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## Final Report from the long term consultant on IT

### Final Observations and recommendations

### TA for the Scandinavian Support Program to Strengthen the Institutional Capacity of the National Statistics, Mozambique

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## Final observations and recommendations

### Executive summary

This report contains my observations and advices based on my stay at INE from September 2002 to August 2004. In general the use of IT shows major progress - especially the development related to Internet. INE now has a permanent Internet connection. It is possible for the staff at INE to search information worldwide and receive/send mail using worldwide accessible mail accounts. These types of access to the Internet were given to the staff at the provincial offices via the installation of Wireless Local Area Network in 2004. In 2004 INE also made a complete renovation of INE's web page. A so-called Portal solution including a content management system was introduced. Dynamic access to databases with statistical data using a simple web-based tool (PX-Web) is integrated in the Portal solution.

In order to continue the progress the following recommendation are given:

- The IT-strategy and IT-policies have been object for discussions at INE and are already the basis for ongoing development work on the IT-area. The documents have however still to be formally approved by the top management.
- In the coming years there should be follow up visits to provinces in order to stimulate and inform about the use of the network. Furthermore open issues about security etc should be discussed and implemented.
- IT polices should be implemented. Some policies need special attention in the coming years. These are the policies about central storing and backup of data, the policy about disaster recovery plan and the policy directed at description of procedures i.e. the operation manual and maintenance documentation should be finalized.
- In addition to the technical evaluation of the PX-Web it will be a good idea to conduct a user survey. It is important to get feed back from the users especially in order to get ideas about how to position/handle dissemination of statistics at the Internet compared to other types of dissemination, but also to get better information about who are the users and what are their specific needs.
- Regarding the introduction of a data warehouse I suggest that INE discusses the strategy and agree on the long-term vision and thereafter decides about what functionality to include in the common data warehouse. Based on long-term vision, functionality, policies about IT etc INE should thereafter evaluate possible solutions and choose the most realistic way forward.
- An important aspect connected to the introduction of a data warehouse is the relation between a coming data warehouse and the existing databases. It is recommended that the coming data warehouse acts as an umbrella-database. This implies that LDB and ESDEM are expected to act as source-databases in relation to the data warehouse.
- The Intranet at INE should be more flexible. It should be possible for each directorate/department to create their own Intranet in order to support the internal communication in the directorate/department. Zope / Plone should be used as the tool.

- The applications in the administration area should be evaluated. The evaluation should be based on the results from the short-term mission in this area. The use of Intranet as an interface to users should be considered as part of an integrated solution.
- The introduction of standards for application development and standards for documentation should continue. A short-term mission on training in the methodology should be conducted.
- The staff situation is much better today than two years ago. However one more person should be allocated to the Network Administration. The introduction of standards for application development and documentation also requires one or two persons extra.
- In order to ensure good management within DISI there a) should be regular meetings for all staff with agenda before and minutes afterwards, b) new bigger tasks must be described using a simple template c) manuals about operation and maintenance of the network should be produced.
- It is recommended to strengthen the role of IT at top management at INE and also a strengthening within the Scandinavian program. Suggestions:
  - Conduct bimonthly meetings about actual status and plans between permanent project staff (all LTA's) and INE top management.
  - The LTA on the IT-area should monthly prepare documents with short description of activities including purpose, expected result and required involvement from INE. This document should be discussed at meetings with team-leader and INE personnel and finally approved by top management.
  - Establish an IT-council (or creation of a similar forum with directors). A proposal to Terms of Reference for the group can be found as an annex in the draft version of the IT-policy.
  - Strengthen the role of IT in relation to donors and home organizations. This could be done via discussions of the above mentioned activity document with donors and home organization. Furthermore it is important that IT-matters are discussed at the Steering Group Meetings.

## 1. Introduction

This report contains my observations and advices based on my stay at INE from September 2002 to August 2004. In general the use of IT shows major progress - especially the development related to Internet. INE now has a permanent Internet connection. It is possible for the staff at INE to search information worldwide and receive/send mail using worldwide accessible mail accounts. These types of access to the Internet were given to the staff at the provincial offices via the installation of Wireless Local Area Network in 2004. In 2004 INE also made a complete renovation of INE's web page. A so-called Portal solution including a content management system was introduced. Dynamic access to databases with statistical data using a simple web-based tool (PX-Web) is integrated in the Portal solution.

