EU-GAMBIA CLIMATE CHANGE ALLIANCE+

TECHNICAL ASSISTANCE TO THE GCCA+ CLIMATE RESILIENT COASTAL AND MARINE ZONE PROJECT FOR THE GAMBIA

Technical Support, e.g. hands-on training, capacity building, and support for effective utilization of existing technical equipment and Internet connectivity, for NEA IT staff

February – March 2024

agrer Grupo TYPSA

GOPA WORLDWIDE CONSULTANTS

Pescares Italia

CONTRACT DATA	
Project:	EU-Gambia Climate Change Alliance+/DCI-ENV/2016/039-639
Contract title:	Technical Assistance to the GCCA+ Climate Resilient Coastal and Marine Zone Project for the Gambia
Identification number:	EuropeAid/140139/IH/SER/GM
Service Contract N:	ENV/2020/416-103
Client:	The National Authorizing Officer Systems Support Unit (NAOSU), Ministry of Finance and Economic Affairs, The Republic of the Gambia
Beneficiary:	National Environment Agency
Date of inception of TA:	12 February 2024
Expected date of TA completion:	18 March 2024
Overall Objective of the Project:	To provide repair and maintenance services as well as hands-on training, capacity building, and technical support for NEA IT staff to ensure that data and databases can be effectively used by NEA officers through the effective utilization of existing technical equipment and Internet connectivity within the NEA premises
Purpose of the contract:	Support project national stakeholders with Technical Assistance to achieve the specific objectives of the GCCA+ project, which are: SO1: Recommendations identified in the ICZM Management and Strategic Plans (January 2016) and the National Climate Change Policy (NCCP) are implemented. SO2: To enhance institutional governance enabling planning and implementation of climate resilience, adaptation and mitigation measures in coastal and marine zones.
Results to be achieved by the contractor:	Contribute to the achievement of the project results structured into 3 components:

Component	*Expected outcome*
# 1: Institutionalization of ICZM approach and related climate change adaptation (in selected regions	(i) institutional capacity strengthened at selected regions, (ii) CC adaptation gap identified iii) increased awareness of ICZM and CC adaptation
#2: Knowledge management through data collection and localizing climate change modelling.	a) updated info available and guidelines for decision making (i.e. these guidelines refer to (i) climate change analysis for planning, (ii) Climate Change Impacts and Spatial Planning, (iii) Climate Change accounting for financial management of impacts.); b) able to generate localized, downscales CC models.
#3: Integration of climate change adaptation actions into ICZM.	i) ICZM/climate resilient plans implemented, CC vulnerability reduced; ii) productive activities in targeted areas maintained or improved

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Mission Report of

Mr. Abdou Darboe

conducted from 12 February – 18 March in The Gambia

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ACRONYMS

AD	Active Directory
AP	Access Point
AV	Anti-Virus
CMS	content management system
DDoS	Distributed Denial of Service
DR	Disaster Recovery
ED	Executive Director
EOL	End of Life
GB	Gigabytes
GCCA+	Global Climate Change Alliance Plus
GIS	Geographical Information System
HP	Hewlett-Packard
HTTPS	Hypertext Transfer Protocol Secure (HTTPS)
ISMS	Information Security Management System
ISN	Inter Sectoral Network
ISO	International Organization for Standardization
ISP	Internet Service Provider
IT	Information Technology
MAC	Media Access Control (Address)
MFA	Multi-Factor Authentication
NCCP	National Climate Change Policy
NEA	National Environment Agency
OS	Operating System
P2MP	Point-to-Multipoint communication
PC	Personal Computer
PoE	Power Over Ethernet
RAM	Random Access Memory
RBAC	Role-Based Access Control
RJ45	Registered Jack-45
ROP	Return-Oriented Programming
RPOs	Recovery Point Objectives
RTOs	Recovery Time Objectives
SFP	Small Form-Factor Pluggable
SLA	Service Level Agreement
SSO	single sign-on
STM-1	Synchronous Transport Module level-1
TB	Terabytes
TL	Technical/Team Lead
TSN	Technical Service Network
UCKP	UnFi Cloud Key Gen2
UPS	Uninterruptible Power Supply
URL	Uniform Resource Locator
UTM	Unified Threat Management
VPN	Virtual Private Network
WLAN	Wireless Local Area Network

1. Executive Summary

The GCCA+ Climate Resilient Coastal and Marine Zone Project, implemented by the National Environment Agency (NEA), with support from a Technical Assistance Team, aims to strengthen institutional governance on Integrated Coastal Zone Management and enhance Climate Change resilience in The Gambia. This mission is centered on fostering knowledge creation and exchange by maximizing the efficient utilization of IT infrastructure, in line with project Component 2. Over a span of 25 days, the mission empowered NEA's IT staff through hands-on training and technical support, addressing gaps in equipment utilization and resolving connectivity issues to enhance communication and information exchange.

This IT consultancy crafted a strategic roadmap aimed at elevating NEA's operational efficiency in critical domains. The mission systematically addressed key areas, including technical training, maintenance and repair, licensing compliance, windows server setup, and IT and network infrastructure upgrades. Grounded in a thorough needs assessment, collaboratively undertaken with NEA staff, the mission has set the foundation for precisely targeted interventions.

The technical training initiatives were designed as a tailored program for NEA's IT support staff. Delving into curriculum specifics, methodologies, and training durations, the mission aimed to fortify the team's capabilities in navigating contemporary IT challenges. Maintenance and repair considerations scrutinize the existing IT equipment inventory, identifying issues and proposing proactive solutions for a prolonged asset lifespan.

Licensing compliance was one of the issues addressed, ensuring the activation of Windows 10 and 11 licenses. The mission provided a transparent inventory and outlines steps taken to achieve compliance. The Windows Server Setup plan is detailed, encompassing hardware specifications, software configurations, and security measures to enhance operational efficiency. Developed strategies for IT and network infrastructure upgrades focus on scalability, security, and performance, aligning with NEA's overarching goals.

Key tasks included reviewing past IT assessments, developing work and training plans, implementing infrastructure improvements, and reporting progress. The deliverables aimed at optimizing IT infrastructure, improving data access, and enhancing communication. This strategic intervention not only addressed immediate IT concerns but also aligns with broader goals of climate resilience and institutional governance, positioning NEA for greater efficacy in environmental management.

2. Introduction:

In response to the evolving technological landscape and the specific needs of the National Environment Agency (NEA), this technical IT consultancy has been initiated with a dual purpose: to address the immediate challenges faced by NEA's IT infrastructure and to strategically equip the IT support staff with essential skills for sustained operational excellence. The overarching goal is to enhance the agency's overall efficiency in environmental management through targeted interventions in the realm of Information Technology (IT).

2.1. OBJECTIVES OF THE SHORT-TERM MISSION

2.1.1. Purpose

The primary purpose of this consultancy was to conduct hands-on technical training for the maintenance and repair of NEA's diverse IT equipment, spanning from desktop computers, laptops, printers, servers, to network infrastructure. The aim was to bridge existing gaps, ensuring optimal functionality and longevity of the agency's IT assets. Additionally, the consultancy endeavored to address the pressing issue of limited internet bandwidth, a bottleneck inhibiting the seamless operation of over 160 staff and more than 300 connected devices.

Beyond immediate concerns, the revival of hardware servers was integral to unlocking advanced capabilities within NEA's IT framework. This included the installation of Sage 300 Accounting software, a pivotal step towards automating NEA's Finance department and fostering a more streamlined and efficient financial management system.

2.1.2. The scope of this consultancy

The scope of this consultancy encompassed a comprehensive review of NEA's existing IT landscape, identification of challenges, and the development of strategic plans for both short-term problem resolution and long-term IT infrastructure enhancement. The hands-on technical training involved imparting essential skills to the IT support staff, empowering them to independently manage and maintain the IT assets effectively.

Furthermore, the consultancy extended its scope to the creation of a robust Intranet setup, leveraging revived servers. This strategic addition aimed to enhance internal communication, facilitate seamless data sharing, and promote collaborative workflows within NEA.

Through a meticulous exploration of both purpose and scope, this technical IT consultancy aimed to propel NEA towards a technologically advanced and resilient future, aligning its IT capabilities with the dynamic demands of environmental management. Subsequent sections will delve into specific strategies, methodologies, and expected outcomes, providing a roadmap for the successful execution of this transformative initiative.

