universities can play a key role in social and economic development. To achieve this, universities need adequate Information and Communication Technology (ICT) facilities, sufficient collections of educational online resources, and with so much now online - reliable internet connections. This paper outlines ongoing work to support Sierra Leone as the country develop its higher education and research capacity to tackle development challenges. The paper provide guidelines to government, institutions, and development partners on how to approach the provision of advanced ICT services to the higher education and research community in Sierra Leone. The paper describes the proposed ICT services and expected beneficiaries. The timing is appropriate as it coincide with the rollout of fibre optic connectivity to universities and schools in Sierra Leone. The premise of the report that the organization of ICT services and connectivity for higher education and research institutions is best provided by a dedicated organization called the National Research and Education Network (NREN) is based on international best practice and the current plans of the stakeholders in the region. Finally, the paper discusses the lessons learnt from collaborations with development partners to improve research capacity and access to research resources and the establishment of a vibrant National Research and Education Network for national development in Sierra Leone.

Keywords: Connectivity, Information and Communication Technology, Fibre Optic, Higher Education, Research and Education Network, Online Resources, Quality Education, Sierra Leone

1. Introduction

The term Information and Communication Technologies (ICTs) is used to refer to hardware, software, networks and media for collection, storage, processing, transmission and presentation of information in the formats of voice, data, text and images (World Bank ICT Glossary Guide). As such, the nature of ICTs is diverse, ranging from telephones, radios and TVs to more
complex technologies such as Internet technologies, mobile telephony, computers and databases. This diversity means that they can be used by people with varying degrees of skills, although the current trends towards sophisticated applications are more and more demanding on the end user. A primary purpose of ICTs is to provide an enabling environment for the generation of ideas, their dissemination and use. Through ICTs, the diffusion and sharing of knowledge is enabled through open access to information and better coordination of knowledge. ICTs facilitate the creation of networks locally, regionally and globally, leading to collaborative and interdisciplinary approaches to problem-solving and research diversification through shared knowledge-bases, online forums and collaborative spaces.

Throughout the globe there has been a fast-growing trend for universities to organize their Internet access and connectivity to each other through centralized organizations called National Research and Education Networks (NRENs). About a hundred countries in the world have adopted the NREN as the centrepiece of their information and communication technology (ICT) plan for tertiary education institutions and for connecting research institutes and other institutions such as schools and hospitals. Within each continent, continental level Research and Education Networks (RENs) have been set up to implement and operate the regional networks that interconnect the NRENs. It also connects to each other, making researchers interconnected as part of a global research and education community. These include GÉANT in Europe; Canary in Canada; Internet 2 & NLR in the USA; CLARA in South America. Similar regional RENs exist in the former USSR; Asia. In Africa, the UbuntuNet Alliance covers the Eastern and Southern belts and the West & Central Africa Research & Education Networks (WACREN) for the West and Central Africa region.

Implementing NRENs has proved to be the most promising option for African Universities and Research Institutions. However, setting up an NREN in Sub Sahara African country has its own challenges. The challenge of African countries include lack of access to the fibre optic broadband thus making Internet cost high ranging from US $3000-$4500 per 1 Mbps; need to negotiate with other countries for connectivity; expensive rates charged by local service providers for local transit; expensive set up costs and unwillingness for local Universities and Research Institutions to participate and provide the seed funds. The lack of interconnectivity among existing institutions in Africa has further hindered collaborative research. Most institutions have made little progress in terms of research outputs and receiving research grants because of expensive Internet bandwidth costs that makes it difficult to share teaching and research resources.

This study will examined the potential for using ICT to support the improvement and transformation of the education sector in Sierra Leone, with the aim – requested in its terms of reference – of raising awareness and stimulating action, especially among Sierra Leone governments and development partners. It identifies specific opportunities and challenges, and recommends areas of intervention for governments, educational institutions, the private sector and NGOs, and development partners.

2. Methodology

The methodology for this study has included desk research, questionnaires and interviews carried out with selected experts and stakeholders. The researchers will adopt the survey method for the study. Seven (7) tertiary institutions in Sierra Leone will be surveyed. Questionnaire will be the main data collection instrument which will be purposefully sent to senior administrators, academic/educators, ICT staff and librarians in all the tertiary institutions in the country. Data will be collected between September 2016 and November 2016 and the main distribution of the questionnaire will be through the electronic mail and hand delivery.
The tertiary Institutions that surveyed include Njala University (NU), University of Sierra Leone (USL), the Milton Margai College and Science and technology (MMCST), University of Makeni (UNMAK), Eastern Polytechnic and Ernest Bai Koroma University of Science & Technology (EBKUST). The sample size will be made up of 500 students from all the institutions, 50 lecturers, 10 ICT personnel and 20 university administrators. The analysis of data was done at the end of the data collection. The responses will be grouped and categorized on the basis of information provided. The analysis was done using Microsoft Excel or SPSS.

