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Topic (i): Architectures, models and standards

Update on How Business Architecture Renewal is Changing IT at Statistics Canada

Supporting Paper

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I. Introduction

1. The following paper provides an update on how the changes introduced as part of Statistics Canada's business architecture renewal initiative have affected IT and IT's relationship with internal clients.

2. Statistics Canada's Corporate Business Architecture (CBA) initiative was introduced to ensure that the Agency continues to deliver three things to Canadians:
   - information that is relevant to the current, highest priority information needs;
   - information that is of a quality that is sufficient for the uses to which it will be put; and
   - information that is produced at the lowest possible cost.

3. Relevance and quality tend to deteriorate over time in the absence of proactive intervention. The Agency must be flexible and agile enough to address continuing changes in the economy and the priority information needs of Canadians.

4. Maintaining the quality of Agency's information products remains a challenge as Canadians lifestyles change and Canadian businesses worry about response burden. Critical tools and computer systems must be redesigned to address this changing landscape while legacy systems must be maintained and supported until they are replaced.

5. Statistics Canada continues to face program cuts and budget freezes as the Canadian Government works to return to a balanced budget. The challenge of remaining relevant and publishing high quality outputs while reducing the costs of programs continues to be a concern that drives a lot of the decision making on investments at the Agency.

II.   The Corporate Business Architecture

A.   Business Objectives

6.   In January 2009 Statistics Canada embarked on a complete redesign of how the Agency's conducts its business. Over the past two years, every facet of how business and investment decisions are made, how we allocate work between subject matter and service areas, and how we are organized, has been questioned and reviewed. The exercise challenged management and staff to rethink our long standing subject matter business processes, the way we use information technology and the practices used to deliver our business and manage our assets and employees.

7.   As the exercise enters its third year, the major objectives remain the same:
- **Cost**: A harvestable efficiency on ongoing operating costs of 5% within 5 years to meet corporate down-sizing commitments with minimal cuts to statistical and analytical programs.

- **Quality**: Enhanced quality assurance through the streamlining of business processes and the implementation of a reduced, unduplicated set of robust systems that are properly maintained and documented.

- **Responsiveness**: Improved responsiveness in delivery of new statistical programs through the streamlining of Statistics Canada's core business processes.

### B.   Architectural Principles

8.   Principles were established to support decisions that would lead to a more efficient, robust and responsive business architecture for Statistics Canada. :
- **Corporately optimal decision making**: The Agency is now making decisions based on what is best for the agency as a whole rather than best for a particular division. Although this is an evolutionary process, services are being consolidated into single service providers and program areas are migrating to these services according to well established plans. Local delivery of these services is permitted only where a clear, corporately accepted benefit-cost case can be made for the exception.

- **Meta data driven**: Processes are being revamped to put the initial emphasis on the definition of metadata and this is ensuring that metadata is now having an effect on how statistical processes and systems are developed. The ultimate objective is to have metadata drive the process.

- **Optimized use of corporate services**: The use of existing corporate services such as collections and dissemination have been significantly expanded. New generic corporate services are being delivered and adopted by program areas.

- **Maximize re-use**: The culture and practice is changing and there are several key success stories to support the business case for reuse.

  - Subject matter areas are eliminating processes and adopting the "mandatory standard" processes that are being developed. Cost-benefit principles are being used to determine when the benefit of adding a business process to accommodate a program specific need is justified.

  - These new business processes are being implemented through a limited set of enabling computer systems and this is resulting in a reduction in the diversity of computer systems and applications the Agency is required to support.

- **Minimize tool kits**: The Agency, through the mandate given to the system Architecture Review Board (sARB), is reducing the number of software and productivity tools it deploys. Once a standard has been established, any deviation from the standard must be submitted to the sARB for approval. This has significantly reduced the number of exceptions to established standards.

- **Statistical information management**: The Agency has initiated a project to define and support an information management framework. This is a major cultural shift for StatCan and components will be introduced slowly to ensure that staff have time to adjust.

