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Session 3: Modern Statistical Production Processes based on a Service-
oriented Business and Information Architecture

Towards an Integrated Statistics Programme for the
post-2015 development agenda

Prepared by Geert Bruinooge

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1. Introduction

Producers of official statistics of developed and less developed statistical systems are faced with similar external and internal challenges. The external challenges arise, in part, due to the shift of the national and international policy environment from a narrow economic and social development model towards a multidimensional social, economic and environmental perspective. This new sustainable development agenda requires an interrelated set of micro statistics, short term and annual statistics and indicators, including those related to emerging cross border patterns of production, trade and investment originating from the global fragmentation of production of goods and services. This integrated set of household and business statistics is required for evidence based policy and decision making around a universal set of issues regarding multi-dimensional poverty eradication, economic growth, employment creation and use of natural resources.

Also a response has to be formulated to the new ICT environment with its fast pace of technological development and availability of non-traditional "real time" data generated through satellite imaging, social media, mobile phone use, sensory devices, etc. Unlocking these non-traditional data for official statistical purposes would address the demand for more real time data, but warrants new confidentiality and privacy protocols on access to the privately held non-traditional data sources and use of new statistical techniques and technology platforms.

Internal challenges are related to the evolving information and knowledge societies at country level demanding a repositioning of the role of the national statistical system. In many countries, new regulatory and institutional environments are being created based on the fundamental principles for official statistics, which will strengthen the independence and integrity of national official statistics. Moreover, with the adoption of the fundamental principles, the demand for improved quality and internationally comparable sets of statistics will further the quest for mainstreaming statistical standards, lessening response burden through use of administrative data and computer assisted collections, improving the cost effectiveness of data production and securing adequate resource allocation for statistics.

It is expected that these multitude of external and internal challenges will lead to an interest in the evaluation of the national business and information architecture and its statistical

production processes. This evaluation should be undertaken with the intent to introduce a collective drive of modernization and innovation under an integrated statistics programme (ISP) for household and business statistics.

Already considerable progress has been made in responding to the internal and external demands through modernization programmes for integrated statistics. These modernization programmes are characterized by technical and managerial specializations of staff working in the national statistical system, the much needed modernization of the IT-environment and their related statistical production processes, and the need for repositioning the legal and regulatory environment of the statistical organizations. It has become obvious that business as usual with fragmented, gradual and generally minor adjustments to statistical processes, institutional arrangements and organizational structure will not be enough.

Partnerships in sharing practices and capabilities, coordination of a global programme on integrated household and business statistics and building technical capacity among national statistical agencies in coordination with regional and international agencies have to be central to the global strategy for a global transformative agenda on integrated statistics.

The independent and generally prominent status of official statistics will only be guaranteed in the emerging information and knowledge society if the statistics continue to be relevant, visual and offered with more open data access, on geospatially-based platforms and available on mobile devices and social media.

This background document will set out the strategic directions in adopting integrated household and business statistics programmes through the modernization of the statistical production processes, institutional arrangements and organizational structures of the national statistical systems. These integrated statistics programmes should facilitate the mainstreaming of statistical standards in the statistical operations and institutional and regulatory environments of the national statistical systems.

A stepwise gradual approach for a national programme for integrated statistics is envisioned. A flexible and modular approach is advocated of which national steps towards modernization can be taken independently of other, while others steps could be taken in sequence with a global programme on integrated statistics characterized by multi-year thematic focus on specific aspects of the modernization of the institutional arrangements, statistical production processes and organizational structures such as the improvement in access to and use of administrative sources and the harmonization of business and household statistics programmes.

2. General organizational principles, corporate services and way forward for a flexible and modular transformation

Often the traditional way of producing official statistics, has seen production organized in what are called "stove pipes" or "silos". Small organizational units are responsible for the complete production cycle of a single set of statistics (i.e. the monthly production statistics for manufacturing) starting from designing the collection of data through survey and administrative sources, developing IT-applications to disseminating the results. This way of

organizing the production processes easily leads to inefficiencies, lack of coordination, duplication of specialization, high costs of maintenance of IT-resources and a fragmented quality culture and assurance framework. The way forward to an efficient and highly professional organization is to organize the production processes[1] in a small number of larger subject matter organizational units[2] and a number of specialized corporate services units[3]. This organization is based upon on a service-oriented business and information architecture.

The service-oriented statistical business and information architecture and the statistical production processes have to be carefully designed, built and implemented with a flexible and modular approach that is incremental but progressive, taking into account the limited budget and staff resources. Evidently, the way forward depends strongly on the starting position of statistical agencies and the regulatory and institutional environment of the national statistical system. That said, national statistical systems at early stages of development can embark on the process of modernisation without the transformation of legacy systems by a gradual introduction of a standards-based business management and service oriented process.

To realise a modern statistical organization through a flexible and modular transformation, existing production processes should be evaluated and possibly redesigned, taking into account the need for production processes for new statistics to fill in the data gaps and colour the "white spots" in the statistical landscape. It is clear that the successful implementation should have a medium-term perspective and may require a large human resource investment in training of highly qualified and specialist staff and in IT-resources. Moreover, it will require a full commitment of the top management of the national statistical system to put through the modernization processes. During this transformation period, strict prioritizing of all activities is necessary[4], including maintaining the regular production and dissemination of statistics.

A step-by-step implementation of programme on integrated household and business statistics takes into account as point of departure, the different levels of quality and scope of statistics, the differences in statistical infrastructure and the organisation of official statistics in various countries and regions. The implementation of a programme on integrated statistics has three distinct components[5]: standards as conceptual organising frameworks, institutional and legal arrangements and statistical processes. All these components contribute to the realisation of a highly efficient and effective production system for high quality statistical outputs.

The way forward should be to elaborate and operationalize the framework provided by the *Guidelines on Integrated Economic Statistics*[6], which have been recognised by the Statistical

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1 The production process is considered to be an on-going and never ending cycle of the following eight distinct phases: specify needs, design, build, collect, process, analyse, disseminate; and evaluate.

2 For example the statistical organisation can be reorganised in two main divisions for statistical production in addition to a division for support services: a) a division responsible for integrated system of economic and environment statistics for sectoral subject matter and macro statistics guided by the SNA and SEEA; and b) a division responsible for the integrated system of demographic and social statistics.

3 Examples of corporate services units are: data collection, methodology and process development, project management, IT-services and application development and Bureau of Standards. These units offer their harmonised services and products to the statistical production units.

4 Compliance with new official obligations and solving of urgent quality problems in existing key statistics must always have a high priority.