Additional information for this research was gathered through the following means:

- Interviews with NREN managers, and regional Research and Education Network (REN) Chief Executive Officers (CEOs) at UbuntuNet 2015 Conference in Maputo, Mozambique
- Further networks and discussions for Sierra Leone joining the WACREN community continued in March 2016 in Dakar, Senegal: WACREN 2016 Conference
- SLREN stakeholder workshop in Njala University in April 2016.
- Searches through NREN and regional REN websites where they existed, and through PowerPoint presentations from conferences.
- Information from WACREN, UbuntuNet, INASP, AfricaConnect, World Bank 2016 report on NRENS in Africa, reports from GARNET and websites and interactions with key players.

3. Background

In 2013, representatives from a key development partner, the International Network for the Availability of Scientific Publications (INASP) visited Sierra Leone to begin the project planning process to improve quality education, strengthen research capacity and access to research resources. They gained a first-hand understanding of the situation and met key people in the higher education and research system. They found that there were challenges of poor infrastructure in institutions: leaking roofs, unpaid bills, no internet connection and limited broadband infrastructure nationally. However they also found that there were people working in the sector with a high level of motivation and commitment to improve standards of education and research. These people and institutions were keen to work with INASP and it seemed the time was right to begin work in Sierra Leone.

With support from INASP, WACREN and key stakeholders in the Sierra Leone research and education community, Ministries, Departments and Agencies, telecom providers, donor agencies and colleagues from Liberia gathered in Njala University, Sierra Leone in April 2016 for a stakeholder workshop to discuss the establishment of the SLREN. The successful event led to the adoption of the “Njala Declaration” to establish and develop the Sierra Leone Research and Education Network (SLREN). An interim Steering Committee was established with the mandate to operationalise the SLREN. The SLREN was officially inaugurated in July 2016 to oversee the establishment of a vibrant NREN in Sierra Leone.

The SLREN operates as a non-profit making organisation and draws its legal mandate from the Universities Act 2005 and the Corporate Affairs Commission Act No. 5 2009 Company Limited by Guarantee without a Share. The SLREN’s vision is to develop and leverage high quality information & communications infrastructure and services for the Sierra Leone research and higher education community for national development. SLREN mission is to develop an advanced network infrastructure services, promote collaboration among the national research and education communities and build the capacity of the RENs community. The objective of SLREN is to promote the establishment of interconnections between national research and education communities using advanced technologies available, connect this network with other
regional and continental networks, and provide services aimed at fostering collaboration between research and education institutions in Sierra Leone and the sub-region.

The timing is appropriate as it coincides with the rollout of fibre optic connectivity to universities and schools in Sierra Leone by early 2017. The international fibre connectivity landing station in Sierra Leone during 2011, connected to the submarine fiber optic cable - laid down on behalf of the Africa Connect Europe (ACE) consortium, will radically improve Sierra Leone’s operating environment, including bringing down the price of bandwidth. There is optimism in the higher education and research community that the landing of the fibre cable will transform internet connectivity in the country (Reuters, 2011) This development will make it far more feasible to establish REN infrastructure in the future. At the moment, however, with the REN infrastructure still forthcoming, universities have limited Internet connectivity, where most are able to use it only for administrative purposes, with students left to find Internet access outside the institution, typically at cyber cafes. Finally, bandwidth costs remain high in Sierra Leone where coverage of the ISPs is limited and many organizations still depend on VSAT technology for connectivity. The paper discusses the lessons learnt from strengthening research capacity, availability of research resources and the establishment of a vibrant NREN for national development in Sierra Leone.

