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Report of the Regional Workshop on the 2010 World Programme on Population and Housing Censuses: International standards, contemporary technologies for census mapping and data processing

Minsk, Belarus, 8-12 December 2008

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INTRODUCTION

Objectives of the Workshop

1. The purpose of the Workshop was to present international standards for conducting population and housing censuses and to highlight the significant capabilities of contemporary technologies and their use in census mapping activities and data capture. More specifically, the Workshop covered: (1) the revised international standards for conducting population and housing censuses, focusing on recommended core topics and tabulations as identified in the United Nations Principles and Recommendations Revision 2 and the Conference of European Statisticians Recommendations for the 2010 Censuses of Population and Housing; (2) international recommendations on census planning and management; (3) new approaches in census geography, including the use of Geographical Information Systems and Global Positioning Systems in census mapping; data collection and dissemination; (4) technologies for census data capture, including the use of Optical Mark Recognition (OMR), Optical Character Recognition/Intelligent Character Recognition (OCR/ICR), Internet data collection, use of handheld devices for data collection; (5) discussed the process stages for data capture; and (6) presented an overview of major commercial suppliers for data capture.

Attendance

2. The workshop was attended by 41 participants from 11 countries, by four international/regional organizations (UNECE, CISSTAT, UNFPA and the United Nations Statistics Division (UNSD)), by one university, and by five commercial providers (DRS, Betasystems). The complete list of participants is presented in the Annex.

Opening

3. Ms. Svetlana Novoselova, Deputy Chairman - Head of Population Census Department of the **National Statistical Committee of the Republic of Belarus** welcomed the participants to the workshop. In her remarks, Ms. Novoselova stated that in recent years, the capacity of national statistical offices to implement improved technologies and methods has improved thereby resulting in reduced census costs. She informed the participants that the next census of Belarus is planned to take place from 14 to 24 October 2009. Lastly, Ms. Novoselova thanked the United Nations Statistics Division for having organized the workshop in Belarus.

4. The representative of the **Interstate Statistical Committee of the Commonwealth of Independent States (CISTAT)** Ms. Bykova, expressed gratitude to UNSD, UNECE, as well as to the National Statistical Committee of the Republic of Belarus for organizing the workshop. She indicated that the workshop was part of vast work carried out by UNSD, UNECE, and Eurostat on capacity building for census preparation, preparation of methodological materials, and technical assistance in census taking to many countries, including countries in the CIS region.

5. Ms. Bykova informed the participants that censuses in the CIS countries are planned in accordance with the principles and recommendations of the UN Statistical Commission, UNECE, and Eurostat. She further indicated that pilot censuses have already been conducted in seven CIS countries (Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Russia, and Tajikistan). The main censuses are planned for as close as possible to 2010: in 2009, in Azerbaijan, Belarus, Kazakhstan, and Kyrgyzstan; in 2011

in Armenia and Ukraine; in 2012 in Turkmenistan; in the rest of the countries the dates are being discussed.

6. Ms. Bykova stated that historical legacy and geographical and economical proximity of the CIS countries result in similarities in problems encountered by their national statistical offices. An example of those issues is migration processes and the opportunity of their study in the 2010 census round. She went on to say that direct participation in the discussion of specific problems makes it possible to not only determine the most complex aspects, but also to collectively find the optimal ways for resolution of common issues.

7. In conclusion, Ms. Bykova welcomed all workshop participants and expressed her confidence that the accumulated international experience and the collective efforts at the workshop would facilitate not only successful census taking, but would also make an invaluable contribution to the provision and improvement of international comparability of census data not only within the Commonwealth, but also with other countries of the world.

8. On behalf of Dr. Paul Cheung, Director of the **UNSD**, Mr. Jean-Michel Durr thanked the National Statistical Committee of the Republic of Belarus for hosting the workshop. He also expressed appreciation for the collaboration of the UNECE for the preparation and the running of this workshop which he indicated exemplified the way the UNSD and the Regional Commissions have to work together in supporting the implementation of the 2010 round of Population and Housing Censuses for the benefit of the countries.

9. He explained that this workshop was part of the 2010 World Programme for Population and Housing Censuses, adopted by the United Nations Statistical Commission in March 2005 for the period 2005 to 2014. The three essential goals of the programme were: (i) adoption of agreed set of acceptable international principles and recommendations governing the conduct of a census; (ii) to facilitate and encourage countries to conduct censuses during the period 2005-2014; and (iii) to assist countries in their efforts to disseminate census results in a timely manner.

10. He informed the participants that as part of the 2010 World Programme on censuses, the United Nations Statistics Division has conducted a series of regional workshops in recent years, on the Principles and Recommendations for Population and Housing Censuses (2006) and Geographic Information Systems and Digital Mapping (2007), respectively. For 2008, the theme of the regional workshops is to present international standards for processing population and housing censuses and to highlight the significant additional capabilities of contemporary technologies and their use for census data capture and data editing. He added that in choosing the main topic for each year, the logic has been to follow the census process and to address countries' needs in their preparations of the 2010 round censuses. He further informed the participants that, many countries have expressed the need to take into account the technological advances made since the previous round, especially in the area of census cartography and data capture and processing and requested UNSD to prepare specific guidelines, including best practices and the strategies for evaluation of different contemporary practices.

11. Mr. Durr noted that mapping is one the most critical activities of a census and that the accuracy of the delineation of enumeration areas and the quality of their representation on a map have a crucial impact on the quality of the data collected. He added that, the analysis and utilization of the census data also require the facilitation of geographic information systems to display the full dimensions of the data.

12. Mr. Durr informed the participants that data capture is also of tremendous importance for censuses. Furthermore, capturing the huge amount of information collected in a census to convert it into a format that can be interpreted by a computer is not only a critical phase of census, but is also costly and time consuming. He indicated that rapid advances in data-capture technology, especially optical, have greatly increased the speed and reliability of producing census databases in an accurate and timely manner. He added, however, that many countries have in the recent past faced difficulties in mastering these technologies, sometimes due to lack of preparation or sufficient knowledge to avoid the numerous pitfalls.

PRESENTATIONS AND DISCUSSIONS FROM THE VARIOUS SESSIONS

Session 2: The 2010 World Programme on Population and Housing Censuses

13. A representative of UNSD presented on the overview of the World Programme on Population and Housing Censuses. In the presentation, the three essential goals set for the 2010 programme were reiterated and the specific role of the UNSD in respect of the programme was outlined. For example, UNSD, in partnership with the UNICEF and UNFPA, are developing dissemination software called CENSUSINFO, based on the original DEVINFO, but with some improved functionalities considered more appropriate for census data.

