Ethiopia and Education Strategy: The Role of Technology

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1. Introduction
2. Schools
3. TVET
4. Higher Education
5. ETMIS (Education and Training Management Information System)
Introduction

- Ethiopia … Africa more than 100 million.. 2nd largest populous in Africa
- Fastest growing economy in the world
- Ethiopia is on the way to implement “Ethiopian Education Development Roadmap (2019-30)”
- To achieve its vision of becoming a lower middle income by 2030.
- The findings of the roadmap proposed reforms in six thematic areas:
  - Pre-primary and primary education,
  - Secondary and preparatory education
  - Teacher education and development,
  - TVET,
  - Higher education, and
  - Policy, governance and leadership.
Technology related - Common to All Problems

- Poor educational facilities - The current educational facilities and materials are inadequate which in turn affected quality of education. One of the areas identified poor provision and utilization of ICT facilities, inadequate internet bandwidth and electronic device.
- The learning-teaching process and research is not assisted by ICT.
- Poor digital literacy.
- Curriculum integration with ICT is poor.
- Low quality of education, which in turn low student/graduate/teacher profile.
- CPD is not supported by technologies.
Schools

Pre-primary Education
• Contextualize the content of the curriculum through using local learning and play materials such as games, stories, songs and puzzles, and organize technology supported learning and reading corners;
• Standardize the curriculum of the school readiness program, and monitor this using technology
• Develop built-in technology assisted continuous monitoring and evaluation
• The learning-teaching process should be supported by ICT.

Primary Education
• Designing and applying transparent, accountable, decentralized and data-based financing system in the primary education.
• The learning-teaching process should be supported by ICT.
• Teaching force (continuous professional development) should be assisted by ICT
• Assist the Adult and non-formal education (ANFE) using technology
Secondary and Preparatory Education

- Replace the Instructional current Satellite TV (Plasma) and radio with ICT technologies
- Vocationalize upper and lower secondary curriculum
- Restructure the traditional learning areas by introducing new learning areas such as Technology and Citizenship Education to shift from the traditional knowledge-focussed curriculum to competence-focused curriculum
- Introduce strong technology assisted teacher management system- There must be a system of managing teachers’ performance and development in which performing teachers are rewarded and poorly performing teachers are identified and measures taken.
- Increase the amount of educational technology funding by diversifying sources- The government needs to enter into Private Public Partnership (PPP).
- The learning-teaching process should be supported by ICT.
Previous Experience - SchoolNet

- Invest on the existing investment SchoolNet

SchoolNet, a nationwide satellite-based network of Ethiopia’s secondary schools provides TV-broadcast educational content for more than 2000 secondary schools nationwide.

- 185 schools are selected from all of the regions for an initial pilot to have a computer lab installed with about 40 computers that is connected to a local area network and server. The idea is the local server will be connected to a central server to download the latest digitalized programs locally so it can be accessed by students and teachers in the computer lab than accessing the contents from the TV broadcast only

- At present 841 secondary schools are connected to the internet and each other using the existing Ethio Telecom terrestrial network of ADSL and having 2 Mbps bandwidth for both data and internet and there is a plan to increase the number to cover all the secondary schools in the next 3 years
Ongoing Project - Improving the Quality of Learning and Teaching through the use of ICT (Total Base Cost US$34.67 million)

- This project aims to build Private Educational Cloud for Secondary Schools

- As part of its efforts to enhance the quality of general education through ICT, MoE have designed a program targeting 300 secondary schools nationwide, which are already connected to the independent and secured SchoolNet VPN using 2 Mbps bandwidth and 10 Universities Having Faculty of Education
The project will have 5 components under this implementation:

1- Developing a national policy and institutions for ICT in general education

2- Developing a national ICT infrastructure improvement plan for general education

3- Developing an integrated Monitoring, Evaluation and Learning System for the ICT Project

4- Teacher professional development in the use of ICT through

5- Piloting the use of e-Braille display readers in selected schools

Educational private cloud for 300 secondary schools and 10 universities

Mobile tablet pilot in 6 schools

Mobile-phone based educational program for 6 schools
Proposed Solutions at School Premises