4. Challenges in Research & Higher Education

Sierra Leone is among the world’s poorest countries and endured a long civil war from 1991-2002 that devastated the country, including its educational infrastructure. More recently, the most widespread epidemic of Ebola Virus Disease (EVD) in history began in Guinea in 2013 and spread to Liberia and Sierra Leone. The country has received considerable attention around the world in recent years due to the most widespread epidemic of EVD and the devastating effects of the Ebola virus outbreak. The outbreak continued for over two years, resulting in significant loss of life and social disruption across the West Africa region. (European Centre for Disease Prevention and Control, 2016)

In August 2014, World Health Organisation declared the Ebola epidemic in West Africa a Public Health Emergency of international concern. According to the UNICEF, over 5 million children and university students were denied access to education in Guinea, Liberia and Sierra Leone as schools and universities did not re-open for nearly one academic year as a result of the EVD outbreak. Before the Ebola outbreak only 74% of children of school going-age were in primary school in Sierra Leone. The impact of prolonged school and university closures in a country with some of the lowest education indicators in the world is dire and the outbreak had negative consequences on the availability of teachers and teaching and learning materials; the safety of school and university premises; and the vulnerability of girls and women. (Global Education Cluster 2015) The psychological well-being of children and youth was also impacted by school and university closures because school and university provide a sense of stability and hope, helping to mitigate the psychosocial impact of a crisis. Thousands of children and youth lost their parents and caregivers, which increased the risk of homelessness, neglect and malnutrition. The temporary closure of universities and restrictions on movement of people halted much of the work of development partner’s projects to strengthen quality education and the foundation to access and production of research. However, it also highlighted the vital need for access to high-quality research resources to help equip researchers and policymakers to tackle their countries’ needs.

According to the African Development Bank report (2011), Sierra Leone has one of the slowest and lowest rates of internet penetration and usage in the world (African Development Bank, 2011)). The civil conflict in the 1990s, suggest that Sierra Leone missed out in the first phase of the submarine fibre cable laid along the West African coast in the mid-1990s. In 2009
however, the government of Sierra Leone developed and adopted an ICT policy in line with 2007 ICT policy of the Economic Community of West Africa States – ECOWAS (Government of Sierra Leone, 2009). Among other provisions, the ICT policy set itself the objectives of: a) improving the education system through the use of ICT to promote e-learning, and b) to subsidise access for high-speed internet subscribers in schools and higher education institutions across the country (Ibid). The objective was to multiply, by ‘seven-fold, the ICT penetration rate from the current low level of 0.27 percent to 2 percent by 2015’ (African Development Bank, 2011) This will be achieved by establishing a landing station in Sierra Leone, connected to the submarine fiber optic cable - laid down on behalf of the Africa Connect Europe (ACE) consortium - and building a terrestrial backbone that delivers broadband internet connectivity service deep into rural areas of Sierra Leone (Ibid). In October 2011, the ACE submarine cable was landed in Sierra Leone’s capital - Freetown - admits jubilation and optimism that the landing of the cable will revolutionise internet connectivity in the country (Reuters, 2011). Over three years since the submarine cable was landed, internet penetration still remain lows at around 1.3 percent, way below the low-income countries’ average of 6.2 percent, with a connectivity bandwidth of 1,994 bps per internet user, compared to an average of 9,141 bps for low-income countries (The Economist Intelligence Unit, 2014:9-10).

The poor internet connection has negative impact on the already ailing research and higher education landscape in Sierra Leone. None of the higher education institutions in Sierra Leone is current using advanced internet-based online learning platforms- considered the norms in Europe and America - such as Moodle and blackboard. The majority of the staff and students of higher education institution in Sierra Leone lack basic technologies and communication networks such as institutional emails and internal network communication systems, with top university professors and administrators using yahoo and Gmail addresses. The disconnection of Sierra Leone from the global network has resulted in:

- Inadequate flow of educational and research content to schools, colleges and universities,
- Inadequate research activities and an underdeveloped research infrastructure,
- Lack of technical expertise and visionary capability that has curtailed competitiveness,
- Limited interaction between academic and research community, industry and government,
- Limited regional cooperation and collaboration in sharing knowledge between researchers, teachers and educators

The ‘digital divide’ of access to technology for Sierra Leone - especially in urban areas - seems to improving. But the gap remains widest in poor, rural, and isolated communities in the poorest communities. Schools and universities in Sierra Leone are far behind in terms of skills and abilities to access and to benefit from technology. These institutions have grossly inadequate educational infrastructure. This limits the ability of students and teachers to access electronic and other media resources available for learning and teaching. This challenge, combined with the lack of exposure to alternative learning resources, keeps the pass rates of children in these rural areas below their urban counterparts. In remote communities, even the teachers face daunting challenges related to isolation from their peers and a lack of teaching resources. Enhancing access to ICT through the provision of advanced ICT in education in the remote and hard to reach research and educational institutions in Sierra Leone will contribute to improving quality teaching and learning for better learning outcomes. There is the realisation that Higher Education Institutions should drive the process of generating knowledge for national development. There is also the realisation that without basic research
infrastructure in ICTs, the evaluation of a knowledge economy necessary for sustained social development will be impossible.