5 Guidelines on Integrated Economic Statistics, ST/ESA/STAT/SER.F/108, Chapter 3 General Framework for Integrated Statistics

6 Guidelines on Integrated Economic Statistics, ST/ESA/STAT/SER.F/108

Commission for organizing the statistical production processes for official statistics. It is proposed to introduce a service-oriented business and information architecture through advancing, a distinct set of general organisational principles for the institutional arrangements of the national statistical system; and the harmonisation and centralisation of statistical production processes using corporate statistical services. By formulating a stepwise approach on the way forward, the paper sets out the implementation of national programmes on integrated household and business statistics.

2.1 General organisational principles for institutional arrangements

The institutional settings (e.g. the degree of centralized or de-centralized of statistical production, the management culture and the quality of the IT-environments) play an important role as the building blocks for the development and implementation of integrated systems. By advancing general organisational principles for these institutional arrangements, it is proposed to modernize the national statistical system in meeting the external and internal challenges of our changing environments. These issues are elaborated in Annex 1.

o   Use of corporate business and information architecture
o   Adopt and update legal mandates based on fundamental principles for official statistics
o   Mainstream standards and metadata
o   Optimize use of administrative data
o   Maximize multi-use of data
o   Top down editing and imputation
o   Initiate methodological innovation and modernization through harmonisation
o   Develop modular IT-applications across statistical domains
o   Establish quality culture
o   Manage development and change

2.2 Corporate services in organising statistical production processes

There are several over-arching and cross functional statistical processes that are universally applicable to statistical production of a national statistical system, being in an advanced or less advanced stage of statistical development and centralised or decentralised statistical system. Targeting modernization through the harmonization and centralisation of the statistical processes in corporate services contributes to the efficiency, effectiveness and quality of these processes. The details of the aspects of harmonisation and centralisation of these statistical production processes in corporate services are set out in Annex 2.

o   Standards and metadata (Bureau of Standards)
o   Population and business registers and frames
o   Data collection and processing
o   Dissemination
o   Methodological innovation and process development
o   IT services
o   Project management

2.3 Way forward (in a step-by-step approach)

The way forward consists of a number of distinct steps, leading to an integrated system of statistics. The results of course will vary and will strongly depend on the point of departure of the national statistical system. In a strictly centralised system of official statistics, it may be possible to create one organisational unit within the national statistical institute responsible for the whole chain of economic and environmental statistics and one unit responsible for the integrated system of demographic and social statistics. In a more decentralised infrastructure of official statistics the results may be a system of closely collaborating agencies which are each responsible for a clear and distinct part of the chain of coordinated statistics. The details are set out in Annex 3.

o   Establishment of partnerships
o   Assessment of current statistical system
o   Identification of domains for improvement
o   Formulation a programme on integrated statistics
o   Communication and advocacy
o   Governance of the programme
o   Design of integrated systems of statistics
o   Evaluation of the programme on integrated statistics

3. Benefits

The benefits of integrated programmes[7] on economic, environment, demographic and social statistics are manifold and significant for policy and decision making by businesses, the government sector and the general public. The integrated statistics programme would be instrumental in progressively generating a more coherent, timely and policy-relevant set of multi-dimensional statistics, reducing the administrative burden for the business world, reducing the costs of production and create room for new developments within the same financial budget. One important benefit is that with the new way of processing basic data in high quality statistical outputs, (e.g. introduction of automated "cleaning" and strictly regulated imputations and editing procedures), errors should become traceable raising the rate of reproducibility.

These benefits, quality, timeliness, consistency, smaller risks of errors and a higher rate of reproducibility, are hard to quantify and to express in money terms but are no less important.

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7 Guidelines on Integrated Economic Statistics, ST/ESA/STAT/SER.F/108, Chapter 2 Policy needs, benefits and challenges of integrated statistics

4. Investments

Reorganizing and re-engineering the production processes of official statistics will take a period of at least several years and will demand high investments of scarce expertise (like subject-matter specialists, IT-developers, project managers and methodologists). The strategic objectives are of course dependent on the starting point and the ambition of modernization programme. Furthermore, the regular production of statistics has to go on during the modernisation process.

Any modernisation of statistical production processes should build on the significant amount of documented good practices and standards on a service-oriented business and information architecture[8] to guide the redesign of the production processes. Furthermore, validated methodology is available for almost all sub processes, like top-down editing and imputation processes and automatic editing of primary data and the use of administrative records in combination with primary data from surveys. Several national statistical institutions have extensive experience in successfully organising harmonised services like data collection, IT-services, methodology and project management in corporate service units. With the development of internationally agreed and standards-based business and information architecture based on best practices, the international statistical community should mobilise a broad based partnership and implement a coordinated capacity building programme in institutional modernisation and change management.

With the allocation of the required financial resources being a main constraining factor for modernisation and innovation, the redesign/reorganization of those parts of the process, which will produce a high efficiency gains and a medium term return on investment should be identified and taken up as a priority.

It is difficult to generalise the direct costs and benefits of redesign and reorganization of statistical processes. Much depends on the starting point. Costs (investments) may be as high as 60 per cent of the direct annual operational costs (running and maintaining) of the original processes, but annual rates of efficiency gains of 20 – 25 per cent and a return on investment in a 3 year period is not uncommon. Detailed project plans will facilitate more accurate estimation of costs and benefits. Of course, the budget allocated to the national statistical system and national statistical offices in low income and low middle income countries have to be structurally increased to meet new demand for statistics.

Apart from budget constraints, there is often a lack of expertise in the national statistical system for redesigning and reorganizing production processes and undertaking project-management. The production of official statistics is not a standard production process and most of the needed expertise and specialisations have to be generated by the national statistical system[9]. For this purpose, project teams are to be created with content/subject specialists of source statistics and national accountants to formulate the design and build processes and participate in the implementation processes.

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8 Based on the Generic Statistical Business Process Model (GSBPM).

9 Production processes of official statistics are quite unique, which complicates the use of commercial off-the-shelf (COTS)-applications. Therefore, a standard commercial customer relation management (CRM) application may for example need complex alterations before it can be used for data collection processes.

Experience has taught that highly qualified personnel is essential and should be appointed as project managers for the daily running and management of the design and implementation of the new production processes. These change management skills are scarce in many countries, and therefore the integrated statistics programmes should give early attention to the development of the change management skills during the design phase.

5. Conclusions

National statistical agencies and the national statistical system face considerable challenges; delaying the design of the modernization and innovation will only compound the challenges in responding to the varied and multitude of new demands on official statistics in the post 2015 era. In order to meet the challenges, best practices have shown that adopting a distinct set of general organisational principles along with the harmonisation and centralisation of statistical services will result in efficiency gains and reductions in response burden in statistical production while improving the quality of official statistics.

