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Topic (i): Governance and management strategies

**ORGANISATIONAL CHANGE RESULTING FROM A MAJOR REENGINEERING PROJECT IN  
THE CENTRAL STATISTICS OFFICE (CSO), IRELAND**

**Invited Paper**

Presented by Margaret McLoughlin, CSO, Ireland

**I. INTRODUCTION**

1. This paper describes the organisational changes that have come about as result of a major process-reengineering project in the CSO. The Project started in 2002 and went live in September 2007. The changes described include governance and change management issues as well as lessons learnt for future enterprise initiatives.

**II. THE INFORMATION TECHNOLOGY STRATEGIC IMPLEMENTATION PROGRAMME**

**A. Background**

2. The CSO has offices in two locations in Dublin and one in Cork City. It has a staff complement of approximately 1000 of which 12% are professional statisticians and 17% constitute the household survey interviewer team. In the late 1990s the CSO developed an IT Strategy (Information Technology Strategy 1999 – 2002 & Beyond) and a Data Warehouse / Data Management Strategy (November 1999). The focus of these strategies was to move to a central data management and storage approach for survey processing to replace the traditional “stove pipe” processing and “islands of data” that existed in the Office at that time. The resulting implementation plans consisted of two phases. The first phase consisted of an infrastructure upgrade from a mainframe to a client-server environment, which was successfully completed in 2001. The infrastructure upgrade consisted of both IT and statistical elements. The IT element included the rollout of Lotus Notes throughout the organisation, which as well as being the corporate email tool, has facilitated document management and considerably improved internal communications. The statistical elements included two applications, namely the Central Business Register system (CBR) and the Classification and Related Standards server (CaRS).

3. The second phase, known as the Information Technology Strategic Implementation Programme (ITSIP), centered on migrating all CSO's individual survey processing applications into one generic metadata driven survey processing system, to facilitate the migration from the mainframe VAX Open VMS environment. This system became known as the Data Management System (DMS) and the organisational changes associated with its design, build and eventual rollout in September 2007 are addressed in this paper.

## B. The Data Management System

4. The ITSIP/DMS project was divided into two stages. The first stage (Stage A) was a six month contract awarded to Accenture in the autumn of 2002, who compiled the Requirements Specifications & High Level Architectural Design. The second stage (Stage B) was awarded, a year later, to Cognizant Technology Solutions Ltd. (CTS) based in Chennai, India. Stage B consisted of the Design and Build of the DMS and this was completed in September 2007 with an additional 18-month support and maintenance to be provided by CTS. The DMS has consolidated the common processes from the current survey processing undertaken by individual survey areas into a suite of nine corporate applications in order to promote consistency and re-use across the various survey areas of the Office. These corporate applications - set out below - reside on corporate databases storing all data and metadata required in the survey-processing lifecycle.

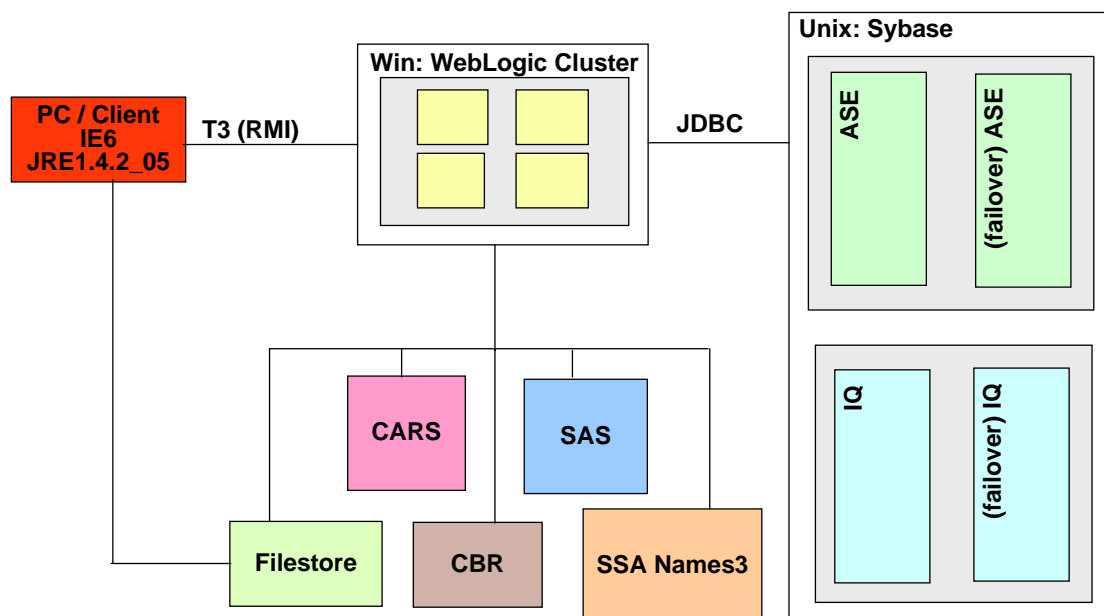
- (a) Register Management
- (b) Sample Selection
- (c) Survey Management
- (d) Data Capture
- (e) Imputation
- (f) Aggregation
- (g) Seasonal Adjustment
- (h) Dissemination
- (i) Respondent Management