2.1.2.1. Challenges in Connectivity

One of the significant challenges faced by NEA pertains to the limited Internet bandwidth available, a bottleneck constraining the operational capabilities for a workforce exceeding 160 staff members and an extensive network of over 300 connected devices, including laptops, desktop computers, and smartphones. This restricted bandwidth impedes the agency's operational efficiency, hindering seamless connectivity and efficient data transfer. Recognizing the need for a comprehensive solution, this report outlines a strategic plan to address this limitation, emphasizing the imperative of upgrading the bandwidth to a minimum of 70Mbps. The proposed solution entails centralizing and terminating the enhanced bandwidth in the main data center, facilitating efficient distribution across various departments and offices within the agency.

2.1.2.2. Revival of Hardware Servers and Automation of Finance Department

A critical facet of this initiative revolved around the revival of hardware servers within NEA. The objective was to breathe new life into these servers, rendering them productive and operational. This recovery is particularly significant as it paves the way for the installation of Sage 300 Accounting software. The introduction of this advanced software solution marks an important step towards the automation of NEA's Finance Department. The automation process is poised to streamline financial operations, enhance accuracy, and expedite decision-making processes within the agency.

3. CONTEXT OF THE MISSION

3.1. Findings and Need Assessment

The initial meeting with NEA stakeholders marked a pivotal moment to identify and assess critical gaps in the agency's IT infrastructure. The primary focus was on enhancing the skills of NEA's IT staff through hands-on technical training to address maintenance and repair issues with faulty equipment. Concerns were raised about NEA's limited Internet bandwidth, hindering operational efficiency across its workforce and device network. Hardware challenges, particularly with non-operational servers, posed significant obstacles, impacting software implementation and data security. Urgent action was needed to revitalize NEA's IT infrastructure and restore seamless functionality.

Stakeholders stressed the importance of enhanced supervision and technical training to equip NEA's IT support staff with essential skills for diagnosing and resolving hardware issues. Tailored training programs were deemed necessary to address these challenges effectively. As consultant, my dedication was evident in providing intensive technical training focused on practical skills, such as system diagnostics and hardware troubleshooting, critical for maintaining and repairing faulty IT equipment.

Addressing these challenges is crucial to enhancing NEA's operational efficiency and fulfilling its mandate in environmental management. Through proactive intervention, NEA aims to bolster its capacity and contribute significantly to sustainable development efforts. Supervision and technical training emerge as pivotal elements in optimizing NEA's IT infrastructure and supporting its mission effectively.

The challenges presented by NEA's low and limited Internet bandwidth on agency operations were underscored. Concerns arose regarding how this constraint significantly hindered daily tasks, resulting in delays, inefficiencies, and compromised workflow across various departments. With NEA's substantial workforce and extensive network of connected devices, this bandwidth limitation had a profound impact on operational efficiency. Urgent measures were required to rectify this issue and ensure seamless functionality across all operations.

3.2. Licensing Compliance

As specified in the Term of Reference, I have supervised the development of a thorough process to activate Windows 10 and 11 licenses across all NEA devices, guaranteeing compliance with licensing regulations. Leading the team, we commenced by meticulously inventorying licensed devices and documenting their licensing status to pinpoint any discrepancies or instances of non-compliance. This particular step was crucial in comprehending NEA's licensing responsibilities and guaranteeing appropriate licensing for all devices, thereby minimizing the potential legal and financial repercussions associated with non-compliance.

4. ACTIVITIES AND OUTPUTS

4.1. Technical Training: Hands-On Practical

The technical training sessions conducted from Day 1 to Day 20 aimed to empower the IT support team with practical skills in repairing and maintaining critical IT equipment.

The training sessions commenced with a comprehensive assessment of the existing IT infrastructure, identifying key challenges and areas requiring improvement. This initial assessment served as a foundation for structuring the training curriculum, ensuring alignment with the agency's needs. Throughout the training period, a holistic approach was adopted, covering desktop computers, laptops, printers, and servers. During the hands-on practical sessions, several issues were identified across the spectrum of IT equipment. Notable issues included expired cartridges, broken printheads, and a damaged Carriage Belt in the HP DesignJet Z6200 Map Printer. For computers, issues ranged from outdated operating systems to hardware failures, with specific problems such as hard disk drive failures and crashed operating systems. These issues significantly impacted the overall efficiency and functionality of the IT infrastructure.

4.1.1. Desktop Computers and Laptops

The training on desktop computers and laptops was extensive, covering a range of topics from basic hardware troubleshooting to complex software installations. Participants gained hands-on experience in diagnosing hardware issues, such as faulty RAM or hard drives, and performing repairs. Additionally, practical sessions focused on operating system installations and system optimization techniques. The successful restoration of **16 desktop computers and 2 laptops** underscores the effectiveness of these sessions in enhancing the team's technical capabilities (***see Annex 5, 8.5.2***).

4.1.2. Servers

The training on server maintenance has played a crucial role in enhancing the reliability and functionality of NEA's IT infrastructure. The IT technicians have gained proficiency in various aspects of server management, including setup, configuration, and troubleshooting, enabling them to effectively address hardware and software issues. Despite facing challenges such as hard disk failures, the team's perseverance has resulted in the successful revival and deployment of **three vital servers: Dell PowerEdge T320, Dell PowerEdge T430, and HP ProLiant ML110 G7**. This achievement underscores the dedication and expertise of NEA's IT support team in ensuring the uninterrupted delivery of essential services (***see the list of repaired computers in Annex 5, 8.5.2***).

4.1.3. Printers

Printer maintenance sessions provided participants with essential skills in diagnosing and resolving common printer issues. Techniques for cleaning printheads, replacing cartridges, and addressing mechanical failures were demonstrated and practiced. Special emphasis was placed on ensuring the proper functioning of high-capacity printers, such as the HP DesignJet Z6200 and HP LaserJet Enterprise MFP M680. As a result, **9 printers** were successfully

restored, contributing to improved printing efficiency within the agency (***see the list repaired printers in Annex 5, 8.5.3***).

The technical training program conducted over the 20-day period has yielded significant improvements in the IT support team's capabilities. Through hands-on practical sessions and comprehensive assessments, participants acquired essential skills in repairing and maintaining desktop computers, laptops, printers, and servers. Moving forward, continued training and ongoing assessment will be essential to adapt to evolving technological challenges and maintain optimal IT performance within the agency.

4.2. Resolution of Issues

The hands-on practical sessions proved highly successful in resolving the identified issues. The HP DesignJet Z6200 Map Printer, with expired cartridges and broken printheads, underwent a thorough cleaning, and all errors displayed on the printer's dashboard were addressed. The printer is now fully functional after comprehensive maintenance. In the case of computers, issues such as hard disk drive failures and crashed operating systems were expertly addressed. The team successfully restored numerous desktop computers to normal functionality, including a Pentium R PC, HP LaserJet Printer, HP LaserJet Enterprise MFP M680, HP LaserJet P3015, HP Color LaserJet CP1215, HP LaserJet P2055, HP LaserJet Enterprise MFP M725, HP LaserJet MFP 177fw, and HP LaserJet Pro MFP M277n. The successful resolution of these issues showcased the team's proficiency in diagnosing and fixing various IT equipment problems.

4.3. Proposed Solutions

For preventive measures and long-term solutions, I proposed the implementation of a regular maintenance schedule, as outlined below. This schedule should include routine checks, cleaning, and software updates for all IT equipment. Additionally, a proactive approach to monitor ink and toner levels, replacing cartridges before expiration, can prevent issues in printers like the HP DesignJet Z6200. To address issues with computer hardware, regular diagnostics and system health checks are recommended. Implementing software solutions that automate updates and patches can ensure that operating systems remain up-to-date, minimizing the risk of crashes or failures.

4.4. Maintenance Schedule

To maintain the optimal performance of IT equipment, a proposed maintenance schedule is as follows:

i. **Monthly Checks:**
   Verify ink and toner levels in all printers.
   Conduct system diagnostics on computers to identify potential hardware issues.
   Perform routine cleaning of printers, computers, and server rooms to prevent dust accumulation.

ii. Quarterly Maintenance:

Replace expired cartridges in printers.

Conduct thorough cleaning of printers, including printheads and Carriage Belts.

Perform deep system diagnostics on servers to ensure their optimal functioning.

iii. Bi-Annual Checks:

Evaluate the overall network infrastructure to identify and address any connectivity issues.

