

# **Sector Review of Information Technology in Official Statistics in Georgia**

**Final Report  
February 2020**



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## **Preface**

The Sector Review of Information Technology in Official Statistics in Georgia was undertaken in partnership between the United Nations Economic Commission for Europe (UNECE), the European Free Trade Association (EFTA) and the National Statistics Office of Georgia (Geostat). It was coordinated with the on-going twinning project between Statistics Denmark and Geostat. The review responded to a request from Geostat arising from the Global Assessment of the National Statistical System of Georgia in 2018/19.

The Sector Review was conducted by a team consisting of Ms Anne Abelsæth (Statistics Norway / EFTA Expert), Mr Povl Valeur (Statistics Denmark), Ms Mira Nikic (Statistical Office of the Republic of Serbia), Mr Marlen Jigitekov and Mr Steven Vale (UNECE). Ms Aida Martirosyan (Statistical Committee of the Republic of Armenia) joined the review team as an observer. The review was conducted in cooperation with the managers and staff of Geostat.

The Sector Review findings are based on discussions and presentations during a mission of the review team to Geostat, which took place on 5-8 November 2019, in Tbilisi.

Prior to the mission, Geostat staff completed a self-assessment questionnaire, which served as a starting point for the Sector Review, and a basis for the detailed discussions. The collaboration between the review team and the staff of Geostat was very positive and constructive throughout all phases of the work. The international experts would like to thank the Geostat management and staff, and particularly the staff of the IT Department, for this.

## Executive Summary

In November 2019, an international team of experts convened by the United Nations Economic Commission for Europe (UNECE), the European Free Trade Association (EFTA), conducted a Sector Review of Information Technology in Official Statistics in Georgia. This overview was undertaken at the request of, and in partnership with, the National Statistics Office of Georgia (Geostat). This report contains the observations and recommendations of the international experts, and has been agreed with the management of Geostat.

The international experts were very impressed with the volume and quality of work carried out by the Information Technology Department of Geostat, and found many examples of good practices, and good ideas for future improvements, particularly in the areas of dissemination and geographic information systems. However, there are also several areas where the international experts can recommend improvements. These recommendations are set out in detail in this report, but four over-arching themes can be identified:

- Investment in statistical IT in Geostat has historically been rather low, and often opportunistic, relying on support from donors in specific projects. A new IT investment strategy is urgently needed to address this. To be successful, such a strategy will need dedicated funding.
- A main consequence of the point above is that the IT infrastructure in Geostat is in urgent need of upgrading. The server room is not fit for purpose. Some servers and operating systems are no-longer supported by manufacturers, and other hardware has reached the end of its expected lifespan. This means that the risk to Geostat operations from IT hardware failure is rather high, and increasing.
- Statistical production is overly dependent on ad-hoc routines developed in desktop tools such as Microsoft Access and Excel. Most national statistical offices have moved, or are in the process of moving, from this situation to more standardised and centralised systems, which are easier to maintain, and can improve consistency of the statistics produced.
- The IT staff in Geostat show a high level of dedication despite their relatively low salaries compared to those offered by other employers. A review of financial and non-financial incentives could identify ways to maintain this level of motivation, and reduce staff turnover.

The international experts would like to commend the professionalism of the Geostat Information Technology Department staff, who make the best use of the limited resources available to them. The experts would like to thank the management and staff of Geostat for their full and active collaboration in the conduct of this Sector Review.

## **Chapter 1: Institutional Environment, Strategy and Resources**

### **Institutional Environment**

At the time of the review, Geostat was finalising a new Strategy for the Development of the National System of Official Statistics of Georgia for 2020-2023, which has since been launched. Strategic priorities include modernisation of statistical production, using new data sources, and moving towards a more-process-oriented organisation structure.

Geostat has 214 staff, mostly located in the head office in Tbilisi. Around 50 of these staff are spread between 11 regional offices, mostly supervising interviewers who work on a contractual basis.

Staff numbers and salary levels are fixed by the government. Salary levels for IT staff are considerably below those for similar jobs in the private sector. The difference can be up to three times, which has an obvious impact on staff recruitment and retention. Salaries are also generally higher for similar functions in other government departments. A new civil service law is in preparation, which may improve the situation, but implementation of this law is currently postponed.

