Preparation of human resources for changes resulting from the modernization of statistical production in polish public statistical system.

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I.   Introduction

1. At present, in the age of IT innovation, the reality mounts new challenges to public statistics. In order to implement them and strengthen the challenges and growing needs of recipients, changes in the way the public statistics operates are necessary. It is, after all, not only the key element functioning within the IT system of the state but also European statistics. What is also relevant, is the exploration and appropriate use of the new possibilities that are, at present, offered by the growing dissemination of data and dynamic development of new technologies.

2. Traditional approach to the organization based on treating the organization as a collection of hierarchical, separated (isolated) vertical sections or departments is making its functioning difficult. It frequently happens that the employees employed in particular departments while looking through the prism of their achievements are not aware of the goals of the entire organization. They do not fully understand the specificity of different departments operation as well as their input into the realization of organizational goals. The "silo" effect comes into play to help optimize the actions inside particular departments. It is particularly difficult to solve problems which are managed by employees of different functional cells.

3. The future organization of public statistics should be based on the so-called process approach – using the familiar and successful solutions, i.e. GSBPM.

4. The specialized units should deal with the statistical surveys at the appropriate stages of specialization. They should be supported by efficient, integrated production environment (IT environment) supporting standardization and optimization of work processes.

5. Concept of Statistical Surveys Organization in the CSO of Poland requires taking action aimed at increasing the efficiency of the statistical production process and accompanying organizational and coordination processes. To achieve this goal a lot of activities must be taken, out of which three main ones, taken with the view of making the organization more efficient, are as follows:

    (a) Identifying and establishing processes within the particular stages of official statistics, based on the Generic Statistical Business Process Model - GSBMP[1]) and preparing the Polish **Integrated Statistical Business Process Model** (ISBPM), that includes models appropriate to reality and the needs of Polish official statistics; specifying the vision of implementing statistical surveys standard of integrated statistical production process taking into consideration metadata objects.

    (b) Standardizing organizational processes, which is based not only on ensuring uniform solutions regarding data collection and processing, but also on implementing the entire statistical process according to uniform principles and procedures.

    (c) Preparing the procedures that make it possible to automate planning processes and survey implementation.

    (d) Implementing the concepts, rules and procedures in stages, with regard the possibilities and human and financial resources.

    (e) Preparing and implementing in stages data collection strategy as well as data storage, processing and dissemination.

    (f) Defining goals and requirements for the metadata system and the analysis of potential use.

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[1] www.unece.org/stats/gsbpm

(g) Preparing and stage-wise implementing the meta-information concept that enables the use and creation of meta-information on every stage of the statistical process as well as management of the access, users and the quality of meta information.

6. In order to prepare of human recourses for changes resulting from the modernization statistical production the following actions should be taken:

(a) Determination of the employees competences in the various stages of statistical production according to GSBPM model,

(b) Gradual introduction of task specialization and the associated concentration of competence,

(c) Raising the general level of competences through the training system and continuing human resources education.

II.   The current model of statistical surveys organization systems.

7. The legal basis of implementation of statistical surveys of official statistics is constituted by the Act dated 29 June 1995 on official statistics (further referred to as the Act) and the annual programme of statistical surveys of official statistics (further referred to as PSSOS or Programme), which constitutes an attachment to the regulation of the Council of Ministers with regard to the surveys programme for a given year in accordance to the provisions of the Act mentioned above.

8. The programme specifies the topical and subject range of statistical surveys and related duties. The document regulates the collection and transfer of statistical data in a given year, data regarding the entire year and indicated statistical data for previous years.

9. The main characteristic features for the present organizational model of statistical survey implementation could be described like:

(a) Diversification and lack of unification of labour processes that lead frequently to:
- multiple performance of the same tasks within different processes;
- increased workload;
- increased costs of preparing and delivering final products;
- excessive complexity of labour processes;
- extension of the time necessary to prepare and deliver final products.