- Total of 80 zero client
- Set Top Box per each plasma
- One media server per school
- Wireless hot spot
- LAN for STB and Computer LAB
TVET

- Large numbers of TVET institutions have been built across the country to increase access.
- Centre of Competency (COC) should be assisted technology
- Introduction of Performance based government funding and support
- Assist teaching and learning using ICT (VR, AR, etc)
- Introducing Computer Driving Licenses
- Technology Dissemination
- TVET management information system (TMIS) as part of ETMIS
- ICT’s potential as a means for continuous learning in TVET
- ICT’s potential as a means for continuous learning and Life long learning in TVET remains an uncharted territory.
• Trends impacting TVET
  • Pedagogically appropriate technology professional development for faculty
  • Cloud Computing for multiple workloads
  • Business Intelligence for Institutional Performance Management / MIS
  • Devices for success / Smart TVET
  • TVET graduate should be IT Skills supporting 21st Century Skills
• Integrate Technology for Great Teaching Impact
  • Student and Teachers can access courses or programs. MOOCs, distance learning, hybrid courses and more
  • Online materials, interactions, and collaboration prepare students and can make classroom time more valuable
  • Educator and students benefit from familiar tools. Office 365 provides email, online collaborative editing and storage of documents, instant messaging, VC, resource sharing etc.
Provide the end to end solution to build the ICT platform for TVET digital transformation
Campus Network for TVET - Overview | Network Diagram
The overall infrastructure is divided into: room decoration; classroom cabling and equipment installation and office cabling.

**room decoration**
- Installation of access control, camera, lighting, flooring, aluminum wall panel;
- Installation of air conditioning, fire and cabinet;
- Installation of power outlet and network panel.

**classroom cabling**
- Installation of classroom’s tables, chairs;
- Installation of classroom’s cabling, outlets;
- Installation of classroom’s TC, monitors and keyboards;
- Installation of projection screen.

**office cabling.**
- Installation of rack, power back box and patch panel.
Ethiopia TVET Shares Education Resources with Desktop Cloud

1,200 virtual desktops deployed in 12 TVET, allowing students easy access to education resources at any time and from any location.
Previous Experience - 3 TVET Pilot Project Review

Infrastructure construction – effect pictures

Before the decoration of the DC room

After the decoration of the DC room
Infrastructure – Immersive studio remaining

Telepresence promotes the information process of TVET. Telepresence solutions provide an immersive face-to-face meeting with telepresence of live-size images and a full range of audio and video co-location. TVET has introduced panoramic telepresence solutions in its implementation projects to create wisdom City model.
Previous Experience - 3 TVET Pilot Project Review

Infrastructure - Video conference room

End-to-end video solutions, which fully support for 1080P60 ultra HD effects, high reliability and security stability, easy to use, so that people in different regions as if in the same meeting room, and make them enjoy the ultimate video and audio effects, bring fun meeting Communication experience. It can also save travel costs for TVET, increase employee productivity and accelerate business decision making.
Higher Education

Critical tools to support Ethiopia’s development towards lower middle-income status by 2025

Education Sector Development Program V for 2015/16–2019/20 (ESDP V) and the National Science, Technology, and Innovation (STI) Policy emphasize excellence and quality

- **Universities**: 5 in 2005 to 47 in 2018
- **Faculty**: 24,000 in 2013 to 33,000 in 2018
- **Enrollment**: 2.75% in 2005 to 12.5% in 2017
- **STEM to Art**: 63:37 overall in 2014
Higher Education Education Sector Challenges

• Education in Ethiopia is still at early stages,
• Faced with multitude quality, equity and access challenges.
• Public and private education sector need to extend services to provide adequate facilities for students, faculty and staff,
• HE Employ MSc/MA/MBA and PhD holding teachers in a ratio of 70:30, eliminating the current reliance on relatively high undergraduate-level instructors.
• Universities are also tasked with career development of academic staff and providing books, laboratories and access to ICTs.
Core Philosophy
• Public purpose and public trust earned through efficiency, quality and accountability
• Produce confident, law-abiding, internationally competitive, entrepreneurial graduates

Access
• Increase GER to 22%
• Support students of great needs to access to universities
• Build infrastructure and services before universities
• Access to technologies for diversified world class (Distance, online, blended)

