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Planning and management considerations for the adoption of electronic data collection technologies

United Nations Statistics Division



Planning and management considerations for the adoption of electronic data collection technologies

- Management of investment in IT
- Institutional capacity development
- IT acquisition management
- IT systems development
- Considerations for use of geospatial information in support of census operations*
- Considerations for use of mixed-mode data collection*
- Testing IT systems and processes
- Information and system security
- Evaluation of investment in IT



Management of investment in IT

- ❑ Successful organizations manage IT systems projects as investments, rather than expenses
 - As IT investment management capabilities increase, IT projects are viewed more as mission improvement projects and less as information technology efforts
 - Senior managers become actively involved in IT project management and are responsible for making decisions, providing oversight
- ❑ IT projects should be monitored to ensure they continue to meet mission needs at the expected levels of cost and risk
- ❑ Interim actual vs. expected results should be compared to assess whether any changes or modifications to the project may be needed



Management of investment in IT

- ❑ **Management structure for managing IT investments**
 - Instituting a management structure is a key component of managing IT investments
 - Management group (or board) should comprise senior managers with experience and skills
 - The investment management board performs two critical functions:
 - ensuring that IT projects and systems meet the business needs of the organization
 - providing IT investment oversight



Management of investment in IT

❑ Meeting business needs

- IT projects and systems should be aligned with the business needs of the statistical office
- To achieve such alignment, the statistical office must continually review and verify the business necessity for its IT projects and systems
- The investment board should assess a project's/system's outcomes in comparison to predefined expectations
- The process of identifying business needs also entails the identification of end-users and customer groups of IT projects and systems
- During the project's conception stage, such users should be involved in developing the business case and in defining how the system will help to meet business needs



Management of investment in IT

❑ Oversight of investment in IT

- The board should oversee the project's performance by conducting reviews at predetermined checkpoints and/or major milestones, in order to interpret the data on project cost and schedule with respect to historic project data and stated expectations.
- The board should also employ early warning systems that enable it to take corrective actions at the first sign of cost, schedule, and performance slippages
- Appropriate corrective actions should be taken for each underperforming IT project or system, in accordance with defined criteria and the documented policies and procedures for management oversight
- Performance data on actual performance including cost, schedule, benefit, risks, and system functionality (both expected and actual) for each IT project is needed
- Adequate resources, including people, funding, and tools, should be provided for IT project oversight



Institutional capacity development

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Institutional capacity development

□ Organizational restructuring

- The introduction of electronic data collection into the organizational setting of the NSO may require the streamlining or redesigning of critical work processes
- If that is the case, then a business process improvement analysis should guide the streamlining or redesigning of critical work processes -- this process be overseen by senior management team
- Critical outcome from the business process improvement analysis could include:
 - Clarification of roles and responsibilities
 - Implementation plan, w measurable goals, objectives & milestones
 - An implementation team for initiating the new business process
Measures to assess progress
 - Plan for addressing training and redeployment



Institutional capacity development

□ Change management

- The implementation of a new business process improvement initiative faces multiple challenges including from organization's natural tendency to resist change
 - Often, the greatest challenges arise not from managing technical or operational aspects but in managing human dimensions of change
- To overcome such resistance:
 - NSOs need to begin managing change early
 - Managers must also recognize that their own roles and responsibilities may need to undergo change as well
 - Managers should build change management plan early in the project
 - The plan should link goals & objectives of the new process to issues such as work roles, reporting relationships & performance expectations
 - The plan should include periodic reviews for assessing and responding to opinions, concerns and needs of staff



Institutional capacity development

□ IT skills and human capacity development

- Effective workforce planning is essential to ensure that organizations have proper skills, abilities, and capacity for effective management
- NSOs will need to build sustainable organization-wide IT skills and information management capabilities through an effective strategic human capital management planning
 - It should be noted that upgrading the skills & capabilities of line managers is critical for building organizational IT management capabilities
- Four key practices in strategic workforce management and planning:
 - Assess IT skills requirements
 - Inventory the knowledge and skills of IT, field operations and management staff
 - Develop strategies and plans to fill gaps between requirements and existing staffing
 - Evaluate and report on progress in filling gaps



IT acquisition management

- ❑ It is important that census agencies successfully acquire IT equipment and systems—that is, ensure equipment and systems are acquired on time and within budget, and that they deliver the expected benefits and functionality
- ❑ Given that census projects utilizing new technology involve risk, NSOs must have a disciplined and streamlined acquisitions process
- ❑ To minimize risk, IT acquisitions require:
 - involvement of specialized (outsourced) acquisition professionals
 - requirements and cost estimates need to be realistic and need to be developed with adequate input from industry,
 - enough communication between a census agency's IT staff and the census program staff who will actually be using the hardware, software and services



IT acquisition management

□ Acquisition strategy

- A strategy for large-scale IT acquisitions should be developed as soon as a decision is made on the use of IT for census operations
- The strategy should take into consideration the life-cycle of the acquisitions process, comprising of three phases:
 - planning and budgeting
 - acquisition phase
 - management-in-use phase (post acquisitions phase)
- The acquisitions strategy should be integral part of NSO's strategic planning process & should be guided by consideration of:
 - strategic objectives, budgetary resources, total cost of ownership, linkage to performance goals for other collection programs, best practices
 - The acquisitions process must conform to applicable national laws and procedures (foreign customs, laws and regulations)



IT acquisition management

- ❑ **Planning and budgeting phase:** Elements of the planning and budgeting phase include:
 - Management review process
 - Establishing cross-functional procurement team
 - Functional requirements
 - Conducting market research
 - Selecting the best option
 - Cost-benefit analysis
 - Risk analysis and management
 - Planning for contract type
 - Planning for competition