(b) Wide diversity of surveys implementation, resulting in:
- dispersion and isolation of knowledge and competences of persons implementing particular surveys (for example dispersing information on the primary needs voiced by the recipients);
- separating and dispersing the communication within the organization (e.g. between particular leader units and recipients of products of public statistics);
- dispersed responsibility and convoluted reporting lines;
- duplication of human resources dedicated to particular surveys;

(c) Excessively complex IT environment, difficult to maintain and develop, consisting of several hundred dedicated and independent IT systems, created for the needs of particular publications. The result of such an organization of IT environment are additionally:
- significant redundancy / duplicating of functionality;
- increased expenditure (finance, and staff) on maintenance and development of IT environment.

(d) Concentration on the "traditional" methods of data collection.

(e) Collecting data independently for particular surveys and the impossibility to share them for the needs of other surveys (data gathered in several separated bases).

(f)   Lack of a comprehensive metadata service.

III.   Modernization of statistical production with the use of a process approach according to the model GSBMP (The Generic Statistical Business Process Model)

A.   Process Approach

10.   The future organization of public statistics should be based on the so-called process approach – using the familiar and successful solutions, i.e. GSBPM. Among the basic features of the mentioned process approach one can mention:

(a)   Concentration of entire activities within the organization of statistical public surveys.

(b)   Adapting a perspective of the "from the outside to the inside" analysis, based on taking client's expectations as a departure point with regard to a product which is to meet these expectations.

(c)   Firstly, concentration on relations (so-called "interfaces") between particular stages of processes and organizations, secondly, looking at the inferior of the organization or the process.

(d)   Activities (in particular sub-processes) should end with a well-defined (qualitatively and quantitatively) product (half-product or final product).

(e)   Activity (especially stages of processes) should start after receiving a well-defined (quantitatively and qualitatively) initial product or half-product, so-called "input".

11.   The presented solutions, are aimed at increasing efficiency of processes of the public statistics organization system while preserving their effectiveness. It seems that the increase of efficiency can be achieved through:

(a)   Optimization and standardization of labour processes.

(b)   Tasks specialization of organizational units.

(c)   Consolidation and unification of IT solutions.

(d)   Optimization of the collecting data manner– single time collection of variables added value re-used simultaneously in many other surveys.

(e)   Maximal use of already collected information – e.g. primary information available in the registers of public administration.

(f)   Minimization of the use of "costly" methods of data collection – i.e. collected from respondents;

(g)   Minimization of data collection social costs – i.e. limiting engagement of respondents and lowering of a irritation factor.

B.   The Integrated Statistical Business Process Model

12.   The concept of the model of statistical surveys is based on the perspective of work processes. The description of fundamental elements of concept solutions was presented while discussing particular groups of model processes including: specification of needs, designing, construction, data collection, data processing, data analysis, data dissemination and ex-post evaluation.

13.   Organization of surveys of public statistics requires a holistic approach – in particular looking through the prism of a single survey but also through the prism of all surveys and, as was already signalled earlier,

drawing attention to the fact that the effect of the entire organization does not have to be simply a sum of particular effects and can be, in a major way, strengthened thanks to the synergy effect.

14. From our analysis it can be inferred that it is possible to significantly simplify the architecture of work processes – i.e. reduction of numerous independent production processes with single processes (Picture below) – in particular thanks to implementation of task specialization and related competence concentration.
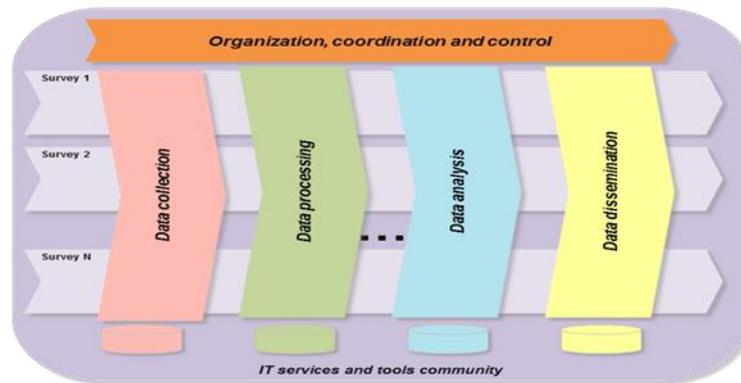