In the case of the Imputation and Seasonal Adjustment modules these processes have been standardised to ensure the use of consistent methodologies in these applications across the Office.

## C. DMS Systems and Design

5. The DMS is a classic 3-tier system, consisting of a Java Client interacting with a J2EE Weblogic Server while the data is stored in Sybase ASE and Sybase IQ databases. All interactions with the databases are controlled through Weblogic.

**Figure 1.** DMS Technical Overview



The User interacts with the DMS Filestore through a network drive mapping on their PC. Interaction with all other applications is performed through Weblogic.

6. The DMS Client is a 'fat client' developed utilising Java Technologies with the GUI developed in Java JFC/Swing. The DMS Client has been designed to work with a Business Delegate design pattern. All interaction with the J2EE / Weblogic server uses Java RMI protocol. The DMS is designed using Weblogic T3 / RMI Protocol. The CSO has implemented a 'single sign-on' solution for the DMS Client whereby the CSO Active Directory Service (ADS) is interrogated for user authentication. Once the user has been authenticated, the user privileges are then retrieved from the DMS Databases and access within the DMS is granted accordingly. The DMS is deployed through Java Web Start Technology which allows both a quick deployment and centrally managed releases to the organisation.

7. The CSO have implemented the Weblogic 8.1 J2EE Server for the mid-tier of the DMS solution. The Client interacts with the Weblogic Server through the use of either Stateless Session Beans or Java Messaging Service (JMS). Users' standard interaction with the DMS is through synchronous transactions. These requests are passed to the DMS Stateless Session Beans. The DMS also facilitates users who want to run jobs in batch mode, asynchronous processing, and these interactions are routed to the JMS Queues where they are processed. All DMS interactions to the Sybase Database Layer are controlled through the use of JDBC Connection Pools defined within the Weblogic Server. User requests requiring access to the Sybase ASE or Sybase IQ databases take an available connection from the pool for the duration of their transaction. The Weblogic servers work in a clustered environment ensuring that there is equal distribution of work across the available server resources and also provide for failover on the mid-tier.

8. Prior to commencing the ITSIP project CSO IT staff had significant experience working with Sybase ASE. In the analysis phase of the project it was recommended that the CSO should also employ the use of data warehouse technologies i.e. Sybase IQ, for the aggregation of survey data and storage of data for dissemination. At a high level, the data within the DMS is stored as follows:

- (a) Register Management, Data Capture (Input), Imputation: Sybase ASE
- (b) Data Capture (Clean Unit Record), Aggregation, Dissemination: Sybase IQ

As part of the overall design of the system it was agreed that all complex numerical processing be performed within the database layer through the use of Sybase Stored Procedures. This improves performance as data is processed within the RDBMS and will ease the long-term maintenance of the DMS.

9. A brief description of the applications that interact with the DMS to contribute to the overall solution is included below:

**Figure 2. DMS – Other Components**

Application	Description
DMS Filestore	The DMS Filestore is a shared network drive onto which both the DMS User and the DMS Weblogic Server have access.  Users have restricted access to specific Survey and Business Areas folders. All data to be Imported / Exported to the DMS must be stored on the DMS Filestore.
SAS	The Seasonal Adjustment processing with the DMS is performed using SAS. The Weblogic mid-tier makes a remote call to the SAS server to facilitate the Seasonal Adjustment calculations.