14. The presentation also covered the recently published United Nations *Principles and Recommendations for Population and Housing Censuses, Revision 2,* focusing on the main changes in revision 2 of the census recommendations compared to revision 1, which was for censuses conducted in the 2000 round. Three main areas of change were highlighted in the presentation – (1) the extensive consultative process for the revision of the Principles and Recommendations which entailed regional and international consultations; (2) the orientation of the revised census recommendations with emphasis on production of outputs for evidence-based decision making, that recognizes the census as part of an integrated statistical system for the production of outputs - and the fact that various approaches of data compilations exist for the generation of these outputs including the traditional census, sample surveys, administrative data sources, or combinations of these sources; (3) other major changes including a section on the responsibility of governments to provide funding for the census, a section on contracting out, a definition of the place of usual residence, and changes in core topics.

Session 16: Preparation of the 2010 round of censuses in the region

15. In a round table meeting, moderated by the UNSD, participating country representatives presented on their preparatory activities for the 2010 round of censuses. Countries also indicated the estimated duration of the census enumeration as well as the work load for enumerators. The duration of the enumeration period ranged between 8 days to about 14 days with a wide difference in the enumerator work load (sometimes stated in households per day and other times in persons per day). While some countries indicated a difference between urban and rural areas in the work load (e.g., in Kyrgyzstan it is 500 in urban areas and 400 in rural areas), other countries such as the Russian Federation allocate work load of 370 persons per day for both urban and rural areas.

16. **Armenia:** The census is planned for October 2011. A census committee will be set up in 2009. The country plans to use GIS in the next census. Also, depending on the allocated budget for data processing, the country could use scanning technology for

data capture - if the allocated budget is small, then manual data entry will be used as was the case for the 2001 census. For the pilot census, CsPro was used for data processing.

17. **Azerbaijan:** The next census is planned for 13 to 20 April 2009. A pilot census has already been carried out and sketch maps for enumeration areas are already prepared. The census questionnaire has 29 questions on population characteristics and 6 on housing. Current activities include testing and improving on the software and hardware to be used for the census. It is anticipated that manual data entry will be used as was the case for the 1999 census. The country would have wanted to use GIS for the census but experienced difficulty particularly with the quality of the maps, as, for instance, the maps were produced at large scale with poor resolution.

18. **Belarus:** All preparatory activities have been completed for the planned 14 to 24 October 2009 census. The census questionnaire has already been prepared and the NSO already has approval to hire the required temporary personnel for the census. While manual data entry was used for the 1999 census, for the upcoming one there will be use of scanning technology using four scanners and about 100 persons for data entry. Furthermore, all data processing will be centralized and carried out at the headquarter premises of the NSO. The country plans to take advantage of more use of electronic data dissemination, including making the data available on-line.

19. **Georgia**: It is envisaged that the next census, in Georgia, will be carried out in January 2010. A pilot census was carried out from 8 to 15 November 2007. The country plans to use digital mapping and GIS geospatial technologies which were also used in the pilot census. The GIS section currently has one person and it is anticipated to have up to 20 by the time of the census. Scanning technology was used for the 2002 census but there were problems as the software used could not recognize Georgian characters. For the pilot census, data entry for some of the questionnaires was manually carried out while for others it was done by scanning technology. The decision on what method of data capture and processing to use for the upcoming census, which is scheduled for 21-28 January 2010, will depend on an assessment of the two methods, including also on their relative cost-effectiveness. Unlike the previous census, the 2010 census will include questions on deaths in the household as well as on migration. A critical challenge for the census, however, is the lack of financial support as there is currently no local budget allocated for this activity.

20. **Kazakhstan**: The next census is planned for 25 February to 5 March 2009. Equipment for the census has already been secured and the census publicity/sensitization campaign is on-going. Enumeration will be with paper maps. However, satellite imagery will be used for one region of the country. Data processing of an estimated 5 million forms will be carried out at the regional level with a minimum of two scanners per location. For the pilot census, OCR technology was used for data capture. The same will be used for the main census.

21. **Kyrgyzstan**: The country is planning to carry out the next census over a 10-day period in March 2009. The legislative basis for the census has already been approved. The questionnaire will be similar to that used for the 1999 census, except that for the coming census, additional questions have been added to solicit information on household members who have been absent from the country for a period of over 12 months and also the reason for the absence. Also, for the first time, the census will include questions on housing characteristics. Data entry will be manual using about 174

data entry operators, for about four months. For data dissemination, the country plans to use DevInfo and also GIS for topical maps.

22. **Moldova**: The next national census is planned to take place in 2012. There have not yet been any substantive discussions on operational issues for the upcoming census. Only the census legislation has been drafted and is awaiting the approval of parliament. It is anticipated, however, that data capture will be by scanning.

23. **Oman**: Preparations for the next census which is planned to take place in 2010 are underway and data collection through the Sultanate of Oman will be by use of PDAs. The Committees responsible for overseeing the implementation of the census were decided by Royal Decree issued in April 2007. In order to meet the requirements of the users a preparatory meeting was organized, and a workshop aimed at a dialogue between users and producers of data will be held in the first month of 2009. The timetable for the census has been drawn to show the duration of each operation, and a special unit established to monitor the quality of census operations, including evaluation of the enumerators, completing of missing data, and revision and evaluation of the data.

24. In terms of structure, the census team is composed of the following units: (i) financial management, (ii) administrative affairs, (iii) information technology, (iv) data quality control, (v) documentation of each census operation, and (vi) training.

25. Two pilot studies are planned before starting the work of the census, the first one in June 2009, and the second one in January 2010. A GIS database was established and updated in order to complete the work associated with maps and to divide the Sultanate into statistical divisions for use in the next census.

26. Given the automation of all census operations and the use of hand-held devices in the process of data collection, the method of data processing will be more accurate and practical. The dissemination strategy will be based on the needs of data users. Also, data will be available on-line to make it possible for users to select and extract the desired variables.

27. Data evaluation will be done through three actions: (i) Center for Quality Control; (ii) through the collection of data using the handheld devices which will reduce the burden on the operation; and (iii) comparison of data with other administrative sources.

28. The Budget for the preparatory phase of the census is estimated at 5 million Omani Rials (13 million US dollars), and for the whole census, it is expected to reach 15 million Omani Rials (equivalent to 39 million US dollars).

29. **Russian Federation**: The next census is planned for October 2010 and the pilot census was carried out in 2008. Some new ideas were tested during the pilot census, including the use of self-enumeration based on a mail-out and mail-back of the census questionnaires. The results of this innovation were not satisfactory. For the 2010 census, self-enumeration may be used for the difficult to access (by enumerator) population groups. New questions which were tested on the pilot census and were not well received by the population include those on ownership on dwelling, marriage histories, and also on commuting. As part of the pilot census, an enumeration period of about 12 days was found to be optimal. Data capture will be by scanners located in about 67 regional centers. There will be automated coding which will require intensive

training of the data capture personnel. Data from the 67 regional centers will be transmitted to headquarters for further processing at the national level.

30. **Tajikistan**: A pilot census was carried out in October 2008 and the actual census is planned for 2010. Paper-based maps will be used for the census. Scanning technology will be used for data capture which will be carried out at three data processing centers.

