

**Statistical Committee of the Republic of Armenia
(Armstat)**

**Metadata Developing Plan
2021-2023**

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Abbreviations

| | |
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| Armstat | Statistical Committee of the Republic of Armenia |
| ASMS | Armstat Statistical Metadata System |
| RA SCS | RA State Council on Statistics |
| S-DWH | Statistical Data Warehouse |
| SIMS | EU Single Integrated Metadata Structure |
| ESMS | Euro-SDMX Metadata Structure |
| ESQRS | ESS Standard for Quality Reports Structure |
| ESS | European Statistical System |
| EU | European Union |
| GDDS | General Data Dissemination System |
| GSBPM | Generic Statistical Business Process Model |
| ICLS | International Conference of Labour Statisticians |
| ICT | Information and Communications Technology |
| IEC | International Electrotechnical Commission |
| ILO | International Labour Organization |
| IMPS | Integrated Metadata Process System |
| IMDP | Integrated Metadata Driven Process |
| IMF | International Monetary Fund |
| IT | Information Technology |
| NACE | Statistical classification of economic activities in the European Community |
| NSDP | National Summary Data Page |
| OECD | Organisation for Economic Co-operation and Development |
| PWFA | Physical Water Flow Accounts |
| RA | Republic of Armenia |
| GSBPM | Generic Statistical Business Process Model |
| SDDS | Special Data Dissemination Standard |
| SDMX | Statistical Data and Metadata eXchange |

1. Introduction

The Metadata management concept is concerned with the content, structure and design of statistical data and processing from the preparation phase to the statistical dissemination phase. Metadata management requires a clear, well-defined understanding of the objectives and uses of metadata. In addition, it provides the necessary tools for data management, accessibility and utilization during the production and dissemination of statistics in order to ensure proper employment of these statistics for decision making and policymaking. The good management of metadata is necessary for the effective execution of the statistical operation. Therefore, the collection of metadata must be performed throughout all stages and operations of statistical activities for data collection, processing, analysis and dissemination. Statistical institutes, therefore, should prepare a clear strategy for metadata management and publication in order to guarantee the effectiveness of the statistical system.

As aforementioned the statistical metadata becomes an increasingly important part of statistical information for all parties involved (data providers, data producers and data users). Therefore it is important to ensure that the Statistical Committee of the Republic of Armenia (Armstat) business gets the most benefit out of Metadata System introduction.

In order to achieve this, Armstat needs to make sure that the chosen type of Metadata System supports organization business and adds the most possible value to it.

It is crucial to plan ahead for the development of the Metadata System, which will need to be able to grow and adapt to any changes in the statistical production business.

The future of Statistical Metadata lies in a professional approach to system design and software development, producing metadata-aware applications¹ that can use, capture, present, use and re-use metadata and the associated resources which it describes.

The Metadata Strategy provides a roadmap for how metadata will be structured, what metadata standards will be adopted, where and how it will be captured and stored, for what reasons it will be used and in what kind of overall statistical data production system architecture it will be implemented.

2. Vision

Armstat is working actively for being recognized as an institution that provides quality, timely and internationally comparable statistical data. This would be achieved by implementing

¹ Software applications recognizing structured metadata items thus allowing adopting applications to metadata content

advanced and innovative skills-based on statistical metadata-driven approach for statistical information production and dissemination.

3. Description of the current situation in Armstat

The Republic of Armenia subscribed to the GDDS on March 29, 2001. As a result of joint work carried out by the experts of Armstat, the Ministry of Finance of RA and the Central Bank of RA, on November 7, 2003 the Republic of Armenia became the 54th subscriber to the IMF SDDS, making a major step forward in the development of the country's statistical system to one of the most important international standards in the field of statistics. SDDS has strict requirements for permanent maintenance, about which the information is publicly available on the IMF's Dissemination Standards Bulletin Board². The Standard Dissemination Bulletin currently includes comprehensive documents in English (metadata, as well as their brief methodology) on the Statistical Experience of the Republic of Armenia regarding the SDDS data categories, which refers to the current data of the country included in the National Summary Data Page (NSDP) maintained by Armstat³.

Metadata are also included in the section “Metadata” of Armstat website in English and Armenian. SDDS includes 22 group indicators, which are included in Real, Monetary, Financial, External and Socio-demographic sectors. The update of these indicators is carried out monthly and quarterly, and the update of metadata and its brief methodology at least annually⁴.

Armstat has developed Quality Policy document that has been approved by the Resolution № 17-A of the State Council on Statistics of Republic of Armenia (RA) dated 20 June 2016 and posted on the website⁵.

Started from 2011 within the EU Twinning Project “Forwarding Armenian Statistics Through Twinning” the quality declarations for each of the statistical products of Armstat have been developed, currently 138 products are organized under 17 statistical domains. A quality declaration describes the regulatory background of the statistics, the purpose and the methodology of the statistics, its' dissemination and other important information for the users of the statistics in question. This means, that the quality declaration contains background information on the statistics and its content and information about what the statistics covers in relation to population, units, geography and time. The quality declaration also includes information on the quality of the statistics in terms of accuracy, reliability and comparability and a number of other things

² <https://dsbb.imf.org/>

³ <https://armstat.am/nsdp/>

⁴ Data update is presented in the advance release calendar of Armstat at <https://armstat.am/nsdp/arc/>.

⁵ <https://www.armstat.am/file/doc/99513198.pdf>

The quality declarations of Armstat are posted on Armstat website under the section “Documentation and Quality”⁶. They are available in Armenian and English and they are permanently updated.