This paper advocates that countries should embark on a national programme on integrated household and business statistics that is flexible and modular in introducing a service-oriented business and information architecture. These national programmes should have the objective of moving away from a fragmented and silo approach for individual statistical outputs towards an integrated systems approach for producing statistical outputs. These integrated systems are characterized by distinct organisational principles for the institutional arrangements with a more optimal use of administrative sources, the harmonisation and centralisation of statistical production processes and the introduction of technological and methodological innovations.

The way forward is to carefully plan and execute the redesign of the production processes at the country level based on a standards-based service-oriented business and information architecture for official statistics. A global strategy on integrated statistics should be put in place to guide the formulation of the national programmes on implementation by mobilising the partnerships in developing data, the coordination and governance structures for the programme on integrated statistics and the formulation of the capacity building and training at national, regional and global level.

6. Points for discussion

How can we make and communicate the business case that benefits exceed the costs of national programmes on integrated statistics in support of the post-2015 development agenda?

What are the challenges and constraints for national statistical agencies in implementing the proposed organizational principles on institutional arrangements and the harmonisation of statistical production processes into corporate services for integrated national statistical systems?

What are the modalities for statistical capacity building, coordination and partnerships for launching national modernization programmes on integrated statistics?

Annex 1

General organisational principles for the programme on integrated statistics

The general institutional arrangements from the Guidelines on Integrated Economic Statistics[10] can be reinforced and complemented with a limited number of general organisational principles for optimizing the functioning of the national statistical system and facilitating the development and implementation of integrated systems of statistics.

1) Use corporate Business and Information Architecture – blue print for process development

The implementation of a programme on integrated statistics will involve redesigning existing production systems and developing new systems. The adoption of a common business and information architecture for statistical production is a way to structure statistical processes according to their mutual relationships and thereby create a robust foundation for the development of efficient IT-systems for the integrated statistics. Without such a statistical architecture in mind, it becomes difficult to develop and document subsystems for different productions processes that are interrelated. Several national statistical agencies have developed business and information architectures, now increasingly documented by the Generic Statistical Business Process Model (GSBPM). A business and information architecture will facilitate the transformation of the present, IT-environment with possible numerous applications in different languages and at various stages of the lifecycle in a more structured landscape with lower cost for maintenance and less risks for the business. Progressively, with the use of the GSBPM and the development of similar architectures, it may become possible to efficiently develop IT-applications which can be shared. The creation of a community of practitioners for the implementation of an integrated system of statistics based on a common statistical business and information architecture will allow for the development of a library of new applications and processes and may accelerate implementation in the future.

2) Adopt legal mandates based on fundamental principles for official statistics

Appropriate legal mandates for national statistical agencies should be in place based on the fundamental principles for official statistics. The legal provisions should allow data collection via surveys and use of administrative sources and allow for the combination of data from surveys and from administrative sources. Compliance of all economic entities in surveys should be obligatory[11]. It should be possible to share micro data between the government agencies and national statistical offices especially in the sharing of information related to the maintenance of common business register for the coordination of the collection of economic and environmental statistics. Privacy and confidentiality of information should be guaranteed and the collected data (from either surveys or administrative source) should not lead to the disclosure of individual economic units without consent. If the present legal provisions are

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10 Guidelines on Integrated Economic Statistics (E/CN.3/2011/37).

11 It should be possible to impose fines on companies which refuse to cooperate. Otherwise, especially "daughters" of foreign multinationals and small and medium enterprises may refuse to comply. Their benefits from official statistical information may be less than their costs of complying.

insufficient to effectively collect basic data, concerted efforts should be undertaken to improve them. These efforts will require a well-developed communication strategy and regional and international support to make the argument for the lawmakers.

3) Mainstream standards and metadata

With the objective of standardizing the concepts, variables, definitions and classification being used by the national statistical system, a "Bureau of Standards" (BoS) can be created. This is an organisational unit (this may be a small unit, as most of the work is done in the statistical departments), in charge of the statistical meta database The concepts, variables and classifications should be in line with international agreements and when different this should be made clear in the definition and the terminology. For the output concepts, it is advisable to use two descriptions: one for scientific use and one for more popular publications for general use[12]. All agencies which produce official statistics should assist in creating and maintaining this metadata database. Without a BoS it becomes very difficult to create coordinated statistics and it will lead to endless and tiresome discussions on concepts with equal names, but different content. The BoS is the basis for further coordination and integration of statistical processes and an important source for generating harmonised questionnaires. The natural place for a BoS is in the national statistical organisation. This agency is responsible for the consistency, the completeness and the management of the system. All information is made public and available to all interested parties[13]. The BoS should cover all statistical domains.

4) Optimize use of administrative data [14]

In a programme on integrated statistics, the use of micro data from administrative sources should receive the highest priority. Progressively, legal mandates should be put in place to make administrative sources available by the holders of the administrations to the producers of official statistics (without charge). Only in the case where there are no administrative sources available (or too late for a timely statistical production) then data may be collected at the enterprises, persons and households. These administrative sources should not be restricted to administrations and registers of (semi-) governmental institutions. Under certain conditions, also administratively generated sources from the private sector may be very useful. For instance, the scanner data of big retailers and their register of barcodes have proven to be very reliable and cheap sources for the compilation of consumer price indexes. Also client administrations of energy providers have proven to be a reliable source for detailed statistics on the production and consumption of energy by households and enterprises. The availability of both government and private administrative sources varies from country to country, but should be actively encouraged.

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12 An experiment in The Netherlands showed that most high school students had problems understanding the formal, scientific definitions.

13 Several NSI's publish this kind of information on their websites (e.g. ONS UK).

14 For the use of administrative sources in official statistics see: 1. Wallgren & Wallgren, Register based statistics, Administrative data for statistical purposes, Wiley 2009. 2. Handbook of Principles and Practices Using Administrative data and Secondary Sources for Official Statistics, UNECE. 3. Check List for the Quality Evaluation of Administrative Data Sources, Statistics Netherlands 2009.

5) Maximize multi - use of data

The integrated system should be organised in such a way that it facilitates the multiple use of micro data for a variety of different statistical products. At several clearly defined stages in all the production processes, the micro data (with the agreed and standardized meta data) should be stored in data depositories for use in other processes. These depositories function as library and archive. Micro data from period t-1 may be used for the calculation of missing records for period t. Micro data from the tax authorities on the income of independent entrepreneurs may be used for income statistics and for business statistics. Information from tax administrations, social security administrations, and client administrations from for example telecom providers and energy providers may be used to decide upon whether a business is "active", "dormant" or "dissolved" and may in this way become an important additional source of information for the business register.