Since August 2002 I have given advice, transferred and developed competence to INE in the following main areas:

- a) IT-strategy and IT-policies
- b) network administration including advice about implementation of security measures
- c) Inter- and Intranet
- d) standards for documentation and system design
- e) application development on specific areas (External trade, Consumer Price Index, National Accounts and Labor Force Survey)
- f) staff and management

## **2. IT-strategy and IT-policies**

In order to reach a situation with well functioning it-applications and a well functioning IT-organization INE must ensure that the work on IT is well understood inside as well as outside of DISI. The approval, dissemination and implementation of the IT-strategy and IT policies play an important role in this understanding. All development efforts should be seen in relation to the goals in the IT-strategy, allowing for a coordinated progress. Furthermore the IT-strategy should play an important role in the coordination among the many different ongoing projects at INE.

The documents have been object for a lot of discussions within INE and are already the basis for ongoing development work within the IT-area. The documents have however still to be formally approved by the top management.

## **3. Infrastructure and network administration**

Regarding infrastructure and network administration INE is now in a much better position compared to 2002. New staff has been hired. The staff is attending courses about network administration. Consolidations of existing routines are taking place etc.

### ***Local Area Network at the provincial offices***

As recommended at a short term mission in January 2003 INE should implement Local Area Network with very low complexity. It was recommended to use wireless technology in a simple peer-to-peer network without a regular server and server software. In order to get an easy mail access to everyone in the provinces it was decided to use the mail server at INE and access the mail via webmail.

All staff at the provincial level now has their own mail account. Regarding backup it was considered to transfer data from each province to INE in Maputo. This option was considered in order to reduce complexity connected to having a regular back up at each provincial office.

After analysing quotations it became clear that permanent Internet connections would be too expensive. A dial up connection was suggested in stead. The dial up connection is opened some time every day (about 1-2 hours). This type access to the mail works fine. As a consequence of having the dial up solution INE should consider alternative back up solutions. This could be an external disk at each provincial office. The external disk

should be supplemented with a tape station if it is decided to store back media outside the building.

In the coming years there should be follow up visits in order to stimulate and inform about the use of the network. Furthermore open issues about security etc. should be discussed and implemented.

### ***Implementation of IT policies***

Many of the policies in the draft version of the document have been implemented (e.g. a renewed antivirus environment has been implemented). But some policies need special attention in the coming years:

- *Rules for storing of data.* Data stored at workstations should be transferred to the central servers. In addition it is recommended that files that are stored centrally should be organized in a structured way in order to be able to find data easily and to have simple rules to use when sharing data.
- *Backup:* The backup facilities have been improved. A new tape station has been installed. The back-up scripts have been improved. The introduction of an external disk as the back up media should be considered. Furthermore the recommendations about back-up procedures should be implemented in order to move backup-media to another location regularly. The Central Bank has been proposed as a location.
- The two policies above are connected to the policy about *disaster recovery plan*. If a disaster happens it is not enough to have back up of data outside the building. It is also necessary to have a minimum of documentation of the data. This effort can be seen in the section about the introduction of standards.
- The *documentation of procedures* must be in place – especially in order to ensure a proper introduction of new staff. The draft version of the operation manual and maintenance documentation should be finalized.

### ***Spam mail***

Spammail showed up at INE like in any other organisation with a permanent connection to the Internet. It is recommended to investigate and implement solutions which reduce the problem.

### ***Migration to Windows Server 2003***

The migration from Windows NT Server to Windows Server 2003 should be conducted in 2004 or beginning of 2005. A preliminary plan and draft version of Terms of Reference have been prepared.

## **4. Internet Portal and Internet database**

INE now has a web page with a new design. Behind the new design can be found a content management system that among many other things gives support to decentral updating of the webpage. It is also possible to find the web application PX-Web that gives dynamic access to basic statistical data.

This main activity was carried out by staff from INE together with Value 4 You (local consultancy company) based on requirement specification prepared by DISI. The tools Zope/Plone were used. Zope/Plone is a web application server with integrated content management system. The application can be operated from a web interface.

The PX-WEB solution was prepared as part of short term mission in May 2004. The steps below show the recommended way forward regarding PX-Web:

- First step: Finalize the technical Internet Database Pilot project. It is recommended that INE as the next step in a stepwise approach creates a project plan describing the creation of a number of PX-files. These files can be sourced from the INE Yearbook and / or other existing sources.
- Second step: Conduct a user pilot project. It is important that Internet databases are driven by user needs. It is important to keep up with these needs through regular user satisfaction surveys, by registration of the usage and by conducting meetings with the key users. In the long term INE should conduct detailed user satisfaction surveys etc. In the short run (1-3 months) it is recommended to use a pragmatic approach focusing on the use of Internet as a new tool for publishing available data.
- Third step: Evaluate and decide about the use of PX-web. When recommendation 1 and 2 has been implemented INE should together with the ScanStat group evaluate the findings of the technical pilot and the user pilot and then discuss the way forward.