31. **Ukraine**: In April 2008, the census law was passed for the next census which is planned for 2011. A technical conference/meeting for the census is scheduled to take place in late December 2008, and a pilot census, lasting 12 days is planned for 3 to 14 November 2009. There will be more questions on the 2011 census than for the 2001 census, especially on housing characteristics, household and family characteristics, and migration. For data collection, the country is planning to use both enumerator-based and also self enumeration. The NSO is collaborating with the geodetic committee to introduce use of GIS in the upcoming census. Data entry will be by scanning and recognition technology.

32. Highlights of the discussions and issues raised as a result of the country statements were summarized in the conclusions and recommendations.

Sessions 3 and 4: Census planning and management

33. The UNSD made a presentation on census planning and management, with emphasis on the need for planning and management of the different inter-related phases of the census, the need for risk management and how adequate planning and management is critical to the success of the census operation. The need for close monitoring of census activities and for ensuring a sufficient budget for the census was particularly highlighted. The presentation covered the importance of quality assurance for the census in order to minimize error in census operations, attributes of quality and also how quality should be measured and monitored. Also discussed was the need for all aspects of the census program to be evaluated in terms of their strengths and weaknesses, and also the use of the post enumeration survey to evaluate census coverage.

34. In the discussion, countries talked about mainly about some of the quality control procedures that they have implemented, such as the checking the coverage of enumeration areas and making adjustments are necessary.

Sessions 5: Outsourcing of census activities

35. This presentation by the UNSD outlines some of the reasons why census activities may be outsourced, including the fact that most National Statistical Office are not capable of carrying out all the tasks involved in the planning and conducting of a census. The reasons include (i) lack of necessary technological expertise or equipment at the NSO; (ii) the need for improving timeliness and accuracy of the data, (iii) a recognition of the complexity of the job; and (iv) the added advantage that the NSO gains access to external expertise and knowledge. It was emphasized that a decision on whether or not to outsource should be based on, (i) defining the technical needs of the NSO in terms of expected output; (ii) specifying the requirements for the delivery of the output in terms of timeliness, quality assurance, accuracy, confidentiality, etc.; and (iii) an assessment of the market *vis-à-vis* the NSO needs to determine if it would be feasible to undertake the outsourcing.

36. The presentation further stressed the need for the contractor and the NSO to have a shared understanding of the requirements of the contract, including objectives, expected

outcomes and priorities. In this regard, it was stated that clear specifications, including standards to be met, are key to ensuring that the NSO gets what it wants and that everyone understands what is expected. Specifications should (i) describe in detail the tasks that are the responsibilities of the NSO and for the contractor, (ii) include detailed milestones with deliverables against which performance should be evaluated, and (iii) address requirements for timeliness, data confidentiality and security, quality assurance.

37. In the discussion that followed, several countries indicated that they had outsourced some of their census operations and a good number also will do so for their next census. Activities that have either been or will be outsourced include mapping, data processing, data coding, publicity campaign, transportation, and document printing.

Session 6: International recommendations on census cartography

38. A representative of the United Nations Statistics Division made a presentation on the results of a pre-workshop questionnaire on methods of census mapping used by the countries in the region both for the last and the next census. Another presentation was made on the main recommendations of the Expert Group Meeting on Contemporary Practices in Census Mapping and Use of GIS, held in New York in May 2007, and also on the soon to be published Handbook on Geospatial Infrastructure in Support of Census Activities.

39. On the pre-workshop questionnaire and also during the discussion for the session, countries generally indicated that they do not have a specialized cartographic unit within the NSO and in past censuses, they have for the most part, used paper maps produced by mapping agencies. For the countries in the region as a whole, there was very limited use of either GIS or digital maps in the censuses of the 2000 round. In Azerbaijan, for instance, the NSO wanted to use GIS for the census but had difficulty getting maps with the required specifications and scale. For the 2010 round, however, while many countries will still use paper maps (e.g., Azerbaijan, Kazakhstan, and Tajikistan) a significant number will use either GIS or digital maps. For instance in Georgia, GIS has already been used for the pilot census; Kyrgyzstan will use GIS topical maps for data dissemination; Moldova will use address maps; and Ukraine plans to use GIS and digital maps).

Session 7: Stages of building a census geography programme

40. The presentation on planning a census geography programme covered (i) objectives of a census geography programme; (ii) international standards and recommendations (iii) main aspects in a census geography programme; (iv) some advantages in using geospatial technologies; (v) main phases of implementation; (vi) an example of a planning process; and (vii) testing the planned census geography programme. In the presentation, for instance, it was indicated that the objectives of a census geography programme are to support the census planning process during the pre-enumeration phase; to support fieldwork operations in the pre-enumeration and enumeration phases; and to contribute to the statistical analysis and dissemination of the census data during the post-enumeration phase. The example of a planning process covered these issues: (i) coordination and monitoring; (ii) technical advice and assistance; (iii) assessment on GIS and census mapping at the NSO; (iv) institutional/Organizational issues; (v) realization of a test; (vi) GIS database design; (vii) digitalization and geocoding activities; (viii) census map updating and printing; (ix) dissemination; (x) staff and training; and (xi) equipment and consumables.

41. During the presentation, it was emphasized that although map production is generally not a specialty of the NSO, there is a need for a cartographic unit which should be in charge of the census geographic programme, including the possible use of GIS. It was further explained that since all statistical data are normally linked to a geographic coding scheme, there is a need for the NSO to take custodianship of the scheme which should be used by all other national agencies that are involved in data collection, and dissemination.

42. In the general discussion, one country, Moldova indicated that they have a law which mandates the NSO to develop a coding scheme for use by all other agencies in the countries. The same scheme will be used in the next census.

Session 8: Integrating fieldwork using satellite/aerial imagery and GPS

43. The presentation offered an overview of the capabilities offered by satellite and aerial imagery and other geospatial technologies for the delineation/field validation of EA boundaries. The presentation covered the following: (i) objectives of delineation of EA boundaries; (ii) criteria for the delineation of EA boundaries; (iii) main critical criterion to delineate EA boundaries; (iv) principal types of maps for census operations; (v) satellite remote sensing, including its advantages and disadvantages; (vi) aerial photography, including its advantages and disadvantages; and (vii) Global Positioning system (GPS), including its advantages and disadvantages.

44. Countries discussed how they deal with administrative boundary changes when planning their censuses. In Moldova and in Ukraine, there are provisions to freeze all administrative and territorial boundaries around 6 months before the planned census date.

Session 9: Statistical analysis and dissemination of census data

45. A representative of the UNSD made a presentation on an introduction on the use of geospatial technology and Internet in support of statistical analysis and dissemination of census data. The presentation also included illustrative examples of experiences and different approaches used by countries to disseminate their census information (policies, restrictions, advantages, etc.) and to distribute census products.

46. The presentation covered, (i) the power of maps, such as to communicate a concept or an idea; to support textual information; and to summarize large amounts of information concisely; (ii) the dynamic census atlases (as opposed to a static census atlas); (iii) spatial analysis techniques; (iv) digital geographic data for dissemination; and (v) digital data dissemination strategies and types of users.