6) Top down editing and imputation

An important element of the production of statistics is the cleaning and editing of the micro-data. In an integrated system almost all cleaning and editing should be done automatically by algorithms. After a check at the level of the cells at the lowest publication level, it may be decided that for certain cells a further (interactive) editing of individual records which a score as implausible may be necessary. The identification of these records is based upon strict criteria and not upon the well-intended feelings of the statistical specialist. This interactive editing should be well documented and should follow strict procedures. After this editing phase, no further changes to individual records may be made. The exception in this editing phase is the cleaning and editing of the micro data of the large and complex enterprises, which are due to their size of eminent importance for the quality of the economic statistics. Without high quality micro data for these enterprises it is impossible to produce reliable statistics.

7) Develop modular IT-applications across statistical domains.

The development and the implementation of an integrated IT system for the production of statistics will take time. It is not possible to design a detailed blue print for the whole system at the start. Rather, an incremental and modular approach should be adopted. The modules in the integrated system for different phases of the production process should be designed and developed in such a way that they can be used for different statistics without a complex redesign. The introduction of a new mode in data collection (for example the use of internet robots for the collection of price information for the CPI) must be possible with only small adaptions in the module. The main challenge is to find a balance between robustness (an application should have a life span of at least 10 years), simplicity (to keep maintenance costs down) and flexibility (to facilitate multiple use, re-use and new developments). Where

possible COTS-applications or specific applications developed by sister institutes or international agencies should be used[15].

8) Initiate methodological innovation and modernization

The fast technological developments and the rapidly growing availability of new data sources may open new ways to produce official statistics and to disseminate the statistical products. Due to the pressure of the day to day production, there is often not much room in the production and service units to explore these new ways. Especially in times where there is much pressure on developing new production systems. One can stimulate innovation in several ways within the NSI, apart from the regular and planned official research programmes, such as using competitions, innovation laboratories and twinning arrangements.

9) Establish quality culture

To guarantee the quality of the statistical output there should be a quality culture in the organizations. The establishment of such a culture is facilitated by introducing a quality assurance frame work. The *Guidelines for the Template for a Generic National Quality Assurance Framework (NQAF)* is a tool for NSI's to provide the general structure within a country-specific national quality assurance framework can be developed. In the NQAF quality is expressed in terms as relevance of the output, timeliness, punctuality, accessibility, clarity and coherence comparability and not just accuracy.

The main benefits of a NQAF are to:

- provide a systematic mechanism for facilitating ongoing identification of quality problems and possible action to their solution. At the same time, it serves to stimulate and maximize the interaction among staff throughout the organization;
- give greater transparency to the processes by which quality is assured and reinforces the image of the office as a credible provider of good quality statistics;
- provide a basis for creating and maintaining a quality culture within the organization and contains reference material that can be helpful for training;
- support quality improvements and their maintenance over time;
- provide mechanism for exchange of ideas on quality management with other producers of statistics with the national statistical system and with other national and international statistical organizations.

It is recommended delegating the development and implementation of a NQAF to a Taskforce, made up of a team of experienced staff of different phases of the statistical production process. As the development, implementation of a NQAF and the ongoing quality assurance activities are time consuming and continuous, it may be advisable to place the task force and the ensuing quality unit under direct supervision of the top management of the institute to ensure the necessary support at all management levels.

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15 For an inventory of IT-applications available for different phases of the statistical production process see: Software inventory by GSBPM phases and sub-processes, UNECE Statistics Wiki.

10) Manage development and change

(a). Project portfolio and portfolio management

To be able to make an optimal use of scarce resources, it is important to make a clear distinction between regular and structural production and supporting activities and all other special activities with a non-regular character like designing and developing new production systems. All these special activities should be organised as projects.

Each business unit (statistical and supporting divisions) has its own project portfolio which contains all projects (with or without an IT-component). For each project, a business case should be formulated.

The business case details the contributions of the project to business and strategic objectives of the organisation (For example: reduction of costs, reduction of administrative burden, improvement of quality). The business case also mentions the assessments of the stakeholders needs for this project, the critical dependencies, the foreseen risks and countermeasures, the costs and benefits, the alignment of the project with the business architecture and the use of proven methodology. Costs and benefits are quantified as best as possible[16]. The "zero option" of doing nothing is analysed. Especially for projects aimed at reducing costs, the return on investment (ROI) time is estimated. All business cases should be checked by controllers. When substantial changes in the project occurs during the execution phase, the business case should be updated and reconsidered. After the implementation phase of the project, the project is evaluated and compared with the projected benefits. The outcomes of these evaluations are reported to the board of directors on an annual basis.

All projects with an IT-component are proposed by the business units for inclusion in the overall IT-projects portfolio. The IT-projects portfolio is managed by the IT-portfolio board. The members of the board are the directors of the business units and the CIO is chair of the board. The execution of all projects is regularly monitored with a special score monitor made up of the information from the project monitors from the business units. The portfolio board decides upon overall planning and programming of the IT projects, exceptions (requests for additional resources or facilities above the originally planned) and prioritization of new projects.

(b). Planning and prioritisation

An important part of portfolio management is the process to decide the projects which are going to be carried out and which are not. The planning cycle is in most cases a calendar year, but for good preparation of larger projects, the project cycle is extended to a longer period (2 or 3 years) based on an annual rolling planning cycle. The first step is the selection of the projects by the programme board. This decision is based mainly upon the urgency of certain projects and upon an objective comparison of the business cases of all individual projects.

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16 Not only the direct costs but also related costs for training, additional computing and storage facilities etc. should be taken into account.

Criteria for selection that have been used are:

- Project is necessarily for compliance with (inter)national regulations and obligations.
- Project is necessarily due to changes in inputs or sources.
- Business case is positive
- ROI time is less than 3 years
- Project length is less than 2 year[17]
- Foreseen project risks are manageable

It is essential for the management of the total portfolio to have accurate and timely information of the progress of the projects and the use of the budgets.

(c). Centralisation and chain management

A programme on integrated statistics may be compared to a complex and long chain of related activities and interdependencies, which operate under strict timelines. For a programme on integrated statistics, this chain starts with the business register and ends with the compilation of macro accounts and statistics (national accounts, environmental-economic accounts, etc.) and the dissemination of the statistical outputs. In order to manage such a process chain, practice has learned that is advisable to organise the main parts of the chain in one dedicated organizational unit.

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17 All projects should have a limited timeline. Projects which a long duration for execution, tend to run a larger risk of failure than smaller projects that have a more restricted scope, timeline and budgets.

Annex 2

Corporate services

With the objective of standardization and harmonization of the statistical processes in mind to gain efficiency and improve quality, it is important to consider both in a decentralised and centralised national statistical system which statistical production processes can be re-organised as service providers in central units. This process of centralisation will also make it possible to reach a higher level in professional services for statistical production processes.

