Sector Review of Information Technology in Official Statistics in Armenia

Final Report

February 2020

Table of Contents

Preface

The Sector Review of Information Technology in Official Statistics in Armenia was undertaken in partnership between the United Nations Economic Commission for Europe (UNECE), the European Free Trade Association (EFTA) and the Statistical Committee of the Republic of Armenia (Armstat). The review responded to a request from Armstat arising from the Peer Review of the National Statistical System of Armenia in 2018/19.

The Sector Review was conducted by a team consisting of Mr Kristian Lønø (Statistics Norway / EFTA Expert), Mr Carlo Vaccari (Istat, Italy), Ms Mira Nikic (Statistical Office of the Republic of Serbia), and Mr Steven Vale (UNECE). Mr Sandro Ambokadze (Georgia) joined the review team as an observer. The review was conducted in cooperation with the managers and staff of Armstat.

The Sector Review findings are based on discussions and presentations during a mission of the review team to Armstat, which took place on 2-6 December 2019, in Yerevan.

Prior to the mission, Armstat 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 Armstat was very positive and constructive throughout all phases of the work. The international experts would like to thank the Armstat management and staff, and particularly the staff of the Information Resources Management and Technologies Department, for this.

Executive Summary

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

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

- Investment in statistical IT in Armstat 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.
- Aa a consequence, the IT infrastructure in Armstat 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 Armstat operations from hardware failure is rather high, and increasing.
- Statistical production is overly dependent on desktop tools such as Microsoft Access and Excel. Most national statistical offices have moved, or are in the process of moving, from these tools to more standardised and centralised systems, which are easier to maintain, and can improve consistency of the statistics produced.
- The exchange of statistical data between different government bodies is not currently done in a secure way. The proposed new cross-government data exchange system will hopefully address this.
- The IT staff in Armstat 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 Armstat Information Resources Management and Technology Department staff, who make the best use of the very limited resources available to them. The experts would like to thank the management and staff of Armstat for their full and active collaboration in the conduct of this Sector Review.

Chapter 1: Institutional Environment, Strategy and Resources

Institutional Environment

Strategic priorities for Armstat include the greater use of administrative data through linked registers (based on the Nordic approach), modernisation of statistical production, statistics for the Sustainable Development Goals, standardising metadata management and increasing electronic data reporting from respondents.

Armstat has around 340 permanent staff members, of which around 180 are located in the head office in Yerevan. There are 11 regional offices, including one for Yerevan city, which focus on data collection, and employ around 430 interviewers who work on a contractual basis.

Salary levels are standard across government, but there is some limited flexibility regarding bonuses. Salary levels for IT staff are considerably below those for similar jobs in the private sector. The difference can be two or three times, which has an obvious impact on staff recruitment and retention.

Strategy

Armstat has a 5-year Strategic Programme for the Production of Official Statistics, which includes provisions on IT. This is implemented through annual statistical programmes. There is currently no single document covering all areas of IT strategy, such as IT training, although a draft was created several years ago. There is also an Information System Development Concept Note from 2003. If these documents were combined and updated, they could form the basis of a new IT strategy.

Resources

The Information Resources Management and Technology Department in Armstat comprises 11 permanent posts (of which, 1 was vacant at the time of the review), plus two contract posts (of which 1 was vacant). All of these staff are based at the head office in Yerevan. There is also 1 person working on IT in a regional office. This is an experiment, that may be extended to the other regional offices if considered to be successful. Finally, one of the members of the State Council on Statistics of the Republic of Armenia has responsibility for the Information Technologies sphere. The ratio of IT staff to total staff, even if all the above posts are included, is around 5%, which is rather lower than the 10% average in Western European national statistical offices.

There are some possibilities to increase the number of staff working in IT, as the latest list of civil service positions includes 14 posts. There is also a long-term aim to reduce the resources

for data collection due to electronic collection and greater use of administrative data. It may be possible to reallocate some posts to other areas, including IT.