47. As part of the discussion, the Russian Federation indicated that they disseminate census data in graphic form, while Kyrgyzstan is planning to set up a database for DevInfo dissemination of indicators from census data.

Session 10: Commercial suppliers' demonstrations on use of mobile GIS

48. A representative of Intergraph made a presentation on the use of GIS in census operation at the pre-enumeration, enumeration and post-enumeration stages. Use of GIS for thematic mapping was particularly highlighted. The presentation also covered the Spatial Data Infrastrure (SDI) and its importance for the census. Furthermore, the representative talked about applications and devices that Integraph has developed for mobile data collection. The presentation also included an illustrative example of how Integraph has been involved in national census activities by presenting on their project to design a Nigeria Census Geoportal based on the 2006 census of Nigeria.

49. A representative of Data+ presented on their project to create and provide to the NSO of Belarus digital maps for use in the 2009. These digital maps, which cover only part of the country, are based on cadastre information. According to the presentation, the NSO is satisfied with the quality of the maps that have been produced.

Session 11: Organizational and institutional issues

50. UNSD made a presentation on the organizational and institutional issues to be considered for geospatial implementation, including the creation and maintenance of a National Spatial Data Infrastructure (NSDI). The presentation emphasized the need to build a geospatial Infrastructure and for countries to consider the census geography programme as a continuous process, rather than the sequential mapping and dissemination operations. It was also emphasized that the use of and application of contemporary geospatial technologies and geographical databases is beneficial at all stages of population and housing census process as these technologies improve the efficiency in the preparatory, enumeration, processing and dissemination phases of the census. In this regard, it was advocated that national statistical organizations develop GIS as a long-term project and ensure the availability of resources for this, and also actively participate, in partnership with other national authorities, in the development of a national geographical information capacity, including the National Spatial Data Infrastructure (SDI), as well as sharing data and standards.

51. In the general discussion that followed the presentation, countries spoke about the role of their offices (NSO) in the census mapping preparation. Here is a sample of experience among the participating countries. In Moldova, there is no cartographic unit, production of paper maps is outsourced and demarcation of enumeration areas is the responsibility of regional statistical offices. In Georgia there is a small GIS section but it is expected to expand soon. In the Russian Federation there is a small mapping section that prepares terms of reference for map production. In Armenia there is a department that follows up on mapping activities, while in Azerbaijan the NSO participates in discussions about map production, but has no permanent census structure. In Oman, on the other hand, the NSO has a cartographic unit that is in charge of map acquisition.

52. Countries also discussed how they deal with the issue of map acquisition for inter-censual activities in view of the fact that many do not have a cartographic unit as part of the NSO. In Ukraine, left over maps from the census are updated and used for inter-censual data collection activities, while in Russia a copy of the paper maps is retained to be used for surveys, as was done for the agricultural census of 2008. In Moldova, a database of addresses of households is used as a sampling frame for inter-censual surveys.

Sessions 12: Methods of data capture

53. This session was devoted to a discussion on the methods of data capture, the relative advantages and disadvantages of the various methods, and issues relating to choice of an appropriate method. The presentation made by the UNSD began by defining “data capture” as a process of converting collected data to a computer interpretable format. It described five main methods of data capture: (i) keyboard data entry, (ii) optical mark recognition/reading (OMR), (iii) optical character recognition/intelligent character recognition (OCR/ICR), (iv) personal digital assistant (PDA), (v) Internet, and revealed the limitations and relative advantages of each method.

54. Choice of method should be part of the overall strategic objective of the census in terms of timeliness, accuracy and cost. The technology used should be decided early in census cycle in order to allow enough time to test and implement the system. When imaging technology is used for data capture, extensive testing is required well in advance of the census.

55. Following the presentation, countries discussed their methods of data capture. The **Russian Federation** has used automated data capture since the 1979 census with results being obtained in about 6 months. Over time, the data capture system, using scanning with optical recognition, has been developed to a sophisticated level with very low non-recognition rates. For the last census, **Georgia** used scanning technology with OCR but experienced problems with recognition of Georgian characters as they had not been included in the software. For the next census, the country will possibly use a combination of scanning and manual data entry. **Kazakhstan** has used scanning for the pilot census and will use scanning with OCR for the 2009 census.

56. **Moldova** used OMR and also scanning with OCR for the 2004 census and will probably use OCR technology to capture data for the 2012 census. There were problems with scanning of the 2004 census questionnaires resulting from poor quality paper which led to paper jams and also the poor legibility of handwriting used to fill in the questionnaires. The country, therefore, recognizes that some of the experienced problems had to do with the quality of the preparations before the scanning and not merely due to the scanning technology.

57. **Tajikistan** used manual data entry for the 2000 census, but will use scanning technology for the 2010 census. **Ukraine** used scanning with OCR for the 2001 census and plans to use the same method for the next census. For the 2001 census, the scanning technology used could not read Cyrillic.

58. **Azerbaijan** and **Kyrgyzstan** will use manual data entry for their 2009 censuses as they did during their last censuses.

Session 13: Country presentations and experiences on data processing

59. UNSD presented a summary of the results of the Questionnaire on census data processing, which was sent to the participating countries prior to the Workshop. Out of the ten CIS countries participating in the workshop, seven filled in and returned the questionnaire. For the 2000 round, four (**Armenia, Azerbaijan, Belarus and Tajikistan**) of the seven countries that responded indicated that they used manual data entry. Another two (**Moldova and Georgia**) used a combination of OMR and OCR while **Ukraine** used OCR. For the 2010 round only **Armenia** indicated that they will use only manual data entry while **Belarus** and **Ukraine** will use OCR scanning technology. **Georgia** will use a combination of manual data entry and OCR scanning technology.

60. Of the countries that responded to the questionnaire, three (**Belarus**, **Moldova** and **Ukraine**) stated that they did not outsource any part of their census data processing during the 2000 while **Armenia**, **Georgia** and **Tajikistan** did. For the 2010 and **Ukraine** does not intend to outsource part or all the data capture process while **Belarus** and **Georgia** intend to. The remaining three countries, **Azerbaijan**, **Moldova** and **Tajikistan** did not indicate what they plan to do in this regard.

61. Some countries made presentations on the method of data capture used for their censuses. **Armenia** used manual data capture for the 2001 census and this activity took about 6 months. CsPro was used for data processing. As part of data processing,

supervisors verified the data entered by data entry clerks, first at 100% and then partially as error rates decreased with time. Re-entry of data was performed by another data entry clerk. For the 2011 census, the country has not yet decided whether data entry will be manual or by scanning. The decision will depend on the budget that will be allocated for data processing.