In order to integrate the developed quality reporting system in the data dissemination system, the PC Axis/PX Web dissemination tool has been installed and ARMSTATBANK.AM has been created that gives users fast and easy access to statistical information, and allows to download data in MS Excel, xml or other formats, as well as to create graphs and tables designed according to their needs. The ARMSTATBANK.AM is linked to Quality Declarations⁷.

3.1. Use of internationally adopted Metadata standards and models

In 2014, Armstat has started the work on the introduction of the Generic Statistical Business Process Model (GSBPM) to document the statistical products according to GSBPM⁸.

The objectives to introduce GSBPM were:

- To define and document statistical processes in a standard way using common terminology,
- To compare, optimize and standardize processes of the production of statistical products,
- To promote communication, awareness, coordination and teamwork across the office,
- To make better decisions on planning, organizing and using resources for each process.

GSBPM (Version 5.0, December 2013) has been translated into Armenian and approved by the Resolution N 30-A of the State Council on Statistics of RA dated 21 November 2016. Statistical business processes for 138 statistical products have been documented according to the GSBPM, of which 117 are grouped into 32 groups, for example, electricity transport (subway, cableway, trolleybus). Statistical business processes for statistical products documented according to the GSBPM are posted on the Armstat website⁹ in Armenian and English and are regularly updated.

The process of visualization of the statistical processes of statistical products documented according to the GSBPM started in 2017, based on the recommendations of the expert from Statistics Denmark/EU Twinning project, 2015-2017/. The visualization of statistical processes is implemented in Excel format and is called “swimming pool model”. It describes and defines the set of business processes needed to produce official statistics, provides a standard framework and harmonized terminology. It is a modernization tool for statistical production.

138 statistical products documented based on GSBPM have been visualized by graphs (swimming pools) and grouped into 55 groups. The visualization process is aimed at providing in a more detailed and perceptible way the statistical processes of GSBPM-based documented statistical

⁶ <https://www.armstat.am/en/?nid=545>

⁷ <https://armstatbank.am/pxweb/en/ArmStatBank/?rxid=9e64099a-87b5-49bd-bef4-216eec278b07>

⁸ <https://www.armstat.am/file/doc/99499438.pdf>

⁹ <https://www.armstat.am/en/?nid=373>

products. It also includes the actor responsible for sub-processes of each phase. In the “swimming pool model”, the separate lines (swim lanes) present the sub-processes under the responsibility of the responsible actor. From the beginning to the end, the arrows are illustrating the implementation chain of statistical business processes. Each phase starts with the starting point “ready to perform this operation” and ends with the ending point “operation is implemented”

The benefits are:

- facilitation of communication within and between statistical organisations
- definition and description of statistical processes in a coherent way
- comparison and benchmarking of processes within and between organisations
- making better decisions on how to organise statistical production.

3.2. Definition and Context

Statistical metadata are data about statistical data. Metadata comprises data and other documentation that describes objects in a formalised way. Metadata provide information on data and about processes of producing and using data. Metadata describe data by giving definitions of populations, objects, variables, the methodology and quality.

A distinction is generally made between structural and reference metadata.

3.2.1. Structural metadata

Structural metadata are used to identify statistical data, e.g. titles, subtitles, short descriptions, dimension names, variable names, dimensions, etc.

For example, structural metadata include the titles of the variables and dimensions of statistical datasets, as well as the units of measurement used (e.g. EUR), code lists (e.g. for territorial coding), data formats, potential value ranges, time dimensions, value ranges of flags, classifications used, etc.

Referring to structural metadata, Armstat is in the process of collection and analyses of statistical variables from different subject-matter areas. Armstat developed methods and Excel tool for standardization, harmonization, documentation and variable inventory in the first phase of the establishment of the variables sub-system. This will be a necessary precondition for the establishment of variables subsystem.

3.2.2. Reference metadata

Reference metadata describe statistical concepts and methodologies used for the collection and generation of data, and provide information on data quality.

They thus assist users with the interpretation of the data, thereby being strongly content-oriented.

Armstat is approaching the establishment of the system for collection and dissemination of reference metadata based on the Euro-SDMX Metadata Structure (ESMS). The main aim of the system will be to document all existing statistics in accordance with the defined time frame in order to fulfil the reporting needs in regards to Eurostat ESMS and ESS Standard for Quality Reports Structure (ESQRS), but also for dissemination purposes i.e. to release reference metadata on the internet in a standardized manner.

Metadata in the Armstat information system will be classified dependable of its usage (see Figure 1): structural metadata, reference metadata.

