I. Introduction

1. The National Institute of Statistics is a public research organization whose mission is to serve the community by producing and disseminating high-quality statistical information, analyses and forecasts in complete independence in accordance with the strictest ethical and professional principles and to the latest scientific standards. The mission has the goal to develop detailed knowledge of Italy's environmental, economic and social dimensions at various levels of geographical detail, and to assist all members of the society (citizens, administrators, etc.) in decision-making processes. The rapid and continuous development of information technology is dramatically changing the way we produce statistics. Users want more statistics, delivered in more sophisticated ways and consequently Istat, like other producers of official statistics or service organizations, need to do more but also with attention to the use of resources that are less than before. Therefore, the ICT function is acquiring an increasingly important role within our organizations. We are maintaining a continuous focus on flexible technical and organizational solutions, in order to turn complexity into opportunity.

2. In the light of the above, this work aims at illustrating the ICT Change Management Project (CM Project) that Istat has been carrying out since 2012 to redefined Institute’s ICT function changing the approach, the way of working and also the ICT organizational culture. The project is a concrete instance in the Stat2015 programme designed to allow an industrialization and standardization of statistical process. The main goal of the CM project is redefining ICT function and environment processes with the target of enhancing productivity, quality of ICT services, control, ICT governance in general allowing quicker innovations.

II. Project Background

3. The organization of the Institute’s IT structure has undergone a profound change in the last ten years. As from year 2000, a gradual transition from a highly centralized structure to a more distributed organization has started. Istat currently has a complex Information System both in terms of technology and organization. As for the technological architecture the current configuration is as follows:
a) Servers located at the headquarters and at branch offices (about 200);
b) Workstations and printers located both at the headquarters and branch offices (about 3000);
c) Tele network using TCP/IP services to connect the peripherals to the centre.

4. The software assets include ad hoc applications developed both with traditional techniques and with object oriented or prototype techniques. Also IT human resources are distributed in the central IT division and in the statistical department performing application development to support statistical mission. This architecture and organization became more and more difficult to manage and raised problems of efficiency, quality of IT services and governance. On the other hand ICT is becoming a strategic resource for any organization and in particular for a national institute of statistics where it is the key to the collection, analysis, production and distribution of information.

5. The statistical evolution, designed in Istat with the Stat2015 programme, allows the transition to a business environment based on a Service-Oriented Architecture supported by plug-and-play technology, with the industrialization and standardization of production processes.

6. In this programme the adoption of an Enterprise Architecture (EA) and of a Business Architecture (BA) is required to reformulate statistical processes and to implement generalized services, methods and standards. In this framework the ICT function plays a key role for the achievement of the objectives of our organization. The traditional chain, based on the vertical integration of different specific ICT tasks and ICT architecture has become out-of-date and the ICT function has to maintain a continuous focus on flexible technical and organizational solutions. It is essential that a statistical organization recognize that IT services are crucial, strategic and therefore organizations must invest appropriate levels of resource into the support, delivery and management of the critical IT services and critical IT systems that underpin them.

7. The effective management of information, information systems and communications is of critical importance to the success and survival of statistical enterprises. Under this approach it is more and more important ICT efficiency, quality of services and ICT governance based on statistical priorities and IT risks. According with this new IT strategic vision and approach, in 2010 Istat started a process of Information Technology Audit aiming to:
   a) identify the organization's technological infrastructure and software assets;
   b) assess the quality, efficiency and effectiveness of the processes for the provision of ICT products and services;
   c) make proposals to overcome problems and to ensure the development of the ICT function in line with the strategy of the Institute.
Audit identifies some important points of attention that arise from
   d) the pervasiveness of dependence on information and services and infrastructure that deliver the information;
   e) the increasing scale and cost of technology and related IT services;
   f) the potential for technologies to enable the transformation of statistical process and practices.

8. As a result of emerging evidences and resulted recommendations by the Audit, it was evident that IT management practices that traditionally have applied are no longer sufficient to support the increasing demand of statistical environment.