(1)   Population and business registers and frames

The backbone for an integrated system of integrated statistics covering the economic, environment, demographic and social domains are unified and harmonised business and population registers and frames. It is the coordinating tool for data collection and processing Without such registers and frames, it will be very difficult to carry out coordinated sampling of statistical units for surveys and to maximize the use of administrative sources.

A civil registry is an important source on persons and households being a system of records on vital events of its citizens and residents. The resulting repository or database is called civil register or population registry. The primary purpose of civil registration is to create legal documents that are used to establish and protect the civil rights of individuals. However, its secondary purpose is to create a data source for the compilation of vital statistics that is a critical administrative source for statistical purposes in combination with population censuses and sample surveys. The World Bank and the World Health Organization with input from several agencies and countries have developed a Global Civil Registration and Vital Statistics (CRVS) Scaling Up Investment Plan. It covers activities over a 10 year period from 2015 to 2024, with the goal of universal civil registration of births, deaths, marriages, and other vital events, including reporting cause of death, and access to legal proof of registration for all individuals by 2030.

For the comprehensive statistical coverage of enterprises, a centralised business register and frame is a critical asset of the national statistical system. The economies of most countries are characterized by a rather small number of very large and often complex enterprises and a large number of household and , very small and medium size enterprises. For , small and medium sized enterprises, it is often possible to link the statistical unit to the fiscal unit in the administration of the tax authorities (for example related to value added taxes, payroll taxes, registration tax and social security systems). However, these administrative systems are not suitable for the profiling of large and complex enterprises. However, these enterprises are very important for the overall quality and consistency of statistics given the size of their operations. Therefore, it has become good practices to establish a specialized organizational unit for the profiling, collection and editing of the micro data of these enterprises.

(2)   <u>Data collection and processing</u>

The corporate service unit Data Collection as a separate and independent unit delivers products and services to the statistical divisions within the national statistical agency but can also do this for parties outside the agency, as long as this does not affect the services to the internal customers in a negative way.

The corporate service unit Data collection is responsible for all data collection for the national statistical agency regardless of the source of the data.

For each planning period (i.e. a calendar year) the service Data Collection and its customers (the statistical divisions) make a detailed plan for the respective data collections. For each collection agreements have to be reached about the contents, the sources, the channels[18], the frequency, the quality and its monitoring, times of delivery, the non-response strategy, the costs and so on. The final agreement on the total packet is the basis for the annual contract (SLA) between the service Data Collection and its customers.

Data from all sources are enriched with the unique identifiers[19] used within the national statistical agency to facilitate the combination of data from different sources, the comparison over time and to stimulate multi-use of the data. The quality of all raw micro data either from surveys or from administrative sources is monitored. Obvious mistakes are corrected with algorithms. For each file, a standard quality report with information on missing records (non-response), missing values, number and type of corrections is made available. In this report comparisons are made with previous surveys.

The service unit Data Collection is responsible for the design[20] and testing of questionnaires for the surveys and the continuous monitoring of the effectiveness and efficiency of the survey design, of the questionnaires and the modes in use[21] .

In an integrated system of statistics, the focus should be on the use of administrative data to minimize the administrative burden (especially for small and medium enterprises (SMEs)). This means that all information, which can be derived from administrations and registers should be used and only additional information should be collected from persons, households or enterprises. This data collection strategy adheres to the principle that information should be asked only once and used multiple times. This means that a coordinated system of samples for the various surveys should be developed along with tailor-made questionnaires for sections of the target population. The coordinated system of samples may in some cases become quite complicated due to national regulations that SMEs may only be included in the sample for a limited number of consecutive periods. For business statistics, it is advisable to produce an

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18 Channels include face to face interviews, telephone interviews (mobile and fixed lines), reporting via smartphones, tablets, internet, via paper questionnaires.

19 This linking is in the case of the availability of a system of unique integral basis registers with unique identifiers for persons, enterprises, addresses, buildings, land, cars and so on In countries without these registers and without unique identifiers, a programme should be initiated to establish these registers with unique identifiers.

20 The ongoing research for new sources and new channels is a part of the regular R&D programme of the NSI with involvement of the experts of Data Collection.

21 The monitoring of the modes use is especially important in surveys, where a combination of modes is used. For example in the case of a survey for crime experience, interviewing by telephone led to lower results compared with data collection via internet.

individual survey agenda for each enterprise. In this way the business community and especially individual SMEs know what to expect.

In the development of questionnaires, the main issue must be the answerability of the questions. The conversion of the administrative concepts or business accounting concepts used in enterprise surveys to statistical concepts is the responsibility of the statisticians. With most national enterprise and household surveys having similar scope and contens, a global repository of standardized and harmonized questions for household and business surveys could further the sharing of practices in computer assisted technologies and techniques.

To reduce the cost of the most expensive phase of the production of statistics, the cleaning and editing of primary data, it should be organized in such a way that the active involvement of subject matter specialists should be kept to a minimum. This may be done in the following way. In the first phase the checking, correction and editing of the bulk of the micro data from either surveys or administrations and registers (only exception are the limited number of large and complex enterprises) is done automatically with algorithms. These algorithms detect and correct obvious mistakes, compute missing values and calculate for the set of records of a person, household or enterprise the value of a plausibility indicator. After applying the weighing procedures, the next phase is a top down plausibility check at the lowest detail level of publication level (the core cells). If there are doubts about the plausibility of the results at a certain cell level then an interactive editing is carried out for the records of an enterprise with a low score of the plausibility indicator. This editing is carried out according to strict procedures (the whole process of cleaning and editing is "rule driven"). All changes in all records are documented.

(3)   Dissemination

The general principles of official statistics can be translated into a limited number of requirements which have to be met for the dissemination of all statistical outputs:

- Official statistical outputs are accessible at no costs to all.
- Dissemination of official statistics is organised in such manner that all users are able to access them at the same moment. Pre-releases under embargo to a limited number of official authorities are made public.
- Confidentiality of information which may be linked to individual entities is guaranteed.
- Statistics are to be published in a comprehensible form, accompanied by meta data and analytical context.
- All statistics shall be presented in a clear and comprehensible form.
- Micro-data may be made available to users for scientific and statistical research under strict conditions to assure confidentiality and dissemination of results.

To meet these requirements, it is necessarily to develop a dedicated infrastructure, to structure the main output products and to investigate additional services and products to satisfy the special needs of users of statistics in government, academia and business world.

It is even more important to develop a strategy for the dissemination and communication of the statistical outputs. To develop such a strategy, it is necessary to understand the present

status and image of the national statistical agency and the view of the important stakeholders (government, business, academia, public in general). These findings are important inputs for the formulation of a strategy. The results will lead to a dissemination and communication policy, which can vary between the extremes of a "low profile" (just publish the basic outputs with a minimum of context on the websites and the user has to come and collect them) or a "high profile" (introduce all new outputs with maximum publicity and "push" them to potential users, engage in public debates as the statistical authority and act as a high profile expert institute).