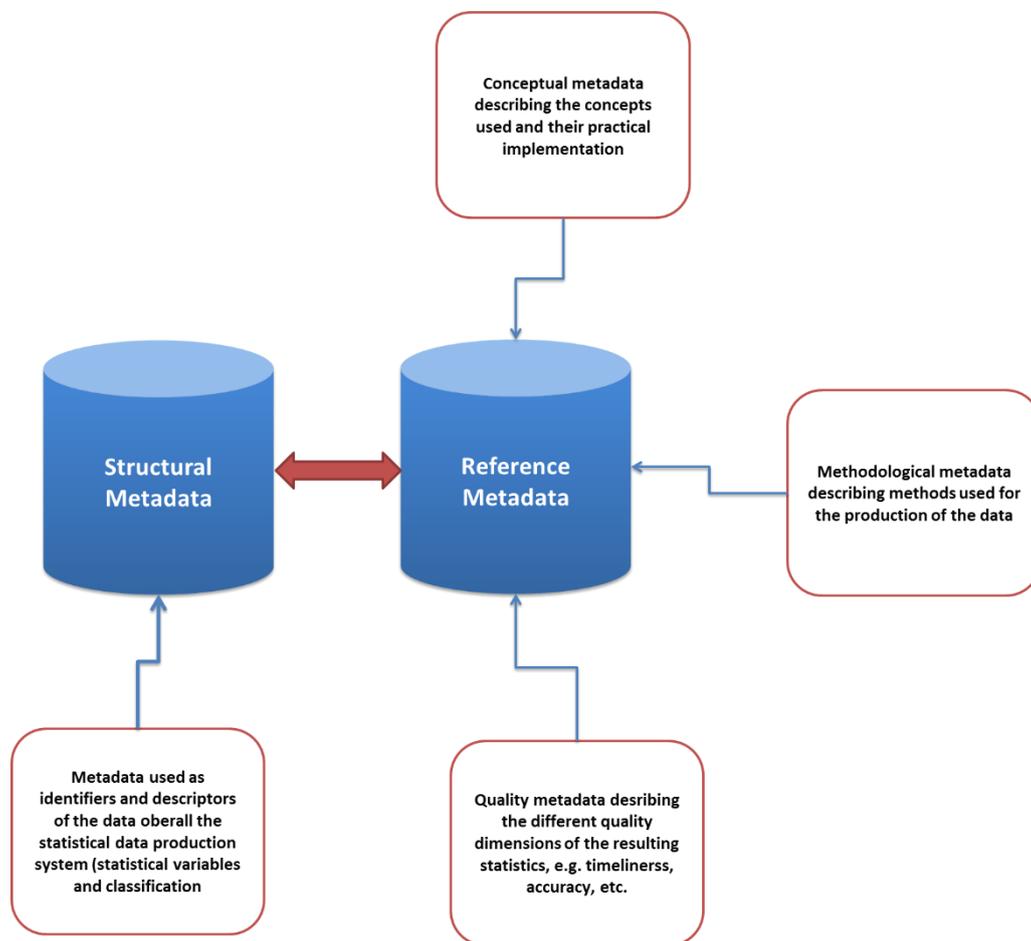


Figure 1. Armstat Metadata system

The reference metadata reporting standards to be used are the following: EU SIMS (Single Integrated Metadata Structure) and reporting formats ESMS (Euro SDMX Metadata Structure) and ESQRS (ESS Standard Quality Report Structure).

SIMS (Single Integrated Metadata Structure) is the dynamic inventory and conceptual framework for all ESS quality and reference metadata concepts.

In this structure, all statistical concepts of the two existing ESS reporting structures (ESMS and ESQRS) have been included and streamlined, by assuring that all concepts appear and are therefore reported upon only once.

Quality is of primary importance in the world of statistics and the implementation of SIMS supports the quality reporting.

Producers of official statistics have to guarantee that statistics are developed, produced and disseminated on the basis of uniform standards and harmonised methods.

Furthermore, users of statistics are guaranteed access to appropriate metadata describing the quality of statistical outputs, so that they are able to interpret and use the statistics correctly.

ESMS (Euro SDMX Metadata Structure) are standardized, user-oriented files used for describing the statistical data sets published by Eurostat on its website.

The purpose of the ESMS files is to document the methodologies, the quality aspects, and the statistical production processes in general.

ESQRS (ESS Standard Quality Report Structure) is a standard for the production and dissemination of quality reports within the ESS.

ESQRS files provide users with detailed information for assessing the quality of the data sets released by Eurostat.

3.3. Metadata in publications

Each statistical publication has a section that briefly presents the methodology for calculating indicators, including information on changes and revisions in the methodologies.

3.3.1. Methodological guidelines for filling in statistical reporting forms

Each statistical reporting form has methodological guidelines. Methodological guidelines are approved with the statistical reporting forms by the State Council on Statistics of the Republic of Armenia and published in the Bulletin of normative legal acts that are available on Armstat's website in Armenian¹⁰.

Armstat has developed a trilingual glossary of statistical terms that is available on Armstat website in Armenian, Russian and English¹¹. The trilingual glossary of quality concepts¹² has been developed based on Eurostat pattern as well.

¹⁰ <https://www.armstat.am/am/?nid=547>

¹¹ <https://www.armstat.am/en/?nid=29>

¹² <https://www.armstat.am/en/?nid=751>

3.4. Methodologies applied by Armstat

Currently, the following methodologies have been adopted within Armstat:

- System of National Accounts 2008 (English, Russian),
- European System of Accounts 2010 (English),
- Quarterly National Accounts 2017 (English),
- Handbook on Supply, Use and Input-Output Tables with Extensions and Applications (English),
- Government Finance Statistics Manual 2014 (English),
- Recommendations on improvement of the assessment of GDP at constant prices, 2005 (Russian),
- Measuring the Non-Observed Economy - Handbook (English, Russian),
- Handbook on price and volume measure in national accounts, 2001 (English),
- Recommendations on improvement of the assessment of GDP at constant prices, 2000 (Russian),
- Guide to Measuring Global Production 2015 (English, Russian) ,
- Balance of Payments and International Investment Position, Edition 6 (IMF) (English, Russian), Monetary and Financial Statistics 2015, International Monetary Fund (IMF) (English),
- Consumer price index manual Theory and practice, 2004 (International Labour Organization, International Monetary Fund, Organisation for Economic Co-operation and Development, Statistical Office of the European Communities, United Nations, The International Bank for Reconstruction and Development, The World Bank (English),
- Practical guide to producing consumer price indices, 2009(UN (English)),
- Producer Price Index Manual; Theory and Practice, 2004 (IMF) (English),
- Methodological notes for the calculation of producer price indexes for industrial products (Armenian),
- Export and Import Price Index Manual; Theory and Practice, 2009 (IMF) (English),
- The order of observation of consumer goods prices and tariffs of services for the calculation of consumer price indexes (Armenian),
- Methodological notes for the observation of consumer goods prices and tariffs of services and calculation of consumer price indexes (Armenian),
- Methodological notes for the calculation of producer price indexes for industrial products (Armenian),
- UNECE Guidelines on Statistical Business Registers, 2015 (English),
- Data Collection Manual for the OECD/Eurostat Joint Questionnaire on Inland Waters (English),
- SEEA-Water System of Environmental-Economic Accounting for Water (English),
- International Merchandise Trade Statistics; Concepts and Definitions 2010 (UN) (English),
- International Recommendations for Tourism Statistics, 2008 (UN) (English),