Fig. 1. – Target model of statistical production

15. Taking into consideration all observation – including the possibility to secure the proper management of work processes – it seems possible that a certain improvement (and simplification) can be performed on the organizational structure of the organization system public statistics, where in the place of "silos" one should introduce organizational units with the following task specifications (functional) – i.e. specialization regarding:

(a) data processing;

(b) data storage;

(c) data analysis;

(d) data dissemination (i.e. customer service);

(e) organization, coordination and control;

(f) providing IT services.

16. Activities of the aforementioned "specialized" units (further referred to as key units) require also the support from supporting units – dealing with managing staff, servicing administration and finance. Along with the implementation of specialized units it will be required to appropriately organize them e.g. by creating appropriate profiled teams with precisely established team roles, preparing work and creating action procedures. It needs a proper competences of staff

17. The idea of reorganization presented herein is strictly related to the need for change of the production environment of public statistics surveys organization. It seems that the integration, consolidation and standardization of IT solutions – within one unified production environment – will be an effective method of supporting reorganization, optimization and standardization of work processes. Additionally, the mentioned consolidation of IT solutions should, in a major way, influence the optimization of development costs of those solutions and their later support.

18. The proposed changes of organization of surveys of public statistics, aims at transferring the organization into an organization depicted in sector-specific publications as "Functional organisation" and at creating the so-called integrated statistical business process system.

IV. **The preparation of human recourses for changes resulting from the modernization statistical production**

19. In order to prepare of human recourses for changes resulting from the modernization statistical production the following actions should be taken:
    (a) Determination of the employees competences in the various stages of statistical production according to GSBPM model,
    (b) Gradual introduction of task specialization and the associated concentration of competence,
    (c) Raising the general level of competences through the training system and continuing human resources education.

A. **Determination of the employees competences in the various stages of statistical production according to GSBPM model.**

20. Organizational structure is a relevant element of the proposed Integrated Statistical Business Process Model which should be coherent with the proposed concept. It is also relevant to enable and support positive effects that it brings. According to the process groups and processes we can distinguish between primary units:
    (a) *Control, coordination and organization Unit;*
    (b) *Data collection Unit;*
    (c) *Data processing Unit;*
    (d) *Data analysis Unit;*
    (e) *Customer service Unit;*
    (f) *IT services Unit and secondary (supporting)* **units** dealing with staff management, administrative and finance management.
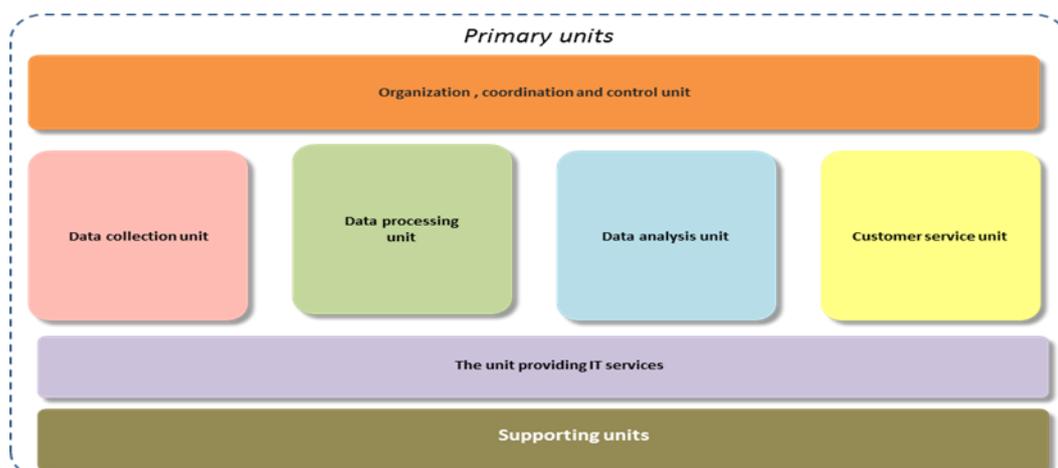

