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HUNGARY: NATIONAL REPORT

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I. INTRODUCTION

1. The Hungarian Central Statistical Office (HCSO) uses geographical information systems (GIS) technology since 1993 to improve publications, to support statistical analysis and data base development, and to organize preparation of different statistical surveys. The use of GIS at HCSO plays an important role in the population census activities. GIS is also used in demographic, population, regional, agricultural and environmental statistics.

II. IMPLEMENTED PROJECTS

2. GIS was first used in the Population Department for the presentation, publication and dissemination of the **1990 population census results**. This **project** called **CD-ROM** was started in 1991. By 1992 the storage and retrieval of population databases on optical media was implemented. The result was a retrieval system able to format statistical data for CD-ROM on several million units. Later, the population census databases and the retrieval tools were combined with a digitized map of Hungary at municipality level. As a result, the statistical tables retrieved from the database can be linked to digitized boundaries.

3. The system CD-ROM was fully implemented in 1993. This version worked on a wide range of personal computers (of minimum 386 CPU using DOS) and resulted in three CD-ROMs which were sold to the public, similar to paper publications.

4. The project used funds from UNFPA and HCSO and its preparation lasted four years, involving over 20 professional and technical assistants. According to the CD-ROM technology, specific equipment for data preparation, transformation and formatting were purchased: CD-ROM Simulator, VD-Publisher, VR-Professional, including software. Basic software development tools, Clipper, Pascal, C and C++, were also purchased.

5. The **DOS-based software** called **Statistical DataBase and Query with Mapping (SDBQM)** was in-house developed in the course of this project. The system provides full access to any kind of data stored in the database. The main benefit comes from its flexibility: it can handle data at Enumeration District (ED) level and it can create and group new statistical nomenclatures without requiring any programming knowledge of the user. It also handles data related to territorial units and data stored in its own GIS system.

6. SDBQM provides a selection of data sources and territorial units, a definition of information to be retrieved, and customized basemaps. On the basis of the selected areas, mapping capabilities can be linked to the information retrieved from CD-ROM databases. Thus, tables can be combined with various maps providing spatial information on the population data. This DOS-based query system works with pull-down menus and does not require any programming skills or an understanding of technical terms.

7. The next phase in the development of the **SDBQM** software was the **implementation of the retrieval and mapping system in the MS Windows graphical environment**. Improvements were started in 1995 and resulted in the **SDBQM for Windows** software system in 1996. It permits the creation of small area census statistics and the linkage of data with small area maps. This version was used inside HCSO for studies and small area statistical analyses only. Furthermore, it was used for **industrial statistical databases**.

Company and product data bases for the years 1992, 1993 and 1994 were prepared and published on CD-ROM in July 1996.

8. SDBQM/Windows allows to optimize the structure of the digitized boundary files to balance the relatively slow speed of CD-ROM readers. In practice, standard file formats used by commercial desktop mapping software, such as ArcInfo or Mapinfo, offer a good solution for data exchange and the distribution of the GIS database. These tasks do not, however, permit the rapid retrieval of the boundary data from CD-ROM.

9. In the framework of the CD-ROM project, **Detailed Maps of Enumeration Districts of Budapest** (over 7,500 units, sub-EDs, street-blocks including identification of houses) were digitized in 1993. All digitized maps are stored in DXF format and can be handled by several GIS applications. All boundaries were checked and prepared by the CD-ROM project in an enhanced format suitable for mapping from GIS base.

10. Another GIS application was the **dissemination of population statistics with maps on floppy diskettes** using the tailor-made MAPSTAT program. MAPSTAT is a DOS-based program which provides prepared tables and maps for users. This simple application fulfilled the needs of the average user and three 'floppy diskette' publications were prepared along this line. The first publication featured tables and maps of the Hungarian national censuses from 1870 to 1990; the second one provided the selected variables of 1990 population census data at municipality level with maps; and the third publication showed electoral districts and data of Hungary in 1994.

11. In addition, in 1993 HCSO established a **joint GIS project with Landinfo Ltd and Kartografia Ltd.** The mutual goal was to provide territorial statistical data using maps for the public. Partners from the commercial side made data transformations of the territorial database and data were provided along with a digitized map. This combined product was marketed with the Windows version of Mapinfo.

III. ON-GOING PROJECTS

12. In 1996 HCSO launched a **pilot project on the use of remote sensing technology** to support urban statistics and delineation of enumeration districts of population censuses. The first part of the project will result in the 'test delineation' of the agglomeration at enumeration district level of one administrative district of Budapest. The second part will store and present the result in appropriate GIS databases. While external contributors will implement all technical aspects of the project, HCSO charts the workflow and manages all organizational aspects.

13. HCSO is participating in a **joint project with the Ministry of Transport, Communications and Water Management and Ministry for Environmental and Regional Policy**. The target of this pilot project is to establish an on-line system between the contributors providing information about representatives and territorial statistical database, called T-STAR. HCSO provides up-todate T-STAR data for its project partners. All information would use X400 network which is being established for all governmental agencies. It is an ArcView based application.

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14. HCSO is also participating in the **project on Administrative Boundary Data in Central and eastern Europe** coordinated by the National Committee for Technical Development. One of the project targets is to set up a shared information system using

Internet where the participants will be non-European Union member countries from Central and eastern Europe.

15. Furthermore, HCSO should harmonize the national statistical areas (territorial units to the EUROSTAT standards). This duty includes adjustment of the national GIS project to the GIS project of EUROSTAT. The adjustment of the national databases to the EUROSTAT projects REGIO and SIRE will also be necessary.

16. As an extension of the CD-ROM project, further GIS software was developed in 1996. The **Advanced Mapping with Windows** (AMW) software package was designed and implemented to manage aggregated territorial statistical data with GIS working from CD-ROM. This package contains a desktop query and mapping program on a typical PC with MS Windows with prepared territorial data base. The target of the project is to provide enhanced services to the users of statistical data without forcing them to learn sophisticated GIS programming languages. This AMW provides easy access to territorial statistics, setting up digitized boundaries and presenting data along with maps.

IV. FUTURE WORK

17. In the past, census managers did not use computer-aided geographical tools for the census planning. Today, it is evident that PC technology should be utilized for the preparation of the next population census in 2000. Although the Population Department of the HCSO has digitized maps for Budapest at ED level, digitized maps for the whole territory of Hungary are still needed. It would facilitate the planning, evaluation and presentation of population census operations for small areas, particularly at enumeration district level.

18. There are several possible sources for creating GIS for the next population census. One solution could be the use of the National Cadastral Program which has already been started. Another source could be the map database created by digitizing the original census maps.

19. HCSO is also investigating and considering other existing GIS that could be applicable for use as a basic system for the 2000 population census. The Division of Cartographic Operations of the Hungarian Military Services offered a comprehensive source of digitized boundaries of Hungary. The scale is 1:50,000 which is much less than is now available for Budapest. This digitized source is called DTA-50, and was carried out with the extensive support of the Defense Mapping Agency of the United States and financial support of the OMFB. Unfortunately the DTA-50, as it stands for Budapest, is not detailed enough to find street and street numbers.

20. In 1996 a new law was prepared and submitted to the Hungarian Parliament by the Ministry of Agriculture, collaborating with the State Remote Sensing Institute. It describes all administrative actions and activities required to create and update the comprehensive and official digital maps. All related ministries and government agencies who will potentially use GIS were asked to comment on the draft law. This draft law also aims to specify the standard of a unified geographical information system for Hungary.