- OECD benchmark definition on foreign direct investment. Fourth edition, 2008 (English),
- Methodological manual for tourism statistics, Eurostat, 2014 edition(English),
- Guidelines for the Application of Environmental Indicators International Labour Organization (ILO), Resolution concerning statistics of work, employment and labour underutilization, adopted by the Nineteenth International Conference of Labour Statisticians (19th ICLS) (October 2013 (English),
- Introduction and adaptation of the ILO Resolution concerning statistics of work, employment and labour underutilization (19th ICLS, October 2013) in the Republic of Armenia (Clarifications for new methodology; PPT format) (Armenian, English),
- 18th International Conference of Labour Statisticians (18th ICLS) Resolution concerning statistics of Working Hours and Child labour (English),
- 17th International Conference of Labour Statisticians (17th ICLS) Resolution concerning statistics of Informal Employment (English),
- 15th International Conference of Labour Statisticians (15th ICLS) Resolution concerning statistics of Employment in the Informal Sector (English),
- 11th International Conference of Labour Statisticians (11th ICLS) Guidelines for Identifying Labour Cost Components (English),
- EU REGULATION (EC) No 453/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 April 2008 on quarterly statistics on Community job vacancies, since 2018 (English),
- COMMISSION REGULATION (EC) No 1738/2005 of 21 October 2005 amending Regulation (EC) No 1916/2000 as regards the definition and transmission of information on the structure of earnings (English),
- COMMISSION REGULATION (EC) No 1737/2005 of 21 October 2005 amending Regulation (EC) No 1726/1999 as regards the definition and transmission of information on labour cost (English),
- MEASUREMENT OF LABOUR COST, prepared by the Organization for Economic Co-operation and Development (OECD), ECE/CES/BUR/2008/4 Rev.1 (English),
- COMMISSION REGULATION (EC) No 224/2007 of 1 March 2007 amending Regulation (EC) No 1216/2003 as regards the economic activities covered by the labour cost index. (English),
- Recommendations on Statistics of International Migration. Revision 1. United Nations, New York, 1998 (English),
- A guide for policymakers and statistics organizations in the Pacific, ILO, 2015 (English),
- Measuring international labour mobility UNECE, 2018(English),
- Guideline of 20 th International Conference of labour statisticians, 2018 (English)
- Indicators of Gender Equality, UNECE (English),
- Developing Gender Statistics: A Practical Tool, UNECE (English),
- Physical Water Flow Accounts (PWFA), Manual (version 2014) (English),
- Guide on marking the types of economic activities of taxpayers in tax reporting forms (Armenian),

- MEASURING POVERTY IN ARMENIA: METHODOLOGICAL CLARIFICATIONS (English, Armenian),
- Principles and Recommendations for a Vital Statistics Systems, UNDESA Statistics Division, New York, 2014, Statistical Papers, Series M No. 19/Rev.3 (English),
- REGULATION (EU) No 1260/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 20 November 2013 on European demographic statistics(English),
- Recommendations on Statistics of International Migration, 1998 (UN(English)),
- REGULATION (EC) No 763/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 July 2008 on population and housing censuses (English),
- REGULATION (EC) No 862/2007 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 July 2007 on Community statistics on migration and international protection and repealing Council Regulation (EEC) No 311/76 on the compilation of statistics on foreign workers (English),
- Principles and Recommendations for Population and Housing Censuses, UNDESA Statistics Division, New York, 2017, ST/ESA/STAT/SER.M/67/Rev.3 (English),
- Conference of European Statisticians Recommendations for the 2020 Censuses of Population and Housing, Documentation: ECE/CES/2015/6, Add.1(English),
- Recommendations for the 2020 Censuses of Population and Housing in the UNECE region (Statistical standards and studies - No. 49) (English).