Equity
• Reduce gender disparity
• Affirmative actions for regional disparity
• Establish centers for disability and accept more PWD

Pathways from K-12
• High standards for student and teacher performance,
• Lengthening the school year, investing in modern learning resources,
• Implementing rigorous methods for assessing

Core functions (60:25:15)
• Student-centred, informed by research, practice-based teaching/learning linked to industry and community
• Generic skills to engage at work place
• Research based on institutional capacity, international cooperation, local journals and 5% funding

Performance and efficiency
• Demand zero defect performance
• External evaluation
• Teacher's competency development
• Better infrastructure and services to support performance
• Better HERQA for quality and relevance monitoring

Relevance and diversification
• Research, applied science and technical
• International coordination and mobility
• Involve professors from industry
• Establish entrepreneurship centers
• Use LMIS for gearing education to needs

Governance management and administration
• Merit-based management, autonomy
• Representation
• Consultation and engagement of stakeholders

Cooperation and Alliance
• Alliance with industry
• Cooperation with external universities

New funding paradigm
• Achieve 30% cofinancing
• Performance based budget
• Implement block funding
• Better procurement management
• Resource mobilization beyond public sector budget

A Higher Education Map of the Education Sector Roadmaps
ICT in Higher Education - Trends

• Flipped classroom – where students get access to material before hand, work on it and classroom time being used to deepen understanding through discussion with peers and problem-solving activities facilitated by teachers.
• Adaptive learning that provide scalable and personalized learning, packaging textbooks, or user’ driven content to individual learning environment
• Open Educational Resources (OER) - external sources for instructional materials that are often freely available rather than depending solely on enterprise-owned or developed content.
• Interinstitutional collaborations, within and across borders using identity federation
• Exo-structure options - cloud-based applications, rather than hosting purchased or self-developed solutions.
• Continued complexity of security threats. - sophisticated emerging threats requiring flexible and layered institutional information security approach
Status of ICTs in Higher Education Institutions

current bandwidth range from 45Mbps to 400 Mbps per campus

computer to student ratio is less than 10% across the universities

Wireless links in some universities

inconsistent use of LMS

Limited ICT services are available to support the research

Enterprise application - HRM, SIS, Finance, accounting, procurement,

Library - Library system (digital library KOHA), Dspace (repository system), ABCD library automation

Policies in place in some cases

HRM capacity, incentive, qualification, size, and governance challenge
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<tr>
<th>Dimensions</th>
<th>Requirements</th>
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<tr>
<td>Commitment</td>
<td>Government understanding of benefits, financial commitment, policy and regulatory endorsement, commitment of the presidents and IT directors especially from well-established universities</td>
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<td>Coordination</td>
<td>Membership, sustainable governance, and management framework - institutions, champions, strategies Relevant national research strategies in support of RENs</td>
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<td>Connectivity</td>
<td>Commercial condition, regulatory endorsement and options for NREN backbone, Steady equipment supply</td>
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<td>Capability</td>
<td>Human resources and skills availability, certification and standards, training in internetworking and business development both at NREN management level and at membership universities</td>
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<td>Content and services</td>
<td>Sharable national resources, collaboration in OER, libraries, apps, national innovation systems, Identity Federation, edurom</td>
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<tr>
<td>Cash (financial resources)</td>
<td>Public funds, donor fund, universal access funds for NREN backbone, membership contribution</td>
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<td><strong>Strength</strong></td>
<td><strong>Opportunities</strong></td>
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<td>Engaged students, faculty, and staff willing to work on improving IT service offerings. Effort to develop a national backbone through the Ethiopian Education and Research Network (EthERNet) Commitment of leadership at the Ministry of Education Levels</td>
<td>Government willingness to improve the state of higher education through a strategic roadmap Advances in technologies like Software as a Service that help reduce traditional procurement process and costs Increasing use of technology by faculty and students Potential support from matured research and education networks and universities</td>
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<th><strong>Challenges</strong></th>
<th><strong>Threats</strong></th>
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<td>Multitude challenges facing higher education institutions that compete against the extensive use of ICTs Resources constraints to build state of the art ICT ecosystem that meet the teaching, learning, research and community engagement roles of the universities Shortage and capability of ICT staff at public and private universities Resistance to change at the level of faculty and also administration Lack of formal governance to make decisions on IT priorities, investments and policies, impacting the openness, speed, coordination, and rigorous decisions Procurement process</td>
<td>Systemic challenges within higher education including inadequate understanding of the role of ICTs in teaching, learning and research as well as rent-seeking behaviour in procurements Expanding and more sophisticated information security threats targeted at higher education. Absence disaster preparedness or documented security procedures Absence of overall end user security awareness and practices</td>
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Vision - A rapid and profound innovation in learning, teaching, research and community engagement at higher education driven by state of the art information and communication technologies that leads to students’ success.

