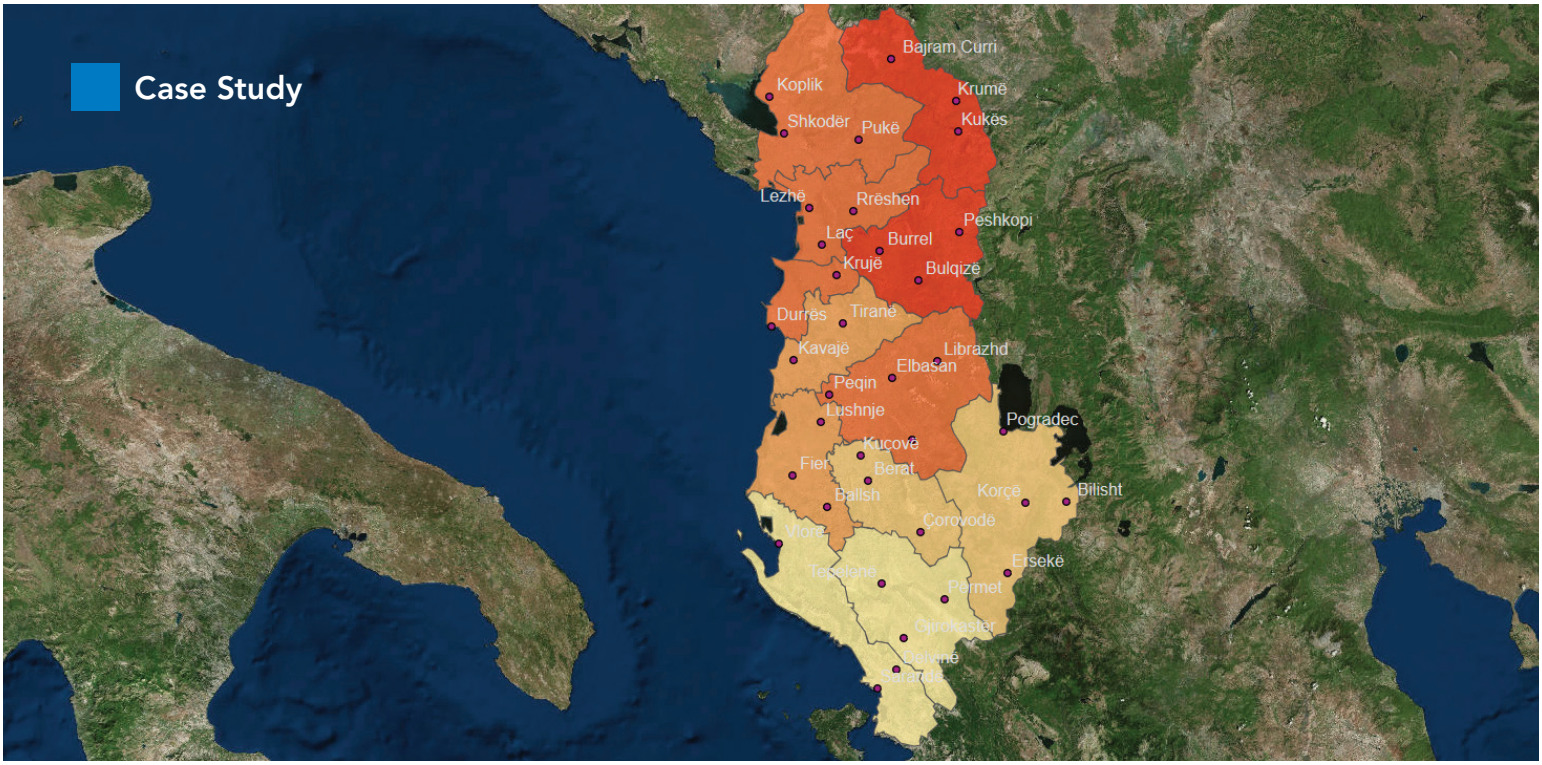


Official Statistics

User

The National Institute of Statistics Albania (INSTAT)

Partner

Team Dev—**www.teamdev.it**

Challenge

Determine methods for introducing GIS technology into the census process to improve accuracy and efficiency.

Solution

Create an enterprise GIS that enabled the country to ensure a complete count and meet EU requirements

Results

Time savings, labor efficiency, integrated systems, increased data value, efficient data distribution, and web capability.