	All DMS modules allow import from and export to many file formats including SAS datasets.
CARS [Developed by Statistics New Zealand]	The contents of the CARS application are mirrored within the DMS. All data that is disseminated in the DMS must utilise a CARS classification, as a consequence the DMS Survey Metadata links with the CARS data for survey definition and processing.
CBR [Developed by Statistics New Zealand]	The CBR is a hierarchical database of businesses within Ireland. Surveys within the DMS can either use the CBR (typically business surveys) or another sampling frame for survey processing.
SSA Names3	The SSA Names3 Server is used for data matching and duplicate identification within the DMS. If a user wishes to search a Register the SSA Names3 server will allow them specify the 'accuracy' of the search which they require and display the results accordingly. When users are entering Register Data into the DMS the data is passed through the SSA Names3 Server facilitating the identification of potential duplicates in the data stream.

#### **D. Governance of the DMS project**

10. The CSO business projects are conducted under the guidance and direction of Project Boards. These Project Boards report to the Senior Management Committee (SMC) of which the Director of IT and Corporate Services is a member. In the case of the ITSIP DMS Project and because of the importance placed in the Project by the Office, and the Director General, the SMC itself was the Project Board for the ITSIP Project. The Director of IT was the project sponsor with ultimate authority, accountability and responsibility for the project.

11. The DMS project was facilitated and managed on a day to basis by a dedicated in-house team – the so-called ITSIP team. This team consisted of experienced senior statisticians and statisticians with extensive business knowledge and statistical expertise together with IT staff with skills in Sybase ASE and software testing. The ITSIP team varied in size from 10-15 people depending on the project stage. At the commencement of the Project there were no in-house skills in Weblogic, Java or Sybase IQ. Recruitment and training of staff in Java and Weblogic started in late 2005, some two years after the commencement of the Design and Build Stage of the Project. Experience has shown that we should have had in-house skills in the tools being used by the Contractor from the outset of the Project. This would have allowed earlier and more thorough quality assurance by the CSO of both the project design decisions and deliverables.

#### **E. Change Management and the DMS project**

12. The ITSIP Stage B Project was originally scheduled for 30 months. However due to various issues set out below this schedule was prolonged to 46 months:

- (a) delay in initial increment deliveries due to new requirements
- (b) delay in CSO testing due to underestimation of time required
- (c) catering for extra functionality in the DMS
- (d) change in design needed for better performance

- (e) change from Windows to Unix for Sybase to cope with the production load
- (f) reworking of Java code to meet Quality Assurance standards

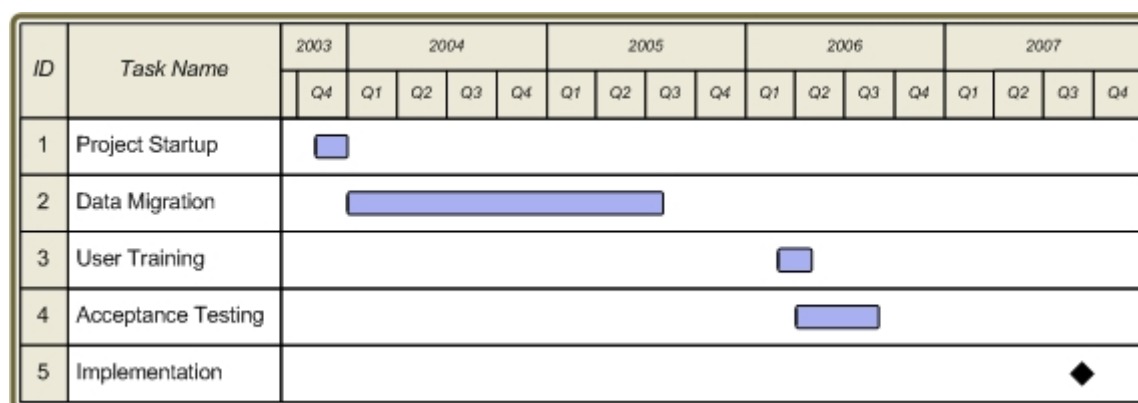
During this period the onsite Cognizant team ranged from 2-17 members while the offshore team ranged from 20-50 staff depending on the project phase.