The Information Resources Management and Technology Department is split into 3 divisions:
- The IT Development, comprising 3 posts (1 vacant)
- The Database Development and Programming Division, comprising 4 posts
- The Information Resources Management Division, comprising 3 posts

93.6% of the main Armstat budget is spent on salaries. The remainder covers all other expenses. The amount spent on IT (hardware and software) is less than 1% of the total. This is considerably lower than in 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. It also tends to be linked to technical cooperation projects or external funding for staff to attend international events. The lack of a dedicated IT training room was also seen as a barrier to improved training opportunities for staff.

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, but the programming languages currently taught are rather outdated. If these links could be strengthened, that could help to attract graduates to work in IT in Armstat, and might encourage the universities to update and adapt curriculums to better meet Armstat's needs.

Contact has been established with the local Microsoft office in Yerevan since its establishment, which might lead to improved training opportunities, as was the case in Serbia

Working Practices

IT staff receive many ad-hoc requests for support from other 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, and no formal project management approach for new developments. Having an agreed project management approach would be helpful. This could be supported by having a unit or function responsible for advising on project management issues and ensuring deliverables are produced on time and to an acceptable level of quality.

For major changes, terms of reference are usually prepared. User and programmer documentation is also produced, but is not stored in a central place for ease of access.

Armstat, with the support of Statistics Denmark, has been a pioneer in using the "swim lanes" approach for documenting statistical production according to the Generic Statistical Business Process Model. This approach could also be used for documenting and planning new systems, taking advantage of the experience in using this technique within the organisation.

Armstat is currently implementing a major project ("ECASTAT") to modernise statistical production. This project includes several activities related to IT, which are currently being defined. The review team considers that a modular approach to developing statistical production systems is likely to be the most successful strategy (see also Chapter 4). A steering committee or similar group comprised of representatives of Armstat, the donor, and the implementing agency, could help ensure the IT deliverables give the best value for money.

Recommendations

- Armstat should create an updated and consolidated IT strategy, including establishing priorities for upgrading hardware and software
- Armstat should seek funding to increase the number of staff in the IT Department
- Armstat should consider non-financial incentives to improve recruitment and retention of IT staff
- Pending a successful outcome to the current experiment in one regional office to have a dedicated IT person located in that office, Armstat should role out this approach to the other regional offices
- Armstat should develop an IT training strategy for statistical staff, to enable them to take over simple programming tasks related to their statistical production work (e.g. writing and running simple database queries), to improve efficiency and reduce the burden on IT staff
- Armstat should investigate the possibility of providing a dedicated and suitably equipped IT training room
- Armstat should investigate the opportunities for improving skills in the use of R and other modern programming environments, both for IT and statistical staff
- Armstat should encourage IT staff to form networks with IT staff in other national statistical offices. This should include participation in international projects, which would provide additional motivation for Armstat staff
- Armstat should encourage universities to change their curriculums to include more relevant programming languages
- Armstat should consider developing strategic partnerships in the area of statistical IT, including with private sector companies and software suppliers, to improve knowledge of, and access to, software tools, and take advantage of any related training opportunities
- The IT Department should consider introducing a ticketing system to keep track of requests from users, and a "Frequently Asked Questions" (on the Intranet / wiki?) resource to help users solve minor issues themselves
- Armstat should continue to standardise documentation of systems, including terms of reference, user and programmer documentation, and put this on the Intranet

- Armstat should use the GSBPM "swim-lanes" approach to documentation for planning and designing new systems
- Armstat should improve the coordination of technical cooperation activities in IT, such as the current ECASTAT project, for example setting up a steering committee with Armstat, the donor, and the implementing agency

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

The review team met with data suppliers and producers of official statistics from the Central Bank of Armenia and the Ministry of Finance. These two agencies, together with Armstat, share responsibility for producing key macro-economic statistics.

Data exchange between the organisations was highlighted as an issue. Currently this takes place mainly by e-mails, Excel files and USB keys, and is not particularly secure. This is also the case for data provided to Armstat by other government agencies. Improved data exchange tools are needed. These may be provided under a government initiative to better connect government bodies and improve data transfer. The SDMX (Statistical Data and Metadata eXchange) standard would provide a useful format for automated data exchanges.

The Central Bank has some training activities in the R and Python programming languages. Greater coordination of training activities could facilitate the participation of staff from different agencies, and therefor increase the overall benefit of the training.