- **Eliminate rework**: When standard processes are being designed, they are reducing and, in some cases eliminating, instances of rework by subject matter experts. For example, excessive editing, a common problem, is being reduced through tight controls built into the new business processes.

- **Focus on the core business**: In order to focus our energies and resources on the core business of Statistics Canada (the process of developing, producing and disseminating statistical information and analysis), StatCan continues to look very seriously at opportunities to outsource support processes either to external service providers or, at least, to internal service areas.

- **Separate development from ongoing operations**: Some progress has been made in the separation of development from ongoing operations. There are additional costs associated with this, and for IT, especially in the infrastructure area, it constitutes a cultural shift that must be managed.

- **Electronic data collection**: The new electronic questionnaire service was launched in production in March 2011 and 7 surveys are now using this mode. By April 2013 approximately 50 surveys will be using the electronic collection (e-questionnaire) service.

- **Remove structural obstacles to efficient operations**: The Agency's organizational structure is being aligned to facilitate process flows.

C.   The Business Process Model

9.   The Agency has adopted the Generic Statistical Business Process Model (GSBPM). It forms the foundation on which Statistics Canada is remodelling our processes and systems.
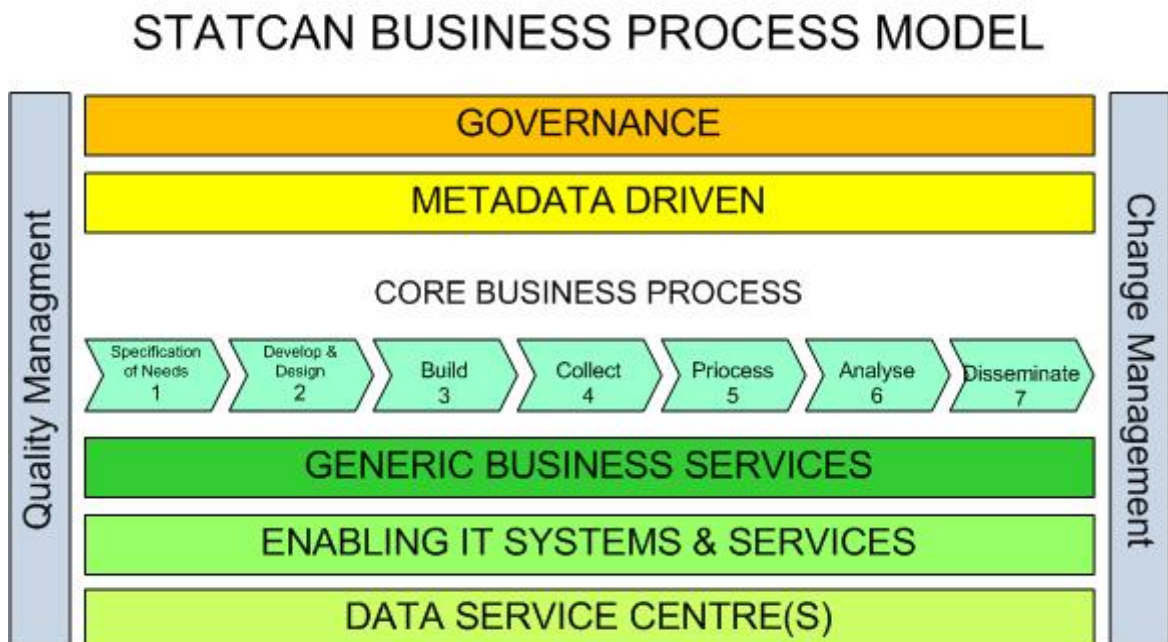
10.   The new model is designed to support the core business processes through reliance on corporate services including common data repositories (Data Service Centres), corporate IT services (infrastructure and

applications), and generic business services. The business processes should be driven by metadata from beginning to end to ensure consistency within and across programs and to reduce duplication of effort. The Agency has strengthened its governance structures to ensure that the corporate good is paramount while still meeting local program needs. The quality guidelines have been reviewed and change management processes are being implemented to ensure that the focus continues to be placed on the production on high quality outputs and the highest priority projects.