Fig. 2. Primary units of the Integrated Statistical Business Process Model

21. The basis assumption determining the multi-layer structure proposed herein is the concentration on specifically identified uniform tasks for task groups implemented within work processes in the integrated task implementation model followed by focusing - within a particular organization unit - on knowledge, experience and competence necessary to perform these tasks. It should also be underlined that at this moment this concept does not define details of organization and their structure, it presents only certain directional ideas which will require further work. Therefore, no inner organization of these units was specified. No specification was given as regards whether they will be characterized by a flat structure or

will they consist of smaller units specialized according to certain criteria. Supportive units mentioned above will not be discussed within the organizational structure.

22. One of the main tasks within the Integrated Statistical Business Process Model will be the comprehensive ensuring of efficiency the entire string of activities regarding the exercise of statistical surveys. It is important that the safeguard of integrity of the statistical processes was the unit having appropriate competence allowing it for an efficient coordination of the proper cooperation of all remaining basic organizational units. Therefore the owner of the string of process groups was the control, coordination and organization Unit (i.e. unit responsible both for its entire result as well as for defining and monitoring the measures of its efficiency, entire management of the string of process groups, defining its course etc.). To accomplish tasks of coordination and monitoring of the entire work performed by all units within one process string (including concentration on "interfaces" between particular sub-process groups), and as well as coordination of management of escalating problems regarding cooperation of units (i.e. concentration on the cooperation between particular units), competences and knowledge of the statistical production process, management skills, organizational skills and cooperation as well as determining the risks and acting under time pressure. are required.

23. Apart from the above described role of the control, coordination and organization Unit, within the entire string process of the Integrated Statistical Business Process Model, the unit plays analogical role on a lower level, i.e. few process groups. It is responsible for the verification and confirmation of the plans prepared by particular units within the process group (plans regarding: construction, production, quality archiving and requirements regarding IT tools and services within the scope corresponding to the competence of a given operational organization), creating a collective performance plan, therefore it is proposed that it played a role of the group owner of the designing processes. Within the Construction process group the control, coordination and organization Unit performs the decomposition of the common implementation plan and directs the composite plans to further implementation by key units taking part in the statistical surveys. For the proper implementation of these tasks, it is necessary that employees have competence in system design, knowledge of methodology and statistical tools, the principles of quality assessment, information of the standards such as GSIM, SDMX. Taking into account that the defining quality standards, analysis and ex-post evaluation refers primarily to the entire string of processes of the Integrated Statistical Business Process Model, the control, coordination and organization Unit should have knowledge of quality management and as well as international quality standards regarding the methods and tools of measurement quality.

24. The fundamental task of the data collection Unit is to collect, on the basis of the necessary preparation by the data processing Unit, different data collections with the use of the most adequate methods of obtaining data. The products of this unit are the data collections gathered for the statistical products group with the appropriate Frames and are transferred to the data processing Units. This group plays a very important role in the statistical production process. Employees should possess comprehensive knowledge of the tools used to collect data and knowledge in the construction of information systems. Knowledge of using administrative sources and possibilities of the use of typical and untypical data sources are also very useful.

25. The fundamental product of the work of the data processing Unit is the micro and macro data Repository appropriately prepared and fulfilled with data. One of the tasks is to analyse the needs of the data analysis Unit. This need refers to the aggregates and need for resultant micro data of statistical products groups and processing of the obtained data (i.e. value collections of variables collected for the statistical products Groups) into a collection of data constituting the basis for preparing information and conducting analyses. This unit creates and implements the construction plan of production as well as

operational and analytical processing of micro data. Due to the scope and specificity of the implemented task, task team should be composed of experts from methodological knowledge (e.g. survey methodology including used concepts, applied standards: dictionaries, classifications and nomenclatures) as well as IT (construction of ETL processes, methods and construction processes of integration, database design, design and development of information systems and also creation OLAP cube).