5. Practical steps for improving quality education and research capacities

Noting the realities of the in-country challenges relating to infrastructure and connectivity, INASP staff, working with Research4Life, decided to begin the project through raising awareness of the online research materials already available through Research4Life, open access and INASP’s own programme. INASP was delighted to be approached by Miriam Conteh-Morgan, a Sierra Leonean librarian, who was appointed by her institution, the University of Sierra Leone, as project lead. ICT Director, Thomas Songu, was appointed as lead by Njala University. These two representatives have been vital to the success of the project; their commitment, collaboration and work ethic have continued to drive activities forward. It has proved invaluable to have two team members representing different sections of information provision and different institutions. They have been able to bring a more holistic approach to planning and overcoming challenges, as well as combining their shared networks and having a vision to extend the project to other institutions. The project plan was developed in consultation with Miriam, Thomas and their two universities; ensuring that plans were appropriate, inclusive, needs-focused and feasible.

6. Building relationships – mobilization and collaboration for access

We began in May 2014 by organizing a symposium for leaders in research and academia who discussed both the barriers and opportunities to supporting access to online research. This event provided a forum for consultation with in-country experts, as well as a chance to explain the project and get high-level buy-in. Priorities identified during the symposium aligned with the recommendations of Sierra Leone’s Government Agenda for Prosperity, including the need for improvements to: ICT infrastructure, education quality and power supply. There was a clear commitment to supporting the improvement of essential infrastructure as well as to recognize and support the role of librarians. Keen to ensure that we provided some practical support early on, the symposium was followed immediately by a workshop for library and IT staff to introduce some of the practical aspects of managing access to online resources. As a result of this workshop, the two groups formed a liaison committee with a view to founding a library consortium.

7. Use of research: creating a skilled pool of researchers and journal editors

There is a relatively low level of research activity in Sierra Leone, particularly of that which reaches academic journals. However, there are pockets of activity producing quality research. This includes research about the agricultural sector, particularly led by the Sierra Leone Agricultural Research Institute. The important research being done in Sierra Leone rarely becomes part of the global body of scientific knowledge because of a lack of skills for negotiating the complicated process of publishing. INASP has learned that, for impact, the improvement of access needs to be accompanied by skills training for researchers and journal editors in writing, research communication and publishing. INASP has tools to address these issues, particularly the AuthorAID initiative. This helps researchers in developing countries to publish and communicate their work, often by offering online courses to researchers. In this case, in response to the poor access to internet around the country, INASP adapted its online courses to develop courses that could be downloaded and used offline, such as ‘Planning and Communicating Research.’ This proved to be especially relevant later during the Ebola outbreak where people needed to avoid travel or large gatherings, and institutions were closed.
A researcher at Njala University applied for and won an AuthorAID grant to run a proposal writing course which resulted in the formation of eight thematic research groups.

The second phase of the project began in September 2015 and will run until March 2018. Three components of the national research system will be addressed: electronic resource access and use; campus networking; and improving the visibility of research through journal publishing. Despite the setbacks resulting in time lost, and the poor ICT infrastructure, those working on the project are optimistic for its success. The project leads are committed and active, the two institutions are collaborating well, both librarians and ICT staff are already represented in the library liaison committee, strong regional links have been forged with peers in Ghana and INASP publishers have extended free access to online literature available through our access programme to the country. We will explore the way forward below.

8. **Electronic resources access and use Expansion to other institutions**

A strong national library consortium can support a country to provide access to resources. A consortium can be a central manager and support for those offering and managing information access at member institutions across the country. It can strengthen buying power, enabling institutions of all sizes and budgets to access information. Negotiating as a larger body can also be more effective than as a single institution. Members can share skills and knowledge and work together to create a stronger information provision service. Having formed a liaison committee, the next step for USL and Njala was to engage with other institutions to take steps towards forming a library consortium. During March 2016 the committee has begun to initiate contact with academic leadership of several institutions to introduce the project. They will be looking to engage ICT and library staff from potential members in order to take a holistic approach to improving and managing access. This will develop during the coming months and years and it will be interesting to see how partnerships and cooperation strengthen the activities and what different stakeholders will contribute.