D.   Governance

11.   Traditionally authority on how a program was delivered was almost entirely vested in the individual program manager. The CBA is changing this approach so that delivery of a program is done collaboratively by the subject matter area, the service areas and other business stakeholders.

12.   The subject matter divisions continue to lead the statistical process but must now operate within the constraints imposed by the Business Process Model. They must maintain the critical liaison with Government policy departments, provincial and municipal focal points and the data user community to monitor evolving information and service needs. Subject matter divisions interpret this information to the corporation to propose new programs and cost-recovered projects.

13.   Within corporately agreed constraints of policy, and business and systems architecture, subject-matter divisions lead the development of new programs and projects, providing requirements to service areas that conduct the work on their behalf. Experts in their respective domains, subject matter divisions certify, integrate and analyze statistical data. Subject matter areas are responsible for identifying key findings from statistical programs and conveying them effectively to the public through release articles and studies. In short, subject matter areas are still responsible for the product they produce and for ensuring that the processes complete successfully, but they must now fulfil their mandate through internal service areas in partnership with other stakeholders.

14.   Various oversight bodies have been given the powers needed to support this change:
   - The CBA Management Committee is responsible for ensuring that projects funded as a CBA initiative deliver quality products on time, and that promised efficiencies are harvested.

   - The system Architecture Review Board is responsible for ensuring that systems are built in compliance with the appropriate standards, tools and practices. All exceptions are presented to the sARB and exception decisions are logged and tracked over time.

   - A Departmental Project Management Office (DPMO) is now in place and a Project Management Framework has been developed. The DPMO is responsible for ensuring that projects are documented and tracked appropriately.

   - Field Planning Boards have been created to ensure that all investment proposals and projects are reviewed before going to the CBA Management Committee and/or the Policy Committee.

E.   Organizational Change

15.   Over the past two years, several major organizational changes have been implemented to consolidate service delivery areas into single entities, to streamline service areas to gain efficiencies or to consolidate subject matter divisions that have become too small as a result of other consolidation exercises.
   - Responsibility for IT has been consolidated under a single Assistant Chief Statistician (described in more detail in Chapter III).

   - The Human Resources Branch has restructured its organization to improve services and eliminate one Director position.

   - The Communications and Dissemination Branch has restructured its organization to improve services and eliminate one Director position.

- Several program area divisions have amalgamated or been reassigned to a different Branch or Field.

III. Impact on Information Technology Services

A. Overview

16. The Corporate Business Architecture initiative had several major impacts on the delivery of IT services at Statistics Canada.

- The first was the consolidation into a single organization of approximately 1000 IT staff delivering a full suite of IT infrastructure services and software application development, maintenance and production support services, including IT architecture and technology centres of expertise.

- IT Branch has agreed to a reduction of 10% of the IT workforce (100 IT resources) by 2015 on condition that the subject matter areas fully adopt the new Business Model.

- What activities and projects IT undertakes is now governed through the implementation of Agency level prioritization of IT enabled initiatives and the move to shared services and systems. This is forcing the establishment of change management processes throughout the Agency.

- Finally the initiative changed how IT procurement is managed and applications get developed. In particular, a standard development methodology has streamlined the development process and the use of generic systems has freed up programmers to work on value-added functionality rather than repeatedly reinventing the wheel.