62. For the 2001 census, **Ukraine** opted for scanning instead of manual data entry mainly due to the volume of the task as well as the time required to accomplish it. Data capture was done in four month and Sybase was used for data storage. There were problems as the scanner could only read digits and not Cyrillic characters. It also could not recognize the yellow color used for the questionnaires. Some of the problems that were experienced could have been due to the fact that the equipment used for the processing of data from the pilot and from the actual census were not the same. Furthermore, there was a general lack of requisite experience at the national and regional offices. For the next census, they hope to use a more up-to-date version of the OCR software, Eyes and Hands.

63. For the 2004 census, **Moldova** used three questionnaires, the individual questionnaire, the household questionnaire, and the questionnaire for those that were temporarily present. Data processing was centralized and scanning technology was used for data entry using both OMR and Readsoft OCR software. Questionnaire images were archived. The NSO outsourced questionnaire printing but got poor quality paper questionnaires which had an effect on data scanning. As a result, the process took longer than anticipated, based on six-day, two-shift scanning teams.

64. Coding was manually done directly onto the questionnaires and for editing, logical controls were included at the preparation, and after scanning at the control stage. Measures were instituted to guard against unauthorized access to the data during the data capture and processing stages. This was done by the use of a password code for each operator with only a limited number of operators having access.

65. For the next census, discussions are still on-going regarding the year and therefore, no decision has been taken yet about operational issues including data capture and processing.

66. In the **Russian Federation**, data processing is done at 67 regional processing centers and then the data are transmitted to the central office for aggregation at the federal level. At the regional level, there is coding and scanning of questionnaires as well as the performance of logical controls to the data. Coding was carried out on the computer in screen mode. Scanned images of questionnaires have been stored. At the federal level, there is data imputation as well as dissemination. Imputation was based on a massive hot deck selection of a donor and every item, except ethnicity, could be imputed.

Session 14: Data Capture: Optical Mark Recognition (OMR)

67. This session consisted of two presentations; one by the UNSD and the other by the representative of the DRS, from UK. The presentation of UNSD mainly dealt with definitions and concepts of the method. OMR is a technology that allows an input device (e.g. imaging scanner) to read hand-drawn marks such as small circles or rectangles on specially designed paper. An OMR works with a specialized document and contains timing tracks along one edge of the form to indicate scanner where to read for marks which look like black boxes on the top or bottom of a form. The advantages of OMR are that this data capture technology does not require a recognition engine. Therefore: it is fast, using minimum processing power to process forms, and costs are

predictable and defined. Conversely, OMR is unable to recognize hand-printed or machine-printed characters. Tick boxes may not be suitable for all types of questions. In that regard, questionnaire design and preparation is Critical. Field Operators must take particular care in filling out questionnaires, and training is essential.

68. DRS made a presentation on geo-coding of census data using paper based systems. DRS have developed a small, inexpensive, accurate, GPS device for use in pre-census activity, enumeration and post-census activity. The device is used to take the longitude and latitude coordinates in front of dwellings and this information is entered on a specially designated space on the census form. The device can be used with any paper based data collection system and any GIS software. This information can be used later on for geospatial presentation of census data. For instance, DRS also gave a live demonstration of the use of the data with Google Earth showing data collected at points on a satellite image.

Session 15: Data Capture: Optical Character Recognition/Intelligent Character Recognition/Intelligent Recognition (OCR/ICR/IR)

69. This session consisted of a presentation by UNSD and by Top Image System (TIS) and BetaSystem. UNSD presented the definitions and the main difference between the OCR, ICR and IR technologies. OCR gives scanning and imaging systems the ability to turn images of machine printed characters into machine readable characters, while ICR is able to process hand written characters. OCR/ICR has less strict form design compared to OMR. Forms can be scanned through a scanner and then the recognition engine of the OCR/ICR system interprets the images and turn images of handwritten or printed characters into ASCII data (machine-readable characters). Images are scanned and stored and maintained electronically, therefore, there is no need to store the paper forms as long as you safeguard the electronic files. The relative advantages and disadvantages were also highlighted in this presentation. Scanning and recognition facilitate efficient management and planning for the rest of the processing workload, but this technology is costly and may require significant manual intervention.

70. The presentation by TIS focused on the company's approach of an Intelligent Data Capture platform (IDR) which has the capability of extracting data from paper based documents based on the OCR/ICR/OMR technology as well as from electronic documents from PDA, the web or email. Their solution combines automated data capture with automatic classification for documents.

71. The presentation by BetaSystem focused mainly on Optical Character Recognition (OCR), Image Character Recognition (ICR) as well as on the company's Dynamic Form Recognition (DFR), and their relative advantages and disadvantages. The presentation also covered process stages of census surveys, including scanning; recognition; verifying processes; data capture; census data flow; and quality assurance.

Session 17: Overview of major issues for the revision of the UN Principles and Recommendations for Population and Housing Censuses, Rev. 2/Overview of the Conference of European Statisticians Recommendations for the 2010 Censuses of Population and Housing

72. The presentation on the UN Principles and Recommendations for Population and Housing Censuses, Rev.2 is covered under the reporting for session 2. The presentation on the Conference of European Statisticians Recommendations stressed highlighted the two main objectives of these recommendations, namely, (i) to provide guidance and assistance to CES countries in the planning and conducting of their population and

housing census; and (ii) to improve the comparability of the data through the selection of a core set of census topics and the harmonization of definitions and classifications.

73. The presentation also focused on the content of CES Census Recommendations in terms of new features such as the new sections on census methodology and on emerging census technology, as well as the addition of detailed appendices. This presentation pointed out that the objective of the CES recommendations was to cater to the counties of the region while also highlighting the complimentary nature of these regional guidelines and the global set and the fact that the latter set of guidelines is much broader than the CES set. For instance, the CES recommendations do not contain a part on census planning and also on tabulations which are included in the global recommendations.

Session 18: Core topics and recommended tabulations

74. The presentation by the UNECE, on a Review of Core Topics in the Conference of European Statisticians Recommendations for the 2010 Censuses of Population and Housing, provided some details on selected core topics, including on the place of usual residence, migration characteristics, ethno-cultural characteristics, economic characteristics, selected housing topics. Also mentioned were some non-core topics that are new additions to these regional guidelines, such as disability and agriculture.

75. The presentation gave details about the place of usual residence, including the definition as well the differences between the CES and the global recommendations in the definition. The concept of "intention of staying" was illustrated in detail using several scenarios. Also discussed was how to determine the place of usual residence for some special cases, such as persons working away from home during the week, students staying away from home, as well as persons in institutions at the time of the census.

76. With regard to the economic characteristics topics, the presentation provided detailed step-by-step guidelines on how to measure economic activity status in a census as well as some examples of best practices based on questions asked by some countries. The presentation emphasized the fact that measurement of economic activity status through information on source of livelihood or source of income should be discouraged.

77. During the general discussion that followed, some countries indicated that they are still asking the question on source of income or source of livelihood as a way to identify the economically active population. For a number of countries, the reference period for current economic activity was two weeks.

