

# ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC

## Expert Group Meeting on Effective Use of IT in Population Censuses

10 – 12 December 2007

Bangkok

### **DRAFT REPORT**

12 December 2007

### ORGANIZATION

1. The Expert Group Meeting on Effective Use of IT in Population Censuses (EGM) was organized by the Statistics Division of ESCAP from 10 to 12 December 2007 at the United Nations Conference Centre, Bangkok; the programme of the meeting is attached in Annex 1. The Meeting was attended by 32 experts, resource persons and agency representatives; the list of participants is attached in Annex 2. The participation of most country experts was funded by the United Nations regular budget, while some experts and all partner agencies attended at their own cost.
2. The secretariat had conducted during the third quarter of 2007 a survey on information technologies applied in population and housing censuses during the 2000 round of censuses and related plans for the 2010 round of censuses. The experts found the results very useful and recommended that the survey report should be published on the Meeting web site with appropriate disclaimers.
3. In addition, the discussions were facilitated by papers that the invited experts had prepared on various aspects of applying IT in their own censuses. In the context of reviewing technology trends and discussing modalities for regional exchange of expertise, the Meeting referred to document E/ESCAP/CPR(4)/7, Good practices and recommendations for the use of information technology in population and housing censuses, which had been prepared for the fourth session of the Committee on Poverty Reduction. A selection of relevant international standards and recommendations were available as background documents.
4. The Meeting elected Mr Stephen K.C. Leung as the Rapporteur and requested him to introduce the Group's recommendation to the fourth session of the ESCAP Committee on Poverty reduction on 13 December 2007. The experts from SIAP, SPC and UNECE acted as moderators of the sessions.
5. The experts shared their experiences in evaluating, managing and implementing technologies at various stages of censuses, including planning, field operations, data capture, data processing and dissemination. The EGM noted with appreciation the efforts of the bilateral assistance that Australia and Japan, and multilateral assistance that ESCAP, SIAP, UNECE and other international agencies working on statistical development in the region, had provided over the past two decades. It agreed that the results of the assistance focusing on improving the use of IT in population censuses had been particularly tangible.

6. In its final session on 12 December 2007, the EGM adopted the following conclusions and recommendations.

### **CONCLUSIONS AND RECOMMENDATIONS**

7. The EGM made the following observations on the trends that affected the application of IT in upcoming population censuses:
  - (a) Some census respondents and many data users have become much more knowledgeable about technology and have higher expectations for systems and formats of data that they were dealing with.
  - (b) Electronic census had become an additional option for data collection, with several countries already enumerating significant proportions of selected areas of their territory through the Internet. In technologically advanced countries, the development is driven by such factors as e-Government policy, the difficulty in recruiting sufficient number of qualified enumerators and respondents expectations for online services.
  - (c) There was an increasing amount of free resources on the internet, including information, software tools and digital maps.
  - (d) Multi-modal data collection had become the fact of life in most census offices, ranging from traditional interviews and recording on printed forms by enumerator to self-administered internet submissions.
  - (e) Since the 2000 round of censuses, hand-held devices, such as intelligent phones, PDAs, and hand-held computers had improved in terms of processing and storage capacity, and battery life.
  - (f) While in most countries paper questionnaires would continue to be the main data collection method, technology offered many new possibilities to control and monitor the form flows.
  - (g) Where administrative data systems provided good coverage and high quality data, the trend was moving towards register-based censuses, either without any enumeration of individuals and housing units or with enumeration of parts of population or parts of information needs. It was noted that the feasibility of register-based statistics depended on the legislation and other national circumstances.
  - (h) There was an increasing demand for interactive online tabulation and visualization (mapping and charting) applications, including those based on underlying unit record data (microdata). Census data were particularly suitable and attractive for those types of applications.
  - (i) There were various solutions to disseminating microdata in a safe way, including in one office the release of anonymized samples for user tabulation after which it would run the same analysis for the whole population; online tabulation of microdata on the server side without making those records available to the user.