Establishing the Foundation: INSTAT Albania Case Study

The National Institute of Statistics of Albania (INSTAT) is the main producer of official statistics in the country and responsible for the coordination of the Albanian statistical system. The production of official statistics in Albania is regulated by the "Law on Official Statistics" that follows the Fundamental Principles of Official Statistics of the United Nations and the European Statistics Code of Practice. The European Union directive Infrastructure for Spatial Information in Europe (INSPIRE) requires member states to share spatial themes through a network of services and to adopt its set of rules.

The Challenge

To build its GIS, the institute partnered with two Italian agencies, TeamDev and CIRPS—University of Rome. They determined census methodologies and introduced GIS technology into the 2011 census process.

INSTAT's expectations for GIS included supporting processes for a complete census count, making data easily available, and providing a foundation for future statistical surveys. Albania's statistics department launched an enterprise GIS that enabled the country to meet these requirements, as well as complying with statistical standards. The system was used to complete the 2011 Albania Population and Housing Census and continues in place today, supporting the agency and the community.

GIS became an agent of transformation. INSTAT integrated geospatial processes with official statistical production to make its data location-based. The system improved continuity by connecting workflows and outputs. GIS also improved the quality of the institute's data by running built-in processes that verified and checked accuracy.

INSTAT increased the value of its GIS by extending its usefulness beyond the initial census project, and the institute is now using it for planning and implementing current statistical operations. INSTAT's digital data and maps are interoperable with other institutions' digital maps and geographic data resources. Statistical information from INSTAT is readily available via a Web GIS application that is open, allowing users to gain access to information. "The statistical maps can be created by our users themselves with specific classification as per needs or specifics of the studies or phenomena," according to Ervin Shameti, head of cartography and GIS sector.

The Solution

System Rollout

Pre-enumeration phase

To begin, the GIS team built an enterprise geodatabase that various team members could access. Using geodatabase tools, they digitized building footprints and street lines from high-resolution orthophotos to create basemaps of the entire country. Because the digitization process would follow a complex workflow for managing vector and raster data, the team developed specific tools for quality and topology control that reduced editing errors and inconsistencies.

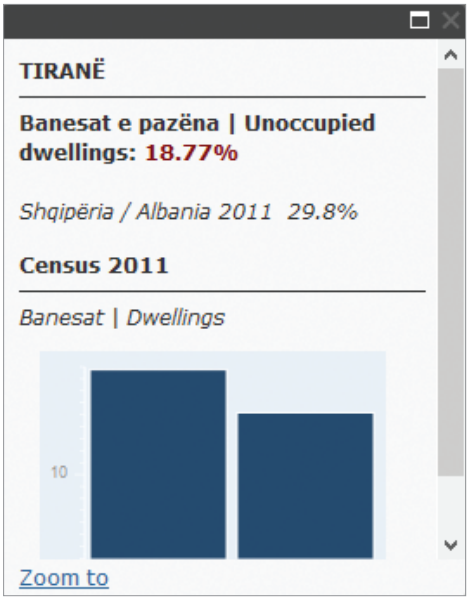
Next, the team customized software tools to delineate census enumeration area (EA) boundaries and codes. To reduce human error, the team built an algorithm that partially automated workflow procedures for mapping the physical morphology of the territory (ridges, slopes, streams), the boundaries of administrative units, the location and shape of roads and streets, and buildings.

Census controllers and supervisors began asking for EA and administrative maps. To produce these products, the team used a GIS tool to create a series of layout pages from a single map document quickly. A feature layer, or index layer, divided the map into sections based on each index feature in the layer and generated one page per index feature. This allowed them to create a multipage map series from a single map document.

Enumeration phase

The team developed an innovative custom application to monitor census coverage in real time during data collection operations. Enumerators transmitted data, such as the number of interviews completed, the number of households, and persons and housing units enumerated, via mobile texts. Located at the INSTAT headquarters, the GIS server mapped the data and made the maps accessible through its web service.

Managers could monitor census progress by date and location. The web service included widgets specific to tracking and visualizing census operational data such as a daily completion count. One widget compared the number of population, households, and housing units estimated prior to the field data collection with the actual number of census units that enumerators had surveyed that day. Another widget allowed users to query the same data and graphically display survey completions by groups, individual census takers, and administrative units.



A widget lets administrators geospatially monitor census coverage.

Managers could use alphanumeric codes to access coverage data by unique identifiers of the census and administrative units. They could also choose to use a map interface to select and visualize data in its geographic context.