### **Strategy**

A new IT strategy will be developed in the context of the Strategy for the Development of the National System of Official Statistics of Georgia for 2020-2023.

### **Resources**

The IT Department in Geostat comprises 13 permanent staff, plus three contract staff working on geospatial information systems and two contract staff working on system and network administration. All these staff are based at the head office in Tbilisi. There is also 1 IT technician in the Tbilisi Bureau . The ratio of IT staff to total staff is around 7%, which is rather lower than the 10% average in Western European national statistical offices.

The IT Department is split into two divisions. One deals with IT infrastructure, comprising 3 staff plus 2 contract staff, whilst the other deals with software and geospatial information systems, and comprises 10 permanent staff plus 3 contract staff. Staff turnover is typically 1-2 people per year.

The IT budget for software and hardware in 2018 was 98,000 Lari (approx. 34,000 US Dollars), which was 1.1% of total Geostat expenditure. IT salaries comprised about 7% of the total salary cost for permanent staff in 2018. These figures are rather low in comparison to Western European countries.

Most investment in IT infrastructure comes from technical cooperation projects, which makes it difficult to have a systematic replacement strategy for outdated hardware and software.

IT training, both for IT and general staff, is rather opportunistic, and supply-driven, however a training strategy is planned to be developed in the context of the Strategy for the Development of the National System of Official Statistics of Georgia for 2020-2023.

The possibility to participate in international events and training, and to build networks with people doing similar work in other national statistical offices was seen as a way of increasing staff motivation, particularly for junior staff.

There are some links to technical universities. If these links can be strengthened, that could help to attract graduates to work in IT in Geostat. Links with the local Microsoft office were established during the mission, and could lead to new training opportunities.

### **Working Practices**

IT staff receive many ad-hoc requests for support from other Geostat staff. They are seen as responsive and helpful, but dealing with and prioritising these requests can be a challenge, particularly at busy times. There is no formal “ticketing” system to record these requests.

### **Recommendations**

- Geostat should continue with plans to develop an IT Strategy in the context of the new Strategy for the Development of the National System of Official Statistics of Georgia for 2020-2023. The IT Strategy should include goals and priorities, to be endorsed by top management, and should take account of new data sources
- Geostat should seek funding to increase the staff of the IT Department
- Geostat should seek government support to raise salaries for IT staff, to make them more comparable with salaries for similar posts in ministries
- Geostat should consider non-financial incentives to improve recruitment and retention of IT staff
- Geostat should encourage IT staff to form networks with IT staff in other national statistical offices. This should include participation in international projects, to highlight the good work in Geostat in areas such as GIS, data collection and dissemination, which would provide additional motivation for Geostat staff
- Geostat should consider introducing a project management function to act as an interface between IT and subject-matter staff, encouraging the use of standard project methodology
- The IT Department should consider introducing a ticketing system to keep track of requests from users

- In the context of the proposed IT Strategy, Geostat should develop an IT training strategy for IT and statistical staff, including a mix of on-line, external and in-house training
- Geostat should consider developing strategic partnerships in the area of statistical IT, including with companies such as Microsoft, and with academia to raise the profile of Geostat with students

## **Chapter 2: National Statistical System and Other Cross-Government Considerations**

The review team met with data suppliers and producers of official statistics from:

- The Ministry of Environmental Protection and Agriculture
- The Public Service Development Agency
- The Ministry of Internal Affairs
- The National Bank
- The Data Exchange Agency
- The Ministry of Economy and Sustainable Development

The software and hardware infrastructures available to these ministries and agencies vary in quality. Some have received assistance to upgrade, for example support from the US Department of Agriculture to the Ministry of Environmental Protection and Agriculture. However, all felt that their services would benefit from further upgrades.

The Data Exchange Agency (part of the Ministry of Justice) is facilitating connections and transfers of data between different ministries and agencies. Geostat could benefit from greater engagement with them, as this might improve the access to some administrative data sets.

Data confidentiality remains a problematic area for some ministries and agencies.