A report with a technical evaluation has been prepared and it has been decided that INE will use the PX-Web. If needed assistance in Statistics Denmark is available to ensure a smooth introduction of the PX-Web technology.

As recommended and planned I still think it is very good idea to have a user survey. It is important to get feed back from the users especially in order to get ideas about how to position/handle dissemination of statistics at the Internet compared to other types of dissemination.

The use of 'focus group-methodology' has been suggested. This methodology includes among other things conducting a meeting with selected users who discuss questions that have been carefully prepared before the meeting.

INE did consider to find another ISP (Internet Service Provider) in order to have the following requirements fulfilled:

- a) Access to Internet from local network at the provincial level.
- b) Access to webmail
- c) Establishing internet publishing
- d) The content management system in zope/plone needs special basic software installations at the ISP-installation

Today INE is using TVCabo and Teledata as ISP's. The existing architecture and the use of TVCabo and Teledata seems to fulfil the needs. It is however recommended that INE follows the ISP-market in Maputo with special attention to

- a) which parts of Mozambique are covered
- b) how does the ISP interconnect with other ISP's
- c) what capacity can the ISP deliver in terms of download/upload

A final aspect is about the choice of software platform. Both Linux and Windows have been discussed as underlying operating systems. It is recommended to use Windows in the short run, since the staff at INE does not have experience in using Linux, but also because the use of Windows was required in the contract between INE and Value-4-U. This implies that zope/plone must be installed in a windows environment and that Value-4-U must support this installation.

## **5. Data warehouse**

The activities connected to ESDEM and LDB in the last years can be seen as efforts towards building a database with common data. As discussed at a mission in 2002 it is important to agree on the long-term goal: the kind of production system INE will strive to build over a 5 year horizon. The mission also recommended to consider reduction of the number of different databases.

At a short-term mission in December 2003 the creation of common data warehouse was discussed. It was recommended to conduct a pilot project where INE should build a simple Internet database using PX-Web technology from Scandinavia.

The Head of Department for IT and a senior analyst went in Marts 2004 on a study visit to Denmark. At the visit they got an impression on possibilities and problems related to the building of a data warehouse in a statistical bureau.

At a short term mission in May 2004 PX-Web was installed at INE's network. It was later decided to integrate PX-Web into the internet setup at INE.

At the short term mission in May 2004 it was discussed how an Internet Database would relate to the overall INE IT-Strategy. It was also discussed which kind of impact an Internet database would have on the subject matter departments. It was stressed that the introduction of an Internet database and PX-Web technology would contribute to learning and give INE and especially DISI experience in building multidimensional databases. The building of a common data warehouse would still need to be discussed.

In order to minimize technical, economical and organizational risks it is important to carefully investigate the ways forward. The solution of using PX-Web is a solution with low complexity both in terms of development and operation.

A common data warehouse can be implemented in many ways using many different kinds of technology (read: levels of complexity). An implementation similar to the Scan-

dinavian model is a possibility. This implies the building of a foundation of metadata. It is also possible to use the PX-Web technology as a basis of a common data warehouse. Furthermore it is also possible to use ESDEM as a common data warehouse.

What to choose depends on an evaluation of the solutions. From the perspective of INE's users it is not really relevant how advanced the technological design behind any given Internet Database is. This is in favor of a low-tech solution like PX-Web in order to reduce risk. Another aspect to consider is the existing use of ESDEM. If the users already are using ESDEM and expect updates to their ESDEM data then we should be careful not to exclude ESDEM.

The following four steps are should be carried out when introducing a data warehouse:

1. discuss strategy and agree on the long term vision
2. decide about functions/scope
3. evaluate possible solutions
4. start building the data warehouse

As stated in the IT-strategy the main functions of the common data warehouse will be to act as a common store with the primary task to deliver data to a) the internet database, b) publications and c) CD-roms.

As part of the discussion about the data warehouse it is important to elaborate more on what functions are needed. This must be done in order to ensure right requirements and on that basis the choice of an appropriate technological solution. For the time being I suggest to introduce a very simple tool.