26. The main task of the data analysis Unit is delivering to the customer service Unit products based on the needs on its part for the statistical products. This task is implemented on the basis of a detailed data analysis, implementing the statistical confidentiality principle and final confirmation of data that are to be made available. The fundamental result of the work of the units should be the groups of publication aggregates and the product groups statistically recorded in the analytical micro and macro data repository (data Warehouse). Due to the scope of implemented tasks, this team should have competences in the use specialized analytical tools as well as knowledge of analytical and classification standards. However, the most important are the skills of analytical and synthetic thinking and drawing conclusion and interpretation of information for the preparation of analytical papers (publications, reports).

27. One of the tasks of the customer service Unit is the preparation of statistical project products, on the basis of the information needs identification (i.e. requirement specification regarding the products fulfilling the identified information needs of statistical information recipients). These statistical project products create the needs for statistical products. The second key task is making statistical information available in the form of final products prepared in the statistical production processes, including their transformation to the selected availability form (printed publication, electronic format). A relevant element of the unit's activity should be also the promotion of offered public statistics products. Taking into account scope of team activities experts should have the ability to: establish friendly relations with the customer, create promotional strategies and also use websites.

28. The IT services Unit was classified as organizational unit. That was mainly due to the relevant role of IT solution that it delivers and maintains which help in effective support of the activities of remaining units. Ultimately, that activity has an influence on the efficiency of the entire production process of public statistics. The IT services Unit, on the basis of requirements regarding the tools or IT services specified by all remaining units, prepares and then after being acknowledged by the control, coordination and organization Unit, implements the construction plan of IT tools /services, maintenance of IT tools/services regarding production, maintenance of IT tools/services regarding archiving and quality plans regarding the maintenance of tools/ IT service. In the context of IT tools construction processes, this unit exercises, adjusts, tests and implements a set of tools and IT services, while in the scope of maintaining IT tools/ services, ensures continuity of work of the entire IT environment supporting the work of the remaining units. In relation to the specificity of tasks implemented by the IT services unit, it is proposed that it was the owner of the IT tool/services designing process. Due to the tasks concerning in particular the construction of highly specialized tools supporting the implementation of the tasks at all stages of process statistical production, specialists should have competences in the systems analysis, systems and architecture designing, programming skills (e.g. Java, SQL, .NET), database and IT infrastructure administration and also security system administration.

29. The proposed and above described structure exerts pressure, just as the statistical surveys organization concept, on functional specialization (i.e. criterion of the division is the role that this organization fulfils in the public statistic processes and the concentration, within given unit, of knowledge and competence necessary for implementation of the ascribed tasks group) and is strictly related to previously described conduct of work processes.

30. In order to proceed to the CSO organizational status proposed herein, it is proposed to use the gradual approach, i.e. step-by-step and stretched in time. Such an approach seems justified not only by the scope of changes but also by the fact that the proposed changes will require proper preparation (including motivation) of people engaged in this process. People constitute the fundamental capital of the organization, which, if appropriately organized and directed, determines the success of each organization functioning. People – with their knowledge and willingness to conduct creative operations – shape the organizational culture and formulate action strategies and implement them. The effective use of the proposed competence and the development of new ones constitute a key success factor for the process of proposed organizational changes.

B.   Gradual introduction of task specialization and the associated concentration of competence.

31. The main aim is the final transformation of the statistical surveys organization system into a target Integrated Statistical Business Process System in particular in such areas as:
    (a) organization structure and associated concentration of competences;
    (b) work process;
    (c) IT environment;
    so that all public statistics surveys were performed already according to the below outlined new concept i.e. Integrated Statistical Business Process Model.

32. Once of the absolutely relevant aspect regarding the implementation of the integrated statistical business process system are the people and structures in which they function. In this case it is proposed to use the evolutionary approach, i.e. gradual changes introduced over time. Firstly, it is suggested to appoint – within the present statistical research organization structure system – **Team on reorganizing the statistical surveys system** (further referred to as "**task team**"). Within this task the following sub-teams would operate:
    – Sub-teams for organization, coordination and control;
    – Sub-team for data collection;
    – Sub-team for data processing;
    – Sub-team for data analysis;
    – Sub-team for client services;
    – Sub-team for IT services.

