

## Consolidation of network administration

Report from a short-term mission

January 12<sup>th</sup> – 24<sup>th</sup> 2004

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Instituto Nacional de Estatística

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## **1 EXECUTIVE SUMMARY**

This mission follows the one in May 2003 about network administration and security policies. This mission implemented further security measures and adds recommendations on how to proceed with the security policy. A large number of activities were carried out and a number of changes to the network were implemented.

Intermittent problems with access to the webmail system were analysed and led to a number of considerations regarding the choice of Internet Service Provider. This choice is critical to INE, as a number of initiatives rely on having a reliable and professional provider. Webmail, local networks at the DPINEs, Internet publishing are the prominent examples of projects that need a good internet connection in order to succeed.

Three provincial offices were visited: Maputo Cidade, Maputo Provincia and Gaza.

The migration of the server platform from NT to a newer version of Windows was discussed and a draft migration plan formulated.

Adding local networks at DPINEs was discussed and a draft plan to implement a pilot network at Maputo Cidade was formulated.

Training in network administration tasks was provided throughout the mission.

## **2 INTRODUCTION**

The Mission was carried out 12 – 24 January 2004 in Maputo.

The consultants would like to express their thanks to all officials and individuals met for their kind support and valuable information. In particular they would thank their counterparts in INE, the network administration staff, Mr. Salomão Muianga and Mr. Pedro Miambo for their preparation of a program which facilitated the work of the consultants.

In May 2003, a short-time mission formulated a draft Security Policy. This policy has been discussed within INE in the time elapsed since that mission, and a number of policies are now ready to be implemented. During this mission some policies were implemented, and recommendations on other policies were formulated.

A conservative upgrade policy has been decided within INE. The central servers at INE is running the Windows NT Server operating system, and support for this system will soon be terminated by Microsoft. Because of this, and since new applications increasingly will depend on more modern operating systems, it is necessary to decide an upgrade plan for INE, so that migration to a newer version of can be effected as soon as possible and in early 2005 at the latest.

A plan has been formulated to connect a provincial statistical office with the main INE in Maputo. The different possibilities to provide connectivity from the DPINE to INE were discussed during this mission, and a visit was paid to the DPINEs Maputo Cidade and Maputo Província.

A working meeting was conducted in Xai Xai, the capital of the Gaza Province. During the meeting, security policies were discussed with staff of the Gaza DPINE. The installations of LAN and Internet at the provinces were also discussed with Gaza DPINE staff.

The list of recommendation from the earlier mission in May 2003 was evaluated.

The Internet connection at INE is provided by Netcabo, and the technology is using Cable TV infrastructure to connect INE with Netcabo. The solution has worked since it was installed in September 2002. However some problems exist. First, the connection fails on a nearly daily basis, and the problems can only be alleviated by turning off the cable modem and then on again. Furthermore, the connection from the outside of INE to the webmail solution implemented in May 2003 sometimes fails. The problems were investigated and solutions discussed.

During the period since the short-time mission in May 2003, a number of discussions have taken place between the consultants and long term Consultant Mogens Grossen Nielsen, regarding the initiatives needed to ensure a well functioning network at INE. These have lead to the formulation of the Terms of Reference for the mission as attached as ANNEX 1 of this report.

### **3 ACTIVITIES DURING THE MISSION**

The mission included a number of activities.