III. The ICT organization evolution within a governance scope

9. The IT Audit analysis led to the definition of several proposals to overcome the observed difficulties and to ensure the enhancement of the ICT function in line with the overall Institute strategy. The recommendations resulting from the Information Audit highlighted the need for a deep re-arrangement of Istat’s processes with focus on those regarding the ICT central area.
10. The ICT Change Management at Istat, started in 2012 and on going, is an ambitious and challenging project with the main objective of designing and defining a new way to conduct IT function at Istat with a new approach services oriented according with the statistical model based on the Generic Statistical Business Process Model (GSBPM); the approach is orientated to achieve adequate governance, management and control of IT environment. It is the ICT line of the Stat2015 programme. The project designs and implements a more efficient IT organizational structure by clearly defined processes, roles and responsibilities, to improve the governance and execution of IT function within the Institute. It also enables the transition from the actual status of IT function in Istat (As Is) to the planned future status (To Be) through a structured approach.

11. The approach used analyses the current ICT organization to design the new IT model focusing on a process based organization. In this way we can overcome the tendency to work stand alone, as a silos, allowing the ICT organization to work more integrated (by process).

12. The ICT Change Management focused the following key components and benefits resulting:
   a) better alignment of business and IT, basing the approach on statistical focus;
   b) shared understanding amongst all statistical and technician stakeholders, creating a common language;
   c) an understandable view of what IT does for business management and statistical processes;
   d) clear ownership and responsibilities, based on process orientation;
   e) fulfillment of the risk management requirements for IT control environment.

13. With regard to IT governance, the project is central for defining, managing and monitoring the structure of relationships and process to direct, manage and control the IT environment to achieve statistical goals by adding value balancing risk. Furthermore, the project designs an IT process model that links IT process, IT resources and information to enterprise statistical strategy and objectives. It introduces and adopts good practices of planning and organizing, acquiring and implementing, delivering and supporting, and monitoring and evaluating IT performance. This approach guides also the operational changes in the IT statistical production chain, highlighting the required standard activities, performances and expected outputs that should be put in place under this method.

IV. The main phases of the project

14. The project is articulated with emphasis in three main phases:
   1) Phase 1 – Design of IT process and governance model
      a. This phase of the project was focused on analysing and designing the new IT process model compliant with IT best practices and recommendations. As a result, a set of core processes, from IT strategy definition to operation, has been completely re-engineered and defined into Operating Procedures with evidence of process flowchart, activities, rules and responsibilities, KPI's and metrics. At same time, several activities like a benchmark involving ICT organizations of Statistical Institutes were conducted to support the business process reengineering.
   2) Phase 2 – Implementation of IT process and governance model
      a. During this phase, the Institute is committed to implement the new IT process model following a gradual approach. A short list of selected processes were identified to be fully implemented. This required an effort in terms of organizational alignment, set up of new IT tools and solutions to better fit the process needs (like trouble ticketing platform, configuration management data base, project management PMO solution, etc.), training and communication program addressed to all stakeholders involved.
   3) Phase 3 – Verification of the implementation
      a. The post implementation phase is focused on guarantee the continuous improvement cycle by performing checks on process changes, collecting feedbacks and apply the correct fixings. During this phase the Institute will review the ICT Process Model and, if necessary, introduce the required improvements.
Each phase refers to specific activities and deliverables. With regard to the phase 1, finished on July 2013, the design of the IT process model was structured in four main lines of activities:

a) **Design of IT model**: It includes the activities of defining the methodological approach and analyzing of the international best practices and standard of references for the definition of IT service according with the statistical process model GSBPM. In addition Istat performed a benchmark survey involving the Statistical Network. The deliverables of this line of activities is the model of the IT process and the reengineering of key process to operate as ICT Service provider.

b) **Organization**: Definition of rules and responsibilities in line with IT process model.

c) **Tools**: define and set up of supporting tools.

d) **Compliance and Regulatory guidelines**: compliance check on ICT security policies and regulatory guidelines.

The line of activities included in all the main phases of the ICT Change Management project are led by teams that involve human resources spanning across various Istat IT organization units and focusing on specific and different IT areas of competence like software development division, IT infrastructure division, EA unit, department IT unit. The governance of the project is provided by the IT Steering Committee and a Working Group, that are in charge of its coordination, design, monitoring and assessment.

With regard to the status of the project, the ICT Change Management concluded the phase 1 on July 2013 and it is on going the phase 2 phase 3 of the implementation and verification of the model.