- (j) Another office was developing table building software, which can be made available on the statistics office website, allowing experienced data users access the complete census unit record file remotely and produce customized aggregate data outputs in tables, graphs and thematic maps.
  - (k) New promising tools, such as blogging and wikis, had become available for collaborative content development and information sharing. However, they had hardly been tested by statistical offices.
  - (l) Global Positioning System (GPS) technology has become affordable, and in combination with GIS and other technologies, it offers new possibilities for improving digital maps for enumeration areas, planning and conducting the census and disseminating the results.
8. The EGM summarized the past experiences in applying IT in population and housing censuses in the form of the following lessons learned:
- (a) Information technology does not only provide efficiency gains in implementing censuses, but also has a significant impact on the quality of data collected and reaching end users.
  - (b) Adopting new technology in the census is not an end in itself. It is used to improve census processes so that the quality of results, timeliness, productivity and cost-effectiveness are improved.
  - (c) There is more than one way of conducting a census; successful methods vary based on the characteristics of the country. The privacy, administrative and societal attitudes can significantly influence the way in which censuses are conducted.
  - (d) Census planning needs to start early. Australia for example has a five-year census cycle and starts planning for the next census well before the enumeration of the previous census.
  - (e) New technology has to be evaluated and thoroughly tested in advance in real situations to ensure it works as planned. The census cannot be used as an occasion to experiment with untested applications.
  - (f) The evaluation of hand-held devices to collect census data had proven that the enumerators had to be computer-savvy. The small screen size does not often permit using a conventional questionnaire design. In countries with multiple languages, the design of applications for hand-helds was particularly challenging. Maintenance, battery backup, and security are important issues when using hand-held devices for censuses and surveys. Where online transmission was piloted, the transmission was not free of errors.
  - (g) The availability and affordability of GPS technology made it possible to geo-code village centres, demarcate enumeration areas, and even individual housing units. Adequate training was required, especially for those new to this technology. Weather affected the accuracy of GPS readings, and supervision was important in reducing errors in field operations.

- (h) In the recent census in the Philippines, the NSO had developed a novel and relatively low-cost application to monitor the progress of enumeration. The application was based on SMS technology, combined with a low-cost open-source routing application. The experts expressed interest in learning more about the solution.
- (i) MS Project was the most frequently used as census planning and management tool. It was particularly useful in assisting project governance to ensure the timely implementation of the census as it allowed the assignment of responsibilities and resources and as the feasibility of implementing one stage of the census depended on the previous stages.
- (j) Imaging (scanning) offered many advantages to downstream data processing, allowing much flexibility in the order in which the forms and fields were coded, recognized, edited and imputed for missing data.
- (k) The use of several recognition engines improved the accuracy of automated capture of alpha and numeric characters. The recognition of hand-written characters of many languages still required more research in order to reach acceptable recognition rates.
- (l) The design, quality and filling of census questionnaires were critical success factors in optical data capture. It was important to collaborate with the system developer during the questionnaire design and to monitor the printing process to ensure consistent quality of the printing paper, ink and colours.
- (m) The questionnaire forms control has to be automated, using bar codes or other suitable methods, in order to trace and track the forms (or parts of forms) that have passed through census processing, and to identify backlogs.
- (n) It is important to ensure that outsourcing contracts have clearly articulated and detailed technical specifications, and quality criteria for communication and deliverables. Outsourcing is best suited for accessing expertise that require highly-specialised skills or large one-time investments for hardware and software.
- (o) With regard to technical assistance, training provided in the receiving country by external experts was effective in terms of learning, especially if it was provided in local language. Regional forums to exchange IT expertise were particularly valuable for managers.
- (p) It is generally difficult to ensure the quality of specialist and the timeliness of information in expert rosters. Relying on pre-named individuals to provide particular expertise was compared with trusting an organization to assign an appropriate expert for a task at hand. The latter approach, relying on an organization as a source of expertise, was preferred by the EGM.
- (q) Study tours were particularly useful when the target country and topic were precisely specified. On-the-job training in a different office or different country was generally effective in building technical skills.