(4)   Methodology and process development

For an integrated system of statistics, the methods used should be tested and robust. To reach this level of quality, a limited but comprehensive series of preferred methods should be developed and documented in a standard-based manner. In the further development of statistical production processes, only methods from this pre-determined series of approved methods and techniques can be used. If a method is not available in the series, a new method should be developed, tested and validated. Important subjects for the series of preferred methods are: determining statistical units; designing panels of economic and social entities; designing and testing of questionnaires; applying structural measures to increase response in surveys; imputation of missing values in surveys and administrative records; selective and macro-editing of records from surveys and administrative data; linking of records from surveys and administrative data; small area estimates; prevention of statistical disclosure; seasonal adjustments; macro integration, methods for index numbers.

The concentration of methodologists in one organizational unit for methodology and process development creates an independent authority and a "body" of specialised knowledge and expertise. Best practice has shown that it stimulates excellence and helps to set priorities and allocate resource.

(5)   IT-services

A national statistical agency is at present in essence a data collecting, data processing and information producing and disseminating institute. The number of unique products which are produced and published for a wide array of different users is enormous compared with other information producing organisations. The quality demands are high and the public exposure is large. The national statistical system are faced with fast technologic developments, increasing internationalization, rapidly growing availability of new data sources, a sharp rise in the rate at which data are becoming available, a growing demand for quicker information as well as decreasing budgets and demand to decrease the response burden.

To meet these demands, Information Technology (IT) plays a critical role. Its position, its organization, its relation to its partners and its focus in the organisation are essential. In most organisations, IT has gone from strongly centralized (main frames, centralized structured application development, central data entry units) via more decentralized small units (desktops, networks, server based computing centre, decentralized interactive processing, decentralized non-structured application development) to a central positioning of IT as a service provider for the statistical production processes of the organisation as a whole. But

just centralization is not enough. In this position, a single supplier IT-services should not act as a monopolist, but should act as a partner for the whole organisation, and not just as a service provider with divisional clients or users. This demands a different relationship with the partners, an open communication and transparency over services and products. Together with the partners, it should develop an IT-strategy to meet the demands sketched above. The IT-strategy should of course be aligned with the overall strategy of the statistical agency. Due to the fast technological developments and the rapidly diverging IT-specialists (cloud computing, web technologies, Big Data applications, BYOD, 24*7 web service, interactive visualisations, etc.) there will be an increasing need to use expertise from outside or to outsource certain IT-services. The IT-department has to play the directing and coordinating role in this to safeguard standards, security, costs and the integrity of the IT-environment.

(6)   Project Management

Designing, developing and implementing an integrated system of statistics is a programme with a high level of complexity, substantial costs, long timelines, considerable risks and a number of partners. To facilitate the programming and management of the programme, it is therefore advisable to identify separate sub-programmes with clear distinct projects. Moreover, a limited number of strict guidelines for the sub-programmes and projects should be articulated to guide the overall programme:

1. Use a standard method for project management (e.g. PRINCE 2 is a widely accepted standard).

2. Apply just 1 or 2 standard methods for software development. For example a Waterfall model like the RUP method for the production processes and an agile development method like the SCRUM method for a prototyping approach.

3. Start a project with a clear and positive business case, which should be updated after each phase of the project.

4. Assign responsibility to the line management for the sub-programmes and the projects (see Governance) [22].

5. Conclude the project with an independent evaluation[23].

The success rate of individual projects is highly influenced by the management capabilities of the project managers. Therefore, it pays to invest in the change management skills of these project managers. The concentration of a pool of qualified project leaders[24] in a specialised service unit directly guarantees their independence, stimulates the exchanges of experiences and improves the professional standard.

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22 Line managers are not automatically qualified to play this role, even if they think so. Training programmes in change management may be necessarily.

23 All evaluations are to be available to (top) management and all project leaders.

24 There are several programmes for certification of project managers (e.g. Ipma-certification). A separate career-line for project managers is very stimulating for young, ambitious project leaders.

Annex 3

The Way Forward

The Way Forward consists of a number of steps, which lead to a national programme on integrated statistics. The results of course will vary and will strongly depend on the starting point. In a strictly centralised system of official statistics, it may be possible to create organisational units within the statistical institute responsible for the provision of corporate services. In a more decentralised infrastructure of official statistics, the results may be a system of closely collaborating agencies which each are responsible for a clear and distinct part of the integrated statistics.

Some of the steps are in a logical order with one step leads to another, yet others can be taken up independently. The steps to be taken are in different domains. Some are in the conceptual domain and are prerequisites to reach the desired high level of coordination in the integrated system. Some are in the domain of redesigning the existing (stand-alone) production processes to attain a harmonised production process for some of the statistical sub-domains. This leads to a redesign of the IT-environment of these sub-domains. A new way of producing statistics needs new skills, this means a training programme for the involved staff and of course the existing organizations may have to be adapted.

Step 1 **Establishment of partnerships**

If agencies outside the national statistical institutes are involved in the compilation and dissemination of official statistics, then for the creation of integrated system of statistics, it is necessary to create partnerships. The first step is to convince all agencies of the necessity and the mutual gains of such a system. This can only be done at the level of the top management. The next step is agreement on the possible new roles and responsibilities of the agencies in the new systems. It may be wise to give this agreement an official status in a "Memorandum of Understanding" (MoU). Such a MoU is a safeguard for continuity by changes in management; budgetary constraints etc. and are important in the communication within the agencies. The partnerships should facilitate exchange of knowledge, expertise and even experts between the partners. The creation of the integrated systems of statistics should be the shared responsibility of the top management of all agencies involved. When agreement on the more detailed programme, the roadmap and the specific roles and responsibilities has been reached, then periodic high level meetings may be very fruitful to discuss progress, solve bottlenecks and strengthen commitment.

Step 2 **Assessment of the current situation**

An inventory of all official statistics in the economic, environment, demographic and social domains of the statistical system need to be carried out. This inventory consists of a list of statistics, their scope, periodicity and timeliness, their coverage of the population, the collection and reporting units, the data sources (census, survey and administrative sources), the methodology of data collection and validation, the modes of dissemination, the producing agency, the main users and the official status (e.g. international or national obligation or regulation or national agreement).

This inventory should describe the "state of the art" of the various domains of economic, environment and social statistics. It should provide answers to the following questions. Are these statistics comparable? Do they cover the complete domain? Are there overlaps? Are the statistics relevant and on time? Is the level of detail adequate? The main users of the statistics are an important source of information for answering these questions.

This inventory will also give an indication of the urgency and priorities in the implementation of the programme on integrated statistics.