**V. Fundamental principles and frameworks**

**A. ITIL for the IT service management linked to GSBPM**

Istat has adopted the ITIL (IT Infrastructure Library) framework as approach to implement a framework of best practice and guidance for IT service management support the statistical environment. The primary objective of ICT service management is to ensure that the IT services are aligned to the business and statistical needs and actively support them. It is imperative that the IT services underpin the business and statistical processes, but it is also increasingly important that IT acts as an agent for change to facilitate business transformation and statistical evolution. This approach is essential to achieve business benefits from IT at an agreed and controlled cost also in the statistical organization. Without good IT service management, it is common for IT projects to fail or go well over budget at project state, for on going costs of ownership to spiral out of control, and for statistical process to fail to achieve the expected benefits. ITIL’s value proposition, adopted by Istat, centres on IT service provider understanding customer’s business objectives and priorities and the role that IT services play in enabling these objectives to be met.

The ITIL Framework is divided into 4 main Sections:

1) **Service Strategy**: The focus of this area regards the achievement of strategic goals or objectives and the use of strategic assets. Strategy processes show how to transform service management into a strategic asset.

2) **Service Design**: The focus of this area is the process of designing IT services, along with the governing IT practices, processes and policies, to realize the strategy and facilitate the introduction of services into the live environment ensuring quality service delivery, customer satisfaction and cost-effective service provision.

3) **Service Transition**: The focus of this area is the process of developing capabilities for transitioning new and changed services into operations, ensuring the requirements of Service Strategy, encoded in Service Design, are effectively realized in Service Operations while controlling the risks of failure and disruption.

4) **Service Operation**: In this area the process focused on achieving effectiveness and efficiency in the delivery and support of services to ensure value for the customer and the statistical environment. Strategic objectives are ultimately realized through Service Operations.
20. There is another important service in ITIL, it regards the continual service improvement in which, learning from experience, it is possible to adopt an approach of continual improvement for IT services. ITIL adopts a lifecycle approach to IT services, focusing on practices for service strategy, service design, service transition, service operation and continual service improvement.

21. The GSBPM provide a basis for statistical organizations to agree on standard terminology to aid their discussions on developing statistical metadata systems and processes. Therefore, the GSBPM should be seen as a flexible tool to describe and define the set of business processes needed to produce official statistics. The CM project linked the IT Service Management to the Business Model taking into account the guidelines of GSBPM.

22. The use of this model can also be envisaged in other separate, but in this contest it is a key to harmonizing statistical computing infrastructures, facilitating the sharing of software components, in the Statistical Data and Metadata eXchange (SDMX). From a statistical perspective, the adoption of ITIL to design the IT process model ensure many benefits. First of all the IT services are aligned better with the statistical priorities and objectives; we have to consider also that the IT service are more reliable and work better for statistical users so this IT organizations helps the increased statistical productivity, efficiency and effectiveness. Then we have to consider a more effective change management, enabling the statistical environment to keep pace with change.

B. The methodological approach

23. To approach the CM project with regard to the phase 1 (Design of IT process and governance model), Istat leads a methodological approach based on a gap analysis. This approach focused on gathering information about the actual status of IT function in Istat. The information regards not only IT solution and infrastructure used to support statistical process but also the current operating practices and routines performed in the operational environment. To realize this baseline of information (As Is) it was organized a wide range of interviews involving all Institute’s organizational functions (more than 60 interviews including Departments of statistical data production). The gap analysis compare the As Is status with the To Be status through a structured approach that allows to design a path towards possible changes in a more rational and measurable way, defining specific actions involving different skills that need to interact within a shared view of a tangible progress. Several shared meetings were organized to collect feedbacks from main stakeholders involved in CM project. The issues coming from the gap analysis were addressed to be overcome in a process design phase following the ITIL guideline.

24. In addition Istat performed also a benchmark survey involving the Statistical Network in order to gain a better understanding on how the National Statistical Institutes deal with ICT rapid evolution. ISTAT designed an IT benchmark survey to collect information regarding IT organization and the maturity level of IT processes. In particular, scope of the survey is to investigate on two main topics: the Enterprise Architecture and some selected IT process of the ITIL framework in the Service Strategy area, Demand Management and Service Portfolio Management. The benchmark defined five dimensions of observation: strategy governance and control, roles and responsibilities, integration and communication, processes, standard and tools.

25. The Process Maturity Framework (PMF) has been used to analyse the results of ICT benchmark study conducted across the members of Statistical Network (see Figure 1).
26. In particular, the method has been used to measure the maturity of Strategy Processes on a scale from 0 to five:
   a) \text{zero= not existent};
   b) \text{1= initial};
   c) \text{2= repeatable};
   d) \text{3= defined};
   e) \text{4= managed};
   f) \text{5= optimized}

27. The general result of the survey shows that the maturity level of the statistical institutes involved in the survey is between 1 and 2, so the level of ICT governance is considered initial or repeatable (see Figure 1). The results have been extremely valuable for the implementation of the ICT change process in Istat because it shows the dimension, according with the other country, on which the institute has to work to design a more efficient IT organizational structure with clearly defined processes, roles and responsibilities. The priority dimensions for Istat are processes, standards & tools, integration & communication.