Post-enumeration and dissemination phase

To make the census data accessible online, the team developed GIS web applications. Users could interactively select a specific classification method to display the data (manual, natural breaks, equal interval, quantile, geometrical interval). They could also select the number of class breaks, apply transparency, and choose different color ramps. The web application was prepared and published in Albanian and English. Users accessed the app from their computers, tablets, and smartphones at www.instat.gov.al.

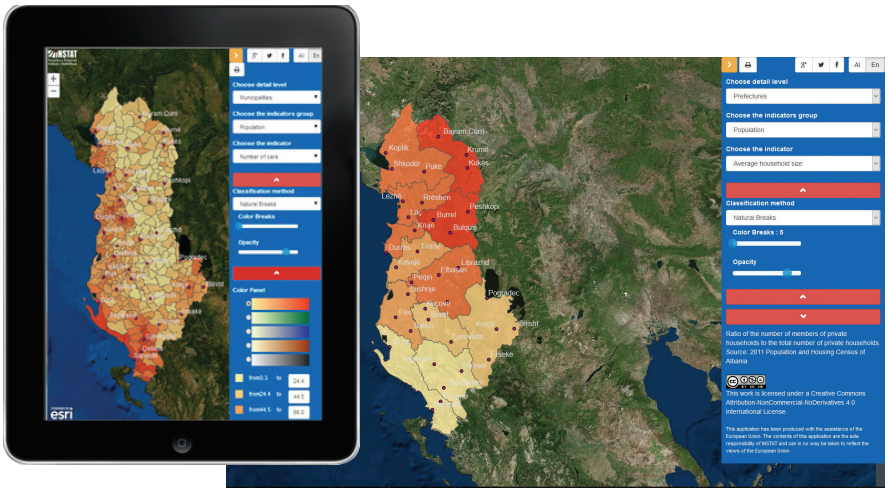
GIS technology

INSTAT uses ArcGIS software. The prevailing criteria that led the agency to choose ArcGIS were that it is simple and ready to use. Users can work in a single integrated environment, which reduces system implementation time. ArcGIS ensured functional workflows between desktop and server environments. System administrators easily configured the system to support multiple departments and business processes without compromising the underlying data. It provided users with census data integrated with spatial dimensions, ensuring that everyone who needed data could access it using a map interface.

The team implemented the ArcGIS geodatabase on a Microsoft® SQL Server to store census data, administrative and statistical boundaries, and orthophotos.

Web GIS developer tools helped the team customize editing operations. Staff performed multiuser edits and digitized building boundaries, EAs, and street lines. An ArcGIS extension processed data from the digital elevation model (DEM) required for delineating EAs.

ArcGIS server technology acted as a dedicated geospatial data engine to support the enterprise. Using its development tools, the team built web applications, such as the mobile app that monitored field operations, and developed client applications in JavaScript™ and HTML. The technology provided a platform for web services that published geospatial information.



INSTAT web application

The Results

Business value gains. By implementing ArcGIS, INSTAT generated high-quality authoritative datasets and published census map products that it shared across the agency and with Albania's citizens via the web.

Time savings. INSTAT estimates that ArcGIS saved it twenty weeks for print map production and four weeks for data dissemination. The agency also reduced quality assurance activities by ten weeks.

Labor efficiency. The enterprise geodatabase centralized information and automated controls, so the institute needed only two operators to perform quality assurance activities. This allowed managers to concentrate personnel resources on the massive activity of data entry.

Integrated systems. Application programming interfaces (APIs) and developer tools drove rapid application development. The apps were easier to integrate with other systems used during the survey.

Increased data value. Web GIS has made data more accessible, and therefore more people use it. They simply use a search tool to find what they need. Data contains location information so that it can be mapped, which makes the data easier to interpret and analyze. Also, different systems can use the same data for other purposes, which broadens the opportunity to map nonspatial data and analyze it.

Efficient data distribution. Production costs had always limited the number of printed atlases that INSTAT published. Now anyone can access the maps from a browser. INSTAT continues to print an atlas, but new versions include maps with QR codes that link to digital online interactive maps.

Web capability. Departments connect and share data on an enterprise-wide platform. Mobile apps connect field and office staff members. Managers no longer need technicians to make their maps. Rather, they can access GIS in their browsers, create their own statistical maps, and integrate them into their work.

Archival reduction. Digital maps have solved storage space concerns that come with paper maps.

Albania's INSTAT successfully implemented GIS to modernize its procedures and data system, making the census process more effective and efficient. Most importantly, Albanians now have census information at their fingertips.

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