Review and update security protocols for all IT equipment.

Conduct training sessions for IT support staff to stay abreast of new technologies and best practices.

5. EXISTING IT AND NETWORK INFRASTRUCTURE AND RECOMMENDATIONS TO UPGRADE

5.1. Internet Infrastructure and Connectivity

The National Environment Agency (NEA) operates on a core network with limited bandwidth of 10Mbps, which has become insufficient to meet the demands of its services and users. With over 160 staff members and 300 connected devices, including laptops, desktop computers, and smartphones, the current bandwidth allocation is inadequate. This report aims to assess the existing internet situation, justify the need for more bandwidth, and recommend transferring to a better and more cost-effective Internet Service Provider (ISP) with clear terms and a Service Level Agreement (SLA).

5.1.1. Current Internet Situation:

i. **Limited Bandwidth:** NEA's core network operates on a 10Mbps bandwidth, which is insufficient for the current and future needs of the agency.
ii. **User and Device Count**: With over 160 staff members and 300 connected devices, including laptops, desktop computers, and smartphones, the demand for internet bandwidth far exceeds the available capacity.
iii. **Exorbitant Cost:** Despite the limited bandwidth, the cost of the current internet service is exuberant at D77,600, translating to D7600 per 1Mbps. This cost is not commensurate with the bandwidth provided and is financially burdensome for the agency.

5.1.2. Justification for Bandwidth Upgrade:

i. **Inadequate Capacity:** The current 10Mbps bandwidth is insufficient to support the agency's operations, resulting in slow internet speeds, network congestion, and decreased productivity.
ii. **Future Growth:** Anticipating future growth and increased demand for internet services, it is imperative to upgrade the bandwidth to accommodate the expanding user base and device count.
iii. **Cost-Efficiency:** Despite the high cost of the existing bandwidth, the agency can obtain significantly more bandwidth for the same expenditure, allowing for better utilization of financial resources.

5.2. Currently used equipment and Recommended Devices for the improvement NEA's Network Infrastructure

The recommended equipment list as in Table 1 below is being sent to the Project Coordinator for procurement. The decision to replace the existing equipment with the recommended devices is rooted in the acknowledgment of their inferiority and obsolescence, posing limitations to NEA's network and internet infrastructure's scalability, agility, and robustness. By transitioning to the suggested devices, NEA endeavors to modernize its technology infrastructure, fostering a more scalable, agile, and resilient network environment. These upgrades not only address current constraints but also position NEA for future growth and technological advancements. Through the adoption of cutting-edge solutions, NEA can optimize its operations, improve connectivity, and enhance service delivery to stakeholders, ultimately driving innovation and efficiency across its network infrastructure.

Table 1: List of Recommended Devices

No.	Location	Existing Devices	Recommended Devices	Quantity
1	IT Server Room	UnFi Cloud Key Gen2 (UCKP)	UniFi Dream Machine Special Edition PoE	1
		24 Ports TP-Link Switch	UniFi Enterprise 48 PoE Switch	1
			Single-Mode LC Fiber Cable (91 meters)	2
			SFP+ to RJ45 Adapter	10
			25 Gbps Single-Mode Optical Module UACC-OM-SFP28-LR	4
			25 Gbps Multi-Mode Optical Module UACC-OM-SFP28-SR	4
		4U Rack	22U Data Rack	1
2	Procurement Unit	24 Ports D-Link Switch	UniFi 24 PoE Switch	1
3	Extension Site	24 Ports D-Link & 24 Ports TP-Link Switches	UniFi 48 PoE Switch	1
		UniFi AP-AC Long Range	UnFi6 EP Enterprise Access Point (AP)	1
4	Technical Service Network (TSN)	24 Ports TP-Link Switches	UniFi 24 PoE Switch	
		UniFi AP-AC Long Range	UnFi6 EP Enterprise Access Point (AP)	1
5	Inter Sectoral Network (ISN) IT Room	24 Ports TP-Link Switch & 24 Ports D-Link Switch	UniFi Pro Max 48 PoE Switch	1

		UniFi AP-AC Long Range	UnFi6 EP Enterprise Access Point (AP)	1
6	Executive Director (ED)	24 Ports TP-Link Switch	U6 In-Wall	1
		UniFi AP-AC Long Range		
7	Director Admin & Finance (DAF)		U6 In-Wall	1
8	Reception Area	UniFi AP-AC Long Range	UnFi6 EP Enterprise Access Point (AP)	1
9	Documentation Center		UnFi6 EP Enterprise Access Point (AP)	1
10	GIS Lab	24 Ports TP-Link Switch	UniFi 24 PoE Switch	1
		UniFi AP-AC Long Range	UnFi6 EP Enterprise Access Point (AP)	1
11	Project Site		UnFi6 EP Enterprise Access Point (AP)	1
12	GEF6 Project Coordinator (Accounts)	24 Ports TP-Link Switch	*8 PoE, SFP* (*Gen1*)	1
13	ROP Office Corridor	UniFi AP-AC Long Range	UnFi6 EP Enterprise Access Point (AP)	1
14	DED Office		U6 In-Wall	1
15	ROP Office		U6 In-Wall	1
16	Chief Security Building		UnFi6 EP Enterprise Access Point (AP)	1

5.2.1. Problem Identified in Existing Infrastructure (Network Part)

i. Not sufficient power backup is available for Datacenter (Server Room).
ii. Central data center (Server Room) is not available in the organization to manage all the resources of the agency services from single Node.
iii. Limited bandwidth is available in the agency to accommodate more than 160 staff and over 300 connected devices including Laptops, Desktop Computers and Smartphones.
iv. No centralized profile management of Staff to access agency's services and Internet services.
v. No security is implemented to protect agency IT infrastructure from external attacks.
vi. No URL filtering, application filtering and content filtering applied on internet usage.

vii. No Efficient way is implemented to limit bandwidth and quota management on internet usage to make internet fair usage scheme.
viii. Centralize Antivirus software does not exist to scan system of Staff.
ix. No domain controller exists in network to manage rights of Staff.
x. Core network is built on a bandwidth of 10Mbps and needs to be upgraded to at least 70Mbps bandwidth to accommodate future needs of Agency's services.
xi. Installed Core Unifi Security Gateway OS is obsolete and have EOL support in 2016.

5.2.2. Proposed Solution of existing Problems

Proposed solutions include deploying proper load calculations for power backup, establishing a central data center with fiber and wireless links, upgrading bandwidth to a minimum of 70 Mbps, implementing agile controller for staff profile management, installing UTM firewall for network security, utilizing UTM firewall features for URL and application filtering, implementing bandwidth and quota management features, setting up a central antivirus server, deploying Active Directory for user rights management, and upgrading the core network to at least 70 Mbps or STM-1. Additionally, replacing or updating obsolete Unifi Security Gateway OS is recommended.

Once the requested equipment has arrived …

Sr. No	Problem	Proposed Solution
1	Not sufficient power backup is available for Datacenter	Calculate proper load of equipment and deploy UPS and Solar System to provide uninterrupted services. Once all the requested equipment is available in the Datacenter, this can be done
2	Central data center (Server Room) is not available in the organization to manage all the resources of the agency services from single Node	Data center facility should be available in NEA Kanifing will be connected with Fiber link and P2MP wireless link as backup by using VPN Tunnel.
4	Limited and insufficient bandwidth of 10Mbps is available in the agency to accommodate more than 160 staff and over 300 connected devices including Laptops, Desktop Computers and Smartphones.	Minimum 70 Mbps bandwidth is required and all bandwidth will be terminated in main data center from where bandwidth will be distrusted to other departments and offices. And all users to be connected to the network, it will be routed to main gateway router for policy and profile management.
5	No centralized profile management of Staff to access the agency's services and Internet services.	Agile controller should be used with WLAN controller to manage staff profiles and policies from single node.
6	No security is implemented to protect agency IT infrastructure from external attack.	UTM Firewall on the agency must be used at edge to protect network from external.
7	No URL filtering, application filtering and content filtering applied on Staff internet usage.	UTM Firewall features of URL Filtering, Application filtering and DIP will be used to obtain these controls.
8	No Efficient way is implemented to limit bandwidth and quota management on internet usage to make internet fair usage scheme.	Bandwidth and Quota management features of UTM firewall or Agile controller will be used to limit per user bandwidth to 01 Mbps. (For this policy from NEA management should be cleared that what services they want to allow to Staff).
11	Centralize Antivirus (AV) software does not exist to scan system of Staff.	Use central AV server to scan all system which will be connected with networks. This feature can also be used available in UTM Firewall.
12	No domain controller exists in network to manage rights of Staff and Students	Use AD and domain controller to connect users on the agency fixed networks and manage rights of users on the Agency's own systems available in the

		offices and labs
13	Core network is built on limited 10Mbps and needs to upgrade to at least Synchronous Transport Modules STM-1 (155Mbps) network to accommodate future needs of agency services.	Therefore, the core network needs to be upgraded or expanded to at least 70Mbps or STM-1 (155Mbps) in order to accommodate future needs of agency services.
14	Installed Core Unifi Security Gateway OS is obsolete and had EOL support in 2016.	Use latest OS if hardware is supported otherwise replace hardware with latest Firmware

In addition the following is urgently needed to ensure ….