VI. The IT model tailored for Istat

28. ITIL framework describes with details processes, procedures, tasks and checklists to align IT services. It doesn't refer to specific organization and therefore it can be useful also in a public contest for statistical environment. ITIL helps to align ICT with the needs of business also in the statistical production.

29. The framework is used by the change management project to achieve integration with the institute's strategy, delivering value. It allows the institute to establish a baseline for planning, implementation, and measurement activities for ICT services.

30. The model was built with an approach is based on a continued service improvement that aims to align and realign IT services to changing statistical needs by identifying and implementing improvements to the IT services that support the statistical processes. It incorporates many of the same concepts articulated in the Demanding Cycle of Plan-Do-Check-Act.
31. The perspective on improvement is the statistical perspective of service quality, the process effectiveness, efficiency and cost effectiveness. The IT processes are built following this perspective through the whole lifecycle introducing standard activities, performances (KPIs), expected outputs as results of the process and adherence to international standards and regulations.

32. In the model, the IT process represents a logically ordered chain of activities that can also be considered as a value chain, as each step increases the value of the IT product towards the statistical product. At a high level of abstraction, processes are a list of ordered activities and IT products represent the IT services that have to meet statistical objectives. The processes are linked in a logical way and it becomes possible to represent the process chain, which starts with the stakeholders and concludes with users, statistical users. (see Figure 2).

33. Analysis and design are based on a set of specific processes and functions of the 4 ITIL’s areas of reference Service Strategy, Service Design, Service Transition and Service Operation. The selected processes and functions to design the IT model are ten as shown below, classified in the different areas:

**Service Strategy**
1. Determination of market space and IT polices
2. Demand management
3. Service and portfolio management

**Service Design**
4. Service Level Management

**Service Transition**
5. Change management
6. Asset and configuration Management
7. Release and deployment

**Service Operation**
8. IT service desk
9. Incident management
10. Problem management

34. The model provides a high level view of process interaction, starting from the Service Strategy to Service Operation (see figure 2).
35. In the model the IT Central Department (DCIT), throughout the Determination of Market Space, IT Policy and Strategy process, defines the ICT Strategic Plan, according with the Institute’s statistical goals. The Strategic Plan includes all ICT projects/initiatives to be realized to support the business needs on three-year base.

36. To collect the business requests and address correctly the human and financial resources required to implement the ICT Project Portfolio, the IT Central Department (DCIT) performs the Demand Management process.

37. The Demand Management gives inputs for new services to be identified and designed by IT Central Department. In the model the review of Service Portfolio Catalogue is performed by Service Portfolio Management process. Periodically, the service feature is negotiated between the IT Central Department and Statistical Department throughout the Service Level Management process.

38. The services provided by IT Central Department are monitored by Service Operation activities. Users are supported by Service Desk Function which detects incidents and investigate problems on software and ICT infrastructure. Both Incident and Problem Management processes aimed at detecting and resolving incidents throughout the submission of Request for Change (RFC) to Service Transition area. The Change Management process is responsible of implement the RFC approved by Change Advisory Board (CAB). The RFC developed/implemented are taken in charge by Release & Deployment process responsible to test and release into production environment/infrastructure all changes referred to software application or infrastructure.

39. Changes are finally inventoried by Asset and Configuration management process and registered into a configuration management data base (CMDB). The settings of KPI’s, metrics and SLA to monitor the above processes guarantees a Continual Service Improvement for IT Organization.
VII. The responsibility assignment

40. Istat adopted a responsibility assignment matrix, known as RACI Matrix to clearly define roles and responsibilities within the IT organization. The key responsibilities role are defined as follow:

   a) **Responsible**: Those who do the work to achieve the task.
   b) **Accountable** (also approver or final approving authority): The one ultimately answerable for the correct and thorough completion of the deliverable or task.
   c) **Consulted** (sometimes counsel): Those whose opinions are sought, typically subject matter experts
   d) **Informed**: Those who are kept up-to-date on progress, often only on completion of the task or deliverable.

