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Topic II: Planning and management of statistical projects

MANAGING AND PLANNING INFORMATION TECHNOLOGY STATISTICAL PROJECTS

Invited paper

Submitted by the U.S. Bureau of the Census¹

I. INTRODUCTION

1. The U.S. Census Bureau, like other statistical agencies, relies heavily on Information Technology (IT) to collect, process, and disseminate statistical data. This increased reliance on IT not only changes human resources and budget priorities but also may affect timeliness, quality, and cost effectiveness of statistical products. This paper will discuss both how the Census Bureau created an IT strategic plan that supports the agency's business operations as well as the strategies it implemented to maximize IT investment benefits.

2. To manage IT projects better requires aligning IT investments with the organization's mission and goals. Creating an IT plan that supports the overall organizational business plan ensures that IT projects will be more effective. In addition, several tools can be used to help manage the IT development and implementation process.

3. During the 1990s, the U.S. Government enacted several laws intended to improve the outcome of government investments and spending. The Census Bureau developed and implemented several management strategies to ensure these laws and guidelines were carried out. For example, the Census Bureau designated an executive level Chief Information Officer (CIO) to provide IT leadership for the entire agency.

II. STRATEGIC PLANNING

4. The first step taken by the Census Bureau was to review all IT investments from

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a corporate-wide perspective. This effort involved participation from both the IT department and the program areas and was done cooperatively to ensure that programs were properly supported. Efficiencies that would result from centralizing several functions were identified. These included developing a bureau-wide architecture, establishing software and hardware standards, managing telecommunications such as telephones and networks, and moving servers and other hardware to a dedicated, IT-operated computer facility. This centralization effort is underway. However, development of specific statistical and administrative program applications has remained decentralized. Thus coordinated strategic planning became essential.

5. To ensure coordination, the Census Bureau began writing an annual IT strategic plan, directed by the central IT department with input from the program areas. The strategic plan shows how IT investments throughout the bureau, both decentralized and centrally controlled, support the business strategies of the bureau. The strategic plan is updated annually. It is the basis for an annual IT operational plan that includes the level of investment the bureau is making in specific projects each year.

6. Although coordinated bureau-wide planning requires much work, it informs the initial decision on whether to invest and also lays a framework for monitoring the progress of projects, particularly those that take several years to complete. Projects not in the plan don't receive funding. In addition, projects must go through extensive review before they become part of the plans.

7. Bureau-wide review of investments is accomplished by an Information Technology Review Board. The 10-member board consists of the top executives of each major program area, such as demographics, economics, and research, as well as the Chief Information Officer, the Chief Financial Officer, and the agency director and deputy director. In order to be approved by this board, major IT investments must come forward with a convincing business case from their sponsors. Below, Census Bureau business case analysis is discussed.

III. BUSINESS CASE ANALYSIS

8. The Census Bureau uses a standard format for business case analysis whenever possible. The business case explains the need for the project; that is, what problem is being solved. It then analyzes and compares alternative solutions on the basis of both the estimated risk and the benefit to cost ratio. Finally, it recommends a course of action that includes estimated resource costs and time frames. Depending on the magnitude of the project, a business case could run anywhere from 4 to 100 pages. If a project is approved on the basis of the business case, the next steps would be to develop a more detailed project plan. The project plan includes specifics on an acquisition strategy, time frames, resource costs, risk mitigation, and deliverables.

9. The following is a template that can be used when developing a business case. Each breakout represents a section of the business case.

Business Need. This section should discuss why the project is important. This includes addressing whether it supports a core mission of the agency, what problem is being addressed, and what are the expected results.

Users/Stakeholders. This describes who would be affected by this decision, and whether they agree that the project is necessary.

Current Approach (baseline). This section describes the current approach and its related problems. It discusses the effect of NOT making any changes. In addition, it tells whether current work processes being supported by this project been analyzed

and redesigned before considering the alternative solutions to the problem.

Alternative Solutions. In this section, alternative solutions are examined for feasibility, including those that would be provided by the private sector or other government agencies. The constraints or assumptions that apply to possible solutions are identified. How the alternatives affect other systems, activities, or operations, such as a networking infrastructure is described. When possible, flowcharts of the processes being considered, system architecture diagrams, etc., for each alternative are included.