3.5. List of classification used in Armstat

The following classifications are currently used in Armstat

- Classification of financial assets of the Republic of Armenia ([Armenian](#)),
- Armenian classification of territorial units for statistics ([Armenian](#)),
- Classification of Division of administrative-territorial units ([Armenian](#)),
- Classification of Economic Activity ([Armenian](#)),
- Classification of Products by Activity ([Armenian](#)),
- Classification of Occupations ([Armenian](#)),
- Classification of Individual Consumption by Purpose ([Armenian](#)),
- Classification of Institutional Sectors ([Armenian](#)),
- Statistical classification of capital assets ([Armenian](#)),
- Commodity Nomenclature of Foreign Economic Activity ([2002 Russian](#)) ([2007](#)) ([2012](#)) ([Armenian 2015](#)) ([2017](#)),
- Classification of Industrial Products by Types of Activity (9-digit level) ([Armenian](#)),
- Classification of the Functions of Government (COFOG) (English),
- International Standard Classification of Education (ISCED -11) (English),
- International Classification of Diseases (ICD-10) (English),
- Classification of environmental protection activities (CEPA 2000) - activities, products, expenditure and other transactions whose primary purpose is environmental protection (English),

- Commodity Nomenclature of Foreign Economic Activity, 2017(English),
- Broad Economic Categories (BEC) (English),
- Standard International Trade Classification (SITC, (Rev.4)) (English),
- International Standard Classification of Status in Employment (ICSE-93) (English),
- International Standard Classification of Occupation (ISCO-88) (English),
- International Standard Classification of Labour Cost (English).

Armstat has the only codes related to classifications. IT department also uses the same codes as NACE and Classification of Division of administrative-territorial units.

4. Basic strategic principles

Armstat will plan the development of a metadata-driven production system that will change the traditional work approach. It will require training and adopting international best practice methods according to the given internal conditions. For the successful implementation of the metadata system, the most important will be the support of the management of Armstat.

Armstat Statistical Metadata System (ASMS) would be developed through the following steps:

- i. The elaboration and organization of a Metadata based workflow;
- ii. Analysis and understanding of the metadata creating processes, usage of the appropriate standards as well as data flow analysis will allow for the design of a central element of ASMS – Sub-system for structural metadata ;
- iii. Metadata will be captured all along the production process; It will be stored in the metadata repository for running the production system covering the full statistical data life cycle;
- iv. ASMS implementation will include the most essential parts as follows:
 - Establishing the metadata-base as the central information source for the management of the statistical production process, necessary structural metadata (variables and classifications) and reference metadata (methodology, regulations, descriptions, quality issues);
 - Clear division of roles and responsibilities for all processes of metadata management covering the full statistical data life cycle from collection to dissemination;
 - Stepwise development of the contents and functionality of the entire metadata system;
 - Importing metadata from available internal/external sources in order to reuse it in the new environment;
 - Providing metadata browsing, retrieval and analysis tools;
 - Providing wizard applications for important production phases in order to support statisticians entering proper metadata;

- Transferring metadata to different production tools (data warehouse, data edit processes, questionnaires etc.);
- Providing tools for employees in order to run the production system properly.

4.1. Benefits from the implementation and usage of ASMS

Most important benefits from the implementation and usage of ASMS will be as follows:

- Much higher flexibility of the whole statistical production process.
- Empowerment of statisticians limiting IT-related tasks and allowing a stronger focus on most value-adding activities such as statistical design, configuration and monitoring of process flows, interpretation and explanation of results, etc.
- Increased efficiency and reduced costs by avoiding multiple developments of redundant and potentially inconsistent metadata elements in the area of processes, exchanges, structures and concepts in different production lines or different organisations.
- Improved quality of the data using shared and widely accepted metadata elements in the area of concepts, process models, processing instructions, etc.
Improved possibilities of evaluation and monitoring of the whole statistical production process through exhaustive, standardised and centrally accessible process metrics.
- Besides increasing the efficiency of statistical production, the quality of statistical information will increase because metadata provides more background information, and statistical production will speed up and will become more up-to-date;
- The most important principle will be to demonstrate the results achieved within the process of development. This will ensure that the statistical staff understands and see the benefits of the solutions that will be implemented gradually, i.e. solutions that will significantly change the traditional manner of statistics production (stovepipe approach) and increase their efficiency.

5. SMS - the core elements of the production environment

The new statistics production environment will be based on the use of statistical metadata as the driving force of all statistics production processes and sub-processes. ASMS will support:

- Statistical data collection processes for all collection methods;
- Integrated Metadata Process System (IMPS);
- Dissemination and interchange system on the Euro-SDMX standard basis.

6. System design

6.1. The architecture of the Metadata system

Structural and reference metadata on the conceptual level will be stored in separated but interrelated metadata repositories like it is reflected in Figure 1.

Reference metadata collected and stored provides Armstat personnel with the competence building opportunity. It is important to organize easy and secure access to it for both Armstat personnel internally and external users of statistical information via Web.

6.2. Integrated Metadata Driven Process Oriented Statistical Production System Architecture

Currently, the data management from data collection to the data dissemination is organised, in Armstat, as the following Figure 2.