17. The rest of this paper describes how the IT Branch has managed the transition to the new IT service delivery model.
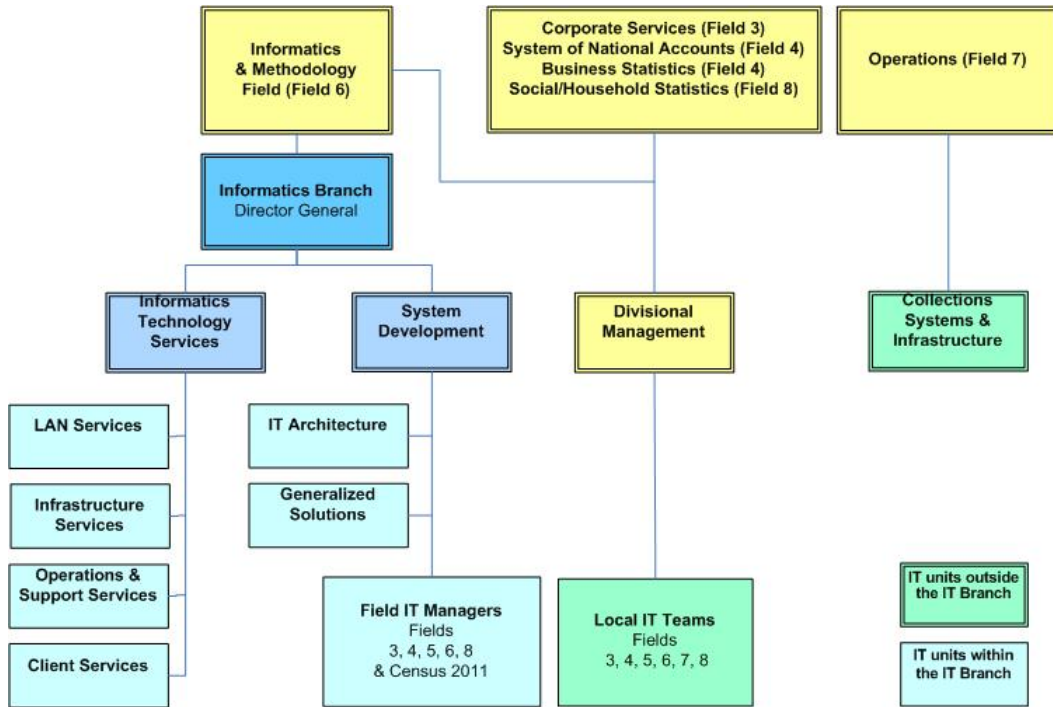
B. Consolidation of IT

18. In 2009 just over half of the Agency's IT resources reported to the IT Branch which was comprised of a Director General acting as StatCan's Chief Information Officer (CIO) and two divisions, each led by a Director: the Informatics Technology Services Division (ITSD) responsible for the IT infrastructure services; and the System Development Division responsible for application development and maintenance services. Close to 400 IT resources were located in small service units (5 to 20 employees) reporting directly to a program area director. The remaining 100 were the Collection Systems and Infrastructure Division (CSID), a division responsible for delivering IT services to the Operations (collections) Field.

19. The consolidation of 500 IT resources into a single Branch could not be achieved without the addition of senior managers to the IT organization. The new organizational structure now includes two branches of three divisions each.

20. The consolidation was done in waves and will not be completed until July 2011. The delays were caused by having to create and staff the second Director General position and the new director positions. When the DG of the new Informatics Systems Branch (ITSB) is in place CSID (the division serving collections) will move to ITSB. This move represents the final step in the consolidation of all IT staff into the corporate IT organization.

21.   The pre-consolidation organization chart for IT at StatCan was as follows:

Pre-consolidation organization chart:

- Informatics & Methodology Field (Field 6)
- Corporate Services (Field 3) / System of National Accounts (Field 4) / Business Statistics (Field 4) / Social/Household Statistics (Field 8)
- Operations (Field 7)

- Informatics Branch — Director General
  - Informatics Technology Services
    - LAN Services
    - Infrastructure Services
    - Operations & Support Services
    - Client Services
  - System Development
    - IT Architecture
    - Generalized Solutions
    - Field IT Managers — Fields 3, 4, 5, 6, 8 & Census 2011
- Divisional Management
  - Local IT Teams — Fields 3, 4, 5, 6, 7, 8
- Collections Systems & Infrastructure