41. Every process of the model is linked to a RACI matrix that assigns a clear role to the different Unit of the IT organization, both in the IT Central Department and in the IT Unit located in the statistical departments. The process to define the IT Strategic Plan has been innovated by introducing a more participative approach by involving other Institute’s committees like:

   a) **Information Technology Committee** (CI) attended by IT Central Department Director, top Managers and ICT delegates from statistical departments. It represents the main roundtable to negotiate IT Services to be provided to business;
   b) **Enterprise Architecture Committee** composed by EA experts consulted for strategic decision on ICT architecture to ensure the alignment with statistical business architecture;
   c) **Change Advisory Board** (CAB) attended by IT Central Department Director and Top Managers responsible to evaluate ad approve main Request for Change (RFC) submitted by Operations.

42. The services provided by IT Central Department are supported and monitored by Service Operation activities. The Service Desk Function represents a qualified single point of contact for users to address service requests to IT Central Department. Throughout the Service Desk, the IT Central Department is able to:

   - quickly identify the user’s requests for service or assistance;
   - offer a standardized set of services defined in features/characteristics and timing;
   - monitor the “status” of each request (trouble ticketing) and provide information to users;
   - detect incidents and investigate problems on software application or ICT infrastructure.

VIII. Remarks and future steps

43. The IT model illustrated above allows to overcome the limits of the “as is” IT organization. The “to be” model offers an integrated view of the IT process, that can facilitate the realization of Istat industrialization and modernization. In fact the Service Strategy process helps Istat to determine the ICT Strategic Plan to figure out ICT guidelines and policies to manage IT systems according with statistical needs. The process aims to guarantee the alignment of IT strategies to statistical requirements and Institute’s strategic goals and at minimize risk related to provide IT services. Service Strategy also aims to collect and evaluate the overall Institute’s ICT requirements to finalize the ICT Strategic Operation. In the medium period, the processes of this area can be implemented through a road map properly designed and scheduled, focusing particularly on:

   a) need to clearly define IT policies and standards for ICT environment (ICT Architecture);
   b) need to create a service and portfolio catalogue to support statistical environment;
   c) need to consolidate the planning phases with the Statistical Department defining priorities, activities, allocation of financial and human resources.

44. Also the Service Operation function helps Istat to design IT services, along with the governance of IT practices, processes and policies. It provides the primary window for users to contact the IT Organization to be supported on a day-by-day basis. The Service Desk is responsible for collect and manage trouble tickets and IT standard services (IMAC requests). It is also responsible of manage any events which is not part of the standard
operation of a service which cause an interruption to, or a reduction in, the quality of the services. Its objective is to restore normal operations as quickly as possible with the least possible impact on the business/users. Incident management and control activities include identification, logging, categorization, prioritization, initial diagnosis, escalation, resolution and closure. Problem management is responsible for managing the lifecycle of all incidents. The processes of this area helps to identify an issue before it places system performance at risk.

45. In the medium period, these processes can be implemented focusing particularly on:
   a) need to introduce a trouble ticketing system and standardize the supporting operation of statistical processing;
   b) ensure the continuity of business operation throughout ICT monitored infrastructure (fast incident detection/resolution);
   c) need to consolidate development platforms and statistical analysis.

46. The Service Transition process helps Istat to design IT services, IT statistical processes, and other aspects of the service management effort. Service Transition addresses how a planned service solution interacts with the larger statistical business and technical environments, service management systems required to support the service, processes which interact with the service, technology, and architecture required to support the service, and the supply chain required to support the planned service. In the medium period, these processes can be implemented through a road map properly designed and scheduled, focusing particularly on:
   a) need of managing Request for Change in ICT Infrastructure/application centrally;
   b) assure the governance of ICT configuration items throughout a Configuration Management Data Base (CMDB);
   c) standardize the release of ICT Application and ensure the performance of testing & quality control procedures.

47. The Service Design with the SLA management process is responsible of defining, negotiate and monitoring the level of services between IT Central Department Organization and statistical Departments. It assures also that all operational level agreement (OLA) and outsourcing contracts of IT Services are suitable to guarantee the agreed level of services. In the medium period, this process can be implemented focusing particularly on monitoring the level of service performance of ICT suppliers and setting Key Performance Indicators (KPI’s) and metrics to measure the ICT Services.

48. Finally a changing process relies on people, consequently, a good people training is one of the most relevant factor to put in place. The new IT model can be real effective only if people change their approach and their way to work helping the institute to turn complexity in opportunity.

References

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