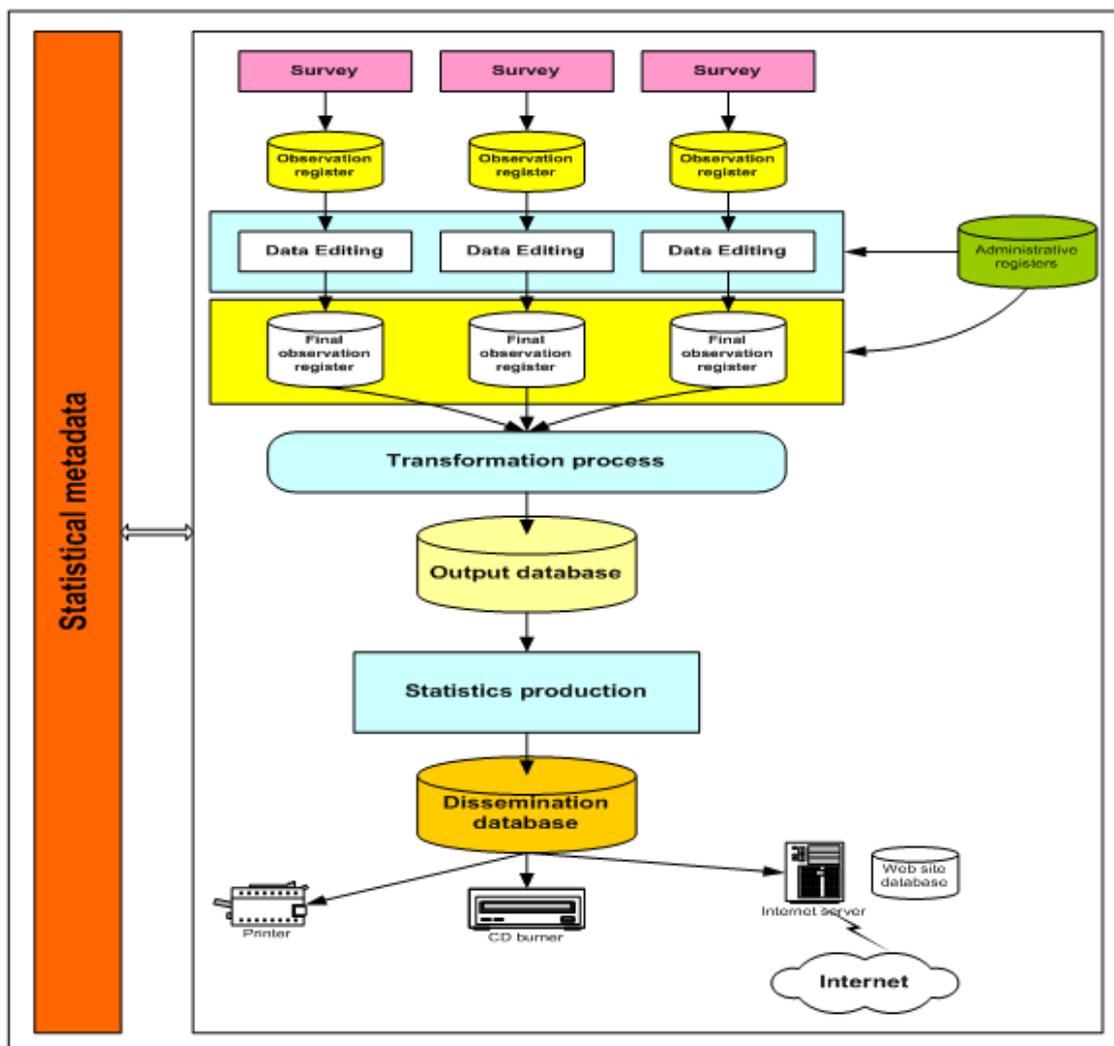


Figure 2. Current data flow scheme in Armstat

The metadata strategy would suggest that Armstat will prepare and/or improve the present data flow organisation into a core element that drives all the system processes and controls the data flows to and from the system (import and export procedures) through the Statistical Data Warehouse (S-DWH) that will, among other advantages: i) deliver better visibility and higher availability across departments, ii) leverage existing IT infrastructure investment, and iii) provide a repeatable and large scale data warehouse.

The S-DWH will act as the room of all statistical information (data & metadata) throughout all statistical production and dissemination processes. All the components of the CDW will be interrelated thus ensuring the usage of metadata-aware software, automation of main applications development (data entry, raw data validation, aggregation and outputs preparation) and the highest level of the information security.

The entire system will be gradually built or improved based on the existing system based on the scheme presented in Figure 3.

