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Revising the Conference of European Statisticians Recommendations for Population and Housing Censuses for the 2030 round:

Technology

Census technology

Note by the Conference of European Statisticians Task Force on Census Technology*

Summary

This document provides an overview of the issues of census technology currently considered for the Conference of European Statisticians (CES) Recommendations for the 2030 round of population and housing censuses. It describes the questions that the CES task force on census technology has developed for the survey on the censuses of the 2020 round and the considerations it has for the CES Recommendations for the 2030 census round. The main purpose of the document is to elicit meeting participants' thoughts on these topics, including suggestions for other areas where the existing recommendations on technology should be expanded or revised.

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I. Introduction

1. Every ten years the Conference of European Statisticians (CES) issues Recommendations to guide countries in conducting their population and housing censuses. The Recommendations are developed by expert task forces overseen by the CES Steering Group on Population and Housing Censuses. In developing the Recommendations for the 2030 round of censuses, the Task Force on Census Technology is addressing the technology-related matters apart from geographic information systems (GIS), for which a separate task force was established. The Task Force on Census Technology consists of experts from Canada, Ireland, Israel, Russian Federation, Eurostat, United Nations Economic Commission for Europe (chair), and United Nations Statistics Division.
2. The work will rely on a survey of countries participating in the Conference of European Statisticians (CES) on their practice with the population and housing census of the 2020 round, and on the extent to which the CES Recommendations were followed. The task force designed the technology-related questions of that survey.
3. This document provides an overview of the issues covered with the technology-related questions for the survey and the task force's considerations for the Recommendations for the 2030 census round. The main purpose of the document is to elicit meeting participants' thoughts on these topics, including suggestions for other areas where the Recommendations on technology should be expanded or revised.

II. Scope

4. Adoption of new technologies or methodological approaches requires understanding of the associated benefits and risks. In considering the introduction of innovations, the census organization should strongly consider learning from the experience with censuses internationally. While all areas of census-taking use technology, the emphasis of the Technology chapter of the Recommendations is to assist countries in introducing technologies that they have not used before.
5. The complexity of technologies may go beyond the capabilities of a census agency and operations requiring specialised technology are therefore likely to be outsourced. The value of doing so is that external suppliers bring with them considerable technical experience and expertise which would otherwise be unavailable to census takers. The 5- or 10-year interval between censuses is a further argument for outsourcing instead of developing in-house capabilities that may not be needed in one cycle only, in view of technological change. Outsourcing therefore play an important part in the implementation new technological solutions.

III. Survey of the 2020 census round

6. Most questions and issues are relevant to countries that include field enumeration in their census, that is, countries with a traditional or combined census. They pertain to (1) internet response; (2) devices used in field enumeration; and (3) software used in different census operations. Questions on outsourcing, while in a separate section of the questionnaire, are also highly relevant for understanding the use of technology in a census.
7. Taking into account technological developments, focusing on the actual practice applied in the 2020 round, and placing emphasis on the issues that would shape the Recommendations, the task force developed the related survey questions. In all, countries are addressed with 20 questions on census technologies (excluding GIS). While all questions have defined answer categories, nearly all of them provide the possibility to explain a country's specific solution if it does not fall under any of the pre-defined categories. One open-ended question addresses online approaches that are specific to population groups.

A. Internet response

8. With the spread of internet use, self-enumeration using the internet was a major technological development characterising the 2010 census round, expanding further in the 2020 round. As the internet option can be incorporated into any of the traditional methods of delivering and collecting census forms, there can be many ways in which this has been applied. The survey questions map the variety of options that were offered to respondents, the way in which they were offered, the features of and access modalities to the online form, methods for ensuring privacy and coping strategies for peak infrastructure demand.

B. Devices

9. The range of devices used in the census has widened, requiring census-takers to find an effective way to make enumeration comfortable for the respondents while maintaining the ability to integrate the responses received on different platforms. The survey questions map the use of different devices and associated difficulties, their number, how they were obtained and what happened to them after the census.

C. Software

10. This section of the survey establishes the implemented cyber security standards and establishes the use of optical or intelligent reading software. For the software used in each major census operation, the survey seeks to establish whether it was available in house, from open source or commercially or custom-made. Specific methods are mapped for anonymizing individual records. As issues not addressed in previous reviews, the survey addresses the ways how technology was used to enhance accessibility of enumeration, and the purposes for which cloud technologies were used.

D. Outsourcing

11. The questionnaire asks to indicate for each census activity whether they were outsourced and provide the main reasons for outsourcing.

IV. Considerations for Recommendations for the 2030 census round

12. The part of the Technology chapter that describes general considerations for choosing and deciding on technology would need to go through minor editing and streamlining. The structure of the remaining part would follow the one that was presented for the survey questions above.

13. Descriptions of paper-based technologies will be reduced drastically as their use would shrink and detailed descriptions already exist and can be referenced. The sections on approaches used for designing electronic questionnaires require expansion and more detail, such as guidance for formulating questions, built-in coding, hints, and logical navigation. Describe the possibilities of primary processing and control of the electronic questionnaires data just at the time of its collecting.

14. It will remain crucial to emphasise the need to take have enough of the time, labour, and financial resources to fully test the new technology and to refine it based on the results of testing. This would have to be factored into the financial planning and influence the extent to which an innovation can lead to a net reduction of cost. It is necessary to test new implementations on diverse groups of users to make your sure the clarity of questions for all users, the convenience of filling in the form, how to improve the data collection infrastructure. All testing must consider potential implications for other census operations and on census data quality.

15. Concerning outsourcing, the fundamental point that any outsourcing should be at the service of the requirements of users and reassure the public on matters relating to confidentiality and data protection remains important. The 2030 Recommendations would have to bring out the advantage of engaging the same contractor for providing applications that are linked with each other, to ensure clear responsibility for the functionality of the system's components.

16. The Technology chapter should highlight the census operations for which it is definitely necessary to use digital technologies. Corresponding references need to be included in other chapters where these operations are focused on.

17. The Technology chapter would have to expand on describing the solutions applied in register-based censuses, building on the accumulated experience with such censuses and anticipating their expansion to further countries.

18. Concerning dissemination, the Recommendations would need to expand the part about user access to the census microdata and the related technological solutions.

19. There is an increasing potential for the use of more innovative data sources and techniques, such as big data, synthetic data, and artificial intelligence, for the purposes of the census. As an example, Switzerland is using machine learning in creating a derived census variable, namely, to determine household type where this cannot be measured directly in their new census system.¹ The Technology chapter of the 2030 Recommendations should include a part about the using such technologies, their potential scope and impact. While the use of such technologies in a census is scarce so far, studies and use cases from other areas could be reviewed to provide suggestions.

V. Conclusion

20. The task force plans to analyse the survey results in late 2023 and use them in writing the technology chapter of the Recommendations in the first half of 2024. In parallel, the task force will review available studies and use cases of novel technologies potentially useful for the census but not yet applied in any census, to address related considerations in the Recommendations.

¹ Swiss Federal Statistical Office (2022). *Using machine learning methods to determine type of private household in the Population and Households Statistics*. Paper for the Conference of European Statisticians Group of Experts on Population and Housing Censuses. ECE/CES/GE.41/2022/6.