Recommendations

- Armstat should implement a more secure system to exchange data with external bodies, avoiding the use of Excel sheets sent by e-mail, or USB devices
- Armstat should take a proactive role in cross-government activities related to developing or improving data sources and data exchange
- Armstat should investigate possibilities for joint training in IT with other producers of official statistics, e.g. joint training in R and SDMX with the National Bank

Chapter 3: Hardware Infrastructure and IT Security

In Armstat, hardware and IT security are managed by the Information Resources Management Division, whose tasks are the following:
- Installation and maintenance of PC and servers software (including virtualization)
- Installation and maintenance of printers and scanners
- Installation and maintenance of tablets and other devices
- Network equipment management

The number of devices managed by the Division is:
- Personal Computers: Desktop 449 (more than 120 running Windows XP)
- Notebooks 57
- Tablets 232
- Servers 14
- Printers and scanners 211

On the 3 main servers VMWare 6.5 is installed. The global data storage devices connected to the servers can manage 2x26Terabytes in RAID 1,0.

The three main servers manage the following applications:
- DL380 (128GB RAM): fileserver, backup fileserver, Survey Solutions, NADA, Symantec antivirus, CentOS Linux for Web development and Ubuntu
- DL180 (32GB RAM): XP operating system, SQLServer development
- DL380 (64GB): Human Resources applications, Software from Government agencies, proxy server, vCenter server, Ubuntu

Linux servers are used for the Armstat website (https://www.armstat.am/en/ running on Apache), for the mail-server (ISPConfig) and for the SDG website (http://sdg.armstat.am/).

The other virtual servers are running Windows Server operating systems. The security of webservers is managed by National Security Services.

For backups, the Veeam backup Application is used to backup Virtual Machines to physical servers. Weekly the backups are copied on USB devices and stored in some external sites.

The Antivirus Symantec Corporate Endpoint tool is used for protection against viruses and other attacks.

VPN networks connect the central office in Yerevan with regional offices and peripheral offices. The Armstat network is connected to the Internet with a dedicated network with the speed of 120Mb/s. All PC are connected to the web, except those with Windows XP. In the central building a WiFi network is planned, to be managed on a separated subnet.

Recommendations

- Armstat should develop a hardware replacement strategy. The next population and housing census may provide an opportunity to upgrade hardware
- Armstat should replace as a priority hardware that is only capable of running outdated and unsupported operating systems (like Windows XP and Windows 7)
- Armstat should upgrade its server room, moving it away from current unsafe location, and in the new server room, all servers should be inserted in standard racks
- The IT Department should consider setting up a procedure for Disaster Recovery, with duplication of all data in some other site, possibly in a regional office or in another public agency
- The IT Department should install an effective spam filter tool
- The IT Department should increase its knowledge of the Linux operating system, to use it in applications and servers that need a safer environment – this is only possible if the IT Department has additional resources
- Armstat should have available a constant electricity supply, and a back-up for critical systems
- The IT Department should install more modern network switches, to improve network speed and security
- Armstat should consider upgrading hardware to provide more secure connections with regional offices
- Armstat should invest in more stable and secure WiFi

Chapter 4: Software Infrastructure

Armstat use different software through their statistics production. They use both Windows and Linux operating systems. Data collection systems are mostly made with MS Access.

For survey administration and data export, Survey Solution is used.

For data processing, MS Access is used in 56 different systems. Postgres SQL is also used. There is also some usage of SPSS and Stata.

For data dissemination, Armstat use PHP, asp .net and the NADA cataloging tool.

All statistics are published on the website (www. armstat.am). The website has 4 main parts: the Statistics, the Statistical database, the Microdata database and the Sustainable Development Goals (SDG) indicators.

For the Statistics website, phpMyAdmin, mysql, html, css and javascript are used. Results are copied manually from internal to external websites every month for monthly publications. Other statistics are updated manually along with the publishing on the website.

The Statistical database is prepared with px-edit and they use pxweb (version from 2013).

The SDG part is based on an open source solution made with python etc. adopted by Armstat, see https://github.com/open-sdg/open-sdg.

The Microdata database gives the public access to anonymized survey microdata. These can be downloaded as Excel or SPSS files.