IT acquisition management

□ Acquisitions phase

- Validate planning decisions
- Manage the acquisition risk
- Consider tools for contracting
- Select contract type and pricing mechanism
- Issue the tender
- Proposal evaluation
- Contract award
- Contract management
- Acquisition analysis
- Acceptance



IT acquisition management

□ Management-in-Use Phase (Post-acquisitions phase)

- Objectives during management in-use phase – to demonstrate that the existing investment is meeting the needs of the census agency and to identify more cost-effective methods for delivering performance and value
- Operational analysis is a key tool
- Operations and maintenance
- Post Implementation Review
- Asset disposition



IT systems development

□ Major IT components for electronic data collection (to develop/acquire)

- Data collection application
- Data transmission system
- Data centre – **data reception, aggregation and storage**
- Disaster recovery site
- Central Operation Control System
- Call centre



IT systems development

□ **IT systems development methodology.** The main elements of system development life-cycle (SDLC) may include the following phases:

- Initiation
- System concept development
- Project planning
- Requirements analysis
- Design
- Development/acquisition
- Integration and testing
- Deployment/implementation
- Operation and maintenance
- Disposal



Considerations for use of geospatial information in support of census operations



Considerations for use of mixed-mode data collection



Testing IT systems and processes

- ❑ Testing is necessary to assure that IT systems & infrastructure, both individually & integrated, perform & function as intended
- ❑ Testing should be conducted early in the preparation stage of the census life cycle so that there is sufficient time for necessary corrections and re-evaluation.
- ❑ A test should be conducted in as close to an operational environment as possible.
- ❑ Sufficient time and budget should be allocated for testing, especially if using such technology for the first time in a census operation.
- ❑ Testing should be guided by a well-developed and written test plan with quality standards for each element to be tested so that all features can be assessed in a consistent manner



Testing IT systems and processes

- ❑ Sufficient management oversight and guidance is needed both in the development and implementation of a testing plan
- ❑ Key operations and systems should be judged to be ready for operation based on testing and not just merely based solely on management judgment
- ❑ Such determination of readiness of systems should be based on comprehensive status information and quantitative metrics on progress in testing key IT systems and interfaces
- ❑ Testing should be guided by a testing plan, which:
 - identifies tasks & activities that need to be performed to ensure that all aspects of the census IT system and processes can be successfully implemented
 - sets out the testing schedule as well as delineates the roles and responsibilities of the project teams involved in testing



Testing IT systems and processes

- ❑ **Types of tests.** Commonly performed tests for IT systems and related procedures include:
 - Development testing (Unit test, Integration test)
 - System testing
 - Usability test, Functional test, Performance test, Infrastructure test, End-to-end test
 - Acceptance testing
 - Integration testing
 - End-to-end test, Performance test (load, volume, and stress), Exception test, Infrastructure test (continuous operation, backup and recovery), Interface test, Regression test
 - Security testing
 - System readiness test
 - Operational readiness test
 - End-to-end test, Interface test, Business process validation



Information and system security

- ❑ Key activities for managing information security risks include:
 - **Risk assessment**—identifying security threats and vulnerabilities to information assets and operational capabilities, ranking risk exposures, and identifying cost-effective controls;
 - **Risk mitigation measures (controls)**—implementing the controls necessary to deal with identified risks to information systems, physical facilities, and networks, in order to protect them;
 - **Awareness and training**—promoting awareness of security risks and educating users about security policies and procedures, as well as providing security training to staff;
 - **Evaluation**—monitoring the effectiveness of risk mitigation measures (controls) and awareness and training activities through periodic evaluation; and
 - **Central management**—coordinating security activities through a centralized group.



Evaluation of investment in IT

- ❑ Once the census project has been fully implemented, an evaluation on the IT investment management should be conducted
- ❑ The purpose of the evaluation is twofold:
 - to compare the actual results, costs and benefits of recently implemented IT investments against estimates and expectations that were set for them in order to assess performance
 - to identify lessons learned geared towards improving future IT investment decision and implementation processes.
- ❑ When conducting this type of evaluation, NSOs should measure a census project's actual results not only against the costs, benefits, schedules and risks (CBSR) presented in the business case, but also against the organizational objectives that are associated with the project



Evaluation of investment in IT

□ Focus areas of evaluation

- Achieving the strategic needs of the organization
 - aggregate impact of IT investments on the whole organization, and not just individual operational customers/units within the organisation
- Satisfying the needs of customers (operational customers/units within organization)
 - the quality and cost effectiveness of IT products and services
- Fulfilling IT internal business performance
 - This focus area aims to evaluate the operational effectiveness and efficiency of the IT organization itself
- Accomplishing IT innovation and learning
 - This area of evaluation assesses IT workforce competency & development; and the use the new systems, extent to which advanced technology was used, employee satisfaction or retention, and the methodological expertise of the IT development team



Evaluation of investment in IT

□ Decisions from evaluation

- One of the major outcomes of the evaluation phase is the number of key decisions made based on the results of the evaluation. These include:
 - assessment of how well the project met its intended objectives
 - assessment of the overall performance of IT investments in improving mission performance
 - determination of what modifications need to be made for future projects
- They are also important in terms of developing plans for continued support and operation of IT projects, especially those that will be repurposed for use in other data collection activities.
- Based on lessons learned extracted out of the evaluation, recommendations could be developed to improve: the IT investment process; and, the development of business cases and refining project cost, risk, benefit criteria