- Installation and documentation of new backup tape device. The backup device was installed and put into regular use. The backup procedures were revised and documented.
- Evaluation/discussion about DPINE LAN, including a visit to DPINEs at Maputo Cidade, Maputo Provincia, Gaza. Several possible solutions for the DPINE LAN were discussed. See recommendation JAN-REC-07.
- Diagnosis of problems with Web-mail access. Webmail access from the outside of INE is very slow if the user is situated at a client connected to any other ISP than Netcabo. See recommendation JAN-REC-08.
- Review of firewall configuration and status for update of externally exposed systems. The setup of the firewall was discussed and reviewed. The externally exposed systems were updated and procedures established for doing this on a regular basis.
- Mirroring of the disk in the proxy server. The disk was mirrored and documentation prepared to show how to recover from breakdowns of the primary disk.
- Logging of internet downtime. Internet downtime is now constantly monitored. The data on downtime can be inspected and interpreted on a regular basis. See recommendation MAY-REC-27.
- Discussion/implementation of external mail backup. In case of breakdowns of the INE mail system, it is desirable to be able to collect incoming mail to INE at a location external to INE. Netcabo provides a service called Volume Box that can be used for this purpose. The solution was not implemented but can be done so with few problems in coming weeks. If implementation is decided, it should be carried out in cooperation with the consultants at Statistics Denmark. See recommendation MAY-REC-9.
- Evaluation of stability problems with cable modem. The cable modem has had stability problems for a long time, which until now has been resolved by restarting the modem. During this mission the problem has not occurred. In the future, each breakdown must be reported to Netcabo, the ISP.
- Add dedicated account for running services. An account was added for running server services such as Exchange. As a result, the ordinary Administrator account can have its password changed regularly without disrupting services.
- Discussion of structure of centrally stored data. See recommendation JAN-REC-15.
- Suggest tasks that need to be carried out on a recurring (daily, weekly, monthly) basis. A number of tasks were provided as a starting point. These tasks will be described in the manual about organisation and organisation of the network administration at INE. See recommendation JAN-REC-16
- Prepare annex to operation manual with draft description of back up procedures.
- Prepare annex to operation manual with draft description of disaster recovery procedures. This activity was not carried out in full because of lack of time. The disaster recovery plan should be based on storing copies of backup data and documentation offsite. The central bank is a good candidate as a reliable site for storing data and documentation.
- Discussion and possible implementation of upgrade of hubs to switches. In the server room, the physical network was upgraded from using hubs to using switches. As a result, the servers have much more data transfer capacity.
- Prepare preliminary plan for the migration from Windows NT. In Xai Xai the migration was discussed and subsequently a preliminary plan formulated.

- Follow up on recommendations from the mission in May 2003.
- Training (classes and on-the-job-training). Training was conducted throughout the mission.
- Meeting with the president. On Monday January 18, the mission was discussed with the president.
- Work visit in Xai Xai in the Gaza province. The DPINE at Gaza was visited on Wednesday 20. January.
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## 4 CONCLUSIONS AND RECOMMENDATIONS

In the network administration mission in May 2003, the final report gave a number of recommendations.

The status for these recommendations has been evaluated during this mission, and a number of new recommendations have been formulated. The new recommendations fall in two categories: General recommendations and recommendations regarding security.

### 4.1 Follow up on recommendations from May 2003

The recommendations from May and the updated comments are cited below.

#### Comments on recommendations from Network mission in may 2003.

ID:	Description	Status and comments
MAY-REC 1	Maintain conservative upgrade strategy	The conservative upgrade strategy is still valid. Upgrading should only take place when it is really needed. However, it is now necessary to upgrade the NT infrastructure at INE. New software will increasingly rely on newer server software and NT will not be supported by an increasing proportion of new hardware. The new platform should be based on Windows Server 2003, as this version is new, very reliable and very secure.
MAY-REC 2	Staffing at the Network Administration	The Network Administration at INE now consists of two persons. It is recommended that one more person be added in order to keep the network operating and evolving in the coming years. The persons working in Network Administration should use an increasing proportion of their time on adding competence and knowledge about Networks and IT. New systems are more capable than old ones, but require a higher level of education of the persons working with the systems.
MAY-REC 5	Prepare disaster recovery plan	A disaster recover plan has not yet been prepared, but it is recommended that such a plan is prepared and implemented. Backup copies of central data should be kept at another location, perhaps at the Central Bank
MAY-REC 9	External mail backup	This has not been implemented. It is still a good idea, especially since power supply in Maputo sometimes is gone for many hours. This can have the result that sender of mail to INE receives an error message saying that INE cannot be contacted. If mail backup is implemented, this will not occur, because mail is stored temporarily at the ISP
MAY-REC 26	Reboot cable modem	The Netcabo cable modem has been unstable for long periods. When there is a problem it can be alleviated by turning off the modem and then on again. When this occurs in the future, Netcabo