Another aspect to be included in the discussion is the organization of data. ESDEM and LDB use 'time-series data organization'. PX-Web use 'cube data organization' The organization of data in cubes should be chosen in order to get the most flexible data organization.

A final important aspect is the relation between a coming data warehouse and the existing databases. It is recommended that the coming data warehouse acts as an umbrella-database. This implies that LDB and ESDEM are expected to act as source-databases in relation to the coming data warehouse.

## **6. Intranet and administration**

INE today has an Intranet, but it must and can be more flexible and with a better design. It should be possible for each directorate/department to have access to the creation of an Intranet for themselves in order to support the internal communication in the directorate/department.

The applications in the administration area should be evaluated based on the results from the short term mission on this area. The use of Intranet as an interface to users should be considered as part of an integrated solution. Data from the administrative area should be

stored in for example an access databases and collected dynamically from the Intranet application. The update of the data could be done from an access application.

Zope / Plone should be used. INE will thereby benefit from the knowledge already present at INE. Furthermore, Zope / Plone seem to give very good support to the introduction of content management. In other words Zope/Plone supports the preparation and approval of documents in an easy way.

As for other bigger projects at INE I recommend to use the guidelines in the manual about application development at this project (read more next section). This comprises the following steps: Initiation (decision about objectives, scope etc), Analysis and design, Construction and test, Implementation and Evaluation.

## **7. Manuals about application development and documentation standards**

Manuals about application development and documentation standards are ready in Portuguese versions and are being tested at the ongoing Labor Force Survey. The main IT activity consisted in preparing project description, specification of requirement from the subject matter side and specification of design from the IT side.

A general development model is introduced in the application development manual. This model implies the use of the following (well known) steps when developing a application:

*Initiation:* Prepare and approve overall description of the project including objectives, activities expected results, organization etc.

*Analysis and design:* Determine and prepare draft description about required functionality and on that basis prepare design of the application.

*Construction and test:* Construct and test application. At this point it should be possible to return to analysis and design and prepare new version of requirement and design.

*Implementation:* Install application in production environment and give training to users of the application.

*Evaluation:* As a final activity the process must be evaluated. The evaluation covers both the product and the process.

It is of great importance for INE to continue the work in this area in order to ensure

- a) documentation of applications (needed in the day to day activities, but also needed as part of the disaster recovery plan)
- b) good working practices and good communication between subject matter and IT specialists etc.
- c) development of applications with expected quality delivered at the expected deadline

Recommendations:

The creation of final documentation of applications should follow the structure in the document about standards. Regarding documentation of the statistics in relation to users it is recommended to use GDDS as this is the strategic choice already made by INE. The Scandinavian approach has been discussed but since INE already is using and have many areas documented using the GDDS approach it is recommended to continue on this track. IFTRAB should be used as a test area for this type of documentation.

After the test at ITRAB the manual should be discussed and approved first via discussions inside DISI and next via discussions outside DISI.

A short term mission on training in this methodology should be carried out. This mission should focus on how to improve the work on introducing standards both in application development but also related to documentation.

## **8. Staffing and management**

The staff situation is much better today than two years ago. On the application development the activities connected to Internet development and methodology has been strengthened.

One more person has been allocated to the Network Administration. It is recommended that one more person is to 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.

In order to ensure good management within DISI the following activities/ advices should be implemented within DISI:

- There should be regular meetings for the staff with agenda before and minutes afterwards.
- New bigger tasks must be described using a simple template. The building of templates will take place as part of introducing standards.
- Documentation/ description of solutions are crucial. Standard are already introduced on some areas e.g. backup procedures.

It is recommended to strengthen the role of IT at top management at INE and also a strengthening within the Scandinavian program. Suggestions:

- Conduct bimonthly meetings about actual status and plans between permanent project staff (all LTA's) and INE top management.
- The LTA on the IT-area should monthly prepare documents with short description of activities including purpose, expected result and required involvement from INE. This document should be discussed at meetings with team-leader and INE personnel and finally approved by top management.

- Establish an IT-council (or creation of a similar forum with directors). A proposal to Terms of Reference for the group can be found as an annex in the draft version of the IT-policy.

It is also important to strengthen the role of IT in relation to donors and home organizations. This could be done via discussions of the above mentioned activity document with donors and home organization. Another way to strengthen the role of IT in relation to donors would be to create a sub-steering-committee only for IT questions. The main task for this sub-steering-committee should be to give advises to members of the steering committee. The IT-council (or a similar forum with directors) could be given this task instead of creating a new group.

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