Benefit/Cost Analysis. This analysis identifies the life cycle costs of each alternative. Benefits realized under each alternative are described and a value is assigned to them. The projected rate of Return On Investment (ROI) and payback period for the investment is calculated. Because information is often incomplete at the start of a project, the analysis describes how much confidence one should have in the benefit/cost data. Also included are tables that display the life cycle costs and benefits for each alternative by fiscal year by resource category (such as staff years, hardware, software, maintenance, testing, etc.).

Risk Analysis. This analysis identifies the level and types of risk associated with each of the alternatives. This includes an assessment of the probability and impact of each risk event. Also included is a discussion of how these risks can be managed, which could involve actions such as breaking the project down into phased successive modules, using prototypes, avoiding custom designs where possible, sharing risk with contractors, etc.

Recommended Decision. The recommendation identifies which alternative represents the best, risk-adjusted value for the agency. It explains why the alternative aligns with the agency overall goals and strategies, and whether its architecture and design is consistent with the agency standards. Any key uncertainties that remain, as well as the results of any sensitivity analysis are discussed here.

Next Steps. This section describes how this decision would be implemented. It identifies the further decision points on whether the project should proceed and future procedural steps or approvals. A key piece of information included here is how performance will be measured during development and implementation. Also stated are when and how the initial assumptions and analysis used for the business case will be updated.

IV. CHECKLIST FOR EVALUATING WHETHER A PROPOSED PROJECT SHOULD BE FUNDED

10. Once the business case analysis is presented to the Information Technology Review Board, the board members must make a decision. The checklist below can be used to evaluate whether or not a project, or some portion of it, should be funded. This checklist is derived from a government-wide checklist that agencies are required to use before requesting money from the Congress for major IT investments. It primarily consists of a review of all the information that should be included in the business case.

Capital Planning:

- (i) Does the investment support the core mission functions of the agency?
- (ii) Is the project being undertaken because no alternative private sector or governmental source can efficiently support the function?
- (iii) Does the investment support work processes that have already been analyzed and

redesigned if necessary to reduce costs, improve effectiveness, and make maximum use of off-the-shelf technology?

(iv) Does the investment demonstrate a projected rate of return that is equal to or better than alternative uses of the resources? This could include improved mission performance, reduced cost, increased quality or timeliness, and increased customer and employee satisfaction.

Architecture:

(v) Is the project consistent with the agency's IT architecture?

(vi) Does the project specify standards that enable information exchange and resource sharing throughout the agency, while retaining flexibility in the choice of suppliers and in the design of local work processes?

Risk Management:

(vii) Does the design of the project reduce risk by:

- (1) reducing custom designed components;
- (2) using fully tested pilots, simulations, or prototypes before going to production;
- (3) establishing clear measures and accountability for project progress; and
- (4) securing buy-in from program officials who will use the system?

(viii) Can the project be implemented in small phases, each of which solves a specific part of an overall mission problem and delivers a measurable net benefit independent of future phases?

(ix) Does the investment employ an acquisition strategy that shares risk between the government and the contractor, effectively uses competition, ties contract payments to accomplishments, and takes maximum advantage of commercial technology?

11. If the investment review board is satisfied that the business case positively answers these key questions, a decision can then be made to proceed with the project at a specific level of investment. At this point, the Census Bureau uses a variety of tools to help manage the development and implementation of these projects.

V. USEFUL IT MANAGEMENT TOOLS

12. First, the Census Bureau has adopted the Business Process Reengineering (BPR) approach. BPR helps organizations identify improved business practices that also may achieve cost efficiencies. One underlying principle of BPR is that an organization should thoroughly review its operational practices before automating or updating the "as is" practices. The bureau has used BPR extensively before embarking on several major IT projects.

13. Another critical tool is project management. During the last few years the Census Bureau has begun to train employees in professional project management. The bureau entered into a partnership with ESI International and George Washington University in Washington, DC to enable large numbers of bureau employees to earn a master's certificate in project management. So far, 160 employees have been certified, with another 40-60 beginning the program each year. The courses are held at the Census Bureau during work hours. Project management techniques involve using multidisciplinary teams to plan, schedule, and implement projects successfully through cost control, configuration control, risk management and clear communications. At the Census Bureau, large IT projects must be managed by certified

project managers in order to be funded.