### **Recommendation**

- Geostat should consider closer collaboration with the Data Exchange Agency to leverage their expertise and possibly facilitate access to new data sources



## Chapter 3: Hardware Infrastructure and IT Security

The hardware infrastructure in Geostat is – even though functional on a day to day basis - generally outdated and replacement is needed. Older servers and other hardware components can be very costly or even impossible to get serviced if they have reached out-of-service age. However, a total replacement at one time is very costly and also risky, and hence it is advisable to plan ahead and spread out the replacement on a timespan of some years.

The IT department in Geostat has a good understanding of the need for ongoing replacement of infrastructure components, but the running budget for IT in Geostat is not sufficient to cover larger IT investments, which makes other financial options necessary.

Backup is done on a regular and scheduled basis but the feasibility of making a restore from backups is not tested regularly, which may lead to a sense of false security. Also, the handling of backups should be considered so that the backups are kept in a remote facility should a disaster occur at the Geostat main location.

In general, there is a good understanding of the different aspects of IT security amongst the IT staff at Geostat even though there is not yet an official policy regarding the different aspects of IT-security. One of the key factors in deciding and implementing an IT security policy is that it is decided upon and endorsed by top management.

A few practical suggestions based on the very constructive discussions with the IT staff of Geostat is mentioned in the below recommendations.

### Recommendations

- Geostat should develop a hardware replacement strategy as part of the proposed IT Strategy. The next population and housing census may provide an opportunity to upgrade hardware. All other projects should have an IT component where possible, including provision for hardware upgrades
- Geostat should upgrade its server room
- The IT Department should consider making more systematic off-site back-ups of data, possibly in a regional office
- The IT Department should make regular tests of restoring data and systems from back-ups
- Geostat should develop an IT security policy, endorsed by top management. This could use relevant ISO standards (ISO 20001) to provide a check-list and could promote:
  - The use of genuine, licensed software to reduce risks
  - A greater awareness of potential and actual security threats
  - The testing of systems by inviting “friendly” hacking

- The IT Department should install more intelligent network switches to allow better network segmentation, for example separating Wi-Fi from statistical production systems
- The IT Department should consider restricting the use of USB ports and other external media drives, to reduce the risk of viruses and malware

## **Chapter 4: Software Infrastructure**

The software for end users at Geostat can be split into 2 groups:

- Commercial software like Microsoft Office, database systems, web browsers etc.
- Self-developed software

The latter group is mostly for data collection and is covered in Chapter 6.

### **Operating systems**

Operating systems at Geostat are Windows Server 2012 R2 on servers and Windows 10 on workstations.

### **Database**

The different data collection tools use different database solutions: PostgreSQL (Survey solution/CAPI), MySQL (self-developed CAWI solution and Labour Force Survey) and MS Access (household surveys and web scraping). After data collection, everything is imported into an MS SQL server database.

### **Data editing, analysis and reports**

A self-developed application for data editing written in php and JavaScript is in use for detecting and editing errors that are not corrected during data collection, but most of the data editing, analysis and reports are done in MS Access. In addition, there are a few people in subject matter divisions using SPSS and STATA (mostly for sampling). A future strategy is to use R, but nobody in Geostat was using that tool at the time of the review.

Regional offices are mainly working on data collection and mostly use MS Excel in addition to the specific data collection tools.

### **Information management and backup**

There is a file server where each department has its own folders, and the different departments have different systems for keeping track of their files. The file server is regularly backed up and testing has been done to retrieve information from backup, and this went well.

There are no formal versioning or project management systems.

Geostat will have a new intranet in 2020, and when that happens, this will be the main channel for documentation sharing and storing. As of now, file systems on the common file server are used.

### **Office tools**

The work stations have - in addition to the standard office tools from Microsoft, Adobe Acrobat, CorelDRAW, Adobe Photoshop and Adobe Illustrator as well as the statistical tools

mentioned above. Most of the statistics production is done using Excel spreadsheets and Access databases, however.