		should be contacted before anything is done with the modem in order to allow Netcabo to troubleshoot the problem. Each such episode should be recorded in order to document the problem properly
MAY-REC 27	Reporting	A system recording Internet downtime was implemented during this mission. The information should be analyzed and aggregated regularly. The usage of disk storage and web traffic should also be analyzed regularly. The manual about reporting was updated and need to be completed and translated into Portuguese.

## 4.2 General recommendations

During this mission several new general recommendations have evolved. These general recommendations are given in the table below.

**Recommendations from mission in January 2004**

ID:	Description	Status and comments
JAN-REC-01	Modernize old workstations	INE has a number of old workstations running older versions of Windows (Windows 95, 98). These workstations should be replaced with more modern ones, preferably running Windows XP.
JAN-REC-02	Add more backup tapes	In order to have smooth operation of the new backup solution, more tapes should be added.
JAN-REC-03	Only store INE relevant data at INE equipment	It is recommended that only INE relevant data be allowed on equipment belonging to INE. Storing other data, such as video, music etc. should be banned. – <should the policy be changed? How to implement?>
JAN-REC-04	Upgrade physical network	The physical network at the server room was upgraded from hubs to switches during this mission. It is recommended that the hubs used in the local wiring closets in the other floors of INE be upgraded to switches. One such switch is already available for installation.
JAN-REC-05	Add knowledge about Microsoft Exchange	The mail system at INE is a very critical IT resource. It is recommended that the network administration staff be given training in installation configuration and maintenance of Microsoft Exchange.
JAN-REC-06	Centralize software installation	In order to assure reliable workstation operation, end users should not be allowed to install software. End users should not be given administrative rights on their workstations. Only the network administration staff should install software.
JAN-REC-0	Store central files in a structured way	
JAN-REC-07	Establish local network at Maputo Cidade as a pilot	It is recommended that INE installs a local network at the DPINE in Maputo Cidade in order to get experience. It is recommended that the local network is kept very simple in order to avoid the need for local support. A wireless local network is recommended. This network can be connected to the internet by a cheap wireless router. Only simple loose connectivity to INE should be chosen. Use only webmail for contact between persons and only use WebDAV for transferring files to/from DPINE to INE central.
JAN-REC-08	Analyze possible ISPs	The choice of ISP is critical to INEs internet connection in general and to the following projects in particular: a) Establishing local networks at the DPINEs, b) Access to webmail,

	c) Establishing internet publishing and d) the use of Content management systems.  It is recommended that INE analyzes the ISP market in Mozambique with special attention to: Which parts of Mozambique does the ISP cover?, How does the ISP interconnect with other ISPs?, What capacity can the ISP deliver in terms of download/upload?.
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### 4.3 Recommendations regarding security

As the security area was given special focus during this mission, a number of recommendations are formulated in this area.

**Security recommendations from mission in January 2004**

ID:	Reference to security policy number	Description	Status and comments
JAN-REC-9	4.2 Management of access to the network	Add procedures for managing the user accounts	It is important that the set of users of the network reflect the organization at INE at all times. New user accounts should be added when new personnel are hired; user accounts should be modified when users move inside the INE organization, and user accounts should be deleted when personnel leave INE.
JAN-REC-10	4.2 Management of access to the network	Use personal normal and administrative accounts for daily work	It is important that administrators only have administrative privileges when administrative tasks are to be performed. Other work should be carried out from a normal user account. Each administrator user should have a personal account with administrative privileges and a normal user account for ordinary work.
JAN-REC-11	4.3 Management of passwords	Implement password policy	The policy states "Passwords must consist of at least 6 characters, 3 of which should be numeric. Passwords must be changed at least 4 times a year." In Windows, this can only be approximated by requiring "complex passwords". Complex passwords must consist of both numeric alphabetical and special characters. It is recommended that complex passwords are required and that change of passwords every 90 days is required. The users should be informed well ahead of the implementation.
JAN-REC-12	4.4 Monitoring of access and use of the system	Log access to systems	In order to monitor access to the systems, it is necessary to log user activity. The login/logout events of users should be logged, but logging file activity is very resource consuming and generates an extreme amount of useless log material. Logging login/logout events is recommended and logging file activity is not recommended.
JAN-REC-13	4.5 Use of UPS	UPS capacity should be increased	The server equipment has UPS capacity for approximately 10 minutes. It is recommended that capacity be added so that servers can run for about 30 minutes without external power. This will ensure a much smoother operation of servers as a much larger proportion of power outages will not require the servers to shutdown. If it is decided to run the Content Management System and Internet publishing inhouse, it is recommended that a generator be installed in order to secure