14. Third, the Census Bureau has greatly expanded the prototyping and testing phases of development. Large projects are broken down into discrete phases that are demonstrated and tested before the project continues to the next phase. This creates many opportunities for evaluating projects and possibly making modifications before too much time and money is invested in the wrong areas.

15. The following case study illustrates how IT statistical projects at the Census Bureau are planned and managed, including aligning such projects with the bureau's mission and business priorities.

VI. Case Study: The Integrated Statistical Solutions (ISS) Project

16. Recognizing the need for a common approach to accessing and disseminating information, the Census Bureau initiated the Integrated Statistical Solutions Project. The ISS project encompasses a suite of integrated processes designed to support creation, access, and dissemination of both integrated data products and individual data sets that can be integrated with other sets. Without ISS, the burden is on the data users to identify, compile, sort, parse, and reformat data prior to analysis.

17. In 1998, the ISS redesign team was established to design the future of data access and dissemination at the Census Bureau and create a roadmap for implementation. Using BPR, the team identified the necessary steps to develop new processes. The ISS team consisted of mid-level managers across program areas, including senior IT managers.

18. First, the ISS team addressed several critical issues such as, why the bureau was undertaking this project, how the project supported the Census Bureau's mission, who the customers and stake holders were, and what the project objectives were. This, along with cost/benefit and risk analyses formed the core of the business case that was reviewed by the IT Investment Review Board.

19. The ISS team identified two primary objectives. First, to provide a dynamic data integration environment capable of responding to increasing and evolving customer demands, such as expanding public access to demographic and economic data through the Internet. Second, to maximize the value of data collection and the resulting data assets, enabling development of new, relevant data products without imposing new data collection costs.

20. The ISS team also conducted customer surveys. The surveys confirmed that two out of three customers use multiple data sets and would like to integrate, manipulate and examine data from several sources.

21. The ISS project— as with any project— depends on the support of the internal and external customers. Therefore, the ISS team developed communications strategies for dealing with principal stakeholders. Throughout the project, the ISS team continues to share information on the systems and processes being designed with the executive staff, program managers, survey sponsors and other customers, to help them understand project objectives, implementation plans, and the reasons for changes and/or delays.

22. Defining the life cycle costs and benefits of the project has been a major challenge for the team. For example, the life cycle cost of ISS will probably be offset through a combination of internal efficiencies, information collection burden reductions, and increased value created through new information products. This

explicit view of project costs and benefits provides useful guidance to ISS business and technical architects, product engineers, and others. However, it becomes the future challenge of managers to measure and capture those savings when the benefits are realized. The team also explored several other alternatives for meeting its objectives, but they were more expensive and did not produce the organizational and technical capabilities that would enable the Census Bureau to keep up with emerging technology and customer demands.

23. At the Census Bureau, the survey process life cycle consists of seven stages (conceptualization, budget approval, survey design, collection, data processing, analysis, and dissemination), but with the implementation of ISS, these stages will be streamlined. After reviewing development and delivery processes in other organizations, the ISS team designed standardized and streamlined product planning and production processes that could be adopted agency-wide. The ISS implementation strategy incorporates a phased development/delivery approach. It establishes clear decision points with respect to project implementation.

24. The ISS team established metrics to permit thorough testing and validation of system components. For ISS, technical proof(s)-of-concept, iterative prototyping, analytical performance testing, network performance simulation, and similar methodologies are being used to assure that program deliverables track objectives. In addition, the ISS team decided to use independent verification and validation (IV&V) against explicit criteria to assure that ISS development phases are delivering measurable functionality and benefits before proceeding with further investments. The acquisition strategy included utilization of both commercial technology and private-sector expertise, proof of concept and pilot projects, technology and tool assessment, and interactions with the research and vendor communities.

25. The ISS design principles require an open architecture, interfaces, and tools that support both internal and external customers. Moreover, deploying a Corporate Metadata Repository (CMR) is a cornerstone of the ISS plan. The CMR will facilitate information access, interpretation, and production across the range of Census Bureau data assets and eventually other Federal, state and local agencies.