Future plans for the website include to have a new site based on a content management system. This will include online questionnaires for data collection. There are no plans to offer an API solution for the Statistical database.

So far there are no plans for receiving other types of data, like scanner data.

Armstat does not have any common systems for their production processes, they are all based on silo principles. That means every statistical production area uses its own programs and flows.

Recommendations

- Armstat should consider alternatives to Excel and Access for statistical production processes. This should include considering software packages used by universities and/or used in other NSIs
- The IT Department should define clear standards for the software to be used in all the statistical process phases: these standards must be valid particularly for consultants and temporary staff

- Armstat should drive the ToR being developed inside the ECASTAT project so that it includes the specifications for a modular system in distinct phases, for example:
    - integrated data collection system for business surveys
    - integrated data collection system for household and population surveys
    - integrated system to manage statistical registers
    - integrated sampling system
    - integrated system to manage business surveys linked to the business register
    - integrated data dissemination system for all surveys
    - integrated production system for central statistical processes

The systems should be developed in a sequence to be determined by Armstat, integrating whenever possible the existing experiences of Web data collection.

Chapter 5: Data Architecture, Storage and Management

Today, most surveys use a Relational Data Base Management System (RDBMS) only once the data are uploaded in the Armstat headquarter servers. The data are previously loaded in Excel spreadsheets and/or in Access archives. In the central SQLServer database surveys data have only few connections with data stored for other surveys.

On the contrary, data for the surveys managed using the Survey Solutions tool (e.g. Prices and Household Budget Survey) is stored in PostGreSQL database.

No standard metadata structure is present, and every survey has its own metadata. However, some classifications are shared between the surveys.

No data warehouse tools are today used in Armstat.

Recommendations

- Armstat should start using an integrated relational data base for all its surveys, moving away from insecure Access data archives
- Armstat should continue with plans to bring statistical metadata into a single, harmonised system, taking account of relevant international standards, including SDDS and SIMS

Chapter 6: Data Collection and Other Inward Data Flows

Currently the data collection in Armstat is managed as follows: For most surveys the IT division prepares Excel sheets with controls. Respondents fill in Excel files and then the spreadsheets are sent via email to Regional offices, where data are uploaded in MS-Access files. Regional offices check the data and, if needed, contact (often by phone) respondents to receive clarifications.

Data, once validated, are sent using email to the central Armstat office where they are uploaded to the SQLServer database. Checks and corrections are carried out using MS-Access and VBA programs working on SQLServer data. Again using MS-Access statistical divisions run the reports, prepared by IT Division. Finally, pdf and xls files are given to the Statistical Information Dissemination Division who publish them on the Internet.

A few surveys, such as the Household Budget Survey and prices surveys are managed using the Survey Solutions tool on tablets. In these surveys data are managed in a central PostgreSQL database. Tables are then created using SPSS programs or using MS-Excel and MS Access.

To date no survey uses web data collection techniques.

Recommendation

- Armstat should start experimenting with tools for web data collection
- Armstat should work to define and implement a unified system for Web data collection to store all the surveys data in one integrated database
- Armstat should investigate the possibility of using scanner data for price statistics
- Armstat should investigate the possibility of automatic data flows from larger businesses, including cooperation with accounting software providers
- The IT Department should avoid the use of email attachments for transferring data between respondents and Armstat offices. To do this they should start experimenting other tools to upload/download data

Chapter 7: Data Processing and Analysis

The Generic Statistical Business Process Model (GSBPM) is used for documentation, not during the development process. It could be used in the IT system development as well (see Chapter 1).

The subject-matter divisions make specifications (called "terms of reference" - ToR) which the Head of the IT division approves, and the systems are developed. The ToRs are written by subject matter people according to a template from the IT division. Usually there is one developer for each system. However, backup persons for the programming is possible because systems are similar. The developers reuse components, if they are similar, when developing new systems. Issues are discussed with subject matter people during the development process. Usually the developers need 1 month for developing and 1 for testing. After finishing a system user documentation and technical documentation are made.

There is some usage of SPSS and Stata for data processing and analysis. However, there is no internal training or internal documents for these or other software.

For price indexes Armstat relies heavily on Excel and MS Access. These systems are vulnerable.