- IT units outside the IT Branch
- IT units within the IT Branch

22.   The organization chart on September 30, 2011, at the end of the IT Consolidation exercise will be as follows:

Organization chart (September 30, 2011):

- Informatics & Methodology Field
  - IT Operations (CIO) — Director General
    - IT Services (Infrastructure) — Director
      - IT Service Desk
      - IT Infrastructure Services
      - Workstation Services
      - Network Services & IT Security
    - IT Architecture and Planning — Director
      - IT Architecture
      - IT Internal Services
      - PM Centre of Expertise / IT Planning / IT Communiations / IT Finances / IT HR Planning / IT Training
    - System Engineering — Director
      - Application Services
      - Technology Centres
      - Generalized Systems
  - IT Systems — Director General
    - Statistical Information Systems — Director
      - System of National Accounts Systems
      - Business Statistics Systems
      - Social/Household Statistics Systems
      - Census 2011 Systems
    - Administrative and Dissemination Systems — Director
      - Admin Services System
      - Dissemination Systems
    - Collection Information Systems — Director
      - e-Collection Systems
      - Field Collection Systems
      - Census 2016 Systems

23.   Although this exercise appears to be a simple reorganization of resources, in fact it was seen as the first test of how ready subject matter areas were to adopt the notions espoused by the CBA. Managers found losing direct control over key "service" personnel was difficult at first. Some managers still find it difficult after a full year under the new model but most have adjusted well, and a few have even embraced the opportunities the new IT delivery model presents.

C.   Changing What IT Works On

24.   The fundamental principle of the CBA initiative is to make decisions based on what is best for StatCan as a whole rather than what is best for individual programs. For IT this means that IT work is itemized yearly and a corporate prioritization process is used to determine what projects get resourced.

25.   ITSD has taken advantage of the complete consolidation of IT infrastructure services to undertake a more aggressive schedule of services changes.
- A tiered service desk model was introduced in 2010 offering more effective and timely responses to service requests from employees and paving the way for a fairly standardized desktop support service at a lower cost.

- A desktop provisioning service covering PCs, laptops, printers, etc. went into service on April 1, 2011. This service will allow for better planning of hardware procurement and replacement which will lower purchase costs through bulk buying, and desktop support costs through more standardization of equipment and service calls.

- A server cloud is being developed in phases to allow ITSD to offer clients capacity on demand and best fit sizing for server capacity. Over time this will lower the costs of procurement and supporting the storage, backup and server capacity services.

- A complete redesign of the Public Access Zone (PAZ) has been completed and the changes required to implement the design are being executed. This will result in more secure applications in the PAZ as well as better monitoring, and will enable a more proactive defence and a more timely response to security threats.

26.   The initiative has changed how applications are developed. There are currently several projects that have delivered, or are developing, generic or shared applications for use by program areas. The number of distinct applications in the systems registry has started to drop as programs migrate to these new systems and discontinue the use of their custom tools.

27.   CBA has led to the implementation of a Project Management Office and the application of a Project Management Framework for projects undertaken within the Agency, regardless of the source of funding. There is more oversight of projects leading to better decision making when issues arise and managers now have standardized tools to help them document projects and assess progress and risks. In time all project managers will be comfortable with the new framework and project managers will able to step to on-going projects with much less effort to get up to speed.

28.   CBA has led to a more horizontal approach to the prioritization of IT enabled projects. All Fields now prioritize their IT enabled projects into predefined categories.

29.   The program of work for IT is defined at the beginning of the year:
- **Basic maintenance and Production Support**: A Service Level Agreement (SLA) is created for each program areas at the beginning of the year. The SLA includes IT planning and portfolio management activities as well as basic maintenance and production support activities.

- **Development Projects**: The creation of new systems or major enhancements to existing systems that deliver substantive new business functions or that are required due to system rust-out are identified during the planning cycle that precedes each new fiscal year. Proposals are developed based on business cases and comprehensive proposals and approved prior to the beginning of the year. Funding sources are identified at approval time. Approved projects must follow the Agency's Project Management Framework and must produce various documents including the Project Charter that describes the objectives, the stakeholders, the scope, funding, deliverables, costs, schedule, etc.