6. CYBERSECURITY RISK ASSESSMENT AND MITIGATION REPORT FOR NEA

During the network infrastructure needs assessment, significant security weaknesses were identified, indicating that the network is highly vulnerable to cyber-attacks. These vulnerabilities underscore the urgent need for robust cybersecurity measures to mitigate potential risks effectively. It is imperative to implement strong and comprehensive cybersecurity protocols to safeguard against various forms of cyber threats and prevent any potential breaches or compromises to the network's integrity and confidentiality. By prioritizing proper cybersecurity implementation, the organization can proactively address these vulnerabilities and enhance its resilience against future cyber threats.

In summary, cybersecurity risks pose significant threats to NEA's operations, data integrity, and reputation. However, by proactively identifying potential risk areas, understanding their cybersecurity effects, and implementing appropriate mitigation solutions and strategies, NEA can strengthen its cybersecurity posture and minimize the impact of cyber threats. Continuous monitoring, regular training, and collaboration with cybersecurity experts will be essential in mitigating evolving cyber risks and ensuring the resilience of NEA's IT infrastructure.

7. RECOMMENDATIONS AND CONCLUSION

7.1. General Recommendations

1. Increase Internet bandwidth capacity to build robust infrastructure.
2. Conduct trainings at regular intervals to cope with the latest trends of IT in:
    a. Maintenance and Repair
    b. Data Recovery Techniques
    c. Server Administration and Management
    d. Networks and System Administration
    e. Cybersecurity.
3. Complete security audit after every 6 months.
4. Increase server memory capacity up to 96GB RAM space and up to at least 4TB storage Hard Disk capacity.
5. Develop and implement general IT policy
6. Deploy a Unified Threat Management (UTM) firewall for
    a. Policies
    b. Managing inbound and outbound traffic
    c. Content filtering
    d. URL filtering
    e. Proper bandwidth resource allocation.
    f. Handling external and internal malware attacks
    g. Absorbing DDoS attacks
7. Deploy an End Point Security solution to all the users.
8. Perform MAC binding to protect from unknown hosts connecting to the network.
9. Implement secure password policies.
10. Implement Strict HTTPS policy.

7.2.Recommendations for Preventive Measures

i. **Regular Training:** Conduct regular training sessions for IT support staff to enhance their skills and keep them updated on the latest technologies and maintenance procedures.
ii. **Documentation:** Maintain comprehensive documentation for all IT equipment, including purchase dates, warranty information, and maintenance history. This documentation can aid in quicker issue resolution and informed decision-making.
iii. **Proactive Monitoring:** Implement monitoring systems that provide real-time information on the health and performance of IT equipment. This proactive approach can help identify potential issues before they escalate.
iv. **User Education:** Educate end-users on proper usage and care of IT equipment. This includes guidelines on turning off equipment when not in use, handling printers with care, and reporting any issues promptly.

7.3. Recommendations for Internet Upgrade:

i. **Bandwidth Upgrade:** Upgrade the internet bandwidth to at least Synchronous Transport Modules STM-1 (155Mbps) network to accommodate future needs of agency services or if not affordable then to upgrade to at least 70Mbps or above to meet the current and foreseeable needs of the agency.
ii. **Transition to a Better ISP**: Transfer to a more cost-effective and reliable Internet Service Provider (ISP) that offers competitive pricing and clear terms of service.
iii. **Service Level Agreement (SLA):** Ensure that the new ISP provides a comprehensive Service Level Agreement (SLA) outlining performance metrics, uptime guarantees, and support services to maintain a stable and efficient internet connection.

7.3.1. Benefits of Bandwidth Upgrade and ISP Change:

i. **Improved Performance:** Higher bandwidth allocation will result in faster internet speeds and improved network performance, enhancing productivity and user satisfaction.
ii. **Cost Savings:** Transitioning to a more affordable ISP will reduce operational costs while providing greater bandwidth capacity, allowing for better utilization of financial resources.
iii. **Reliability and Support**: A reliable ISP with a robust SLA ensures minimal downtime, proactive support, and timely resolution of any connectivity issues, enhancing overall network reliability and user experience.

8. ANNEXES

8.1. Annex 1: Terms of Reference

GCCA+ CLIMATE RESILIENT COASTAL AND MARINE ZONE PROJECT FOR THE GAMBIA

TERMS OF REFERENCE for NKE mission

Project Activity:	This activity is covered under Component 2: Knowledge creation and management through data collection and analysis, here technical support through effective use of existing IT – infrastructure
Activity Title:	Technical Support, e.g. hands-on training, capacity building, and support for effective utilization of existing technical equipment and Internet connectivity, for NEA IT staff
Position:	IT – expert, junior expert
Duration:	25 working days
Intended Start:	November 2023

Project Background

This Project "GCCA+ Climate Resilient Coastal and Marine Zone project for The Gambia" aims at consolidating results and positive experiences of the previous GCCA project "Support to The Gambia for integrated coastal zone management (ICZM) and the mainstreaming of climate change" 2013-2016.

The objectives of the project are:

1) to support implementation of recommendations set out in the ICZM Management and Strategic Plans (Jan 2016) and the National Climate Change Policy (NCCP) implementation plan for the Gambia (April 2016); and

2) to enhance institutional governance enabling planning and implementation of improved climate resilience, adaptation, and mitigation measures in the Coastal and Marine Zones of the Gambia.

The project seeks to benefit coastal communities and help them to adapt to impacts of climate change through institutional strengthening, knowledge management, and demonstrated implementation of the National Decree of the Integrated Coastal Zone Management (ICZM) approach, at national and local levels. It considers the inter-linkages between social, economic, and environmental dimensions of sustainable development, and is in alignment with the Gambia's National climate change Adaptation Plan and strategy (NAP) as well as the Nationally Determined Contributions (NDC). This action also intends to widen partnership with non-state actors (NSA) and to further integrate women's rights and gender equality issues into local climate adaptation plans.

The project has three technical components including:

Component 1: Institutionalization of ICZM approach and related climate change adaptation (in selected regions),

Component 2: Knowledge management through data collection and analysis; through downscaled climate modelling; to inform climate resilient development; and

Component 3. Implementation of small scale (as well as up scaled, when appropriate) climate change adaptation into ICZM.

Each of these components has a set of defined result areas and indicative activities set out in the Financing Agreement.

Introduction

This mission is covered under Component 2: Knowledge creation and management through data collection and analysis, here technical support through the effective use of existing IT – infrastructure.

NEA has received an array of IT support from several projects and programs, including hardware and training from the GCCA+ project on data management and the use of GIS software. However, a lot of hardware available in the NEA office is not effectively used, equipment, albeit functional, is not brought to use, purchased equipment does not have genuine software, internet in the office is used through individual routers instead of using the fiberglass link bought for every month by NEA, etc.

To be more specific, here are some examples of issues identified:

- Computers purchased for the GIS lab by the GEF 6 project do not have genuine Windows versions, thereby preventing the update of Windows, a prerequisite not only for the effectively use ARCGIS on these computers, but also necessary to prevent the spread of viruses on these computers. Furthermore, the small RAM on these computers make it difficult to use them for GIS purposes, as proven recently during the training mission on the atlas production, when one of these computers was used for atlas production, thankfully upgraded by the GCCA+ project PE component to enable effective use of ARCGIS.
- NEA has several printers, including a large HP Designjet Z6200 for printing maps and an A3 HP Officejet 7510 printer (purchased by GCCA+), both idle and not connected to computers. Attempts to get maps printed for the Coastal Fora inhouse did not work out and the TA needed to use the costly service of an external provider to print these maps.
- The office pays every month D 70000 for a fiberglass Internet connection which is currently not used by many officers in NEA.
- The workstation (purchased by the GCCA project) within the IT unit is idle and no one can make use of it. The TL was told that the workstation is broken, until our GCCA+ data management expert used it to retrieve maps produced by a JICA financed project (these maps are about 20 years old).