78. Some countries, e.g., the Russian Federation and Ukraine, indicated that collection of information on some topics, such as disability status and ethnicity/nationality was problematic due to the sensitive nature of these topics.

Session 19: Alternative approaches to census taking

79. In this session, there were two presentations, one on the Overview of Approaches to Register-Based Populating Censuses, and the other on a summary of alternative approaches to census taking with emphasis on the French Rolling Census.

80. The presentation on the register-based population censuses, by the UNECE, covered the general considerations about using registers in terms of the advantages of using register data for censuses, including (i) the use information that is already available thereby eliminating additional burden on respondents; (ii) the fact that data are potentially

available every year; and (iii) that it is cheaper than full enumeration once high quality registers are established. It also presented the requirements of using register data, such as, the need to have public and legislative support, and the long time and large investments needed to develop high quality statistical register system to be used for censuses.

81. The presentation covered the main requirements of the approach for generating census information, e.g, availability of a population register and a dwellings register; capacity to link persons and dwellings, and identifying households; as well as public and legislative support for the use of population registers. Also presented were the advantages and limitations of using registers to obtain census information. This presentation also provided examples of different variations of use of registers including (i) use of registers in combination with full enumeration; (ii) use of registers in combination with existing sample surveys; and (iii) use of registers in combination with ad hoc sample surveys.

82. A representative of the UNSD presented on the French Rolling Census. The presentation provided information on why the method was adopted, namely, to respond to more recent needs of statistics, and to smooth the costs and the expenses by spreading them over a long time period there by making it possible to utilize better experienced/trained staff and better control the operations.

83. In the presentation, the representative explained the methodology of the new method including the sampling strategy as well as the frame and how it is maintained. The presentation also provided information on the estimation principles and mechanism as well as how the cost for the new method compares to that of the regular census in France.

84. Some of the countries, for example, Armenia and Moldova, have already established population registers but there are concerns about the quality of the registers due to coverage and update issues.

Session 20: Data collection: PDA-Handheld-computers/Internet

85. The representative of Oman made a presentation to demonstrate the use of the PDA in the Oman census of 2010. The Sultanate of Oman first used the PDA in the 2003 census but only for the Governorate of Muscat. For the 2010 census, PDAs will be used throughout the country not just for data collection and transfer, but also for census management, including communication among staff.

86. With the use of the PDA, contents of the questionnaire are stored in the device that questions appear sequentially on the screen. Procedures for instant verification of the data are also programmed into the PDA so that the device would display a warning if either inconsistent or no information is entered. It was mentioned that the use of the PDA as a means of data collection and data capture helped to eliminate or minimize in-office data editing, coding and entry as would have been the case with the use of paper questionnaires.

87. It was emphasized that the 2010 census project has been benefited a lot from lessons learnt during the 2003 census regarding the use of PDA for data capture in a census operation. Based on the experience of the 2003 census, improvements have been made to the method in order to make the 2010 census more efficient and have the results ready in a more timely fashion. For instance, it was mentioned that while during the 2003 census there was a technician on stand-by, for the 2010 census, Oman will develop a list of trouble shooting issues.

88. The presentation also covered issues of how the data will be transferred from the PDAs to the central office. As part of the presentation, there was a demonstration of how the instrument is used to enter the data as well as the logical controls that have been programmed into the system.

89. During the discussion, a question was raised regarding estimated costs in terms of using the PDA versus the use of scanning. In response, it was stated that compared to scanning, the use of the PDAs in the 2003 census of Oman results in substantial cost savings. In another question, it was asked if the questions are the same in the PDA as in the paper questionnaire to which the response was in the affirmative. In response to a question on whether the GPS device being used can function in-doors, it was stated that all readings are taken from the main entrance even for multiple dwellings.

Session 21: Data Capture: Overview of Major Distributors/Commercial Suppliers

90. During this session, three presentations were made by the data processing providers DRS, Beta Systems and Top Image System. Each provider gave an overview on its specific solution to census data processing and some concrete examples of country application to illustrate its implementation.

RECOMMENDATIONS AND CONCLUSIONS

91. With regard to international recommendations, participants urged that the proposed disability measurement questions of the Washington Group disseminated. It was emphasized, however, that there is a need to test the public acceptance of the questions before these questions can be incorporated into a census.

92. The workshop participants recommended early planning of the census, especially regarding the use of improved technology and also when there is outsourcing of census activities.

93. It was emphasized that testing of the census questionnaire and of the technology to be used in different aspects of the census was crucial. In this connection, it was mentioned that the pilot census would provide a dress rehearsal for the main census.

94. Although countries of the region have experience in outsourcing of census activities and could exchange experiences during the workshop, it was still felt that the importance of thorough preparation of the tender process and of the testing of the processes to be outsourced needed to be further emphasized.

95. Participants took cognizance of the capabilities of contemporary technologies in GIS. It was recognized that for countries not yet having a GIS programme for the census, the use of GIS tools only in the post-enumeration phase would be an opportunity to introduce within the NSOs the technology, with benefits for the analysis and dissemination of census results in line with international recommendations, and limited initial investments in term of human and financial resources.

96. In the context of a National Spatial Data Infrastructure, workshop participants underlined the importance of the NSO's collaboration with other agencies, mapping agencies, other government agencies, producers or users of maps.

97. With regard to data capture, many countries in the region already use optical data capture methods. Availability of software recognition engine for Cyrillic characters is, however, still generally problematic although the situation is improving. The importance of testing the data capture process before the census was also emphasized.

In addition, participants recommended that attention be paid to the quality of the paper to be use if data capture will be by scanning technology.

98. Participants expressed interest regarding alternative methods for census, but took into consideration the necessary pre-conditions to implement these methodologies. For example, they noted the long time that is required to develop registers that can be considered adequate for census purposes.

99. The workshop participants expressed interest in the presentation of Oman on the use of the hand held device (PDA) for census data collection. They were particularly interested in the use of the PDA in combination with GPS to enable the geo-referencing of the data and also the introduction of validation controls in the device. Also of interest was the other uses of the PDA after the census operation, including for other inter-censual surveys and other censuses, e.g., of establishments.

100. The participants expressed the need for exchange of information among the countries of region and highlighted the role of regional and international agencies in this regard, including the UNECE, UNSD and CIS Secretariat. The exchange of information could be done through, for instance, posting of information on websites, and/or organization of workshops, among other things.

EVALUATION OF THE WORKSHOP

101. Overall, the participants appreciated the workshop's main focus on use of GIS in census operations and on new technology for data capture. Participants stated several elements that were the most useful, like sharing of experience among participating countries, use of modern technologies for capture and processing of census data, and introduction of alternative approaches to census. Also, some participants stated that the workshop gave them an opportunity to learn about the advantages and disadvantages of various methods of data capture, as well as perspectives on the use of GIS in census. Most participants rated the overall value of the workshop as either good or excellent and the majority of the participants indicated that the workshop's objectives were achieved.