- (r) Online training was most effective after an introductory training or on-the-job training had been given. Online learning was also useful for obtaining basic understanding of general software packages. It had limited use for staff preoccupied with their daily work and it had limited use in learning IT management.
9. The EGM recommended that, in support of applying appropriate IT in population and housing censuses, the Governments should:
- (a) Ensure that the national legislation take into account modern information and communication technologies and provide the requisite environment for the effective and safe implementation of ICT in population and housing censuses, and other official data collection operations.
  - (b) Improve the civil registration system throughout, and consult relevant national statistical offices when designing and revamping administrative data systems potentially suitable for statistical purposes. Administrative records are often a cost-efficient alternative for collecting official statistical data.
  - (c) Continue improving government-wide ICT infrastructure, including one that facilitates the transfer and appropriate use of confidential data and information, and help government departments to pool skills, capabilities and development efforts.
  - (d) Invest in educating decision makers both on the general importance and use of results of censuses as well as on strategic ICT investments for data collection, archiving and dissemination.
10. The EGM recommended that statistical offices responsible for population and housing censuses should:
- (a) Consider efficiency, quality and timeliness as key objectives in setting priorities.
  - (b) Develop capacity in strategic IT planning, evaluation and management.
  - (c) Before proceeding with any new development, review the lessons learned from the previous applications of IT in censuses and other operations
  - (d) Consider the usability of applications and hardware beyond the census operation, i.e. in other statistical operations and other government operations. Where needed, seek external guidance in putting any tender specifications together.
  - (e) Document census operations adequately, including the applications developed, and place on the web where appropriate.
  - (f) Adopt systematic practices in documenting and archiving census data and metadata and sharing metadata with the public.
  - (g) Influence relevant national legislation, and establish policies and systems to make available for researchers anonymized data sets from censuses and surveys.

- (h) If not applied yet, implement computer-assisted or automatic coding and editing. Pay attention to the consistency of results if data capture, coding and editing are done in several locations.
  - (i) Allow sufficient time for testing of hardware, software and applications before adopting them for the census. Subjecting an application to sufficient load testing is not easy in a typical web development environment and might require external expertise or outsourcing.
  - (j) Evaluate low-cost, free and open source software as alternatives for commercial software packages and own application development.
  - (k) Ensure that developers document and deliver the source code for any application.
  - (l) Develop capacity to maintain the organization's web site as external service providers do not always supply the required and dependable hosting services.
  - (m) Create an attractive and user-friendly web site for the census, as it is an effective way to enhance the visibility of the organization and the use of collected data. The web site should not be limited to data and immediate metadata, but could provide advocacy material and advice on the use of census data.
  - (n) Provide opportunities for staff to contribute expertise outside the office, including abroad, in order to utilize and nurture their skills more broadly and to retain highly-motivated staff.
11. The EGM recommended that the secretariat of ESCAP and the Statistical Institute for Asia and the Pacific (SIAP), in collaboration with other regional and international agencies as appropriate, should:
- (a) Prepare guidelines on how statistical and census offices should approach the development community when they needed assistance on IT development, including advice on how to find out if there are other countries with the same interest and needs.
  - (b) Continue providing forums for sharing expertise in specialised areas of statistical IT and in IT management in general; provide a venue and funding support for regular exchange of IT experiences and best practices.
  - (c) Organize advocacy and training workshops on all aspects of documentation, archiving and safe dissemination of census microdata. A request was made to provide advisory services on general data security for a statistical office.
  - (d) Establish a web site where statistical and census offices could share their experiences in applying IT.
  - (e) In view of some countries lacking a dependable web hosting service, a suggestion was made to provide a reliable server to host websites of statistics/census offices.
  - (f) Conduct training in the utilization of free tools and maps, such as Google Earth, in digital mapping and GIS development.