33. The above mentioned teams would function as a interdisciplinary, inter-departmental units created within the matrix structures imposed on the current public statistics organization.
    The matrix structure relates to the mathematical concept of a matrix, which in particular marks a rectangular table of numbers organized in a particular way in columns and rows. This structure of an organization, just as in the case of a mathematical matrix, is based on the principle of two dimensional grouping: columns are the stable organizational structures – in the case of this concept this will include the present CSO department – and the rows signify specially performed tasks – i.e. portfolio of undertakings, which will be performed in relation to the construction of the Integrated Statistical Business Process System. To the implementation of the mentioned tasks, it is suggested to create the abovementioned Task team. The idea of creating the Team on reorganizing the statistical surveys system was presented in Fig. 3. Particular members of the aforementioned team, and its subcomponents, will remain on currently binding principles assigned to the departments (i.e. "columns"), but will implement other work than that performed for the departments, i.e. will perform tasks (see "rows") related to the implementation of the Integrated Statistical Business Process Model.
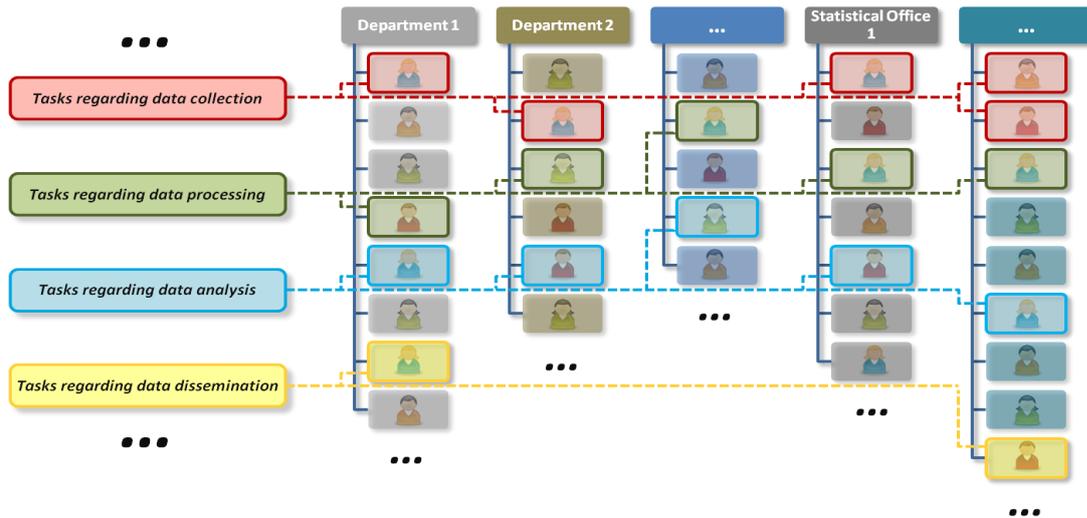
Fig. 3 –The idea of creating a Team on reorganizing the statistical surveys system

34. It is foreseen that the activities included in the implementation of the Integrated Statistical Business Process Model should result in presenting a new, targeted organizational structure hereinafter referred to as modernized (or "new") organizational structure of the Integrated Statistical Business Process System. Until the target organizational structure is created, a temporary structure would function i.e. temporary structure with a "matrix" like team on reorganizing the statistical surveys system. Attention should be drawn to the fact that the number of surveys performed with new methods – including the corresponding fall of the number of surveys implemented with old methods – up to the moment of appointing a target organizational structure, will result in the increase of the number of members of the aforementioned task team.