The few above examples demonstrate the need to support the NEA IT unit to fulfill its task to support NEA officers in their daily work, thus allowing for the effective use of data and databases within NEA.

This mission, however, is not another mission to make an assessment of the IT capabilities and recommend the purchase of new equipment. This mission is to provide hands-on support to the IT-Unit to bring existing technical equipment into good use for NEA staff, to ensure that hardware and software are well maintained and to connect the officers with the already purchased fiberglass internet, establish an intranet (if possible), thereby providing hands-on training for IT staff on relevant tasks to maintain and support the IT infrastructure within NEA.

The ED informed the AGRER TL that this is a major issue and requests high priority for this mission.

The IT Unit currently comprises of two staff, namely

1. Mr. Eliman Saloum Sock with a diploma in cyber security, hardware engineering and web design; and
2. Mr. Modou Lamin Sanneh with a diploma in networking, hardware engineering and web design.

Their mandate and responsibilities involve managing and maintaining the organisation's IT infrastructure, ensuring data security, providing technical support, and implementing IT policies and procedures. They have access to resources like servers, networking equipment and basic IT repair tools. But the unit currently does not have an inventory of the IT equipment under their control, thus establishing an inventory and developing and implementing a maintenance protocol to ensure the functionality of the IT equipment is also part of this assignment.

Both staff are aware of their shortfalls and have confirmed the need for guidance and support in maintaining the hardware and software under their control. They requested additional training in emerging technologies, enhanced cybersecurity measures, software training, programming and development training and data management training.

Objective of the Assignment

The overall objective of this mission falls under specific project objective 2:

- To enhance institutional governance enabling planning and implementation of climate resilience, adaptation and mitigation measures in coastal and marine zones

The specific objectives are:

- To provide hands-on training on maintenance and repair services for the IT equipment within NEA, capacity building, and technical support for NEA IT staff to ensure that data and databases can be effectively used by NEA officers through the effective utilization of existing technical equipment and Internet connectivity

Scope Of Work

This 25 working-days mission is divided into the below parts:

- to review the past IT assessments (briefly) and check if described equipment / connectivity, etc., is still available/functional;
- together with the IT section, to develop a brief work- and training plan to ensure good use of the equipment and internet connectivity, while staff are trained on-the-job to repair and maintain the IT infrastructure, where and when possible;
- to implement the plan and ensure good use of the existing infrastructure, with priority given to internet connection, then computer maintenance, and thirdly connection of printers, the workstation (if appropriate), and other IT equipment, as appropriate;
- to conduct training on software and hardware maintenance, including operating system updating, the use of Antivirus and Firewall software and its implementation/application;
- to brief the TL and PC regularly on progress made, obstacles identified, possible equipment needs including possible solutions to address these obstacles;
- to write a brief report on the activities conducted, problems encountered and the trainings provided.

Consultant Input

For this assignment a total of 25 working days is foreseen, which should start in November 2023.

An updated calendar will be developed upon mobilization.

Deliverables

The consultant will deliver the following:

1. Trained IT staff, capable of delivering improved and functioning IT infrastructure, including Internet connectivity, functioning printers, updated software in computers, and, to the extent possible, an intranet, utilization of the work station, as well as any other IT equipment that is functional but currently not used;
2. A final report within two weeks from receiving comments from AGRER and NEA.

All deliverables will be reviewed by the AGRER TL, and comments will be provided within 7 days of submission. All draft deliverables will be submitted to NEA for acceptance. The consultant is expected to perform all integration, revisions and amendment requested by the AGRER and NEA. Payment be after acceptance of the corresponding final version of the deliverables by NEA and the TAT Team Leader.

Specification And Qualification

Qualifications and skills

- Postgraduate (diploma, MSc) in computer science, or related field
- Fluent in spoken and written English and be able to write clear, concise technical and non-technical reports in English
- Excellent facilitation and professional training skills are desirable and will be an advantage

General professional experience

- A minimum of 10 years professional experience in the area of computer science, data and database management or related field
- Must have proven experience in training/capacity building at university or of government officials and other stakeholders in training/capacity building of government officials and other stakeholders in computer science related assignments
- Proven experience of working as part of a team
- The ability to operate within multi-sectoral, multi-cultural teams with good communication skills and flexible working style will be an advantage

Specific professional experience

- Extensive experience in addressing and/or managing computer related problems, hardware and software as well as Internet connectivity and training thereof
- Independent and free from conflicts of interest

Statement of Work for the ICZM expert mission

NKE 1	Data Management
GCCA+ Overall Objective	To enhance institutional governance enabling planning and implementation of climate resilience, adaptation and mitigation measures in coastal and marine zones
Component 2	Knowledge management through data collection and localizing climate change modelling

	NKE – ICZM expert	Man-days	Dates
Specific objectives	The specific objectives are: • To provide repair and maintenance services as well as hands-on training, capacity building, and technical support for NEA IT staff to ensure that data and databases can be effectively used by NEA officers through the effective utilization of existing technical equipment and Internet connectivity within the NEA premises.	**Total 25 days**	November – December 2023
Scope of work	• to review the past IT assessments (briefly) and check if described equipment / connectivity, etc., is still available; • together with the IT section, develop a brief work- and training plan to ensure good use of the equipment and connectivity, while staff is trained on-the-job to repair and maintain the IT infrastructure; • to implement the plan and ensure good use of the existing infrastructure, priority given to internet connection, then computer maintenance, and thirdly connection of printers, the workstation (if appropriate), and other equipment, as propriate; • to conduct training on software and hardware maintenance, including operating system updating, the use of Antivirus and Firewall software, etc. • to brief the TL and PC regularly on progress made, obstacles identified and possible solutions; • to write a brief report on the activities conducted, the problems encountered and the trainings provided.		
Place	Banjul, within the premises of NEA		
Milestones	1. Work plan 2. Training materials 3. Mission report, including the training materials		
Schedule	Foreseen for this mission are 25 working days		
Output	• Functioning Internet connection in NEA, printers and work station can be effectively used by NEA staff and NEA computers are maintained, updated and protected with genuine software, including firewalls and virus scanners • A brief mission report		
Expected outcomes	1. Access to data and databases improved 2. NEA communication outward enhanced 3. Existing equipment effectively utilized		

8.2. Annex 2: Agenda/activities conducted

8.2.1. Work Plan for 25-Days Consultancy Assignment

Milestones:

1. Review and Assessment (Days 1-2):

- Review past IT assessments, IT contract documents (Internet Contract with the existing ISP) briefly.
- Check the availability of described equipment and connectivity.
- Engage with NEA IT staff to understand current challenges.

2. Develop Work and Training Plan (Days 3-4):

- Collaborate with NEA IT section to develop a comprehensive work and training plan.
- Prioritize tasks based on the criticality of internet connection, computer maintenance, and connectivity of printers and other equipment.

3. Implementation of Plan (Days 5-15):

- Execute the work plan as agreed upon.
- Focus on improving internet connectivity within NEA premises.
- Address computer maintenance issues, ensuring all computers are updated and protected.
- Connect printers, work station, and other functional equipment.
- Conduct hands-on training sessions for NEA IT staff.
- Monitor progress and provide regular briefings to TL and PC.

4. Software and Hardware Training (Days 16-20):

- Conduct training sessions on software and hardware maintenance.
- Cover topics such as operating system updating, antivirus and firewall software usage, etc.
- Ensure NEA IT staff are well-equipped to handle routine maintenance tasks.

5. Report Writing and Documentation (Days 21-23):

- Document activities conducted, problems encountered, and trainings provided.
- Develop protocols and schedules for NEA to maintain their equipment regularly.
- Prepare a draft mission report for review.

6. Review and Finalization (Days 24-25):

- Share the draft mission report with AGRER and NEA for feedback.
- Revise the report based on received comments.
- Submit the final report along with training materials.