- **Enhancements and adaptive maintenance**: Major system changes are treated as development projects. Decisions on whether to proceed with less substantive and less costly changes must be made by a change management board. Funding limits for this type of work are identified at the beginning of the year and work is managed through task assignments up to the limit of the budget for the year.

30. Rust-out projects, business transformation projects which need substantial IT investment and adaptive maintenance, and larger enhancement initiatives, must be identified in the Agency's Investment Plan. The Plan has a 10-year outlook however entries for the outer years are considered more as bookmarks than firm plans. Only work that has been included in the Investment Plan is considered for funding during the annual planning cycle. This means that program areas and IT have to work together ahead of time to ensure that system risks and new functionality requirements are identified ahead of time and included as early as possible in the Plan.

31. For this strategy to work two conditions must be met:
- **Program areas and Senior Management must be willing to prioritize.** Program areas and the Executive level decision committees must find a way to prioritize within the main program Fields and across Fields. This means that they must be willing to live with what doesn't get approved.

- **Change management boards must take a strong stand on reducing the number of change requests coming from work groups within the program areas.** The Change Management Boards must be able to say NO to minor changes and the program areas must accept to live with the consequences of freezing the functionality of a system and/or moving to generalized or shared solutions.

32. The IT community also has a role in ensuring that program areas can make the business decisions described above. In particular, the IT teams must provide program areas with accurate estimates of the effort required to complete the systems work that is being presented for funding approval and be able to identify the resources available to do the work should funding be approved. This is not an insignificant task given the size of the IT community (about 1000 employees) and the mix of technical and analytical skills that might be required by any given project. The IT Branch has always had to manage this challenge due to the nature of the internal cost recovery funding model, however, with twice the number of resources to manage, the Branch has had to become even more proficient at moving resources around to meet corporate priorities without unduly disrupting on-going projects and program operations, or compromising our the ability to deliver the promised 10% reduction in IT capacity over 5 years.

D.   Changing How IT Work is Done

33. The new IT delivery model has changed how the IT community goes about the business of IT. Now that all IT teams report through the IT Branch there is a more consistent approach to service delivery based on a partnership model. The IT Branch provides services to clients and works collaboratively with clients to support operations and develop and maintain applications. Clients no longer micro-manage the IT team but work through SLAs and project agreements to ensure that the expectations are well described for both parties and that delivery schedules are respected.

34. The impact of CBA on IT has been significant:
- Generalized systems have been formally recognized as mandatory and when new systems are developed the sharing model is defined from the outset and new shared or generalized systems become mandatory once delivered.

- IT teams have made considerable progress in adopting the corporate development framework which is based on the IBM Rational Unified Process. This framework facilitates the definition of user requirements through a combination of use cases and iterative development techniques significantly reducing misunderstandings about functionality. Furthermore the framework forces programmers to document the processes and develop test cases as they go.

- The development of shared/generalized systems requires the use of more formal architecture models and a more service oriented approach since they must interact smoothly with other applications used during the statistical lifecycle.

- The Architecture Service has grown from about 5 architects in 2008 to about 25 architects today since systems are larger and more complicated to design and clients see the value in putting a considerable amount of time up front into the design process.

- The systems Architecture Review Board (sARB) focuses primarily on how systems are built including ensuring that systems comply with pre-defined standards and methods, that exceptions are reviewed and documented and that security standards are enforced. The efforts of the architects and of the sARB have reigned in custom development and most projects no longer question that they have to conform.

- Decisions on when to upgrade to new releases of software products and tools such as MS SQLServer or Oracle are now being made by the sARB following recommendation from the service owners. This ensures that effort is not spent on upgrades that have no business value and that once a decision to upgrade is made, all systems using the software in question must submit a plan on how to upgrade within a pre-determined time period. This ensures that service areas do not have to support multiple environments for very long.

