Scalable Digital Census Planning

How Statistics Botswana is Making the Leap from Paper to Digital

Census data is a crucial part of effective governing. Understanding the size, distribution, and diversity of the populace helps policy makers provide optimized economic planning, development and improved policy planning. Statistics Botswana, a parastatal organization, is responsible for the collection and dissemination of official statistics for Botswana.

Located in southern Africa, the Republic of Botswana has a population of almost 2.3 million people. In the past, conducting a Population and Housing Census (PHC) in the country was a manual, paper-laden process. Fieldworkers would receive paper maps to orientate themselves to their assigned enumeration areas (EA). Then they would go into the field with paper forms to collect the census information

manually. The method was tedious, complicated, error-prone, and required fieldworkers to have advanced map interpretation skills.

In line with UN recommendations and following international trends, Statistics Botswana decided to dramatically streamline this process and modernize their census-taking methods, for their upcoming PHC in 2021.

From Paper to GIS and Beyond

Although the democratization of data makes spatial data (raster, point and vector) more readily available to everyone, in many cases the ability to collect, process, analyze, interpret, and present this data has remained with the few specialists who have the required domain and technology expertise. Previously, in Botswana, the role of cartography in a census has been to support the production of Enumeration Area (EA) maps in support of census enumeration and thematic maps derived from census information during the Analysis and Dissemination phase of the census.

However, the development of geospatial technology has broadened the scope of its use thereof in census proceedings. Nowadays, it covers all the phases of a census, namely Pre-Enumeration Mapping, Digital Enumeration as well as Analysis and Dissemination.

As part of the transition to a digital census, the 2021 PHC will also introduce the creation of a Dwelling Unit (DU) Frame, an important new addition to the Pre-Enumeration Census Mapping phase.

This necessary component of an effective census will provide Statistics Botswana with detailed household and land use information on each dwelling unit in Botswana. Business units/structures and points of interest will also be systematically and comprehensively captured in the process. The Botswana DU Frame will not only provide a valuable additional source of information that complements the census results; it will also form the backbone of the Botswana Master Sample Frame – the statistical frame used as the basis for the intercensal survey program.

Spatial context has become critical in implementing large-scale census efforts and requires desktop and server-based GIS solutions to effectively produce census data and disseminate it to thousands of people.

The Impact of Geospatial Capabilities

To help to transform, streamline, and democratize the entire census process, Statistics Botswana made the decision to utilize HxGN Smart Census for the 2021 census.

HxGN Smart Census is a client-server software platform designed exclusively with census management in mind. It integrates traditional GIS functionality with a powerful workflow and workforce management tool to provide a total solution for census strategies. It also provides modules that power the end-to-end workflow, from pre-enumeration mapping to enumeration to dissemination.

With this solution, Botswana will use imagery base maps to capture dwelling unit data during pre-enumeration fieldwork. An intuitive mobile application that incorporates intelligent caching will enable users to quickly train and capture data in the field, with or without internet access. In addition, office work such as the defining of enumeration areas and supervisor areas will be done in a web-based smart GIS application with predefined workflows. The workflow and workforce capabilities of HxGN Smart Census control and limit each type of user (office and field) to their allocated geographical areas and tasks.

Primary Deliverables

The HxGN Smart Census will play a central role in composing the following primary deliverables of the Pre-Enumeration Mapping phase of the census:

1. Up-to-date geographic frame for Botswana that will reflect the current administrative boundaries of the country.
2. Up-to-date Enumeration Area and supervisor area map database with accompanying information to be used during the enumeration phase of the census.
3. Detailed Dwelling Unit-Frame with current image base maps.

Benefits

Cost Savings

HxGN Smart Census has numerous advantages for Statistics Botswana, especially when it comes to cost reduction. Censuses are by far the costliest statistical data collection project in a country. There is constant pressure to improve efficiency while cutting the costs.

Traditional desktop GIS software, in combination with mobile GIS software, is the current standard in pre-enumeration census mapping. Since the costs associated with desktop and mobile GIS are determined by the numbers of users/licenses, the savings are usually significant – especially for a country like Botswana where large numbers of temporary GIS operators and fieldworkers are deployed to do the work.

By implementing a streamlined workflow system, the HxGN Smart Census solution will reduce these costs and empower workforces of any size to be quickly trained and to focus on their duties instead of navigating through a complex and perhaps overly-powerful GIS system.

Improved Data Quality

HxGN Smart Census workflows guide users both in the office and in the field through their tasks. This ensures consistency in the execution of the methodology and hence improved quality.

The “production unit” concept within HxGN Smart Census – where every inch of territory that a country covers is accounted for by the system – ensures total coverage during pre-enumeration mapping; this level of completeness effectively eliminates errors of coverage that were often experienced during past census enumeration.

Additional Benefits

A census-mapping project is a huge undertaking, but HxGN Smart Census provides Statistics Botswana with an excellent platform for easy work scheduling, project tracking, and reporting. Additional advantages include:

- Scalable – Minimal training compared to conventional desktop GIS means that new users can be quickly brought in, trained, and put to work.
- Flexible – Configuring the software to ensure that each user can only access tasks assigned to him/her eliminates duplication of effort and potential differences in methodology interpretation. This improves data quality and consistency.

- Up-to-Date – Since software is installed only on the server, each time a user logs in from a client, they get access to all the latest updates and changes. Software and application updates are easy and non-disruptive to ongoing activities.
- Field-Ready – The offline functionality enables fieldwork to be done in remote areas. Advanced caching ensures that relatively small data packages are sent to and from the server, keeping data costs and connection time to a minimum — an important aspect from a fieldwork and budget perspective.
- End-to-end Solution – The Pre-Enumeration module feeds seamlessly into the Enumeration and Dissemination modules of HxGN Smart Census thus providing a total census solution.

What’s Next?

Statistics Botswana is investigating the use of HxGN Smart Census Enumeration module for use during the Enumeration phase of the 2021 PHC. The Enumeration module has a built-in Computer-Assisted Personal Interviewing (CAPI) solution, but it can be configured to integrate with a range of third-party CAPI solutions as well. In addition, HxGN Smart Census Dissemination Module will also play a vital role in the dissemination phase of the Botswana census.

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