Mission: Provide leadership and planning for the effective and strategic use of emerging technologies in higher education to meet the goals outlined in the Education Sector Strategic Roadmap
Goals

- Leverage ICTs in for attainment of the Education Sector Roadmap,
- Deploy fit for purpose excellent ICT infrastructure and services to support higher education institutions in realizing their strategic goal in promoting quality teaching, research and community engagement.
- Enable innovative teaching and learning.
- Support world class research,
- Use ICTs to deliver efficient and cost-effective enterprise services of the universities,
- Reduce and mitigate ICT-related risks to higher education institutions,
- Expand ICT use to deliver digital content,
- Attain great IT management, support and outreach, and deliver quality of support.
Strategic Areas of EthERNet

- Area 1: Learning and Teaching
- Area 2: Research
- Area 3: Administrative Applications
- Area 4: Library Services
- Area 5: Security
- Area 6: Infrastructure provision
- Area 7: Management and Support Services
Preserving Originality of Students’ work

• All higher education institutions implement a plagiarism tool to check for the originality of students’ work.

• Ensure that all submitted work is tested for plagiarism using university authorized software,

• All the results of the test made available to students for remedy and actions.

• Develop and implement a plagiarism software use policy at higher education institutions.
Area 2: Research and Innovation

- Research requires research infrastructure and research agenda
- Research agenda in Europe – Horizon 2020
- Research infrastructure in Europe in the following areas: environmental and health, biological and medical, energy, physical science, material science, social impact and humanities, mathematics and ICT

Source: Australia National Research Infrastructure Roadmap
https://docs.education.gov.au/node/43736
e-research infrastructure as component of research infrastructure

- ICTs serve as glues to the research infrastructure, because researchers need to:
  - Move a huge amount of data
  - Access to high quality instrument
  - Access to powerful computers to crunch data
  - Collaborate with international team
  - Research process management

- Advanced networks
- Identity and authentication services
- HPC
- Cloud resources
- Research data management
- Research workflow support
E-Research strategies

- Strengthen EthERNet – governance, capability to become idp provider, research communities support, etc.
- Reshaping EthERNet infrastructure to support research
- Develop a plan for EthERNet to become a low cost Internet provider, providing a better quality of service through a link to UbuntuNet Alliance and/or in coordination with Ethio Telecom.

E-research strategies

- Establish coordinated efforts to ensure adequate research IT support be available at all higher education institutions.
- HPC access consolidation – current initiatives, needs of researchers, skills and presence ‘go to” expert
- Open science participation – open science awareness, linking to research communities, open research and publishing
- Develop and implement a research workflow support policy.
- Develop and implement identity provision policy
Area 3: Enterprise Applications Strategies

- Implement core applications in all universities – SIS and FIS, HRMS…
  - Functionality and open standard, web services based architecture
- Develop Enterprise Architecture for the higher education institutions to provide a holistic view of the processes, data, application systems, and technology infrastructure that exists within the higher education.
  - As-is and target business, data and applications, technology architecture
  - Solutions, and blueprint for priority solutions
- Establish integrated applications and data for Higher Education

EA model of Harvard University - https://enterprisearchitecture.harvard.edu
Policy objective 4: Promote Integrated Enterprise Application for Higher Education Institutions

- Develop and implement a web policy at the institutional level,
- Develop and implement institutional data classification policy,
- Develop and implement institutional data management policy,
- Develop and implement institutional software compliance policy,
- Develop and implement institutional applications development and use policy,
In a typical library in the United States users access fifty online article for a book in circulation. This implies libraries need to pay special attention to digital resources.