- (g) Ensure that technical assistance for statistical and census offices in the region, including that focusing on optimizing the use of ICT, is coordinated.
- (h) In IT and other training workshops, always use data and produce outputs relevant to the trainee's country.
- (i) Make all training materials available online and in the format that is useful for those who are not able to attend the group event. Provide training materials in national languages.
- (j) Follow up the training afterwards in order to evaluate and to enhance its impact.
- (k) Support the conversion of proven software applications, such as CSPro and the Microdata Management Toolkit, to become fully platform-independent; support their continued maintenance

# ANNEX 1. PROGRAMME

## Expert Group Meeting on Effective Use of IT in Population Censuses, Bangkok, 10-12 December 2007

12 December 2007

Date	Time*	Agenda item -Module	Session content	Prepared speaker(s)
Monday 10 December 2007	0900-0930 hrs	1 -Opening session	-Welcome -Introduction of participants and resource persons - Moderation arrangements and election of Rapporteur -Group photo during the first break	ESCAP
	0930-0945 hrs	1 -Objectives of the EGM	-Scope and purpose of the Meeting	-Mr Ilpo Survo
	0945-1000 hrs	4 -Resources	-Overview of available online information sources	-Mr Joel Jere
	1000-1100 hrs	2, 3 -Technologies for all stages of census	-Overview of the ESCAP survey	-Mr Mark Grice
	1100-1200 hrs	2, 3 -Technologies for all stages of census (cont.)	-Planning and monitoring -Utilization of handheld devices	-Mr Gema Purwana
	Lunch break			
	1300-1430 hrs	2, 3 -Technologies for all stages of census (cont.)	-Location-specific technologies: GIS, GPS, digital maps	-Mr Md. Nowsherwa -Mr Bounmy Vilaychith -Mr Joel Jere
	1430-1500 hrs	2, 3 -Technologies for field operations	-Monitoring of enumeration progress	-Mr Val Abuan
	1500-1630 hrs	2, 3 -Technologies for data capture	-Imaging -OCR/ICR and OMR	-Mr Mohan Singh Thapa - Mr Bounmy Vilaychith
Tuesday 11 December 2007	0900-1000 hrs	2, 3 -Technologies for data capture (cont.)	-CAPI and CATI -Register-based censuses	-Mr Lao lok (Frankie) Un - Mr Paolo Valente
	1000-1030 hrs	2, 3 -Technologies for metadata documentation and data archiving	-Documenting and archiving census datasets -Making census microdata available in a safe way	-Mr Jan Smit -Mr Daniel Clarke
	1030-1130 hrs	2, 3 -Technologies for data processing	-Data coding -Data editing and imputation	-Ms B. Tserenkhand -Mr Mai Van Cam
	1130-1200 hrs	2, 3 -Technologies for dissemination	-Dissemination through the Internet	-Mr Has Bunton
	Lunch break			
	1300-1400 hrs	2, 3 -Technologies for dissemination (cont.)	-Dissemination through the Internet	-Ms Angkana Hattakitkosol -Mr Stephen K.C. Leung
	1400-1430 hrs	4 -Resources	-Outsourcing	-Mr H.R. Gunasekara

Date	Time*	Agenda item -Module	Session content	Prepared speaker(s)
	1430-1700 hrs	5 -Regional exchange of expertise	-Experiences in sharing expertise with other countries - Experiences of the UN (ESCAP, SIAP, ECE) -Discussion on exchange modalities	-Mr Denis Farrell -Mr Masao Takahashi -Ms Davaasuren Chultemjamts -Mr Ilpo Survo -Mr Paolo Valente
Wednesday 12 December 2007	0900-1000 hrs	-Joint session with the fourth session of the Committee on Poverty Reduction	Participation in the opening session of CPR4 as country representatives	-All EGM participants
	1000-1200 hrs	5 -Recommendations	-Adoption of the EGM recommendations	-Rapporteur, assisted by the secretariat
	Lunch break			
	1330-1630 hrs	-Joint session with the fourth session of the Committee on Poverty Reduction	Participation in CPR4 as country representatives	-All EGM participants
Thursday 13 December 2007	0900-1200 hrs	(5) -CPR4 -Fourth session of the Committee on Poverty Reduction	Presentation of the EGM recommendations to the fourth session of the Committee on Poverty Reduction	-Rapporteur of the EGM - All EGM participants who can stay on
	Lunch break			
	1330-1630 hrs	-CPR4 -Fourth session of the Committee on Poverty Reduction	Participation in the fourth session as country representatives	-All EGM participants who can stay on
Friday 14 December 2007	1400-1700 hrs	-CPR4 -Fourth session of the Committee on Poverty Reduction	-Adoption of the report of CPR4 (CPR4 has Informal programme in the morning, to which all are welcome)	-All EGM participants who can stay on