### **Recommendations**

- Geostat should consider alternatives to Excel and Access for statistical production processes. This should include considering software packages used by universities and familiar to students
- The IT Department should introduce more systematic versioning of in-house software tools
- The IT Department should introduce overview documentation of in-house applications, in addition to the documentation currently embedded in the software code

## **Chapter 5: Data Architecture, Storage and Management**

Data flow into Geostat by various routes and in various formats. They feed in to a central SQL database, which can be seen as a sort of data warehouse for input data. This database does not yet contain all historic data sets, some of which only exist in formats such as Excel, or even paper.

Data are extracted from this central database by the IT Department, using SQL queries, and are then passed to subject-matter departments for further processing. This processing usually takes place in Excel or Access, though some calculations are included in the SQL queries when the data are extracted. These queries are maintained by the IT Department. Processing systems are mostly custom-developed for a particular subject-matter area, and are not particularly standardised. This increases the burden on the IT Department.

Geostat currently use geographic information systems for data dissemination (see Chapter 8), but there is little use of geospatial information in statistical production. An increasing number of data sources are including geo-location, which gives new possibilities for integrating data across sources and statistical domains.

Metadata such as statistical classifications are managed and stored centrally to ensure consistency across outputs.

### **Recommendations**

- Geostat should consider developing more standardised statistical production systems based on a common architecture
- Such systems should allow subject-matter specialists to directly manage all stages of statistical data production, including development of calculation routines, independently from the IT department
- Geostat should consider how geospatial data could play a more central role in the data architecture, as a means of integrating data from different subject-matter domains

## **Chapter 6: Data Collection and Other Inward Data Flows**

### **Electronic questionnaires**

The main source for data-collection in Geostat is electronic questionnaires. For that purpose, the Geostat IT department has developed an efficient and standardized process for creating new electronic forms that can be put into action on the Geostat website.

The published questionnaires are not yet device aware (adaptive design) in the sense that they work equally well for a wide range of devices no matter the screen-resolution and orientation. This is a feature that is becoming more and more important.

### **Web services**

Geostat has developed different web services for data collection that works as intended, although no standardized approach has been used yet. The benefits of a standardized approach are numerous, but security and lower cost for implementation and maintenance are the most important.

### **FTP**

The use of secure versions of FTP (SFTP/FTPS) is an efficient and secure way to transfer larger amounts of data and this is already being used in order to transfer data from other governmental authorities (register data). With more widespread use of register data in the future this channel for data exchange is likely to become more important in the future.

### **Mail system**

Use of e-mails for exchange of data is generally not advised since there are several issues involved. It is difficult or impossible to ensure security and once data is in the mail system it is not easy to get rid of again (GDPR) and it is usually not possible to log access to data at a sufficient level compared to data being held in a database.

### **Recommendations**

- Geostat should consider implementing adaptive design when developing electronic questionnaires – the effort should be weighed against the actual user need by analysing the capabilities of the actual browser usage on website.
- The IT Department of Geostat should consider how data collection web services could be more unified in order to make development, security, use and maintenance easier and more streamlined. In this process it is recommended to look at WSS (Web Service Security) in order to ensure identity, integrity and confidentiality.
- A standardized way of using FTP should be considered by Geostat. This should include choice of server software, decisions of allowed protocols, keytypes and – lengths and how users are created and handled. Also scheduled log inspections are important since FTP-servers are known to be targets for hostile attacks.

## **Chapter 7: Data Processing and Analysis**

### **Planning and data integration**

The planning phase of a survey seems to be handled well, except for the involvement of IT staff at an early enough stage of the process: Often they are asked to produce a new questionnaire just a few days before training of interviewers is supposed to begin. Hence the process is very vulnerable and dependent on IT staff to move quickly. This also leaves very short time for testing.

Apart from this, the rest of the planning process seems to be handled well despite lack of IT tools: There is a library of questionnaires and manuals, there is a (manual) system for keeping track of master files for classifications, code lists and metadata in general. The tidy planning process ensures that data integration routines work smoothly, as there is no doubt about current versions and methodologies if inconsistencies arise.

### **Review, validate, edit and impute sub-processes**

For the electronic data collection (CAPI, CATI, CAWI) most of the data validation is done using logical controls in the data collection tools. For CAPI followed by data entry, double data entry is used to weed out errors at an early stage.