9. **E-resource management and awareness raising**

Institutions and staff need to be able to manage their online resources effectively in order to offer a good service to researchers. They need to be able to select the most appropriate resources and then ensure that users are aware of what is available, and are able to access them easily and simply in order to make full use of that which they are providing. A further training workshop on electronic resource management for librarians and a training workshop on search skills will be held for faculty staff, both in the first half of 2017. These workshops will use the training materials developed for the May 2014 events, which aimed to promote the availability of electronic resources (negotiated-for free access by INASP, open access or through Research4Life) in institutions across Sierra Leone.

10. **Symposia for academic leadership**

These symposia will bring together senior faculty and library staff to discuss the project. They will build upon the Phase one symposium, looking in more detail at how activities can support research, teaching and learning in Sierra Leone. They will introduce new institutions to the liaison committee and the benefits of a library consortium. Several half day symposia and training events will take place between March and May 2017 which will be facilitated by the liaison committee.
11. National ICT infrastructure and campus networking

The building of Sierra Leone’s ICT infrastructure was hampered and delayed by the long civil war. Where there currently is internet connectivity, and when access becomes more widespread, institutions will need to keep up with the technology. They will need skilled engineers and ICT professionals to configure campus networks, and ensure campus-wide access. Institutions will need their own infrastructure in order to make use of that which is available externally.

12. National Research and Education Networks

In November 2015, INASP supported Thomas Songu to participate in the UbuntuNet-Connect conference in Maputo, Mozambique. The UbuntuNet Alliance works in eastern and southern Africa aiming to secure and support National Research and Education Networks (NRENs) to develop efficient ICT systems. NRENs are not-for-profit, specialized internet service providers dedicated to supporting the needs of research and education communities within countries. They work closely with research centres and institutions to provide the most appropriate services. This conference gave Thomas the opportunity to meet with other NRENs supported by INASP – in Tanzania, Zambia and Uganda, and explore what might be possible in Sierra Leone. This gave him the impetus to join the West and Central African NREN network, WACREN. A committee has been convened to establish a Sierra Leone NREN in order to support institutions around the country. The ICT Director has reported a great depth of learning and inspiration attributable to this trip. To support this, Thomas and the committee have arranged two conferences, with financial support from INASP, bringing together key stakeholders in Sierra Leone (including Vice Chancellors, Principals, senior academics, researchers, ICT professionals and campus engineers) and WACREN. The events were the first step towards mapping out the establishment of a Sierra Leone NREN and the potential for that to join WACREN. Once the national infrastructure is in place for our partner universities, USL and Njala, to connect to high speed internet (hopefully by early 2017) they plan to work with a Ghanaian expert to configure their networks. This will build the Sierra Leonean links with Ghana and within the region.

13. Journal publishing, journal quality and visibility of research Journal editors

As mentioned above, important research is being undertaken in Sierra Leone, but researchers often find no outlet for their work. The institutions wish to revive those journals that, due to the war and then the Ebola virus, have ceased to operate and need support to start publishing again. INASP hopes that, by supporting the building of skills and brokering relationships, Sierra Leonean journals can eventually be hosted on African Journals Online (AJOL) – an INASP founded project now independently and locally run. In collaboration with AJOL, a training workshop on journal publishing and journal quality took place in February 2016. INASP sponsored eight editorial team members from Sierra Leonean journals, those both in operation and in the latter stages of development, to attend the AJOL workshop which took place in Accra, Ghana. Early in the project, connections with Ghanaian institutions were made, and Ghanaian colleagues and practices have been both helpful and influential. Many reports and grey literature produced in Sierra Leone risk being lost due to difficulties in publication and a lack of institutional or national repositories. This means important knowledge is not being shared, or used and could potentially be duplicated. This literature needs to be kept, and needs to be shared, either institutionally or nationally; even internationally. The creation of a Sierra Leone platform using journals online software may be a way to increase the visibility
of research coming out of Sierra Leone. INASP could sponsor a Ghanaian expert to assist in the development and configuration of such a system as well as facilitating a mentorship initiative to support ongoing work and development.

Putting learning to use as well as providing support to Sierra Leone, the project was also an opportunity for INASP to explore work in a new country, and in particular a country where IT facilities and broadband infrastructure are limited. Since beginning work in Sierra Leone, and learning from our experience there, INASP has been investigating needs in other countries where ongoing or relatively recent conflicts have damaged infrastructure, strained resources and made day-to-day work much more challenging.