13. As the Project go-live date was delayed on a number of occasions, business interest in the Project waned despite successful data migration and User Acceptance Testing (UAT) phases, which involved substantial input and commitment from business areas. At the same time the Project developed a separate identity of its own that was perceived as neither IT nor Business led. It is now clear to us that the involvement of business users in the whole project lifecycle is crucial.

14. The DMS project was highly dependent on the goodwill and co-operation of business areas. Business areas supplied the initial functional requirements for the DMS together with requirements for data and metadata migration and tested the DMS during UAT. This co-operation was readily supplied by most business areas and involved a huge commitment on the part of statisticians as they had to ensure “business as usual” was not jeopardised and that their statistics were compiled on schedule while involved in the additional effort required for the DMS. However despite the ITSIP team’s best efforts survey owners did not adequately document their UAT test procedures. This resulted in knowledge gaps at the go-live stage with consequential delays in the parallel run.

15. User participation in the DMS project was in phases as illustrated below:

**Figure 3.** User participation in the DMS project



The data migration phase required users to

- (a) identify their survey data and metadata that needed to be migrated to the new DMS database environment
- (b) verify and validate that this survey data and metadata had been migrated correctly

This phase took approximately 20 months in total and required a lot of user input and support particularly as identification of the required metadata (mainly classifications) was for many a new way of looking at their data as indeed were database columns when checking variables. Experience has shown that it might have been more efficient to have undertaken data migration after stabilisation of the application development rather than as a parallel task. This would have reduced the migration rework / deletion of data from the migrated tables during UAT and Production. After the migration phase there was a lull in the Project for users until user training began some nine months later in March 2006. This was followed by six months UAT which began in April 2006 and ended in September 2006. Between this date and the go-live date, a year later in September 2007 there was no user involvement in the Project.

16. These long periods of non-involvement of business users in the Project were mainly caused by the repeated delays in the project schedule because of the issues outlined above under subsection 12. However the net effect of these delays to the Project was the perception by many business users that the DMS would not deliver on its original objectives. Many business users were reluctant to change to a generic “one size fits all” survey processing system when they already had a customised survey processing system specific to the functionality requirements needed to process their survey.

17. Since the DMS was launched in September 2007, uptake by many business areas has been considerably slower than scheduled. There are many reasons for this, not least the extra effort involved in undertaking parallel runs of the DMS with their legacy system. For staff involved in the day to work of undertaking a survey the immediate priority is producing the statistics on time, not the corporate benefits accruing to the Office as a result of using the DMS. While we may have adequately tackled “stove pipe” processing in making the DMS available to all we still have much work to do when it comes to dealing with “stove pipe” thinking!

18. Another obstacle to migrating to the DMS as planned was the introduction of PC SAS to the CSO. At the outset of the ITSIP project the CSO had approximately 150 systems written & maintained centrally and 250 end-user applications (mainly in SAS). While the ITSIP project was underway, the Office began introducing PC SAS with an initial purchase of 10 licenses in April 2001 and thereafter on a phased basis until the final figure of 200 was reached in November 2007. Given that SAS V6.12 on the mainframe was no longer viable because of mainframe space restrictions and the mainframe’s impending closure, business users began moving away from this environment to PC SAS for much of their data analysis and survey processing. Porting their mainframe SAS code to PC SAS was relatively straightforward and gave users all the workspace and CPU processing power they needed. The challenge is now to coach users into the DMS for their survey processing and back to a server based platform for their data analysis in SAS!

19. However on the plus side there is a slow, steady acceptance of the DMS by the Business. Business areas are more aware of their statistical processing methods as a consequence of having to input them as metadata into the DMS. New statisticians and statisticians with new surveys are more open to moving to the DMS than existing staff with their very own survey processing systems. As the DMS was the Office’s first real attempt at consolidating survey processing into a single system and used a big bang approach to roll-out, it was always going to be a hard sell.