			uninterrupted operation of the website
JAN-REC-14	4.6 Use of removable storing devices	Removable media should be disabled on workstations	Removable media, such as floppies, CD-roms, USB attached drives can be used to copy unauthorized data to and from the system. Consequently, access to such media should be extremely limited and disabled for all others.
JAN-REC-15	4.7 Rules for storing of data	Store central files in a structured way	<p>It is recommended that files that are stored centrally be placed in a structured way in order to be able to find data easily. Such a structure is already partly implemented, but it is recommended that drive letters be assigned according to the following principle:</p> <p>V: denotes the department level such as DISI, other department, management etc. Access rights should be assigned such that only members of the department can read, write files.</p> <p>T: denotes each user's home directory for files that only have relevance for her/him. These files should be accessible only to the owner.</p> <p>H: denotes common data accessible to all INE users.</p> <p>E: should be used for storing of files that are needed across department boundaries. Each project has a directory on this drive. "Escandinavo" is an example. Members are scattered across department boundaries but need access to an area with administrative data.</p>
JAN-REC-16	4.8 Operation according to documented procedures	Update operation manual and prepare maintenance documentation for all systems	
JAN-REC-17	4.9 Protection of the network against attacks like virus, hackers etc	Store important data centrally	It is recommended that all-important data is stored centrally in the servers. This insures that the data is backed up and can be restored in case of disasters. It also ensures that access to data is only granted to employees that need it for their work.
JAN-REC-18	4.10 Management of backup	Sets of backup media should be stored offsite in order to facilitate recovery after a disaster	Procedures should be implemented in order to move backup-media to another location regularly. The Central Bank has been proposed as a location.
JAN-REC-19	4.14 Physical access to the	Physical access to server room	It is recommended that physical security be tightened at the server room. This is necessary in order to secure the centrally stored data and the

	server room	<p>central components of the network. A strong door should be installed with a card reader based lock. A card reader based lock is better than a traditional lock, because lost cards can be disabled as opposed to lost keys. The set of active cards are easily managed by the network administration staff. The window in the server room should be secured by bars or by cancelling the window altogether.</p>
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## **ANNEX 1 Terms of Reference for the mission**

**TERMS OF REFERENCE  
for a short-term mission  
on  
Consolidation of network administration**

**12 – 23 January 2004**

within the Scandinavian Assistance to Strengthen the Institutional Capacity of INE/Mozambique

*Consultants:* Niels Jespersen and Bo Guldager

*Counterparts:* Salomão Muianga and Pedro Miambo

### **D R A F T**

#### **Background**

This short-term mission is part of a broader task about creating a well-functioning network administration at INE. This task includes hiring extra personnel, developing problem-solving guides etc. INE is now in a much better position. New staff has been hired. The staff is attending courses about network administration. Consolidations of existing routines are taking place etc.