Output:

- Improved and functioning IT infrastructure within NEA.
- Enhanced internet connectivity, functioning printers, and updated software.
- Training materials and documentation on maintenance protocols and schedules.
- Brief mission report highlighting activities, challenges, and solutions.

Expected Outcomes:

- Access to data and databases improved.
- Enhanced communication outward from NEA.
- Effective utilization of existing IT equipment.

Notes:

- The schedule may be adjusted based on the actual progress during the implementation phase.
- Regular communication with TL and PC to ensure alignment with project goals and expectations.
- Flexibility to address unforeseen challenges and adapt the plan as needed.

8.2.2. Daily Activity Logs

On the project's start day, the Team Lead (TL), Project Coordinator (PC), and NEA IT staff convened for a crucial meeting, fostering mutual understanding and collaboration. Discussions centered on identifying key challenges in NEA's IT infrastructure, with meticulous clarification of project objectives. The day featured the distribution of an IT equipment inventory template for gathering essential information. Collaborative data collection sessions with NEA IT staff delved into equipment status, functionality, and challenges. Simultaneously, a 25-day work plan addressing identified challenges was crafted and refined through discussions with the TL and NEA IT staff. The day concluded with a comprehensive summary, establishing expectations for subsequent phases and emphasizing team-wide comprehension. Overall, the day marked a successful project kickoff, prioritizing challenges, initiating data collection, and fostering collaborative dynamics. Future efforts will focus on executing planned activities, continuing data collection, computer and printer repair and maintenance and maintaining open communication within the team.

Day 2 of the assignment began with a productive meeting with Mr. Modou Lamin Sanneh, the senior IT support technician. During the meeting, Mr. Lamin provided a comprehensive overview of the existing contract with the Internet Service Provider (ISP), Gamtel. It was revealed that the agency (NEA) currently benefits from a total Internet bandwidth of 8 Mbps at a monthly cost of **GMD 70,000.00**. However, it became evident that this bandwidth allocation is insufficient considering the agency's workforce of approximately 161 employees, all of whom rely on this limited bandwidth for various tasks using their smartphones, laptops, desktops, etc. Following the meeting, the team proceeded with technical training sessions focusing on PC and laptop repair and maintenance. This included hands-on activities such as conducting system diagnostics and troubleshooting, recovering failed Hard Disk Drives (HDDs), and addressing issues related to failed or crashed operating systems by replacing them with genuine Windows 10 or 11 installations. Additionally, training covered essential tasks such as file backup, system formatting, and reinstallation to ensure the smooth operation of the agency's IT infrastructure. Later in the day, the team received instruction on utilizing the "**wmic bios get serialnumber**" command to retrieve the serial numbers of Windows-based PCs and laptops. This data collection method was highlighted as crucial for maintaining accurate IT equipment inventory records within the agency. As a result of the day's training and activities, the team successfully **restored four desktop computers back to normal functioning,** marking a significant achievement in enhancing the agency's IT capabilities and ensuring operational continuity.

On Day 3 of the assignment, the team continued with technical training, focusing on hands-on PC and laptop repair and maintenance tasks. The session encompassed conducting system diagnostics and troubleshooting, recovering failed hard disk drives, and addressing issues with failed or crashed operating systems by reinstalling genuine Windows 10 or 11 installations. Trainees also learned the importance of file backup and practiced creating and maintaining backups to prevent data loss. Furthermore, the training covered system formatting and reinstallation procedures, including steps for erasing existing data, partitioning drives if necessary, and performing clean installations of the operating system. By the end of the day, **three desktop computers** were successfully restored to normal functionality. These activities not only provided valuable practical experience but also contributed to enhancing the agency's IT capabilities and ensuring operational continuity.

On Day 4 of the assignment, I focused on writing and submitting an assessment report evaluating the feasibility of implementing Sage 300 on the cloud, taking into account the current IT infrastructure of the agency. This involved analyzing factors such as system requirements, compatibility, security considerations, and potential benefits and challenges of transitioning to a cloud-based solution. Additionally, the day included continued technical training sessions, with a focus on hands-on PC and laptop repair and maintenance tasks. Trainees engaged in activities such as conducting system diagnostics and troubleshooting, recovering failed hard disk drives, and addressing issues with failed or crashed operating systems by reinstalling genuine Windows 10 or 11 installations. Furthermore, the training covered file backup, system formatting, and reinstallation procedures. By the end of the day, four desktop computers and an HP LaserJet Printer were successfully restored to normal functionality, contributing to the enhancement of the agency's IT capabilities and operational continuity.

On Day 5 of the assignment, the team continued with technical training, emphasizing hands-on PC and laptop repair and maintenance tasks. The session included conducting system diagnostics and troubleshooting, as well as recovering failed hard disk drives. Trainees addressed issues with failed or crashed operating systems by reinstalling genuine

Windows 10 or 11 installations and performed file backups. Additionally, activation of non-genuine Windows in various offices was undertaken. The importance of file backup was emphasized, with trainees practicing creating and maintaining backups to prevent data loss. System formatting and reinstallation procedures were also covered, encompassing steps such as erasing existing data and partitioning drives if necessary. By the day's end, one desktop computer was successfully restored to normal functionality. These activities not only provided valuable practical experience but also contributed to enhancing the agency's IT capabilities and ensuring operational continuity.

On Day 6 of the assignment, the team persisted with their technical training, placing a strong emphasis on hands-on PC and laptop repair and maintenance tasks. The session entailed thorough system diagnostics and troubleshooting, alongside adeptly recovering failed hard disk drives. Trainees adeptly tackled issues stemming from failed or crashed operating systems by reinstalling genuine Windows 10 or 11 installations and diligently performed file backups to safeguard vital data. Furthermore, the team diligently continued their efforts in activating non-genuine Windows across various offices. The significance of file backup procedures was reiterated, with trainees honing their skills in creating and maintaining backups to mitigate the risk of data loss. System formatting and reinstallation protocols were comprehensively covered, including meticulous steps such as data erasure and drive partitioning if deemed necessary. By day's end, three desktop computers, including a Pentium R PC, were proficiently restored to full functionality. These ongoing activities not only furnished invaluable practical experience but also substantially bolstered the agency's IT skill, ensuring seamless operational continuity.

On Day 7 of the assignment, we completed the hardware maintenance and repair of all the desktop computers deemed reparable. Working closely with the NEA IT support Technicians, we successfully addressed issues with three computers. One of the machines encountered a Power Supply Unit (PSU) problem, which we managed to resolve by cutting and extending the cable for easy mounting on the Motherboard. However, several other computers were deemed too old and beyond repair, prompting our recommendation for their disposal. During the final two hours of the day, we shifted our focus to the two Dell Tower Servers. We meticulously opened and cleaned them using a vacuum blower, ensuring their optimal functioning. Work on the servers will continue tomorrow as we strive to maintain and enhance the efficiency of the agency's IT infrastructure.

On Day 8 of the assignment, our technical training was centered on addressing issues with the two Dell servers, specifically the Dell PowerEdge T320 and Dell PowerEdge T430. Unfortunately, our efforts to bring them into production were hindered by hard disk failures. Despite our diagnostic efforts, the systems failed to detect hard disk memory during attempts to install Windows Server operating systems, including Windows Server 2016 and 2019. As a result, the installation process remained unsuccessful. However, we remain committed to resolving this issue and bringing the servers into operational status. Tomorrow, we plan to explore alternative techniques and solutions in our ongoing efforts to overcome these challenges and ensure the functionality and reliability of the agency's IT infrastructure.

On Day 9 of the assignment, our efforts to resolve the issues with the servers yielded successful results. We managed to successfully install Windows Server 2019 Datacenter version on the HP ProLiant ML110 G7, Dell PowerEdge T320, and Dell PowerEdge T430. Through perseverance and diligent troubleshooting, we were able to overcome the challenges previously encountered and bring these critical components of the agency's IT infrastructure into operational status. This achievement marks a significant milestone in our ongoing efforts to ensure the functionality and reliability of the agency's systems. We remain committed to maintaining the performance and efficiency of the servers as we continue the hands -on training and maintenance activities with the IT support team of NEA.

On Day 10 of the assignment, we conducted a comprehensive assessment of the organization's network infrastructure, focusing on both the LAN and Wireless LAN networks. Our objective was to identify problem areas such as weak signal strength or areas with no signal at all, as well as instances where the internet connection was not evenly distributed throughout the premises. Through thorough analysis and testing, we sought to determine the root causes of these issues and develop strategies to improve network performance and connectivity. Additionally, we dedicated time to activating all the computers in the GIS training Lab with Genuine Windows 10 licenses, ensuring compliance and optimal functionality of the software. By addressing these aspects of the organization's IT infrastructure, we aim to enhance efficiency, reliability, and overall user experience for employees across the organization.