Armstat has some challenges when it comes to matching different registers as they often don't have common identifiers. They don't use any record linkage systems.

For disclosure control Tau-argus is used in some population surveys. For business statistics they group categories together to avoid confidentiality problems.

Version control systems like Git or Subversion are not used. Older versions of programs are copied to backup folders before further development.

Recommendations

- Armstat should introduce the "R" package in its statistical processes, including training and user support
- Armstat should investigate the use of record linkage tools, for example Relais from Istat
- Armstat should consider introducing specific price index software
- Armstat should consider introducing Git for version control of programs

Chapter 8: Dissemination

Overview of dissemination in Armstat

The Statistical Information Dissemination Division was established many years ago, but still has a small number of employees. It is important to emphasise that these employees are full of enthusiasm and try to achieve all goals, but this is very challenging and hard work. This Division consists of six employees. Work in dissemination and communication is separated to different areas:

- Creation, development and monitoring of the five-year plan and annual program of Armstat
- Maintaining the release calendar according to the plan and program
- Creation, development and publishing of publications
- Dissemination of data and relationships with users
- Managing the wide scope of users demands
- Paper publishing is by demand and exceptionally
- Future: publishing of reference metadata

Armstat Web sites

Armstat.am

- Is the official Armstat web site
- There is a variety of documents on this web site, for example
    - Law on official statistics, article on dissemination
    - Policy of dissemination
    - Strategy of dissemination
    - Code of practice of EU
    - Quality policy
- There is a FAQ page on the web site
- Armstat conducts annual user satisfaction surveys by sending a questionnaire via email to users
- The annual user satisfaction surveys are advertised on the main web page, when you access the web site notification of the survey is shown. The response rate is 20-25%

Armstatbank.am

- Is the main dissemination database
- The latest version of PC-Axis is used for developing
- Dissemination division checks the data and prepares data in xml format
- Files in xml format are sent to IT
- IT prepares PX-Edit format for PX-Web
- After introducing Armstatbank phone calls from users decreased significantly
- Armstat considers Armstatbank updating as part of publishing

Sdg.armstat.am

- Is the web site for disseminating Sustainable Development Goal (SDG) indicator data
- Armstat is at an Alpha stage in development, so the site is still 'work in progress'
- Developed with Open SDG. Open SDG is a reporting platform developed for managing and publishing data and statistics related to the UN SDGs. It is built exclusively with open-source libraries and tools and can be hosted and maintained using free services. Though the platform itself is available at no cost, it can be modified to fit a variety of user needs, and comes with many customizable tools and features including:
  - Data that can be downloaded in machine-readable formats
  - Several options for data visualizations, graphs, data tables, and maps
  - Data management capabilities and tools that can display the percentage of indicators with statistics that are being reported online, statistics that are in progress, and statistics that are currently being explored for each goal
  - Availability in all official UN languages: Arabic, Chinese, English, French, and Spanish. Additional languages are currently being added through SDG translations
  - Countries wishing to reuse this site's underlying platform are welcome to do so for free.
- Developed with support of US experts (data scientist from the Centre for Open Data Enterprise (CODE))
- As Open SDG is an open source platform, Armstat modified it for their needs, code is written in python
- Data are stored in md (Markdown Documentation) files, every indicator has its own md file

Other web databases
https://www.armstat.am/en/?nid=13
- External trade database, files in pdf and xml

Microdata
- Anonymized micro data from SILC, LFS, HHS, Population census and agricultural census. External users have to have access rights to access these data (not open to everyone)
- Microdata Library

Other data, files are in xml formats
- Balance of Payments and Foreign Trade
- Macroeconomic Indicators and National Accounts
- Finances
- Industry
- Population Census and Demography
- Prices and Tariffs

Web analytics
Web analytics are done using Google Analytics in the IT department and the report is shared with the dissemination department

<u>Capi.armstat.am website</u>
Used only for internal purposes such as monitoring of CAPI surveys

<u>Facebook</u>
Armstat publishes data, announcements and various events on Facebook. Facebook is the only social network that is used in Armstat for dissemination.