To be a learning lab and serve as conduits of innovation, creativity, productivity, collaboration, and knowledge in a global context, libraries need to reinventing themselves in four areas: learning spaces, research and digital research data curation, teaching, learning and literacies, and collections access.
Digital Library strategies

• Campus wide digitisation of collections
  • Digitising is a major and specialised undertaking, therefore a cost-based decision should be made about doing this in house or out-sourcing. If done in house, universities need to develop digitization workroom and programs to accelerate in-house digitization process.

• Making “digital native” available – meta data, policy for deposit of digital scholarly output, etc.

• Website for digital resources with links to other open resources

• Capacity of staff to provide digital content services

• Libraries needs to have spaces reserved for information literacy instruction, study and collaboration, video capture, virtual reality, and media creation. When in-house expertise is inadequate, utilize appropriate field experts and consultants to ensure comfort and functionality, for the purposes of sustainability, safety, space efficiency, and ergonomic design.
Information literacy

- The ability to explore issues, ideas, artifacts, and data and to effectively utilize information resources is essential in a global information society, and equally essential to academic success.
  - Develop an information literacy portal for faculty, staff, and students as a means to increase the virtual reach of information literacy instruction. Develop a curricular map to ensure information literacy instruction is appropriately integrated into university studies and seek opportunities to further embed into courses when appropriate.
  - Provide information literacy training that promotes the ability to explore issues, ideas, artifacts, and data and to effectively utilize information resources on request basis.
  - Use different options like talks first year induction programmes, pizza lunch, focus groups, surveys, etc.) to determine best instructional design for information literacy instruction.
  - Create opportunities for staff to learn about using library resources and gain important information literacy and critical thinking skills,
  - Develop and offer an “information literacy boot camp” for graduating seniors who plan on attending a graduate program,
  - Ensure information literacy is integrated in core curriculum,
  - Create a residence hall outreach program to provide research assistance and information literacy instruction to students.
  - Identify opportunities for information literacy instruction to online and distance education students,
  - Create an award for student scholarship that utilizes library resources
Area 5: Managing Security Threat

- IT security is everyone’s responsibility. Even with the robust protection in place, plan must be put in place for protection against intrusion, which often can be triggered with one person. It is therefore essential to identify and react to intrusion quickly, perform rapid analysis, take mitigation actions. The defense against cyber threat needs to involve incident and risk management at national, campus level, a robust defense using the state of art tools, disaster preparation and recovery and users education.
Security strategy

- National - Strengthen EthERNet to establish higher education Information Security Incidents Response Team (IRIST) that will facilitate centralized reporting of incidents and management that affects university networks, perform training and raise awareness on risks, resolve security related tickers like web hacks, SQL injections, Denial of Service, Cross-site scripting, email spamming, loss of backups among other security-related complaints from the community.

- Institutional level security - Setup a small team to serve as in house Information Security Incidents Response Team (IRIST) and develop their skills

- Develop a plan and guidelines for management of threats Incident detection, recording, handling, classification and initial support, Investigation and diagnosis, escalation, resolution and recovery, Incident closure.

https://www.renater.fr/securite?lang=en
http://www.carnet.hr/computer_security
Security

• Implement consistent identity and access management, including single sign-on, in all higher education institutions,
• Deploy security solutions to protect all the assets of the higher education institutions,
• Develop appropriate Disaster Recovery and Business continuity plans
• Plan and deliver user education as part of information literacy education or independently,
  • Use other options including online courses, information forums, new employee and student induction, and
  • Simple messaging can also be exploited for ongoing alert and training on security issues.
• Implement institutional information security policies and others sub-policies that help to strengthen cybersecurity including:
  • Incident management policy
  • Disaster Recovery Policy
  • ICT monitoring and privacy policy
  • Information security breach management policy
  • Building and physical access Policy
Delivering better infrastructure

- Using benchmarks, establish a baseline infrastructure including staff’ and students’ desktop and laptop hardware and productivity tools requirements, data center, servers, high performance network, wireless services, learning and teaching infrastructure and tools and all supportive infrastructure that meets the growing faculty, staff and student needs.
- Using benchmark establish the necessary bandwidth and networking for all students and staff to meet national, regional, and international education and research collaboration and communication.
- Develop an inventory of the current ICT infrastructure and networking to understand the extent of ICT automation.
Integrated infrastructure