On Day 11 of the assignment, we embarked on a comprehensive overhaul of the IT room to optimize efficiency and organization. This involved cleaning and rearranging the server rack, ensuring that all equipment was neatly arranged for easy access and maintenance. Additionally, we meticulously organized all patch cables, connecting them to the switch in a systematic manner to minimize clutter and enhance connectivity. As part of our efforts to streamline operations, we consolidated all switches and servers into a single 27U rack, facilitating easier management and maintenance of the network infrastructure. Furthermore, we prepared for disposal all old desktop computers and laptops that were deemed beyond repair or maintenance, as well as the old 6U rack. By decluttering the IT room and ensuring proper disposal of obsolete equipment, we aim to create a more efficient and functional workspace that supports the organization's IT needs effectively.

On Day 12 of the assignment, we replicated our efforts to optimize the IT infrastructure, this time focusing on the Agency's main Server Room located on the ground floor. Our tasks included cleaning and rearranging the server rack to ensure optimal functionality and accessibility. We meticulously organized all patch cables, connecting them to the switch in an orderly fashion to streamline connectivity and reduce clutter. Additionally, we consolidated all switches into a 6U rack, enhancing space utilization and facilitating easier management. Concurrently, we prepared for disposal all outdated desktop computers and laptops that were deemed irreparable or beyond maintenance. However, during our assessment, we discovered a significant issue with the Server Room's location: it is situated under a toilet, leading to water leakage and subsequent dampness. This condition poses a severe risk to the valuable IT equipment, causing rusting and potential damage. Addressing this issue is crucial to safeguarding the integrity and functionality of the IT infrastructure.

On Day 13 of the assignment, we conducted an in-depth analysis of the agency's internet bandwidth in relation to the staff population and the number of connected devices on the network. This assessment allowed us to make informed decisions regarding the optimal bandwidth required for the agency, considering both performance needs and cost-effectiveness given the available resources. By evaluating current usage patterns and potential future growth, we aimed to recommend a bandwidth allocation that would support the agency's operations efficiently without overspending. In the latter part of the day, we continued with hands-on training sessions, focusing on equipping the IT support technicians with essential skills in network cable creation and crimping. We covered various categories of network cables, including Straight-through Cables, Cross-Over Cables, etc., and provided practical demonstrations on their construction and usage in different network configurations. By empowering the technicians with these skills, we aimed to enhance their capabilities in maintaining and troubleshooting the agency's network infrastructure effectively.

On Day 14 of the assignment, we maintained our focus on hands-on training sessions, ensuring that the technicians are thoroughly equipped and proficient in the necessary techniques for effective IT support and maintenance. With all servers now successfully installed with Windows Server 2019 Standard and Datacenter operating systems, we have established a solid foundation for the next phase of our project. This progress enables the finance department to proceed with the installation of the Sage 300 Accounting Software solution. To facilitate this process, we have provided remote login access to the vendor, allowing them to perform the necessary installation and configuration tasks efficiently. Additionally, we have designated one of the servers for data backup purposes, ensuring the security and integrity of the agency's critical data. Furthermore, this server will serve as the host for the agency's Biometric Time Attendance system, providing a centralized and reliable platform for managing employee attendance records. By allocating resources strategically and leveraging technology effectively, we aim to enhance the agency's operational efficiency and facilitate seamless workflow processes.

On Day 15, our team-initiated work on the HP DesignJet Z6200 Map Printer located in the GIS center at the Intersectoral Network (ISN) Department. The primary objective was to diagnose and troubleshoot the printer to identify the underlying cause of the issue affecting its functionality. Through meticulous examination and testing, we aimed to pinpoint any technical glitches or mechanical failures that might be impeding the printer's performance. This process involved inspecting various components, analyzing error messages, and conducting tests to isolate the root cause effectively. By addressing the printer's issues promptly and accurately, we aimed to restore it to full functionality, ensuring that the GIS center could continue its critical operations without disruption. Day 15's activities underscore our commitment to providing timely and effective technical support, thereby contributing to the smooth functioning of NEA's IT infrastructure and supporting its organizational objectives.

On Day 16, the team continued hands-on technical training with IT support staff, focusing on diagnosing issues with the HP DesignJet Z6200 printer. It was discovered that the printer's cartridges had expired, and both the printheads and Carriage Belt were entirely broken. Urgent replacement of these components is crucial for the printer to regain functionality. The training session provided an opportunity to demonstrate how to identify and troubleshoot hardware issues effectively. Additionally, it underscored the importance of regular maintenance and monitoring to prevent such issues in the future. By addressing these hardware issues promptly, the team aimed to ensure the smooth operation of the printer, supporting the GIS center's ongoing activities within the Intersectoral Network (ISN) Department. Day 16's activities exemplify the team's dedication to equipping IT support staff with the skills and knowledge necessary to address technical challenges efficiently and maintain critical equipment effectively.

On Day 17, the team began addressing issues with the HP DesignJet Z6200 Map Printer located in the Media Printing Room at the Extension Site Department. The primary objective was to diagnose and troubleshoot the printer to determine the underlying cause of its malfunction. Through systematic examination and testing, the team aimed to identify any technical glitches or mechanical failures affecting the printer's performance. This process involved inspecting various components, analyzing error messages, and conducting tests to isolate the root cause effectively. By diligently investigating the printer's issues, the team sought to implement timely and appropriate solutions to restore its functionality. Addressing these issues promptly is crucial to ensure uninterrupted printing services at the Extension Site Department, supporting the organization's operational needs.

On Day 18, the team identified that the HP DesignJet Z6200 Map Printer had accumulated dust due to prolonged disuse. Technicians promptly conducted thorough cleaning to address errors displayed on the printer's dashboard. This comprehensive maintenance ensured the printer's functionality was fully restored. By addressing the issue of dust accumulation, the team mitigated potential damage and prolonged downtime, ensuring the printer's reliability for future use. Day 18's activities demonstrate the team's proactive approach to maintenance, highlighting their commitment to preserving equipment functionality and preventing issues caused by neglect. This proactive maintenance approach contributes to the smooth operation of essential equipment, supporting the organization's operational efficiency and minimizing disruptions to workflow.

On Day 19, the team oversaw hands-on practical sessions, focusing on repairing the HP Color LaserJet Enterprise MFP M680 located in the Media Center. Additionally, successful repairs were conducted on other printers, including the HP LaserJet P3015, HP Color LaserJet CP1215, and HP LaserJet P2055. Through these sessions, the team addressed various technical issues and malfunctions, ensuring the proper functionality of the printers. This hands-on approach not only resolved immediate issues but also provided valuable training opportunities for IT support staff, enhancing their skills in printer maintenance and repair. By effectively repairing multiple printers in the Media Center, the team contributed to maintaining uninterrupted printing services, supporting the smooth operation of activities in the Media Center and other departments relying on these devices.

On Day 20, the team diligently engaged in hands-on practical sessions focused on repairing specific printers: the HP LaserJet Enterprise MFP M725, HP LaserJet MFP 177fw, and HP LaserJet Pro MFP M277n. The primary objective was to diagnose and address issues unique to each printer model, ensuring their proper functionality. This practical training initiative aimed to enhance the technical skills of the IT support staff, fostering expertise in printer maintenance and repair. By focusing on diagnosing and resolving issues within each printer model, the team aimed to equip staff with the knowledge and skills needed to handle similar challenges efficiently in the future. This proactive approach not only addressed immediate issues but also contributed to the ongoing development of the IT support team, strengthening their capacity to maintain and troubleshoot printers effectively.

On Day 21, the team undertook crucial preparatory tasks for the network upgrade at NEA. A comprehensive list of required equipment was compiled, prioritizing essential components like Z6200 cartridges and printheads for printers. This meticulous planning ensures that the upgrade process will proceed smoothly and efficiently. By identifying specific needs and ensuring the availability of necessary supplies in advance, potential delays or setbacks in the upgrade project can be minimized. Moreover, this proactive approach reflects a commitment to thorough preparation and attention to detail, aligning with the overarching goal of enhancing NEA's network infrastructure. The focus on essential printer components highlights the team's dedication to addressing specific requirements and optimizing the functionality of critical equipment within the organization.