<u>Future plans</u>
- New armstat.am site
- Intranet
- Online reporting system (introducing e-questionnaires)

Recommendations

- Armstat should upgrade its web site infrastructure by using more up to date programming approaches, better security (SSL), and introducing a Content Management System: new version of website must be mobile-compliant
- Armstat should consider using Twitter to publish announcements when new data is published
- Armstat should update the used version of PX-Web, introducing advanced PX-Web features like API and SDMX
- Armstat should consider moving to more automated ways of updating the PC-Axis database, including implementing the Nordic metadata model
- Armstat should identify a role responsible for analysing Google Analytics data, reporting monthly to high-level managers
- Armstat should define a policy to increase the hits to all its websites, to do this, different actions should be taken:
  - develop new ways to disseminate data like infographics
  - implement new statistics more "popular" (like names given to children)
  - develop new section of the websites, like "Statistics for children"
  - give more attention to Analytics data, identifying most accessed pages and giving them more focus
- Armstat should explore the use of free and open source GIS tools such as Open Street Map
- Armstat should investigate the use of dynamic mapping tools
- Armstat should introduce a "mobile-first" policy for new web applications, to ensure they work effectively on a wide range of devices
- Armstat should consider how to make outputs more discoverable, including how to improve the Google search ranking

Chapter 9: Non-Statistical IT

- Armstat has different IT systems for administrative functions
- All governmental bodies are connected through the Ministry of Finance
- The Armstat IT department is not in charge of software for administrative functions, but provide some support for implementing those software tools

Correspondent system
- This is a closed system, developed and maintained by the Ministry of Finance
- There is no possibility for Armstat IT to make changes to this software
- The Ministry of Finance is very open to suggestions, and has added some functionality on request from Armstat
- Armstat is very satisfied with this system

Treasury IT system
- In use for last three years, covers all invoices and salaries
- Three divisions use this software: Procurement and Logistics Division, Financial and Economic Division and Accounting Division

Financial management
- Client TREASURY software is used
- Developed and maintained by the Ministry of Finance
- All governmental bodies, including regional ones, are using this software
- There is no paper work
- There is one logon with specific user and password for Armstat
- Access is possible only from one computer for security reasons, only the Secretary-General of Armstat has access

Human Resources (HR)
- The Civil Service Office is in charge of this system and all procedures related to HR
- Armstat and other governmental bodies are using this system for transferring information between bodies
- HR has access, employees do not have access to this system
- All employee files are uploaded to this system by Armstat HR
- The system automatically calculates vacation days, absence days, etc.
- All necessary documents for vacant jobs are transmitted to the Civil Service Office through this system
- Currently, a new HR system is in development. Vacancies will be announced in this system, which will be open to the public.
- Armstat will be able to see who applied for what position and will be able to see all posted documentation

- Regarding HR software, Armstat and other governmental bodies are currently in a transition period. Armstat is still using the old system and expects the new platform be in place very soon
- The new HR software will be web-based. It is expected to be faster, more transparent and more open, e.g. testing of candidates will be done electronically, not on paper like now

Tenders
- www.tender.am is in the development phase now
- It will be used on governmental level

Accounting program
- The Accounting Division uses software which is also used by every governmental body and private business
- It is a desktop application
- All kind of expenses are put in this software
- The software is connected to the Treasury

Special software for reporting to Ministry of Finance
- Reports on all financial transfers and budgets
- The Ministry of Finance is responsible for developing and maintaining this software
- The software is installed on the Armstat premises
- The software displays yearly, semi-yearly, quarterly and monthly budgets

Special procurement program on level on Armenia governmental bodies
- https://www.e-gov.am/en/ - This website brings together the electronic governance tools and databases of the Armenian state agencies as well as providing a comfortable environment for their use
- The State Procurement Agency is responsible for developing and maintaining this software
- Armenia's finance ministry is introducing a new state procurement website www.gnumner.am

Recommendations
- Armstat should implement an intranet where all internal documentation can be collected. An intranet can be a powerful tool to improve knowledge and exchange of information inside statistical offices
- Armstat should proactively be involved in testing new cross-government applications to ensure these applications meet Armstat's needs
- Armstat should try to influence the development of the accounting program. Since every accountant and book keeper in Armenia uses this software, it might be possible to introduce some automatic reporting through this software to Armstat