There are some automatic outlier checks, but most of the tasks in this sub-process are done by statisticians using Access, SQL and Excel, and the methodology is dependent on which subject matter division is responsible.

Derivation of new variables and units as well as weight and aggregate calculations are also done using Access and SQL. Most are done in standardised ways within the subject matter divisions.

### **Analyse phase**

The analysis is, of course, done in the subject matter divisions using subject matter specific methodologies. Disclosure control is done in the free version of Tau-Argus, which is maybe not complex enough to be the ideal choice.

### **Recommendations**

- Geostat should introduce a wiki-based solution for process documentation
- The IT Department should be involved earlier in projects relating to developing or changing statistical processing and analysis systems

## Chapter 8: Dissemination

Geostat has introduced various innovations regarding statistical dissemination in recent years, for example, videos, infographics and maps. Android and iOS apps have been developed to disseminate data, infographics and news.

Geostat actively uses social media for statistical dissemination, including YouTube, Facebook, LinkedIn and Twitter. In most cases, posts are in Georgian, but there is also an English Twitter stream.

The main tool for disseminating detailed data is PC-Axis, developed by a consortium led by Statistics Sweden. PC-Axis seems well suited for this purpose, though the updating process is currently rather manual. More automated approaches have been successfully implemented in other statistical offices, often using the “Nordic Metamodel”. An automatic approach should allow subject-matter specialists to develop automated data flows from the statistical data production database(s) to the web site without help of the IT department.

Most PC-Axis data cubes show a “last updated” date, but this is not consistently enabled across all cubes.

The Geostat web site features the various dissemination products, but sometimes these are presented by type or format rather than by subject-matter area. For example, the main database is called “PC-Axis Database”, whereas most statistical offices create a brand name such as “Statbank” or “StatLine”.

Geostat plans further improvements to its web site, such as making it more “mobile-friendly”, to cater for users accessing it from smartphones, tablets and similar devices. A similar approach is needed for apps, where a “mobile first” policy would help to ensure they are suitable for use on mobile devices.

Another possible improvement for the web site would be to ensure that outputs are more easily discoverable by search engines. This would improve Geostat’s ranking in search results. Direct access to webpages containing data from search engines may be one way of achieving this.

A user satisfaction survey has been conducted for the web site, but there is no systematic user testing of new features before they are added.

### Recommendations

- Geostat should introduce a “mobile-first” policy for new web applications, to ensure they work effectively on a wide range of devices
- Geostat should make its main statistical database more prominent on the web site, including introducing a brand name that will be more attractive and meaningful to users than “PC-Axis”



- Geostat should consider how to make outputs more discoverable, including how to improve the Google search ranking
- Geostat should consider moving to more automated ways of updating the PC-Axis database, including implementing the Nordic metadata model
- Subject-matter departments should check that all PC-Axis tables have the last updated date enabled

## Chapter 9: Non-Statistical IT

During the last five years, the Georgian government has put enormous efforts into digitalization and creating e-governance. Part of Georgian E-governance is the application of [information and communication technology](#) (ICT) for delivering [government services](#), exchange of information, communication transactions, integration of various stand-alone systems between government, as well as [back-office](#) processes and interactions within the entire government framework.

Georgia has developed and implemented an entire public finance management information structure, which is shared between different government entities. The Public Finance Management System (PFMS) consists of a number of subsystems, each of it with a specific purpose. These sub-systems include:

- e-Document software - Document exchange system
- e-Treasury - Helps recording and managing spending
- e-Budget - Enables digital budget planning and reporting to the Ministry of Finance
- e-HRMS - Electronic Human Resource Management System supports human resource management in government agencies
- e-Procurement - For public tendering and electronic procurement of goods and services
- e-Flow - Data exchanging system within government
- Hr.gov.ge - Governmental job agent software

