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Topic III: Efficient management of increasing technical complexity

**DEVELOPMENT OF A UNIFIED SYSTEM OF STATISTICAL INFORMATION –
THE NATIONAL STATISTICAL SERVICE OF THE REPUBLIC OF ARMENIA**

Supporting paper

Submitted by the National Statistical Service of the Republic of Armenia¹

I. INTRODUCTION

1. The development of a unified system of statistical information NSS RA (USSI RA) aimed at connecting all statistical offices of the republic into a corporate network with output to the government information system is a task of high priority for the National Statistical Service of the Republic of Armenia. This task is in line with the requirements of the contemporary democratic society for openness and the global development of information and communications technologies.
2. The general structure of the UNSS should promote efficient co-ordination of actions in data and metadata communication within and among the individual statistical systems. The USSI NSS RA must ensure the interconnectedness of individual statistical systems so that these systems could form a single open system that would be unified, flexible, efficient and user-friendly both for the local and outside users.

II. MAIN OBJECTIVES AND TASKS FOR THE BUILDING OF USSI NSS RA

The construction of USSI NSS RA involves the solution of the following problems:

- building up of the architecture for USSI NSS RA;
- creation of the technical basis for the development of USSI NSS RA;
 - provision of computer technology to all subdivisions of the NSS RA, the acquisition and introduction of the necessary equipment and software;

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- building of the local area network (LAN) in the main office and regional offices;
- connection of local networks with the corporate network built according to the regulation on data confidentiality;
- development of application programs for the statistical information systems incorporated into the USSI RA;
- development of interfaces for data communication among various systems;
- building of a corporate depository of statistical data and metadata (data warehouse);
- building of a data warehouse for data communication;
- building of electronic archives for statistical data and metadata;
- improvement of the statistical data communication system (on the basis of WEB, OLAP and GIS technologies);
- development of GIS applications for statistical surveys;
- building of an electronic library catalogue for the NSS RA with access to the corporate network and the Internet;
- development of the electronic version of the Statistical Yearbook of Armenia and other statistical publications on CD_ROM;
- development of WEB applications and support of the official NSS RA web site www.armstat.am (Internet) and the Intranet;
- working out a system of documentation flows carrying administrative and financial information;
- training of staff;
- training of staff in the sub-sectors of information technology
- training of staff in the sub-sectors of statistics.

The system of statistical information

3. More than 250 statistical surveys are taken within the NSS RA during the year and more than 150 statistical questionnaires are collected. There is a continuous exchange of both administrative and statistical data between the Central Office NSS RA and regional statistical departments.
4. It is intended in the first stage of the introduction of the Unified System of Statistical Information to pass over the functions
5. of data transfer on electronic carriers to regional offices. In the next stage data will be keyed in at the district level. Standard software along with detailed instructions needs to be prepared for data input.
6. Data transfer will be made through the communications canals. At the beginning this will be a modem connection but following the establishment of a corporate network data will be transferred through WAN. Through the corporate network the regional offices will have direct access to the databases of the NSS RA.
7. In-coming data from the regions will be accumulated (objedinatsja) in the operational databases and, if necessary, will be transferred to the regions for making corrections.
8. The regulations in regard of data control and instructions will be stored in a special metadata base.
9. The **microdata bases**. After verification and the necessary corrections data from the operational bases are transferred to the microdata base. Information in the microdata base is stable and needs not be changed. The sources of microdata are the databases of the business register, administrative registers and households.
10. The software product Microsoft SQL Server was chosen for the maintenance of the microdata bases.
11. MS Visual C++ and MS Visual Basic can be used for the development of software.
12. **Macrodata bases**. For the development of a statistical product either the aggregation of primary data or grossing up of the sample data to the whole population, or a special calculation or other methodologically approved actions are necessary. Having obtained output data according to specified algorithms, we create the bases of output data. These bases are named the macrodata bases. The algorithms for the calculation of macrodata that are provided by the statistical divisions and approved by the Division of Methodology are stored in a special metadata base.
13. Macrodata, which represent aggregated information, will be calculated automatically on the basis of classifications.
14. The software product Microsoft SQL Server was chosen for the maintenance of macrodata bases.

15. The above mentioned macrodata bases allow obtaining the necessary statistical information more quickly according to the individual pattern of the reporting form or according to the concrete sample survey.
16. The construction of a union table that implies co-ordination of various variables is rather a labour-consuming exercise but the creation of statistical data warehouses will help to resolve this task.

Building of a corporate statistical data warehouse

17. Data warehouse will be the central part of the architecture of storing statistical data within the NSS RA.
18. Data warehouse must contain stable statistical variables that would cover the whole range of the collected, processed and published statistical variables.
19. The updating of data warehouse will be implemented only by periodical addition of new data to the already stored ones.
20. Data in the warehouse should be organised in such a way as to support the process of decision-making and give answers to the users' requests as quickly as possible (5-20 sec).
21. Data warehouse provides a possibility to analyse data in the course of a certain number of years (time series).
22. In this way it is proposed to obtain a single? one? jedini? product instead of many disintegrated databases. This will ensure better data quality, take less time to acquire the final result, provide easier access to the needed information while maintaining at the same time the necessary control of confidentiality both on the Internet and Intranet.