35. The idea of transformation the organizational structure of the statistical surveys organization system presents in the diagram below:
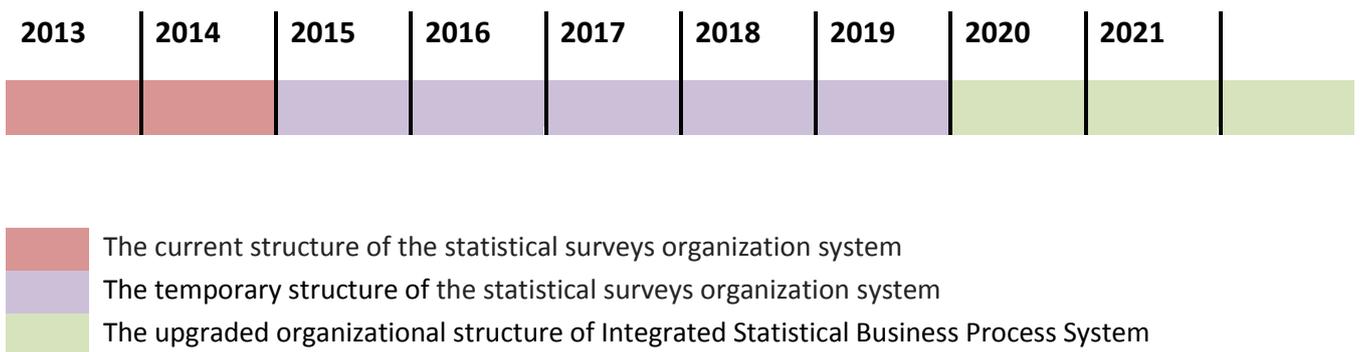

| 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | |

The current structure of the statistical surveys organization system

The temporary structure of the statistical surveys organization system

The upgraded organizational structure of Integrated Statistical Business Process System

Fig. 4. Idea of organizational transformation

C.   Raising the general level of competences through the training system and continuing human resources education.

36. A very important element related to certain implementation of a new statistical surveys organization is to strengthen the competence of personnel statistics. For this purpose, it is necessary to take comprehensive action regarding in particular:
- improve the efficiency and effectiveness of work processes in units of official statistics;
- optimization and reorganization the structure of official statistics;
- modernization and development of information technology in the public statistics;
- creation and enrichment of the Knowledge base as a key driver of innovation and development of official statistics.

37. The main systems that support the process of continuous improvement of competence are:
- The Knowledge Base System;
- Educational System.

Knowledge Management Systems

38. Knowledge is an organized repository of information, which we identify, analyze and remember (store) in order to use it to achieve personal goals or in relation to the organization – mission and organizational goals. High efficiency of knowledge use is called wisdom. Apart from having a vast store of organized knowledge, wisdom means the ability to constantly improve it, creatively connect and associate different elements of knowledge and drawing conclusions from these associations.

Wisdom defined in such terms is an attribute of an individual as well as an organization. It has a relevant influence on the efficiency of the functioning of the organization where that knowledge includes the knowledge of all people in the organization, association processes are frequently distorted by such factors as: formal procedures, hierarchical paths of communication, and particular interests of units or groups. Therefore, managing knowledge, i.e. steering the processes of obtaining, accumulating, storing and using it has a relevant influence on the efficiency of using knowledge (i.e. organizational wisdom) and in consequence on the efficiency of operation of the entire organization.
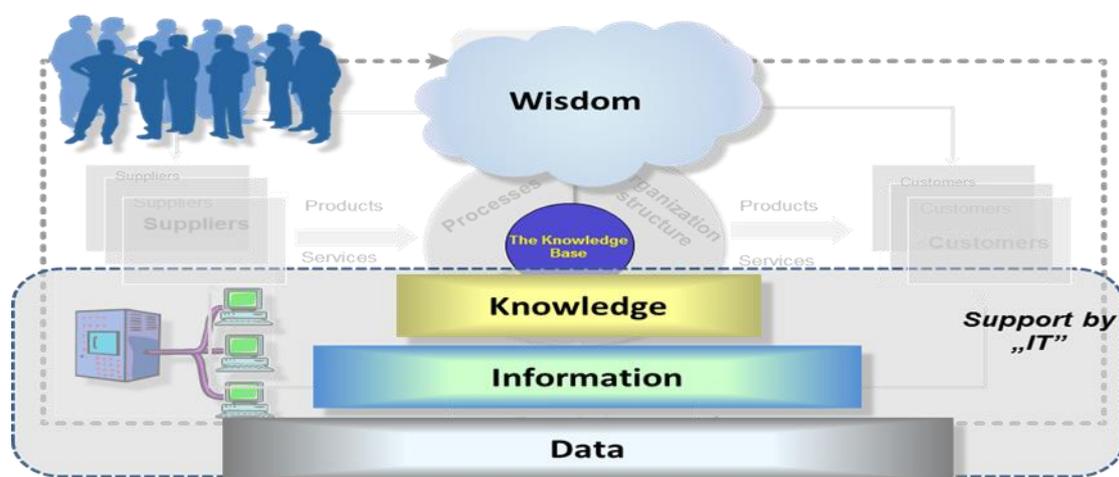