ANNEXES

Annex I. Agenda of the Workshop

Annex II. List of participants

ANNEX I. WORKSHOP AGENDA

Regional Workshop on the 2010 World Programme on Population and Housing Censuses: International standards, contemporary technologies for census mapping and data processing

Minsk, Belarus, 8-12 December 2008

Provisional Agenda

Time	*Topic*	*Responsibility*	*Document*
	Monday December 8, 2008		
	Opening		
9:00 – 9:30	***Registration of participants***		
9:30 – 10:00	**Session 1 – Opening remarks –** welcoming remarks by Host country, UNSD, administrative matters	UNSD	
	The 2010 World Programme on Population and Housing Censuses and the preparations of the 2010 round of censuses in the region, and international recommendations on census planning and management Objective: To present the activities on 2010 World Programme on Population and Housing Censuses followed by a round table on the preparations of 2010 round of censuses in the region		
10:00 – 10:45	**Session 2 – The 2010 World Programme on Population and Housing Censuses** – Presentation by UNSD – General Discussion	UNSD	Pres. 1 (UNSD)
10:45 – 11:00	***Coffee break***		
11:00 – 12:30	**Session 3 –** Census **planning and management** Overview of international recommendations on census planning and management with special reference to quality assurance – Presentation by UNSD – General Discussion	UNSD	Pres. 2 (UNSD)
12:30 – 14:00	***Lunch break***		
14:00 – 14:45	**Session 4 –** Census **planning and management** A national example on quality assurance – Presentation by UNSD – General Discussion	UNSD	Pres. 3 (UNSD)
14:45-15:30	**Session 5 –** Outsourcing **of census activities** Presentation on when to outsource and practical guidelines on how to manage outsourcing. – Presentation by UNSD – General Discussion	UNSD	Pres. 4 (UNSD)
15:30 – 16:00	***Coffee break***		
	International **recommendations on contemporary practices in census cartography and use of Geographic Information Systems (GIS), and introduction to GIS fundamentals** Objective: (i) Presentations on the recommendations of the Expert Group Meeting on Contemporary Practices in Census Mapping and Use of GIS, (New York, May 2007), and the "*Handbook on Geospatial infrastructure in support of Census Activities"*; (ii) census mapping and use of GIS in the region; and (iii) stages of building a census geography programme; organizational and institutional; and a demonstration on use of mobile GIS		

Time	*Topic*	*Responsibility*	*Document*
16:00 – 17:30	**Session 6 –** International **recommendations on census cartography** – Presentation by UNSD – Presentation of UNSD results of UNSD pre-workshop questionnaire on census mapping and use of GIS in the region – General Discussion	UNSD	Pres. 5 (UNSD)
	<u>Tuesday December 9, 2008</u>		
9:00 – 10:30	**Session 7 – Stages of** building **a census geography programme** (Definition of the national census geography, e.g., EA development and geo-coding; constructing an EA-level database for the Census; and statistical analysis and dissemination of census data) – Presentation by UNSD – Presentation by expert – Presentation by countries – General Discussion	UNSD	Pres. 6 (UNSD) Pres. I (Expert)
10:30 – 11:00	***Coffee break***		
11:00 – 12:30	**Session 8 –** Integrating **fieldwork using satellite/aerial imagery and GPS** UNSD presents an overview of the capabilities of satellite and aerial imagery and other geospatial technologies for the delineation/field validation of EA boundaries. Countries present their experiences in integrating field work using geospatial technology (GPS, RS, etc.). – Presentation by UNSD – Presentations by expert – Presentations by countries – General Discussion	UNSD	Pres. 7 (UNSD) Pres. II (Expert)
12:30 – 14:00	***Lunch break***		
14:00 – 15:30	**Session 9 –** Statistical **analysis and dissemination of census data** UNSD presents on use of geospatial technology and Internet in support of statistical analysis and dissemination of census data with a review of experiences and different national approaches (policies, restrictions, advantages, etc.) – Presentation by UNSD – Presentations by expert – Presentations by countries – General Discussion	UNSD	Pres. 8 (UNSD) Pres. III (Expert)
15:30 – 16:00	***Coffee break***		
16:00 – 17:30	**Session 10 –** Commercial **suppliers' demonstrations on use of mobile GIS** Presentation by commercial providers of GIS/remote sensing/handheld solutions for censuses (e.g, use of Arc Pad) – A demonstration by Expert – General Discussion	Commercial provider	Pres. IV (Expert)

Wednesday December 10, 2008			
Time	***Topic***	***Responsibility***	***Document***
9:00 – 10:30	**Session 11 –** Organizational **and institutional issues** UNSD presents the organizational and institutional issues to be considered for geospatial implementation, including National Spatial Data Infrastructure (NSDI). Countries present their experiences in GIS project administration and management. – Presentation by UNSD – Presentation by countries – General Discussion	UNSD	Pres. 9 (UNSD)
10:30 – 11:00	***Coffee break***		
	Introduction to Data Capture **Methods** Objective: To present an overview of Data Capture management considerations and present and discuss the applications and issues of data capture using Optical Mark Recognition Technology; Optical Character Recognition/Intelligent Character Recognition, Manual Data Entry and provide an overview of different process stages		
11:00 – 12:30	**Session 12 – Methods of Data Capture** Methods of data capturing, advantages and disadvantages of each method, issues for consideration when choosing the method – Presentation by UNSD – Presentation by Expert – General Discussion	UNSD Presentation by expert	Pres. 10 (UNSD) Pres. V (Expert)
12:30 – 14:00	***Lunch break***		
14:00 – 15:30	**Session 13 – Regional** experience **with data processing** UNSD presentation of results of pre-workshop questionnaire on data capture/Country presentations on their experience on data capture – Presentation by UNSD – Presentation by countries – General discussion	UNSD Country presentations	Pres. 11 (UNSD)
15:30 – 16:00	***Coffee break***		
16:00 – 17:30	**Session 14 -** Optical **Mark Recognition** Construction/design characteristics, hardware and software requirements and scanning/storage, advantages and disadvantages; overview of the major commercial suppliers – Presentation by UNSD – Presentation by Expert (Overview on OMR) – General Discussion	UNSD Presentation by Experts	Pres. 12 (UNSD) Pres. VI (Expert)