\* 15-minute coffee breaks in the mornings and afternoons, to be announced during the sessions

## ANNEX 2. LIST OF PARTICIPANTS

Mr Gema Purwana	Director, Statistical Information System, BPS - Statistics Indonesia, Jakarta
Mr Valentino C. Abuan	Director, Information Resources Department, National Statistics Office, Manila
Mr Stephen K.C. Leung	Acting Assistant Commissioner, Census and Statistics Department, Wan Chai
Mr Masao Takahashi	Deputy Director, General Affairs Division, Statistics Bureau of Japan, Tokyo
Mr Has Bunton	Deputy Director-General, National Institute of Statistics, Ministry of Planning, Phnom Penh
Mr Denis Farrell	First Assistant Statistician, Population and Environment Statistics Division, Australian Bureau of Statistics, Belconnen
Mr H.R. Gunasekera	Director, Department of Census & Statistics, Colombo
Mr Samaychanh Boupcha	Director General, National Statistics Centre, Vientiane
Mr Bounmy Vilaychith	Acting Director, Data Service and IT Division, National Statistics Centre , Vientiane
Mr Lao Iok (Frankie) Un	Acting Head, Department of Computer and Information, Statistics and Census Service, Macao
Ms B. Tserenkhand	Director, Data Processing and Technology Department, National Statistical Office of Mongolia, Ulaanbaatar
Mr Li Xiru	Deputy Director-General, Department of Population and Employment Statistics, National Bureau of Statistics, Beijing
Mr Md. Nowsherwa	Director, Computer Division, Bangladesh Bureau of Statistics, Dhaka
Mr Boonsom Suwannakhot	ICT centre, National Statistical Office, Bangkok
Ms Angkana Hattakitkosol	ICT centre, National Statistical Office, Bangkok
Ms Pannee Pattanapradit	Economic and Social Statistics Bureau, National Statistical Office, Bangkok
Mr Mai Van Cam	Deputy Director, Department of Population and Statistics, General Statistical Office, Hanoi
Mr Mohan Singh Thapa	Joint Director, Office of the Registrar General, India, New Delhi
Mr Paolo Valente	Statistician, Statistical Division, United Nations Economic Commission for Europe, Geneva
Mr Rick Baxter	Census Technical Advisor, Statistics and Demography Program, Secretariat of the Pacific Community, Noumea Cedex

Mr Pietro Gennari	Director, Statistics Division, United Nations ESCAP, Bangkok
Ms Haishan Fu	Chief, Statistics Development Section, Statistics Division, United Nations ESCAP, Bangkok
Mr Ilpo Survo	Chief, Statistical Information Services Section, Statistics Division, United Nations ESCAP, Bangkok
Mr Joel Jere	Statistician, Statistics Development Section, Statistics Division, United Nations ESCAP, Bangkok
Mr Jan Smit	Statistician, Statistics Division, United Nations ESCAP, Bangkok
Mr Mark T. Grice	Independent Statistical Consultant, ESCAP, Statistics Division,
Mr Daniel Clarke	Assistant Regional Coordinator, Microdata Project, StatisticDivision, United Nations ESCAP, Bangkok
Ms Sara Duerto Valero	Project Staff, Microdata Project, Statistics Division, United Nations ESCAP, Bangkok
Mr Antonin Coeur-Bizot	Project Staff, Microdata Project, Statistics Division, United Nations ESCAP, Bangkok
Ms Davaasuren Chultemjamts	Director, Statistical Institute for Asia and the Pacific (SIAP), Chiba
Mr Bhakta Gubhaju	Population Affairs Officer, Population and Social Integration Section, Emerging Social Issues Division, United Nations ESCAP, Bangkok
Ms Wanphen Sreshthaputra-Korotki	Population Information Expert, Population and Social Integration Section, Emerging Social Issues Division, United Nations ESCAP, Bangkok