Fig 5. Knowledge Base

39. The task of the Knowledge Management System (along with the knowledge Repository) is to secure a coherent and comprehensive support for the implementation of the Knowledge Management process.

40. The process of knowledge management boils down to separating, classifying and expressing knowledge, information and experience both within the organization (including among its employees) as well as outside the organization (including suppliers and recipients of statistical information). Within the knowledge management model one can identify the following areas:
    – knowledge collection from outside resources;
    – organizational memory – storing, structuring and updating of sources of knowledge within the organization;
    – information distribution – enables a free flow of information, makes the dissemination of information easy;
    – information interpretation - analysis and interpretation of information included in the systems, enterprise's data sources.

41. It is assumed that the Knowledge Management System should support the implementation of e.g. the following tasks/functions:
    – identifying the sources of knowledge,
    – collection of knowledge (i.e. storing, recording),
    – organizing the collected knowledge (i.e. classification, categorization, adjustment),
    – sharing the knowledge (e.g. through the dissemination of knowledge, support for group work),
    – learning (e.g. support for the use of knowledge in implementing the present activities),
    – creating new knowledge (e.g. support to the analysis of the gathered knowledge and experiences, the aim of which would be to improve the functioning of the work and organization processes).

42. Knowledge Base should also support the exchange of experiences, acquiring them during participation of Polish representatives in the work of working groups, task teams of EU institutions in the area of public statistics, and it should enable to conduct knowledge and good practices transfer with regard to both domestic and national solutions.

43. Due to its role, it seems that the Knowledge Management System should be strictly integrated with the Educational System.

Educational Systems

44. Education System is an element of a wider process of knowledge management and as such should be strictly related to the Knowledge Management System. To the main tasks of this system one should include:
    – disseminating e-learning system in the scope of public statistics (both for the needs of internal and external recipients);
    – publishing multimedia presentations – with the aim of self-improvement and increasing qualifications of public statistic staff and the statistical information recipients;
    – promoting and publishing educational contents regarding statistical knowledge – articles,
    – e-books and other publications presents in a graphic or text form.

45. Central Statistical Office in years 2015-2017 will realize the project "Statistical skills development academy - strengthening the competence of statistical staff and the general public"

    This project's aim is to build an efficient and effective organization, using modern technology and available knowledge on methods and statistical techniques, to constantly improve the quality of the

services provided by the Polish statistics, necessary for rational building the information society. In this project will be used modern tools supporting a statistical staff competence development, among others e-learning platform. It will increase an efficiency and effectiveness of public administration owing to apply the new ICT tools – as a project implementing tools facilitate to knowledge building and exchange between CSO organizational units, thus contributing to increase the efficiency of organization, in particular the implementation of the surveys and the provision of products and public services.

46. The particular aims of the project are:

- Providing effective support for the efficient conversion of existing thus far , so-called "Departmental" (composed of Departments) structure of public statistics into an optimized, including in accordance with the modernized working processes, so-called "task force" organization

- Preparation and realization of an appropriate training program supporting the transformation of the organization to carry out statistical surveys of official statistics.

- Preparation and implementation of effective solution (in particular e-learning) supporting a training processes and obtaining an appropriate competence of the employees of public statistics.

- Preparation an effective and widely available solution supporting a dissemination of knowledge about statistic in the context of general public.