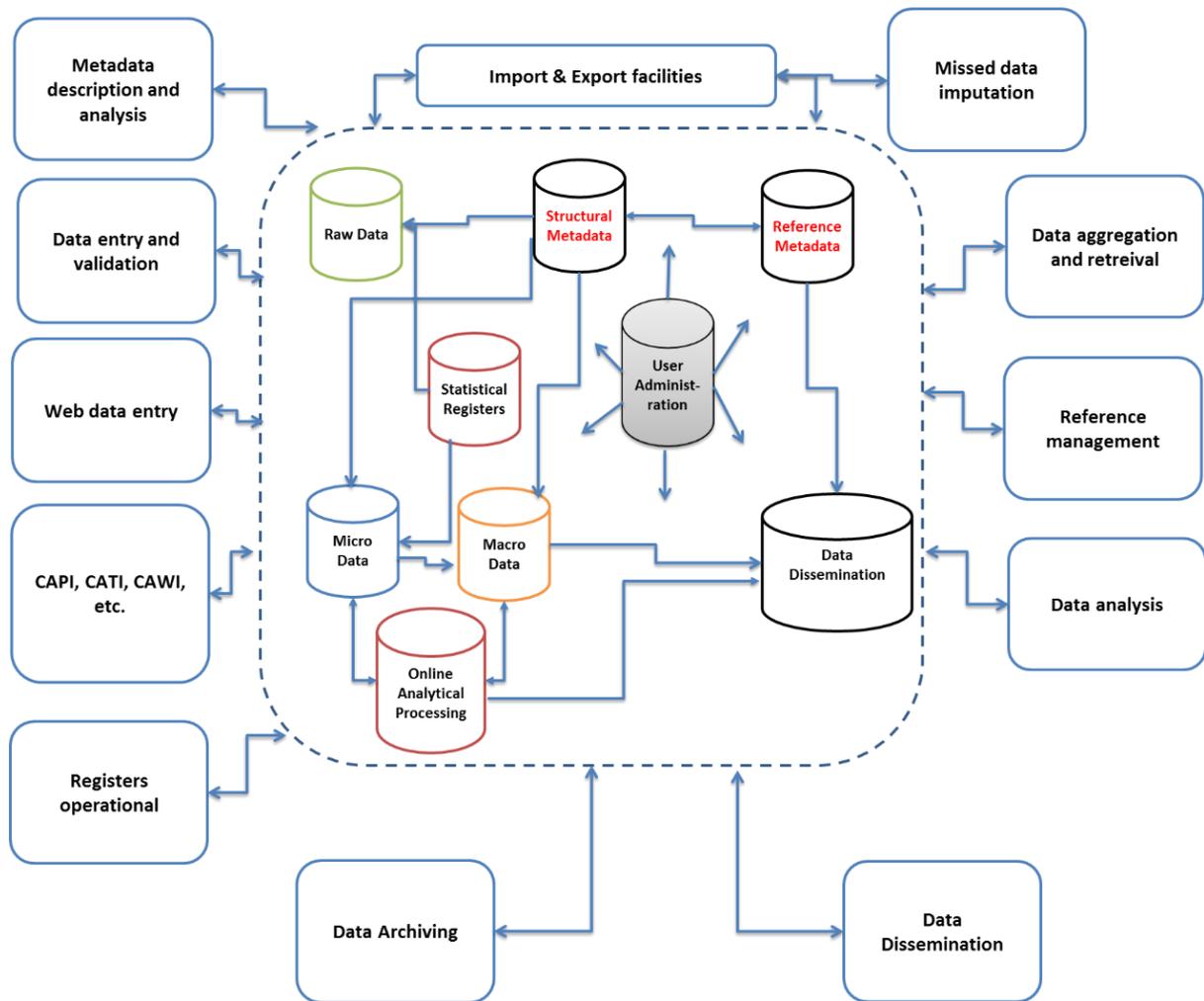


Figure 3. ASMS high-level conceptual architecture

6.3. Tools for entire system development

To ensure the possibly lowest costs of entire system development, Armstat will consider the use of open-source/free software platform wherever feasible. Applications that will be elaborated on the principles of metadata aware software will ensure metadata as driving force for the entire system.

6.4. Ways of development. Outsourcing versus in house development

The best way of development the ASMS platform keeping good efficiency will be based on a cost-benefit approach. Depending on the results, there are several possibilities for system development:

- i. Total outsourcing;
- ii. Total in sourcing, or
- iii. Composition of both based on selective sourcing which capitalizes on the inherent advantages of both internal IT departments' and external vendors' inherent cost advantages, is recommended.

A decision will be taken for which tasks which development method to use dependably of:

- i. Available resources (human, technical and financial);
- ii. The complexity of the task;
- iii. Availability of internal expertise;
- iv. Time constrains.

6.5. System development phases

System development has to be carried out in sequence which will ensure achieve fast and efficient results convincing statistics producers – subject matter statisticians on high efficiency of the metadata-driven process-oriented statistics production approach thus motivating them to assist the development and implementation in a most effective way.

Prioritization of the development and implementation will be done in strong accordance with the Generic Statistical Business Process Model (GSBPM).

GSBPM main processes are subdivided into three main groups:

- New surveys preparation (Specify Needs; Develop & Design; Build);
- Surveys data processing (Collect; Process; Analyze);
- Dissemination and Archiving.

Specifics and interrelations of the main processes are described in the column Integrated Metadata Process System (IMPS) development in Figure 3.

The develop and design process interrelates with Surveys data processing group of processes as for new surveys development as for existing surveys due to the necessity of metadata descriptions.

The proposed sequence is presented in Figure 4.