It is very useful to combine the creation of this inventory with a scan of all the IT-applications in use for the production of the official statistics. In most cases, this IT-application landscape will not be very transparent and will be expensive to manage. Over the years probably, very many different and dedicated tailor-made applications have been added to this landscape. This scan will provide information on the complexity and the costs of the maintenance of this IT-environment, the status of the applications, the ownership, the documentation and the quality of the applications, the risks involved (outdated, non-supported versions, excessive use of spreadsheets in production processes, large numbers of decision points in modules, business rules in tooling, etc.).

Step 3 **Identification of domains for improvement**

The implementation of an integrated system of statistics is an incremental and complex process and will take several years (depending on the starting point). It is important to start with a domain where it is possible to produce results rather quickly and with sizeable wins in quality and costs. These results will convince the stakeholders that further investments are worth spending. But before you set out to introduce your plans for an integrated system of statistics make sure that the goals are attainable. If there is a lack of funds, unclear responsibilities or competences, completely different cultures and priorities and there is no possibility to create "a coalition of the willing", then change your goals and the ambitions.

For an integrated system of statistics, the obvious candidate for the start is the domain of the short term statistics for the branches manufacturing, construction, trade, transport and services. The first step is to describe the desired output (the complete set of output tables at publication level) in detail. The specification has to be made in three dimensions: the population of units, the definition of the variables to describe the phenomena and the reference period (month, quarter, and year). This has to be done together with the main users (internally and externally). It is important to calculate the costs of extra statistical output (more details or more content) for the agencies and for the business world. Based upon this output, the optimized statistical methodology is developed and a set of coordinated and harmonised questionnaires for the involved sub-populations is designed. The questionnaires should be developed for all modes, taking into considerations the cost benefits (paper, internet, tablets).[25] At this stage, one can investigate the possibility of combining reporting obligations of businesses to other agencies in the statistical system, tax authorities, social

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25 For more details in designing and conducting business surveys see: Snijkers et.al., Designing and Conducting Business Surveys, Wiley 2013.

security funds, pension funds, and chambers of commerce . A common technical reporting standard (e.g. XBRL) can be introduced[26].

At the same time the maximum use of administrative sources should be investigated. For short term statistics, access to and quality of information from the value added tax administration should be actively investigated. The research should give answer to questions like: Is the tax information in time available for monthly statistics and for quarterly statistics? For what scope of target population of enterprises can we use the tax information? It is not likely that tax information is sufficient for all enterprises, which will lead to a design and methodology for the combination of administrative records and survey data. In this research project, the use of other administration is also investigated. One should take care that the combined monthly and quarterly estimates also are robust and unbiased estimates of year-to-year developments.

For the inputs which cannot be derived from administrative sources, surveys with the optimal sample size are designed. The combined records from surveys and administrative sources are then corrected and edited from a top-down perspective. Records of small enterprises are checked and corrected automatically. Records of large and complex enterprises are edited interactively (see above). Non-response or missing fields are corrected by imputation using records of previous years and a factor for development based upon short term statistics of the sector and size class of the particular unit. All sets of tables are checked for disclosure of information on individual enterprises.

Step 4 **Formulation of a national programme on integrated statistics**

For an undertaking like the development and implementation of integrated systems of statistics, with large investments, a long timeline, serious consequences for the statistical output and organizational changes, the formulation of a comprehensive programme is essential. The first version will have to be rough (many details are not known yet). In a later stage, it can be more fine-tuned and detailed. In the programme, the rational, objectives and scope are clearly formulated along with the methodological approach, expected benefits, a rough estimate of the costs, the expected timeline and the parties involved. It is advisable to design the programme in such a way that it can be divided in a limited number of sub programmes and projects which can be carried out independently. The first version is the basis for discussions within the top management of the agency and later for discussions with top management of the other involved agencies, stakeholders and financing partners. At this stage, it is important to get a commitment to the full scope of the programme. If the full programme on integrated statistics cannot be implemented immediately, one may decide to implement some of the sub programmes first. The advantage is that budgets to be committed to the sub-programmes are considerably less than by committing to the full programme. However, there is a risk that the timelines will become considerable longer and that the full programme will never be fully completed.

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26 It may take a long time to realise a combined report. Another approach may be to achieve agreement on standard business accounting and all institutes to which the businesses have obligations to report, have access to the individual digital accounts of the businesses. Here reporting is switched to retrieving.

Step 5 **Communication and advocacy**

Communication and advocacy for the programme on integrated statistics is essential, to achieve, maintain commitment and support and overcome resistance for the programme. A targeted communication and advocacy is best left to the communication profession. So, it is worthwhile to use professionals to formulate a communication strategy and design a communication plan. In the communication strategy, the explicit detailed objectives of the communications (information, commitment etc.), the involved parties, the communication channels and tools and the communicators should be stated. It is important to coordinate and orchestrate the content, channels and tools of the communication. One should avoid communicating conflicting messages and continuity is essential.

It is important to distinguish between external and internal communication.

External communication:

The strategic external communication with important stakeholders such as main users (ministries, planning offices, parliament, Central Bank) and statistics producers (ministries, Central Bank) is the responsibility of the top management. The more tactical communication with data providers (ministries, Central Bank, holders of registrations and administrations) is the responsibility of the line management. For communicating just technical information, like methodological changes, changes in statistical output, new sources and publications schemes, one can use the regular channels like advisory boards supplemented by dedicated meetings and regular (digital) newsletters. For getting commitment and support from external parties more effort is needed. At the implementation stage, the stakeholders and users should be informed in detail about the changes in output and the consequences thereof.

Internal communication:

The internal communication is essential to create support, commitment and to overcome resistance. The creation of an integrated system of statistics will be threatening to many employees and managers in the production process. It will affect their daily work, they may have to learn new skills and may get new line management and colleagues. Many of them may regard the integrated system as an accusation that they have not done their work well. Most statisticians are emotionally attached to the statistics they have nurtured to full production.

Here again, all communication should be coordinated and orchestrated. The communication should be organised top down. The best way is to start with a management meeting with top and middle management. In this meeting the background, the reasons, the challenges and the gains of an integrated system of statistics should addressed. It should be made very clear that there is no alternative. All top managers should make clear that they are in full support of the programme and that they have committed themselves to the outcome. It is important to be very honest in the communication. If one of the goals of the integrated system is to generate efficiency be clear about it. If it will have consequences for employees one should be open about this. The next step is to inform the rest of the management and the employees as quickly as possible. This is best done in meetings per department supported with central information on the network (newsletters, FAQ's, discussion fora, etc.). During the course of

the programme informal lunch meetings of top-management and employees are very instrumental in keeping in touch with the work floor. It is important to take doubts and concerns of the employees seriously and it will be necessary to explain the reasons for an integrated system repeatedly. One must make sure that the messages are consistent over time, otherwise it will be seen as "*they don't know what they want*", with all kind of negative consequences.