As a next step, in 2017 the SLREN and INASP plan to commission institutional studies of the research and knowledge systems in other universities and research institutions in Sierra Leone. Undertaken by local analysts, these will provide rich accounts of how research is done in the country, how it connects to practice and policy, and the overall state of the system. To test the waters – and to get an initial reading of the suitability of online support – we also targeted researchers in neighbouring countries of Guinea, Ghana, and Liberia when advertising INASP’s recent online course in research writing.

14. Conclusion

This paper explores the underlying contributions that a National Research and Education Network can provide to Sierra Leone’s economic development, specifically human resource capacity in the technology and technical fields. Taking a comparative study of tertiary and research institutions in Sierra Leone, this research inquiry identifies the NREN’s ability to facilitate a sector wide ICT capacity building strategy for higher education and research institutions, national and international university partnerships for distance learning and exchange program-based training programs, and train the trainer programs on advanced ICT infrastructure development within national institutions as key areas where it can support national level human resource capacity growth.

The study highlighted that a vital importance to the sustainability and success of NREN implementation is the identification and involvement of dynamic and committed people, including early engagements with NREN stakeholders and change agents. Strategically, the rationale of establishing the NREN should focuses on both the value for money argument where the Network would provide more affordable bandwidth and the availability through demand aggregation and leveraging member institutions’ collective purchasing power. Given the opportunity of laying and maintaining the fibre-optic communication infrastructure, priority should now be given to ICT infrastructure development and knowledge transfer and training programmes and value added services building on the bandwidth provision. SLREN must therefore embark on awareness raising and technical skill development at the university level and within the NREN administrative organization. Yet while it needs its own set of capacity programmes to function effectively, SLREN can play as a coordinator and facilitator for this and other national-level skill training and knowledge transfer initiatives.

Moving forward, Sierra Leone’s experience demonstrates that an NREN can build communities of practice along with, and even prior to its work implementing the physical infrastructure. Involving university-based ICT directors in key decision-making demonstrates how both government-led and private entity-driven NREN governance models can effectively incorporate member interests and concerns. As the NREN in the country continues to expand in different ways, it might be prudent to consider how some of the value added services that make an NREN so unique can be utilized by universities to better support the development of a domestic skilled talent pool.
With regard to funding, it is general practice for operational expenses of SLREN will be covered by fees and service charges from their members, while the government would cover major capital expenses for initial setup and later upgrades (with possible donor support). One option, of many, is to offer SLREN capabilities as a consultative service, which could generate additional revenue streams to be reinvested back to support the project’s sustainability. In the interspace linking the higher education and ICT sectors, the SLREN’s organizational structure and network-based value-added services can act as source of common ground and mutual gain-driven collaboration member institutions. Particularly in the context of recently fragile or post-conflict states, the cases looked at for this inquiry shed light on how an NREN can be used to grow research and education and technology-based ecosystems growing the ability of local populations to populate and sustain their countries’ economy long-term.

Suggested further reading

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Biography

Mr. Thomas Songu is an Information and Communication Technology (ICT) professional with over 20+ years implementation experience in strategic management of ICTs spanning the education, finance, media, defence, telecomm, mining and pharmaceutical industries at national and international levels. His considerable involvement in the development and implementation of strategic ICT projects has given him substantial experience in ICT infrastructure management for global public and private sector organizations. Thomas is currently working as the Director of ICT, Njala University. He is also a founding member and CEO of the Sierra Leone Research and Education Network (SLREN). Thomas has recently worked as ICT Expert, through the International Organization for Migration (IOM) funded project in the area of ICT Capacity Building in tertiary education to Sierra Leone. He has also previously worked as ICT Consultant for leading global organisations, including the UK Home Office, Computer Sciences Corporation (CSC), Siemens, T-Systems, Credit Suisse, Barclays, mainly in the UK, USA, France, Spain, Germany, Portugal, the Netherlands, and the United Arab Emirates (UAE). Thomas previous qualifications are a Bachelor of Science degree (BSc.) in Education with major in Mathematics and minor in Economics from Njala University, Sierra Leone, and a Master degree of Science (MSc.) in Information Systems Management, from London South Bank University, United Kingdom. Thomas is currently a PhD reader at Njala University. His research topic focuses on leveraging ICT in development to improve quality education and research capacities in developing countries.