- Assess technology trends including cloud computing and mobile technologies to ensure that the future proof technologies are taken into consideration,
- Carry out capacity planning process using network and infrastructure and network design boot camps,
- Make a plan on multi-year improvement
- Develop an ICT standards portal that changes on annual basis
- Establish permanent budget line for IT infrastructure sufficient for maintenance, upgrades, replacement, and expansion as necessary in order to provide IT support on the level required by academic institutions,
- Deliver high performance infrastructure as per the plan and standard.
Streaming procurement process

• The **procurement of ICT infrastructure should meet the prescribed standards and the following principles:**
  - Purchases will not be based solely on lowest price
  - Decisions will result in delivering the optimal mix of IT to create the best value for higher education institutions.
  - Total cost of ownership should be understood prior to any resource commitment
  - Portability, scalability, open standards, best practices, innovation and long-term supportability will be included in value assessments
  - Creative use of existing investments will be considered prior to making any new investments.

• **University Information Technology departments should have the sole authority for placing orders for IT software and hardware on behalf of the Universities regardless of the source of funding.** The centralized ICT procurement process will enable:
  - Pricing advantages obtained through volume purchasing and working with preferred vendors
  - License compliance for software purchases
  - Ensures hardware and software will be compatible with IT infrastructure

• **Purchases involving substantial investment should be carried out through transparent purchasing governance framework.**
Area 7: Governance, organizational setup and support

- Governance is a cornerstone for driving central planning, coordination, and control in a decentralized IT environment.
- Effective governance is a key to provide proper controls on acquisition of assets and approve infrastructure roadmap and other long term strategies.
- A proper organizational framework and highly trained staff underlie a smooth operation of ICT environment in higher education institutions.
Area 7: Governance and Management

- Establish a governance framework for ICT decision making drawn from different user groups and decision makers. Such governance process may include:
  - Executive Committee that approve IT strategy, policies and investments for the University. Members: CIO, Business VP, VP Research, CFO, External partners
  - Advisory Groups (Academic, Administrative, Research) that recommend IT priorities and investments for respective areas to the Executive Committee - Members: CIO, Faculty Deans, Department Heads
  - IT Policies, Architecture & Standards Group that reviews and recommend institution’s IT policies and technology directions to Executive Committee -- Members: CIO, Department IT Leads. Subject Matter Specialists and
  - IT Project Review Committee that review status of IT projects across the University, identify opportunities for collaboration, provide advice to ensure success - Members: CIO, Department IT Leads. Subject Matter
Organization

- Ensure adequate staff is available based on international metrics and project intensity. Universities should have at least 1 IT personnel for 250 staff/student.
- Ensuring that the ICT Support Unit is staffed with a sufficient range of human resource and skills combined with remuneration.
- Allocate adequate fund for students to participate in IT service delivery
Key Challenges and Issues to be Solved

- Legal issues for NREN - In terms of positioning NRENs within government policies and laws
- Ethio Telecom Service related Issues (SLA, slow response for both EthERNet and Member institutions)
- Leader’s commitment. Technology alone is not the solution. The key elements for success are the leaders, teacher and other decision makers who have the vision and the ability to make the connection between students, computers and leaning. Tight follow up and monitoring of ICT Directorate.
- Digital Divide among the universities – becoming an Issue of good governance
- Poor ICT Infrastructure - Campus Network (Smart Campus, smart building)
- Shortage of Skilled ICT Man power – Use Intern students, implement ICT Structure, opening more ICT Academies, collaborate with Academic Staffs.
- Poor Digital literacy , though having Training and consultancy team leader in each university
• **Policy and Legal Frameworks** (ICT Policies, strategies, Guidelines and Standards)
• Focusing on Devices and Gadgets than services & capacity building
• Poor institutional Repository and Digital Library infrastructure and services
• Data Centre and NOC expansion to accommodate REN in Ethiopia – IT Park new building
• Investing on devices than human
• To have an integrated, coordinated, compatible ICT System we have to plan and work together incorporating all stack holders (Universities, MCIT, Ethio Telecom, INSA, etc.) which will have an impact on interoperability and cost efficiency.
The Ethiopian Education and Research Network (EthERNet) was initiated in 2001 as part of a national capacity building program along with SchoolNet and WoredaNet.