- IT is adopting release management practices to reduce the effort associated with testing and moving to new releases of applications. In particular, as the ownership of systems shifts more and more to service areas and the number of generalized systems increases, new releases of applications are treated in similar way as new releases of software products and tools.

- Systems are treated as assets, in the same manner as is already done for IT infrastructure components, and evergreening/replacement strategies are identified up front and reviewed annually. IT must work with the business areas to determine how best, and when, to replace a system which is nearing its end of life to ensure that the best decision is made as to its replacement. This could mean migration to an existing generalized solution or replacing the system if its functionality is very specific to a program area.

- Comprehensive change management processes are being established by the business areas to decide, with input from IT, which tasks should be undertaken by the IT resources.

35.   The changes have also had a big impact on investment planning and project management at StatCan. The annual planning cycle now starts with an initial review of proposals so that business decisions can be made up front on the validity and priority of each proposal. Managers then have about five months to develop more a in-depth business cases and business proposal for each proposal that received initial approval. A final decision meeting is held at the end of the third quarter to produce the final list of projects that have been approved for funding and/or resourcing.

36.   The IT Branch is adapting well to the new direction. Clients have found the changes in IT delivery more difficult to adjust to since they have had to shift their focus from a detailed involvement in survey operations to a reliance on multiple operational service areas and more emphasis on long term planning, strategic direction and project oversight.

IV.   Observations

37.   The lessons learned from this transition have not changed much since the half way point in April 2010. These include:

(i)   Solid analysis of the implications is necessary to identify the stress points and culture shifts necessary to make this broad a transformation a success. StatCan took at least a year to analyze where we needed to go and how to get there, develop clear guiding principles and communicate the objectives to as wide an audience as possible. Even with this effort there was still a lot of angst among IT employees due to a lack of understanding of the new direction and scepticism about the validity of the changes.

(ii) Despite point 1, don't take too long to start moving. Identify easy wins so that employees quickly see the benefits of the new approaches and can observe how issues are resolved.

(iii) Ensure that there are strong governance and decision making processes throughout the process. The most senior management levels must be wholeheartedly behind the initiative and be seen to be supportive at all times. They must be willing to make tough decisions and stand by them.

(iv) Management has to be willing to deal with the funding issues. IT as StatCan works on a cost recovery basis. Moving to the mandatory use of corporate infrastructure services and to software systems services delivered by Informatics Branch employees working on a per diem basis meant that some areas benefited more than others. Senior managers had to be willing to compromise and to find ways to redistribute funds in cases where a business area was a loser financially.

(v) There can never be enough communications and many techniques are needed to successfully communicate to a diverse community in a large organization. It is imperative that the messages aimed at staff be thoroughly thought through and that they answer the types of concerns raised not only by managers but by all levels and areas in the Agency.

(vi) Using standard tool sets and development frameworks saves money and decreases the risk of failure, however, the use of these tools must be governed closely and projects must have access to at least some resources with knowledge of these tools and practices. It is also important to properly account for the learning curve for staff with little or no experience with the standard tools and methods.

(vii) Engage the staff. They have great ideas and many are very willing to help and to be a part of the transformation. At the end of the day, this transformation is for them and they will inherit the good and the bad results of the initiative when the senior managers move on.

V.   Conclusion

38.   A significant amount of work went into this business transformation aimed at overhauling how business processes serve the Agency priorities and how IT services are delivered. After only two years the benefits are obvious including lower costs, more collaboration, more robust systems, and a reduction of risk. The CBA initiative is lowering our reliance on the knowledge individual employees carry around in their heads and implementing sound investment practices to ensure that replacement plans are in place for our aging systems. Ultimately StatCan will be more flexible, have more confidence in the quality of our data products and be in a position to react quickly to changes in demographics, technology, the economy and government policy. This will ensure that Canadians continue to receive reliable and timely data to enlighten and inform decisions affecting a broad spectrum of business and social issues.