### e-Document software

- Web app
- Developed by Ministry of finance (MinFin) (their IT label agency)
- Mandatory for all governmental bodies
- Mostly for document exchange
- If new functionalities is needed, request is send to MinFin
- Web app is on GEOSTAT premises, database is also on GEOSTAT premises
- GEOSTAT can use servers of MinFin
- All governmental bodies can choose between their own premises or MinFin servers
- GEOSTAT pays per user, monthly, approximately 1000 GEL per month for all users
- GEOSTAT pays for support
- IT Support for application is remote
- MinFin login remotely with admin pass and do the requested changes
- This is only non-statistical software that GEOSTAT pays
- Access to E-document goes not through Active directory (AD), service developed by Microsoft for Windows domain networks, but through separate channel, with different users
- GEOSTAT can contact MinFin and access can be accommodated to use AD
- Electronic sign is mandatory for all governmental bodies
- GEOSTAT finds e-Document software very user friendly

### e-Treasury

- Accounting software
- Web app, web service,
- Not on GEOSTAT premises, hosted by MinFin

- Free of charge for GEOSTAT
- Developed by Ministry of finance (MinFin) (their IT label agency)
- Mandatory for all governmental bodies
- Used by all governmental bodies, recently municipalities are join in using this software
- This software is used by account, finance and budget division

#### **e-Budget**

- Budget planning software
- Web app, web service
- Not on GEOSTAT premises, hosted by MinFin
- Free of charge for GEOSTAT
- Developed by Ministry of finance (MinFin) (their IT label agency)
- Mandatory for all governmental bodies
- Contains all kind of expenditure, starting from salary
- When budget id preparing MinFin immediately controls allocations
- GEOSTAT finds e-Budget very useful
- GEOSTAT finds e-Budget very user friendly
- Budget lines are fixed, classification of expenditure is done by MinFin
- This software is used by account, finance and budget division

#### **e-HMRS (e-HR)**

- Web app, web service
- Not on GEOSTAT premises, hosted by MinFin
- Free of charge for GEOSTAT
- Developed by Ministry of finance (MinFin) (their IT label agency)
- Same login as e-Document software
- Useful
- User friendly on desktop
- All relevant modules for typical HR software,
- Contained all scanned documents (employee's folder)
- Info about holidays, medical leaves, maternity leave, daily attendance
- Only HR has access, employees do not have access
- Bad side: all information put mainly by HR staff
- No possibilities to upload something or send bulk data through web service
- All document are uploaded one by one

#### **e-Procurement**

- Software for public tendering and electronic procurement of goods, services and works by the procuring entities as set by the PPL (Public Procurement Law)
- a central unified platform for tendering and procuring goods, services and works for procuring entities as set by the Public Procurement Law (PPL) (including central and local government bodies)

#### **e-Flow**

- Link between all above apps
- Developed by Ministry of internal affairs
- For example, Ministry of internal affairs interconnected GEOSTAT and Ministry of justice when they are exchange documents

#### **Hr.gov.ge**

- Job agent software

- Web app, web service,
- Developed by Ministry of finance (MinFin) (their IT label agency)
- Not on GEOSTAT premises, hosted by Civil agency
- Controlled by civil agency
- Free of charge for GEOSTAT
- Every citizen can make profile for applying to governmental post
- All governmental bodies announce vacancies through this portal
- GEOSTAT's HR upload information to it
- GEOSTAT's HR see all relevant posts, downloads info and documents and send it to right division in GEOSTAT

### **Other GEOSTAT internal software**

#### **For controlling goods and stocks, inventory, fixed assets**

- Developed by GEOSTAT IT
- Very user friendly

#### **For managing time in and out of office**

#### **For controlling GEOSTAT premises access, control on meetings**

- Web app, developed by IT
- Every employee can see own profile
- Every supervisor can see employee's profile which she/he is in charge of
- Supervisor has to approve any kind of absence through this app
- HR and internal audit have access to all data
- App registers is employee is in the office or not
- App registers only attendance, not time use
- There is report on attendance history data, report can be export to pdf and excel

### **Conclusion**

It is very clear that Georgia has good cross government standards and GEOSTAT is very satisfied with the web services that they are using for administrative functions. One possible area for improvement is tools for communication within Geostat. An intranet can be a powerful tool to improve knowledge and exchange of information inside statistical offices, and could be helpful for Geostat.

### **Recommendation**

- GEOSTAT should implement an Intranet where all the documentation (statistical and non-statistical) can be collected and information can be shared.