## **F. Communication Management and the DMS project**

20. Communication with business areas on ITSIP project progress was quite difficult given the repeated delays with project deliverables and to the final go-live date. As a result this communication seesawed between dispensing schedules for data migration, user training, UAT etc. on the one hand and informing the Business of a delay to the Project plan on the other. Between these two extremes the approach of “No news is good news” was adopted.

21. During the autumn of 2005, the Director General held a meeting with a group of key “opinion influencers” from the Business with a view to maximising the level of overt corporate support in the Office for the ITSIP project. At this meeting it was stressed again how important it was to focus on working together and how essential supportive corporate management was to the Project. Business areas were reminded of the progress to-date as well as the key drivers for the Project namely the need to move to a relational database environment for data storage in order to dispense with the notion where data were seen as “Section owned” rather than “Corporate owned”.

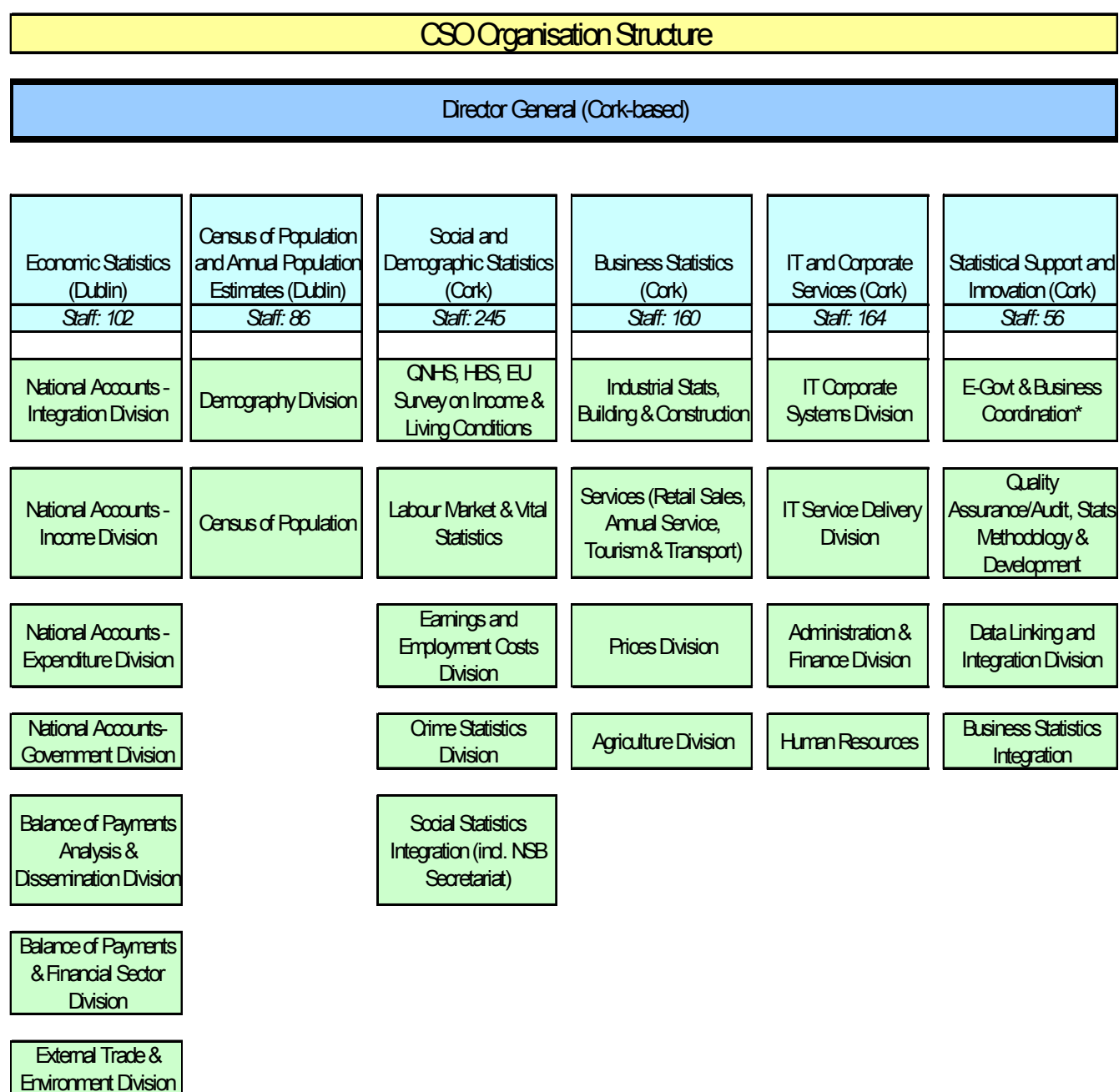
22. The launch of the DMS in September 2007 was marked with the presentation of a specially commissioned mug, biro and mouse mat to all staff. The latter give an overview of the DMS and contact details for the Service Desk and DMS eLearning product. ITSIP team members were presented with specially designed polo shirts with the DMS logo for launch day. An extensive poster campaign was also