The project’s aim was to build capacity of public universities to share educational resources and research among member institutions locally and globally, in a phased approach.

- **First Phase** – Implementation of LAN/WAN for Seven relatively earlier established public universities.

- **Second Phase** - Tele-Education and Tele-Medicine (MPLS/VPN) for Tele-Education purposes.

- **Third Phase** - E-Library System, for all public Universities, which include computer labs for 13 2nd generation universities.
• Ethiopian Education and Research Network (EthERNet) is the Ethiopian National Research and Education Network (NREN)
• EthERNet 40G backbone with 10G access to 36 public Universities and Institute of Technologies having its own state of the art Data Center and Network Operation Center
• The optical (fiber) backbone is built on highly reliable OPGW and ADSS on EEU high voltage lines. 4841 Km of fibers are used
• Costs More than 1.2 billion ETB
• Exchange Point/Internet Gateway is at EthERNet Data Center in Addis Ababa to peer with neighboring NRENs (SudREN, KENET, SolmaliREN) and ultimately will connect to UbuntuNet, GiANT, Internet2 and all other global research and education network.
• Current Member of UbuntuNet Alliance
EthERNet Optical Network Architecture
EthERNNet IP Backbone Architecture

Aggregation layer

Edge layer

Bahirdar(5)
Kombolcha(6)
EPR-1(1)
EPR-2(2)
EPR
-1
(1)
EPR
-2
(2)
Kombolcha
Bahirdar
Sidst
Kilo(3)
Bole(4)
Welkete(7)
Adama(8)

Arbaminch
Meda Welabu
Bule Horra
Dilla
Jijjiga
Debre Zebit
Defence
Adama
Dire Dawa
Haromaya

Wollo
Semera
Woldiya
Mekel
Wollega
Ambo
Assosa
Adigrat
Axum
Dir
E
Daw

M6000–3s
T8000

10G
40G

Sodo
Arbaminch
Bahirdar
Debre Markos
Debere Tabour
Gonder
Metu

Wolayita
Sodo
Jimma

Mizan Teferi
Wachamo
Hawassa

Welkete
Metu

T8000
M6000–3s

10G
40G

Sidst
Kilo(3)
Bole(4)
Aggregation layer

Gonder
Debre Zebit
Defence
Debere Tabour
Debre Markos
Jigjiga
Adigrat
Axum
Dire Dawa
Haromaya
The Hub and tunnels from Africa
Connecting Ethernet to the world through GEANT

GÉANT and partner networks enabling user collaboration across the globe

September 2014
1. 100 or more higher education to be connected to the EthERNet network.
2. Meshed transmission
   • The transmission network will be meshed topology, and the ring topology shall increase from 2 to 5 Rings.
   • This will enhance the network security, strengthen service availability.
3. Full OPGW migration
   • Most of the fiber route uses the existing OPGW cable, but needs to migrate the rest that uses the existing ET’s optical fiber cable. Meanwhile, it needs to push EEU to prioritize the OPGW construction in favor of the cities which accommodate universities.
4. Redundancy at the aggregation layer
   • For the aggregation layer, one more AG router should be for each aggregation site
   • Tvet ins, mizan, kombolcha, adama, yekatit, yirgalem
ETMIS (Education and Training Management Information System)

- ETMIS provides tools for reporting data, which is aggregated for submission to the next level. The flow of ETMIS information is from the lowest level - education and training institutions, to the regions and finally to the National Education and Training Data Base hosted at EthERNet.
- Enhancing educational management and Improving management
- Improved data collection and analysis and Transparent, structured, up-to-date reporting
- Improved course planning
- Better financial management and Insight into human resource
- Monitoring of student performance and Online information source for students and parents
- Build ETMIS and BI system at EthERNet Private Cloud
- Implement the ETMIS Policy and Guidelines
- Use the STMIS data for block grant, policy, strategy and research.
- Integrate with SIS and other school system
Thank You!