However there are still areas that need attention:

- For the time being the implementation of security policies must be prioritised. This includes policies about monitoring access to the system, central storage and backup of data etc. Because of not allowing diskette stations in the workstations we must investigate and give training in how to do remote maintenance of the PC's at INE.
- Further the migration from Windows NT Server to Windows 2000 Server will be an important task in 2004. Discussion on how to carry out this migration must be started and a preliminary plan must be prepared. Note: The upgrading of operating systems at work station is done on a day-to-day basis. Most workstations have windows 2000 installed some have older or newer versions.
- The test-installation of LAN at the provincial level must also be evaluated.
- Another important task related to infrastructure is the coming use of Internet. Recommendations in this area are expected to be ready by the end of the year. The mission must give recommendations on how to support the Internet information architecture.
- Besides the areas mentioned above the short-term mission should follow up on recommendations in the mission from May 2003. See annex A.
- Problem about how to handle backup because of increasing amounts of data
- Upgrading of hubs from 10 Mbit to 100 Mbit (Planning and possibly implementation)
- When installing new hardware and software training must be given special attention. It is important that the staff have confidence in installing and in operating the systems.

#### **Purpose of the mission**

- Implementation of security in order to reach the objectives for implementation of security in the IT-strategy for SEN.

- Creation of an up-to-date basic infrastructure using newer versions windows for operative systems, in order to ensure flexible, scalable systems that are easy to maintain. The infrastructure must take into account the plan for using Internet.
- Follow up on recommendation in order to follow the process.
- The existing and new staff at INE should be able to maintain and extend the installation after courses and on-the-job-training. The experienced staff should also be able to train new staff using the course material.

## **Expected results**

- 1) Course material
- 2) Implemented solution in selected areas including policies and documentation (end user, operation and installation according to standards)
- 3) Preliminary plan for the migration from Windows NT to Windows 2000
- 4) Staff trained in a) IT-infrastructure and network administration in general b) security in general and how to implement specific security solutions.
- 5) Mission report

Creation of a test/production environment must be considered in order to ensure test of applications but also in order to give DISI staff access to an environment where to do experiments and learn about for example installation and testing of web-mail.

## **Activities**

1. Detailed planning and prioritization
2. Evaluation of the test of network installation in the provinces, including discussions about using fiber optic, Internet access.
3. Courses, on-the-job-training and implementation of selected solution at the following areas:
  - General infrastructure and network administration, including information about Internet and information about win 2000 win 2003
  - Security. The following policies must be included: 1.2 Operation of the network, 4.4 Monitoring access of the system, 4.8 Operation according to documented procedures, 4.9 Rules for storing of data, 4.10 Back-up, 4.11 Disaster recovery plan. As part of the mission the policies must be either implemented or the mission report must include recommendation about how to implement the policy.
4. Writing of mission report and evaluation

## **Tasks to be done by INE to facilitate the mission**

- Elaborate ToR for the mission
- Prepare and supply the consultant with necessary documents and information
- Supply good working conditions for the consultant

## **Consultant and Counterpart**

Consultant:

Niels Jespersen and Bo Guldager from Statistics Denmark

Main counterparts:

Salomão Muianga and Pedro Miambó

## **Timing of the mission**

Two weeks (January 12 – January 23, 2004).

**Report**

The consultant will prepare a draft report to be discussed with INE before leaving Maputo. He will submit a final draft to INE for final comments within one week of the end of the mission. Statistics Denmark as Lead Party will print the final version within 3 weeks of the end of the mission.

*These Terms of Reference were prepared by*

Day / / .....

*Approved by/in the name of the President of INE*

Day / / .....

## **ANNEX 2 Persons met during the mission**

- Dr. João Dias Loureiro, Presidente do INE.
- Ms. Anastásia Judas Honwana, Head of IT.
- Mr. Salomão Muianga, Network Manager.
- Mr. Pedro Miambo, Deputy Network Manager
- Mr. Joao Chauque, Programmer
- Ms. Maria Alice Chiponde, Delegada, Gaza Provincia.
- Mr. Hans Erik Altvall, Consultant, Coordinator.
- Mr. Mogens Grossen Nielsen, Consultant
- Mr. Arnaldo Silva, Director, Netcabo
- Mr. Rogeiro Lam, Consultant, Value for You
- Mr. Alfredo Veiga, Consultant, Intra