used to raise awareness of the DMS go-live date throughout the Office. The DMS project was the first project in the CSO to use such techniques to heighten project visibility.

#### D. Change since the DMS project

23. A new organisational structure was drawn up for the CSO in late 2006 - see Figure 4 below - which split the IT functions across two directorate areas - IT & Corporate Services and Statistical Support & Innovation. Census of Population Division are also a key player in the IT arena in the CSO. Within the IT & Corporate Services directorate IT Service Delivery Division has responsibility for day-to-day delivery of Network, Desktop and DBA support and Service Desk services while IT Corporate Services is focused on development and support of centrally developed corporate applications.

**Figure 4. CSO Organisation Structure**



\*Includes some electronic data collection and web dissemination.

24. Within the Statistical Support & Innovation directorate, eGovernment and Dissemination Division are responsible for dissemination and the CSO on-line service. Data Linking & Integration Division together with Business Integration Division are both involved in exploiting the statistical potential of administrative records held by other government ministries/agencies and integrating these external data sources with existing CSO survey data.

25. As the DMS was the last step in the ITSIP endeavour it was necessary to take stock of where IT needed to be in the Office in order to deliver on the CSO's business strategy. As the last IT strategy covered the period 1999 – 2002, it was opportune to prepare a new IT strategy. This process was started within the IT & Corporate Services area in the summer of 2007 with a series of workshops initially involving the main IT players in the Office before engaging in a series of workshops with the Business. A "top down" approach was adopted to formulating the IT strategy. This involves mapping the CSO business strategy to business information requirements and translating the latter into information technology requirements. These IT requirements would then determine the necessary capabilities of the information technology environment to meet the business information requirements.

26. The CSO's latest Statement of Strategy has as its primary goals:

- (a) Improvement in the scope, quality and timeliness of our statistics
- (b) Minimising the burden on survey respondents
- (c) Increasing the use of administrative data for statistical purposes
- (d) Achieving greater efficiencies using best practices
- (e) Raising public awareness and use of statistics.

27. The CSO in its commitment to reducing the response burden arising from statistical surveys and the requirement to exploit the statistical potential of administrative records suggests an information need to integrate data and metadata both across its surveys and with external data sources. This means that our current data processing approach which is mainly survey centric (e.g. the survey instance being the primary data unit in the DMS) now needs to accommodate a customer centric approach to cater for these alternative sources of data and to optimise data integration.

28. In November 2007 the SMC emphasised the importance of having a business led IT strategy and appointed the Director with responsibility for Statistical Support & Innovation to chair a specially appointed IT Strategy Steering Group whose members are mainly drawn from business areas. The Terms of Reference for this Group are as follows:

- (a) The primary function of the IT Strategy Steering Group will be to provide support and appropriate business level input to the development of the IT strategy
- (b) Responsibility for the development and writing of the IT strategy will rest with the Director of IT and Corporate Services. Drafting will be co-ordinated by the IT and Corporate Services Directorate, in conjunction with the Steering Group. Sign-off on the final strategy will be at SMC level
- (c) The Steering Group will
  - review the process (and timetable) for the development of the strategy and agree the approach with the IT and Corporate Services Directorate
  - discuss and agree the scope and issues to be covered/addressed in the IT Strategy
  - ensure that the IT strategy meets the CSO's business strategic needs
  - facilitate direct interactions with the business areas to gather requirements (e.g. invite submissions, face-to-face meetings)
  - ensure that the agreed process and timetable for the development of the strategy is adhered to
  - provide input/observations on the various drafts of the IT Strategy as it moves through the different stages of development