It is also very important to engage the representatives of the unions of as they are important interfaces between the employees and the top management. If they are well informed and if they are convinced of the necessity of the programme and treated as partners in business, they may act not as stubborn opponents but as critical supporters.

The communication should be kept on an intensive level throughout the life of the programme. Successes should be celebrated, but be open about disappointments, delays etc.

Even with perfect communication there always will be "doubters" and "unbelievers", but for all management it should be made clear from the start: you are either "*in*" and fully committed or you are "*out*", and will have to look for another job preferably elsewhere[27].

Step 6 **Governance of the Programme**

Designing, developing and implementing an integrated system of statistics is a large programme and requires extra provisions for a good programme management. For the programme and all the sub-programmes, programme boards and programme managers are needed. The programme boards are chaired by the senior manager of the domain involved. If the (sub-) programme goes beyond the borders of organizational units, it is preferable to have a senior manager as chair. Shared responsibility at a lower level may lead to conflicts which needs higher management to solve anyway. The programme boards and the programme managers are supported by a small bureau in operational and administrative tasks. The programme boards consist of the chair, the programme managers and directly involved management. All members have mandate to take decisions within the scope of the (sub-) programme. Escalation in the exceptional case of conflicts is possible (to for example the complete board of directors or the Director-General). The chair and the programme manager prepare the meetings and all members can put issues on the agenda. Discussion of conceptual or methodology should be avoided in the programme boards and should be delegated to experts.

To prioritize, to allocate budgets and resources, to monitor progress of projects a central portfolio[28] of projects (running and foreseen) is a useful instrument. Periodically (3 or 4 times a year) all running and foreseen projects are discussed. New projects will only be discussed if there is clear business case with scores on the contribution of this particular project to the main goals of the overall programme. Projects can only start after commitment of the responsible management for the supply of the necessary resources. A system of a "rolling planning" in which accepted projects are put on the role of all projects with an intended start

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27 Grumpy ex-managers can have a very negative influence in the organisation.

28 There exists an extensive literature on portfolio management. See for example: B. Maizlish, Robert Handler. IT portfolio management Step – By – Step. Wiley 2005.

in the future allows the organization to plan and carry out the necessary preparations in time for the start. In this way a possible long delay between acceptance and start of the project may be avoided.

All running projects are monitored on a monthly basis and progress or lack of it is regularly discussed in the programme board. Budgets are allocated per phase of a project after the previous phase is successfully realised. Additional budgets or extra time and resources can only be allocated on the basis of a new business case. If there is no positive business case anymore then the project must be stopped. A good driver for execution of projects *in time, in scope and in budget* is to cut the regular budget of the organizational unit with the foreseen efficiency gains at the moment of the intended implementation.

All projects have a steering committee; chair is the senior manager of the domain involved. Members are the project leaders and directly involved managers. The steering committee can take decision within the scope of the project. And again, conceptual and methodological issues are delegated to experts.

Step 7 **Design of integrated systems of statistics**

When agreement on the scope of the integrated systems of statistics has been reached, a detailed design of the whole chain of all processes, inputs, intermediary products, outputs and all interdependencies must be made. A part of the design is an estimate[29] of the development costs, the needed time for development and implementation (costs from training personnel should be included) and an estimate of the daily costs of running the system. Also the gains of the systems should be quantified. From the start of designing one should be aware of possible consequences of the choices made in the design[30] phase. The process of designing an integrated system should be top down. The first step is to decide upon the total statistical output of the system[31]. Then possible sources should be identified. The respective production processes should be designed according the lines of the business architecture. The next step is to carry out an extensive Proof of Concept (PoC) to test whether it will work in practice. It is very important the check the timely availability of the micro-data form the primary and secondary sources and the time available for the processing. A part of the PoC should be a check of the design with the business architecture and the software architecture to get an expert view on the consequences for the IT-environment (running time, storage etc.). If the PoC shows bottlenecks, one must make sure that they can be solved (for acceptable costs) before the next phase can start. Based upon the (adapted) design, the PoC, the estimated costs and benefits a decision must be made whether the programme is feasible and acceptable for all involved partners.

Step 8 **Evaluation of the programme on integrated statistics**

The integrated systems of can be viewed as value chains and the strength of a chain is decided by its weakest link. The integrated system should be evaluated continuously to make

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29 Estimates should have margins of not more than 20 per cent and preferable less.

30 A choice of a design to use a complete register (e.g. business tax for all the companies) may lead to excessive storage demands and very long processing times. A design based on a pre-selection of tax data may be a better solution.

31 A large part of the output of official economic statistics is regulated (in detail) by the SNA, SEEA and by national or international regulations. In some cases even the production processes are prescribed in detail in the (EU) regulations.

sure that all targets are reached. So it is imperative that total production process is planned, controlled, and monitored across the complete chain. For all iterations of all (sub) processes and for all steady states monitoring reports should be produced and analysed. These reports should always be compared by reports of previous iterations to detect trends. But not only the internal processes should be monitored and evaluated, but also the processes and policies affecting the administrations and registers which are the sources for the integrated system.

When anomalies occur, decisions have to be taken about the follow up. This has to be done carefully and not at the level of the sub processes but at the level of the overall change management. Changes in processes may easily affect the comparability in time.

Example 1: response rate in a business survey drops below the agreed threshold, then one has to decide either to increase data collection efforts (higher costs?) or solve this with statistical techniques (lower quality?). What is the reason for this drop? Is this an incident or a trend?
Example 2: screening of tax records shows an unexpected increase of income of dentists. Contacts with tax authorities show that the control policy for this group is intensified and is responsible for this change. One has to decide how to deal with this.
Example 3: the government decides to raise the threshold for monthly payments of VAT. This means that less businesses pay on a monthly basis and more on a quarterly basis. How does this affect the quality of the statistics for the small businesses? How to deal with it?
Example 4: there seems to be a systematic underestimation of the GDP in the 1st estimate of the 1st quarter of the year. Here one needs an analysis in depth to find the backgrounds and to decide how to deal with this problem.

The integrated systems of statistics are compared with a value chain, but they are more like integrated networks of information flows. Just like the integrated network of public transport in a big city. On normal days, this network of busses, trams, trains and subways transports thousands of passengers from one place to another and back again without a hitch. But on some black days due to a snowstorm, a nasty traffic accident or a power cut, it grinds to a halt with crowds of angry and frustrated passengers on the platforms. It takes time and effort to get it running smoothly again. If this happens often the people lose confidence in the network and they turn to different modes of transport.

The same may happen with integrated systems of statistics. So a continuous evaluation of the system is essential and regular maintenance a must.