The system of analysis of statistical data

23. The programs SPSS and STATA, which contain tools for factual data analysis currently used to analyse data output, etc., are provided with interfaces for the connection to databases.
24. Work has been started to present statistical information with an attachment to a geographical map. The creation of the statistical GIS system allows presenting statistical data in a more precise way.
25. The establishment of data warehouse implies an opportunity for the users (both statisticians and users from outside) to make an analysis of data from various (but harmonised) statistical domains for a period of several years (time series). To speed up the process of decision making, that is, to receive answers to the requests of the users, the given technology must be provided with a powerful analytical tool, the so-called on-line analytical processing (OLAP). For this purpose it is necessary to apply additional solutions using SQL and MDX together with Visual Basic or to use the already existing software, for example, the IDM product Synergy International System.

Building of the corporate network

26. There is a local area network (LAN) operating in the central office of the NSS RA connected to a Windows 2000 Server that covers 100 users; the network ensures data communication velocity of 100 Mbs. In total, there are about 180 personal computers in the central office but only 50% of these meet the requirements of today. Work is currently going on to expand the network. In perspective, LAN in the central office will include about 250 computers. Modem connection is used to link 11 regional (marzovije) centres and 5 district (taracki) centres.
27. In February 1999 NSS RA opened its site on the Internet at the address <http://www.armstat.am>. The site is installed at the provider to make access for the users easier. In the future, along with the improvement of the communication canals, it is intended to place the site on the server of the NSS RA. The site functions in 3 languages –Armenian, English and Russian. Beginning in 2001, the materials on the site are in the format Acrobat Reader allowing avoiding the problem of incompatibility of the fonts. There is a link from the site to the Library base with the help of which thanks to a convenient search system it is possible to find the necessary literature in the electronic catalogue of the NSS RA library.
28. The Intranet server containing useful information for local data users (normative acts, training materials, classifications and so on) functions within the local area network.
29. Steps have been taken to place a mirror (zerkalo) of the site www.armstat.am on a server abroad thus making statistical information on the site NSS RA more accessible to the users of statistical information.

Principles of building the local area network (LAN) within the NSS RA

30. The LAN is based on the Fast Ethernet 100 Mb technology owing to its comparatively low costs and popularity.
31. The LAN operates under the control of Windows 2000 Server. The main function of this server is to ensure a domain (domennaja struktura) configuration allowing centralised administration.
32. The following data processing servers will be functioning within the network:
 - servers containing microdata bases with strictly regulated access so that the confidentiality of statistical data would be ensured;
 - servers containing macrodata bases accessible to NSS RA officers or researchers with a special permit;
 - the server containing a data warehouse;
 - the server containing a data warehouse for communicating statistical information through the Internet;
 - mail server providing all employees of the central statistical office with electronic mail, moreover, this server will ensure automatic electronic mail connection to the regional subdivisions and other respondents, and the connection will be implemented by a system that precludes any possibility of unauthorised access to information;
 - the “Intranet” server holding useful information for office use.
33. All servers are provided with backup copying and archiving equipment.
34. Measures are taken to organise non-interrupted functioning of the network, its testing and speedy resumption of functioning (in about 10 minutes) in case of a failure.
35. Steps are taken to ensure antivirus protection. For this purpose antivirus programs are regularly updated.
36. It is also intended to build LAN for the 11 regional statistical offices and then by means of a modem connect these offices with the 51 district offices (taracki). The LAN structure in the regional (marzovih) offices will be the same for all offices: the disk operating system Windows Server NT or Windows 2000 Server; the Fast Ethernet 100 Mb technology.
37. It is planned to build a network in the statistical office of Erevan that would connect about 20 workstations but in the remaining 10 regional offices there will be 8 workstations in each of them.

Building of a corporate territorially divided network

38. The unified network NSS RA must connect the local networks of all statistical offices into a single corporate territorially divided network built in compliance with the regulations of data confidentiality. The efficiency and degree of protection of data flows depend on the architecture and reasonable administration of the network. The network must be administered from the centre. A policy of data security and network safety needs to be worked out.
39. Through the corporate network regional offices will have access to the information resources that are concentrated in the central office.

Staff training

40. To ensure the correct use of UNSS resources it is planned to regularly conduct seminars and lectures for the staff of the NSS RA. An issue has been raised in regard of organising a training course where in the framework of co-operation for the preparation of statistical surveys not only the officers of the NSS RA could be trained but also employees from the administrative registers, other information providers (respondents) and the users of statistical information.
41. The training of staff will be provided by means of special programs worked out taking into account the category of trainees, for example, statisticians, economists, systems analysts, programmers and data base administrators.
42. To improve the skills of the experts it is intended to organise special skills improvement courses for them in Armenia and abroad as the issues concerning the efficiency of the information system, data protection and in particular the observance of confidentiality rules depend on the professional qualifications of experts.
43. Meticulous attention is also devoted to the issues of self-education and a special library of literature and laser discs with training programs is in the process of creation.
44. It is intended to place a large quantity of reference and training materials on the internal “Intranet” server.

Conclusion

45. The creation of the USSI means balanced development in the three main directions:
 - building of the corporate network;
 - creation and support of the statistical databases including the data warehouse;
 - staff training.
46. The effectiveness of functioning of the USSI depends to great degree on the preparedness of staff.
47. In the process of seeking solutions to the tasks the NSS RA collaborates with such international organisations as Eurostat, UNSD, UN/ECE, UADID, FAO, the World Bank and others.

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