- have a role in determining how the strategy will be communicated to the staff of the CSO

29. The Steering Group decided to organise a series of workshops as a mechanism for gathering inputs/requirements for the next IT Strategy. It was initially planned that separate workshops would be held for each statistical product area (e.g. business statistics, social statistics, price statistics, agriculture statistics etc.). These workshops would consolidate requirements from the respective business areas that should be addressed in the IT strategy. This “bottom up” approach has now been replaced with mixed groups in each workshop. Each workshop will consider the following topics and the Steering Group will then consolidate the findings.

- (a) Governance/Project Management
- (b) In-source/Out-source
- (c) People strategy (Skills needs, IT and Non-IT staff)
- (d) Data Capture
- (e) Processing
- (f) Data integration (single customer view etc.)
- (g) Analysis/Dissemination (including metadata issues)
- (h) Metrics for IT performance
- (i) Management information
- (j) System performance
- (k) Security/Data Storage/Archiving

30. In parallel to the above initiative the IT directorate is compiling a common requirements vision based on the CSO business strategy so that it can ensure that the future enterprise architecture is aligned to the CSO’s corporate objectives. The future state enterprise architecture needs to be an adaptive architecture, with the primary design goal being to facilitate change in business processes and in the Office’s stated corporate goals.

31. While the IT strategy is being formulated the CSO still needs to progress a number of ICT upgrade projects. The largest of these is the requirement to upgrade and consolidate its existing SAS environment. The CSO has chosen the SAS Enterprise Business Intelligence (BI) Server platform to accomplish this, optimise data integration capability and deliver BI functionality to the Office. Enterprise Guide will be the SAS client for “power users” while ordinary business users will use a web browser. The Office intends to establish a Business Intelligence Competency Centre (BICC) in order to exploit BI capability with respect to data at its disposal so that the Office is able to effectively contribute to “evidenced based policy making” in the broader public sector.

32. Learning from the lessons of recent years the Office arranged a number of presentations and demonstrations of the new SAS product to business users, before its purchase, so as to maximise user involvement and buy-in to the Project. The opportunity is taken at all these interactions with the Business to demonstrate the fit of the Project with the CSO’s corporate goals as illustrated Figure 5. This approach is being used more and more to convey the future objectives of the Office to the Business in selling them new projects so that they see the “Big picture” and not just the needs of their area of responsibility.

33. Given the amount of change associated with the DMS for business areas and the level of change and discipline involved in moving to the new SAS server environment, it is planned to roll out the product piecemeal i.e. to one business area at a time. The schedule of change in the Office must be managed but more importantly the reason for the change must be communicated to and accepted by all parts of the Business if its involvement is to be optimal.

**Figure 5.** *SAS Enterprise BI fit to Corporate goals*

<b>SAS Enterprise BI Product &amp; Enterprise Guide Functionality</b>	<b>Corporate Goal 1 Improvement in the scope, quality and timeliness of statistical outputs</b>	<b>Corporate Goal 2 Minimise Response Burden</b>	<b>Corporate Goal 3 Optimise use of administrative data &amp; direct survey data for statistical purposes</b>
<p>√</p> <p>(Centralised Metadata Repository)</p>	<p>√</p> <p>(Metadata repository supports standardisation / quality)</p>	<p>√</p> <p>(Improved data management processes because of better metadata management)</p>	<p>√</p> <p>(Improved data management processes because of better metadata management)</p>
<p>√</p> <p>(Data Integration Functionality)</p>	<p>√</p> <p>(Data Integration Functionality supports cross-survey data comparison / analysis)</p>	<p>√</p> <p>(Using Data Integration Functionality to move towards single respondent record / view across survey)</p>	<p>√</p> <p>(Ease of working with multiple file formats)</p>
<p>√</p> <p>(OLAP Capabilities (for data analysis and exploration))</p>	<p>√</p>	<p>√</p>	<p>√</p> <p>(Using Data Integration Functionality &amp; OLAP Capabilities)</p>