On Day 22, the team continued its efforts to enhance NEA's network infrastructure by focusing on prioritizing equipment for the upgrade. Understanding the critical role of reliable internet connectivity in facilitating agency operations, we accurately assessed current requirements and identified essential components needed for the upgrade. This involved careful consideration of factors such as bandwidth capacity, network security measures, and scalability to accommodate future growth. Additionally, we took proactive steps to solicit quotations from reputable vendors, ensuring that we procure quality equipment at competitive prices. By engaging in thorough preparation and strategic decision-making, we aim to lay a solid foundation for enhancing agency network performance and reliability. Day 22's activities underscore our commitment to optimizing NEA's technological capabilities and supporting its mission with robust and efficient network infrastructure.

On Day 23, our primary focus was dedicated to comprehensive report writing, encapsulating all activities undertaken since the assignment's inception. This included detailed documentation of technical hands-on training sessions, equipment assessments, repairs, and network infrastructure upgrades. With meticulous attention to detail, we compiled a thorough account of the progress, outcomes, and insights gleaned from these endeavors. By documenting our efforts comprehensively, we aim to provide stakeholders with a clear understanding of the project's trajectory, achievements, and areas for further improvement. This report serves as a valuable resource for evaluating the effectiveness of our strategies, informing decision-making processes, and guiding future initiatives aimed at enhancing NEA's IT capabilities. Day 23's activities highlight our commitment to transparency, accountability, and continuous improvement in supporting NEA's mission through strategic IT interventions.

On Day 24, our emphasis remained on report writing, as we diligently continued documenting all activities conducted since the project's inception. This included meticulously detailing technical hands-on training sessions and other interventions implemented throughout the project duration. Our commitment to this process ensured that we comprehensively captured the progress made and insights gained at every stage of the project. By maintaining a focus on documentation, we aimed to provide stakeholders with a clear and transparent account of our efforts, outcomes, and the impact of our interventions. This dedication to thorough reporting serves not only to record our achievements but also to inform future decision-making processes and support ongoing efforts to enhance NEA's IT infrastructure. Day 24's activities underscore our commitment to accountability, transparency, and continuous improvement in advancing NEA's technological capabilities.

On Day 25, our focus shifted towards finalizing the comprehensive project report, encompassing all activities undertaken, including technical hands-on training sessions. With meticulous attention to detail, we compiled and structured the report to provide a clear and comprehensive overview of our efforts throughout the project duration. Following the completion of the report, we submitted it to the Technical/Team Lead for thorough review, ensuring accuracy, coherence, and completeness before dissemination to stakeholders. This rigorous review process aimed to guarantee that the report effectively captured the project's objectives, methodologies, outcomes, and insights gained. By finalizing and submitting the report, we aimed to communicate the project's achievements and impact transparently and effectively, thereby facilitating informed decision-making and future planning processes within NEA. Day 25's activities underscore our commitment to professionalism, accountability, and delivering high-quality results in support of NEA's IT goals and objectives.

8.3. Annex 3: People Trained

i. Mr. Eliman Saloum Sock
ii. Mr. Modou Lamin Sanneh

8.4. Annex 4: Training materials

8.4.1. Ebooks:

i. CompTia A+
ii. Windows Server 2016 Administration

8.4.2. Hardware Training Syllabus and Outline

This timetable emphasizes practical, hands-on learning experiences, allowing IT Support Staff to apply theoretical knowledge directly to real-world scenarios and develop essential troubleshooting and repair skills.

Day 1-2: Introduction to Hardware & Software
- Basic Introduction About Hardware & Software
- Understanding Operating Systems: Editions, Requirements, Types of Installation, Driver Installation
- Hands-on: Installing Windows 10, 11, and Server 2019 Datacenter

Day 3-4: Hardware Devices & Troubleshooting
- Understanding Hardware Devices: SMPS, RAM & ROM, Hard Disk, Motherboard, Processor
- Hands-on: Troubleshooting hardware issues

Day 5-6: System Assembly & Disassembly
- System Assembly & Disassembly Techniques
- Hands-on: Assembling and Disassembling systems

Day 7-8: Data Backup & RAID Configuration
- System Image Backup & Types of Data Backup
- Introduction to RAID Configuration
- Hands-on: Configuring RAID setups

Day 9-10: Dual OS Installation & Computer Peripherals
- Dual OS Installation
- Understanding Computer Peripherals: Input and Output Devices, SMPS
- Hands-on: Dual OS Installation practice

Day 11-12: Motherboard & Memory
- Understanding Motherboard: Types, Form Factor, BUS, Chipset, CMOS
- Memory: Types, Modules, RAM Development
- Hands-on: Motherboard and Memory troubleshooting exercises

Day 13-14: Hard Disk & Processor
- Hard Disk: Type, File Systems, Components
- Processor: Type, Cache, Cores Information
- Hands-on: Hard Disk and Processor diagnostics and repair

Day 15-16: Printers Repair & Component Management

- Repairing Printers
- Assembling and Disassembling Components
- Component Upgrade Techniques
- Hands-on: Printer repair and component management practice

Day 17-18: Troubleshooting Techniques & Review

- Advanced Troubleshooting Techniques
- Review of all topics covered
- Hands-on: Comprehensive troubleshooting scenarios

Day 19-20: Final Project & Assessment

- Final hands-on project: Participants diagnose and solve real-world hardware and networking problems
- Hands-on Network cable crimping

8.5. Annex 5: Any other materials, lists, reports, etc. prepared

8.5.1. IT Equipment Inventory

NEA_IT_Equipment-Inventory_2024.xlsx

8.5.2. List of Repaired Computers

1) HP
Desktop-MTRA1SQ
Processor Intel(R) Core(TM)i7
RAM 12.0GB
Hard Drive 1.81 TB

2)Dell
Desktop-J8A5HM7
Intel core i5
RAM 8G
HARD DRIVE 1.8 TB

3) Dell
Desktop-EQ55Q8H
Intel core i3
RAM 4G
Hard Drive 1 TB

4) Printer
HP Color Laserjet Pro MFP M177

5) HP
DESKTOP-Q2QSPFP
INTEL(R) Core i7
RAM 12 GB
Hard Drive 1.8 TB

6) HP
DESKTOP
INTEL Core i7
RAM 12 GB
Hard Drive 1.8 TB

7) DELL
DESKTOP-L1MFM46
Intel Pentium (R)
RAM 4G
Hard Drive 465G

8) DELL
DESKTOP-6D93I16
Pentium (R) Doul Core
RAM 2G
Hard Drive 148GB

9) HP
DESKTOP-UTJK2T6
Intel Core i3
RAM 8G
Hard Drive 930G

10) DELL PowerEdge T430 (Server)
Core (R)
RAM 32 GB
Hard Drive 4 TB

11) DELL PowerEdge T320 (Server)
Core (R)
RAM 16 GB
Hard Drive 3 TB

12) HP ProLiant ML110 G7 (Server)
Core (R)
RAM 16 GB
Hard Drive 2 TB

13) HP
DESKTOP-BA0CNK7
Intel Core i7
RAM 8 GB
Hard Drive 1 TB

14) HP
DESKTOP-RACNEKP
Intel Core i7
RAM 4 GB
Hard Drive T GB

15) HP
DESKTOP-E73HP1B
Intel Core i7
RAM 12 GB
Hard Drive 1 TB

16) HP
DESKTOP-GS3KNAB
Intel Core i3
RAM 4 GB
Hard Drive 465 GB

17) HP
DESKTOP-94IQR43
Intel Core i7
RAM 12 GB
Hard Drive 1 TB

18) HP
DESKTOP-CCMB1P7
Intel Core i7
RAM 12 GB
Hard Drive 1 TB

19) DELL
DESKTOP-556457Q
Intel Core i5
RAM 8 GB
Hard Drive 1 TB

8.5.3. List of Repaired Printers

i. **HP LaserJet P3015**

ii. **HP LaserJet P2055**

iii. **HP LaserJet CP1215**

iv. **HP LaserJet MFP 177fw**

v. **HP LaserJet Pro MFP M277n**

vi. **HP LaserJet Enterprise MFP M725**

vii. **HP DesignJet Z6200**

viii. **HP DesignJet Z6200**

ix. **HP Color Laserjet Pro MFP M177**