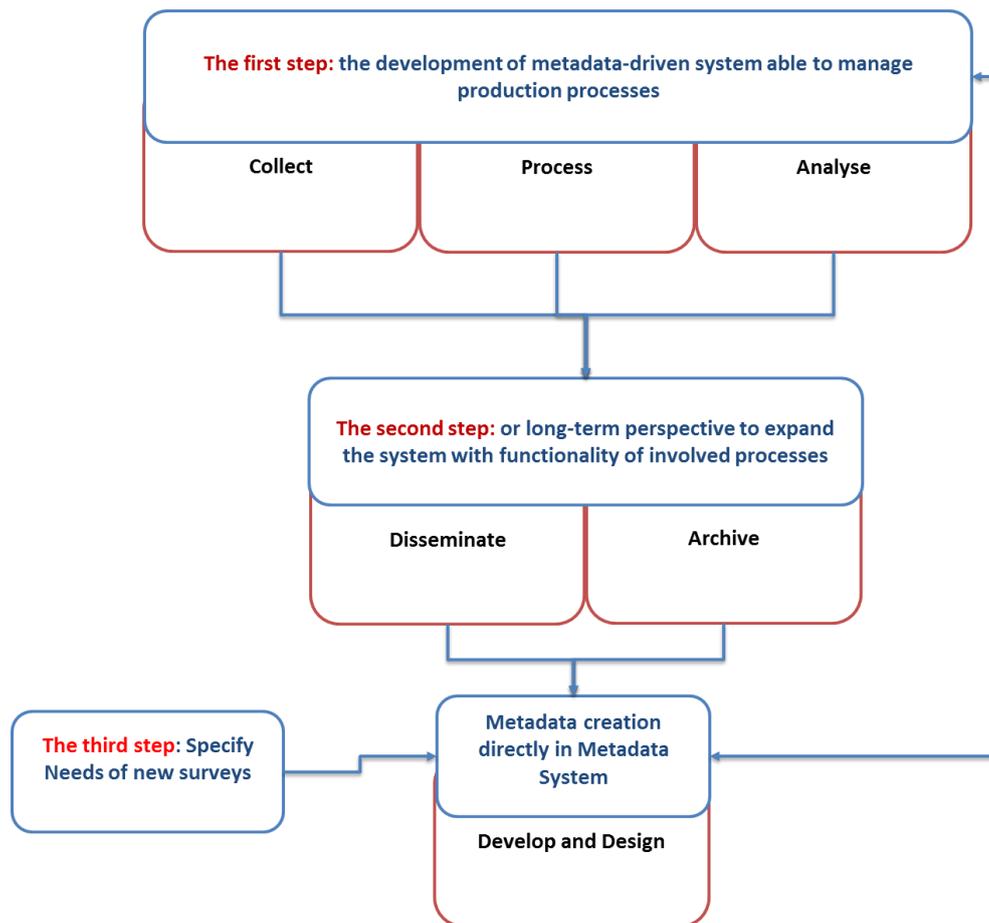


Figure 4. System design according to grouped phases

The transition of whole statistics production from surveys production system to process orient one will start when the core elements (the first priority task). Production metadatabase and Micro database will be developed, tested and launched in the production environment.

To achieve the success of this reorganization and increase the culture of the entire work the listed below activities will be implemented:

- The staff of statistical subject matter units will be regularly informed about the main activities within the system development process;
- Special seminars for employees will be organized to explain the advantages of a new approach of statistics production and a new division of tasks and responsibilities which will lead to significant changes in the organizational structure of the Armstat;
- Statisticians will be involved in the defining of the development tasks, testing of interim solutions and completed applications as much as possible;
- Training programs will be timely elaborated and implemented;

- ICT infrastructure (particularly workstations and networking) will be tested on compliance of new production system requirements;
- The first system modules and/or sub-modules successfully implemented will be promoted for wider usage.

6.6. Partial process-oriented working environment

Development of metadata-driven statistical data production system is connected with the transition from “stove-pipe” to process-oriented data production approach. It is proven in practice that the best results are achieved implementing a partial process-oriented solution in which most time and resources consuming processes (collection, entering & editing and outputs dissemination) are integrated as for all surveys conducted. Data analysis (micro and macro), outputs preparation as well as new surveys design would still be a task of competent statisticians in subject matter divisions thus ensuring higher quality results.

6.7. User types and roles

To ensure high-level data security within the entire system and effective access to the necessary data within the data production processes special subsystem of the user’s administration will be created.

Roles of the users with different access rights will be defined in this subsystem. Number and types of roles will be elaborated and defined during the process of system design.

Access control will contain three mutually supportive technologies that can be used to provide the system security: authentication, access control and audit. However, access control is the most important technique on logical security level and it is used frequently.

Access control will allow to define the user’s responsibilities and possibilities in the system. It will define what a user can do directly and also what programs executing on behalf of the user are allowed to do. Access control limits the activities of successfully authenticated users basing on the security constraints defined on the conception level and on the administration level.

Access control approach consists of two components¹³:

- set of access policies and access principles that determine the possible access of system’s users to data and information stored in a system using the access modes and
- set of control procedures (security mechanisms) that allow to verify the access requests sent by system’s users in agreement with defined principles and rules; these access requests may be allowed, denied or modified.

¹³https://www.researchgate.net/publication/220101285_Management_of_access_control_in_information_system_based_on_role_concept

The access security system will contain two components that cooperate with each other to assure the global security of information systems:

- strategy of logical security that determines all the environments and specifications of the entire organization on the security level and
- access model with:
 - set of concepts to describe the system objects (data access) and system subjects (users),–definition of the users' rights to access the data,
 - access control policy that describes how users can use data, defines data structure and manages the users' rights to access the data.

6.8. System governance and competence building (knowledge management)

System governance is a comprehensive framework for measuring and improving the system qualities. System quality is a very broad concept. It covers purposes, viability, supportability, risks, compliance to regulations, and compliance with technical standards.

A governance operating model can provide substantial detail regarding the ways in which activities will be conducted to implement governance. Indeed, one of the main reasons to create a governance operating model is to define and document the processes, procedures, and reporting mechanisms that will constitute governance, along with the training, IT, and other resources that will be needed.

Armstat metadata competence must build on insight and experience of the key production processes, according to the adopted Generic Statistical Business Process Model (GSBPM).

Close connections with other national statistical institutes in regards to the development of common solutions and exchange of competence are welcome.

Technological development and diversity are placing large demands on the competence of both ICT staff and subject matter statisticians. Technological developments, based on metadata-driven approach, open standards and platform-independent systems, directing to new electronic services and forms of data and metadata collection, processing, dissemination and interchange nationally and internationally is a real working environment requiring a high competence level. Armstat will increase its competence in order to make the best use of new developments.

The aim of the ICT operations is to contribute to the simplification, improvement and increased use of common working processes. Therefore, it will be necessary to increase the ICT staff's competence concerning methods and tools to be used for solution modelling and project management. Thus, the risk of projects failure can be avoided.

In order to meet the objectives of this Metadata strategy, ICT development projects must to a greater degree than before be organized across the organisational structure of Armstat. Therefore,

there will be a need for competence associated with help and support systems for coordinating and collaborating across the boundaries of different structural units.

Based on the above, a competence building plan will be developed. It will describe Armstat current individual and collective metadata competence and set up the actions for its improvement.

The plan will provide specific actions for developing relevant competence required to reach the strategic goals.