Time	*Topic*	*Responsibility*	*Document*
	Thursday December 11, 2008		
9:00 – 10:30	**Session 15 – Optical** Character **Recognition/Intelligent Character Recognition/ Intelligent Recognition** Construction/Design Characteristics, Hardware and Software Requirements and scanning/storage, advantages and disadvantages; overview of the major commercial suppliers – Presentation by UNSD – Presentation by Expert (Overview on OCR) – General Discussion	UNSD Presentation by expert	Pres. 13 (UNSD) Pres. VII (Expert)
10:30 – 11:00	***Coffee break***		
	Preparations of the 2010 **round of censuses in the region and review of the United Nations Principles and Recommendations for Population and Housing Censuses and the Conference of European Statisticians Recommendations for the 2010 Censuses of Population and Housing** Objective: A round table presentation on preparations of the 2010 round of censuses in the region and presentations on major issues for the revisions of the United Nations Principles and Recommendations for Population and Housing Censuses and the Conference of European Statisticians Recommendations for the 2010 Censuses of Population and Housing		
11:00 – 12:30	**Session 16 –** Preparation **of the 2010 round of censuses in the region** – Presentation by UNSD – Presentation by CIS Secretariat – Presentation by each participant of the situation in his/her country – General Discussion	UNSD CIS Secretariat Country presentations	Pres. 14 (UNSD) Pres. (CIS)
12:30 – 14:00	***Lunch break***		
14:00 – 15:30	**Session 17 – Overview of major issues for the revision of the UN Principles and** Recommendations **for Population and Housing Censuses, Rev. 2/ Overview of the Conference of European Statisticians Recommendations for the 2010 Censuses of Population and Housing** – Presentation by UNSD – Presentation by UNECE – General Discussion	UNSD UNECE	Pres. 15 (UNSD) Pres. A (UNECE)
15:30 – 16:00	***Coffee break***		
16:00 – 17:30	**Session 18 – Core topics** and **recommended tabulations** Core topics and recommended tabulation of the Principles and Recommendations, Rev.2 – Presentation by UNSD – Presentation by UNECE – General Discussion	UNSD UNECE	Pres. 16 (UNSD) Pres. B (UNECE)

Time	*Topic*	*Responsibility*	*Document*
Friday December 12, 2008			
9:00 – 10:30	**Session 19 –** Alternative **approaches to census taking** Alternative methods to collecting, processing and disseminating census-like statistics at the global level/Alternative methods of census taking in the UNECE region – Presentation by UNSD – Presentation by UNECE – General Discussion	UNSD UNECE	Pres. 17 (UNSD) Pres. C (UNECE)
10:30 – 11:00	***Coffee break***		
11:00 – 12:30	**Session 20 – Data Collection: PDA-Handheld-computers/Internet** Different technologies/processes in data collection using handheld devices (e.g. PDAs) and Internet – Presentation by UNSD – Presentation by country – Presentation by Expert	Country presentation	Pres. 18 (UNSD) Pres. VIII (Expert)
12:30 – 14:00	***Lunch break***		
	Demonstrations **by commercial suppliers, and the final report, recommendations & conclusions**		
14:00 – 15:30	**Session 21 – Data Capture: Overview of Major Distributors/Commercial Suppliers** – Presentations by commercial providers – General Discussion	Presentation by experts	Commercial Providers Presentations
15:30 – 16:00	***Coffee break***		
16:00 – 17:30	**Session 22 - Final Report, Recommendations & Conclusions** – Final Report, Recommendations & Conclusions: review and adopt report, conclusions and recommendations (Final report lead by Rapporteur, evaluation of Workshop)	UNSD	Final Report

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ANNEX II: LIST OF PARTICIPANTS

Workshop on the 2010 World Programme on Population and Housing Censuses: International standards, contemporary technologies for census mapping and data processing

Minsk, Belarus, 8-12 December 2008

No.	Country / Organization	Contact Person Information
1	Armenia	Mr. Gagik Gevorgyan Member of State Council on Statistics of the Republic of Armenia National Statistical Service of the Republic of Armenia
2		Ms. Astghik Gyulbenkyan Main Specialist, Households Survey Division National Statistical Service of the Republic of Armenia
3	Azerbaijan	Mr. Khalig Nasibov Deputy Head of Population Census Department State Statistical Committee of Azerbaijan Republic
4		Mr. Vasif Gaziyev Chief Adviser State Statistical Committee of Azerbaijan Republic
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9		Mrs. Natalya Stankevich Chief Economist, Division of Preparation and Processing of Population Census Results, Population Census Department National Statistical Committee of the Republic of Belarus

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11		Ms. Natela Kveladze Head of Population Census Sub-division Department of Statistics
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13		Mr. Yerzhan Tuleytayev Head Department of Statistics
14	Kyrgyzstan	Ms. Nurjamal Karasheva Deputy Head Main Computing Center of the National Statistical Committee
15		Ms. Gulzeinep Mursabekova Head of Population and Housing Census Department National Statistical Committee
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17		Ms. Maria Strajescu Head of Division for Population Census National Bureau of Statistics
18	Oman	Mr. Sulaiman Alzadjali Director General of Information and Publication Centre, Director of Information Technology and Communication, Census 2010 Project Ministry of National Economy
19		Mr. Ali Al Raisi Director General of Social Statistics and Census 2010 Project Ministry of National Economy
22	Russian Federation	Ms. Irina Zhuravleva Deputy Head of Department of Population and Health Statistics Federal State Statistics Service
23		Mr. Oleg Manzhula Head of Division of Census Technological Security Federal State Statistics Service
24		Ms. Irina Zbarskaya Head of Department of Population and Health Statistics Federal State Statistics Service

No.	Country / Organization	Contact Person Information
25	Tajikistan	Mr. Najmiddin Rizoev Chief Expert of Population Census Department State Committee on the Statistics of the Republic of Tajikistan
26		Mr. Khayrudin Safarov Deputy Chairman State Committee on the Statistics of the Republic of Tajikistan
27	Ukraine	Ms. Mariia Timonina Deputy Director, Population Statistics and Administrative System Department State Statistics Committee of Ukraine
28		Ms. Tetiana Nikolaienko Head, Census Division, Population Statistics and Administrative System Department State Statistics Committee of Ukraine
	UN Agencies	
29	UNSD	Mr. Jean-Michel Durr Chief, Demographic statistics section United Nations Statistics Division
30		Ms. Margaret Mbogoni Statistician Demographic and Social Statistics Branch United Nations Statistics Division
31	UN-ECE	Mr. Paolo Valente Officer-in-Charge, Social and Demographic Statistics Section Statistical Division UNECE - United Nations Economic Commission for Europe
32	UNFPA	Mrs. Tatyana Haplichnik Programme Coordinator UNFPA Country Office in Belarus
33	CISSTAT	Ms. Natalia Kulikovskaya Chief, Department of Social Sphere and Trade Statistics Interstate Statistical Committee of the Commonwealth of Independent States
34		Mrs. Nina Bykova Chief, Division of Population and Labour Statistics Interstate Statistical Committee of the Commonwealth of Independent States
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35	University of Rome "La Sapienza"	Mr. Roberto Bianchini CIRPS, University of Rome "La Sapienza"
36	Intergraph	Dr.-Ing. Jens Hartmann Account Manager Öffentliche Auftraggeber, Security, Government & Infrastructure
37	Beta Systems Software AG	Mr. Christoph J. Steinl Vice Director for International Consulting Beta Systems Software AG Business Line ECM

No.	Country / Organization	Contact Person Information
38 39	DRS Data Services Limited	Mr. Andy Tye International Manager DRS Data Services Ltd. Mr. Brian Carbarns International Manager DRS Data Services Ltd.
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