VII. ORGANIZATIONAL CHALLENGES

26. Improving the planning and management of IT statistical projects requires organizational change. Major changes that affect the organizational culture are especially difficult to implement. At the Census Bureau, the most difficult changes to implement are those that require cooperation and involvement across the entire agency.

27. One of the reasons organization-wide change can be difficult to implement is that it often involves shifting responsibilities and assignments between parts of the organization. When activities are centralized, the donating office loses both control and resources. One approach that has been used at the Census Bureau is to put in place Service Level Agreements. These are agreements between the office providing the service and the user office. For example, when management of a Local Area Network (LAN) shifts from a program office to the central IT office, a signed agreement is put in place that specifies the level of service that the central IT office will provide, such as a 24 hour a day, seven day a week help desk, a less than 1 percent down time for equipment, specified times for maintenance of equipment, etc. The performance of the IT office can then be objectively measured. These agreements are also put in place when servers and other equipment are moved to the central IT facility.

28. Another difficult area can be adoption and enforcement of agency-wide

standards. The Census Bureau approached this by putting together teams of people representing each program area and the IT area to develop the standards. In that way, the standards were able to support the programs' business and had the approval of the program areas rather than just the IT office.

29. Requiring a business case analysis for major IT investments can be expected to yield mixed results until employees gain analytical skills needed to produce a good analysis. At the Census Bureau, while employees were gaining the necessary training and experience, a central consulting office was established to aid program areas in writing business cases. A few skilled employees were always on loan to different program areas to help develop and write major business cases. This central consulting office was also made available to help with Business Process Reengineering, project management support, and other such activities.

30. Finally, putting together an IT Review Board can be very challenging. Even when staffed by top executives, the natural instinct in many organizations is for managers to support projects coming from their own areas, rather than those that may take resources from their areas to support priority work elsewhere. The Census Bureau executive managers have devoted a lot of time and resources towards building a team approach to strategic planning.

VIII. CONCLUSION

31. As statistical organizations become increasingly reliant on IT, planning and management of IT investments also becomes increasingly important. Statistical organizations must create strategic plans that reflect organizational priorities and align IT investments with those priorities.

32. Statistical organizations need to incorporate management processes and tools to help document and evaluate the cost, benefits, and risks of proposed IT projects before such projects are undertaken. These tools include Business Process Reengineering, business case analysis, and high level organizational review and approvals. Once projects are approved, strong project management is required to assure that projects are completed on time and within budget. Prototyping, pilot projects, and extensive testing are important components of successful IT projects.

33. These types of organization-wide changes often meet resistance and take time to implement. Often an organization will need to create new structures, such as an IT Investment Review Board. Also, employees may need training in areas such as project management. This requires commitment on the part of agency top management and senior executives, as well as financial investment for training.

34. Despite the challenges of planning and managing IT statistical projects, statistical agencies have little choice but to take the steps necessary to assure that IT investments are chosen wisely and implemented successfully. Otherwise, the business operations will not be supported adequately in the current and future environment where keeping up with technological advances is a critical part of statistical operations.

REFERENCES

U.S. Department of Commerce Information Technology Directorate, U.S. Census Bureau, 2000. *FY 2000 Information Technology Strategic Plan*. U.S. Census Bureau, Washington, DC.

Executive Office of the President, U.S. Office of Management and Budget. *Circular No. A-11 Part 3: Planning, Budgeting, and Acquisition of Capital Assets*. U.S.

Office of Management and Budget. Washington, DC. 1999.

Potok, Nancy A. and Levy, Richard, *Putting the Pieces Together: Measuring the Cost-Effectiveness of Information Technology Investments at the Census Bureau*. Paper prepared for the Conference of European Statistics, Seminar on the Management of Statistical Information Technology, Geneva, Switzerland. U.S. Census Bureau. Washington, DC. 1998.

Computer Assisted Survey Research Office. *Integrated Statistical Solutions at the Census Bureau*. U.S. Census Bureau. Washington, DC. 1997.

Frame, J. Davidson, *Managing Project Management in Organizations*. Jossey-Bass Publishers. San Francisco, California. 1995.

ISS Project Team. Consultations with Mark E. Wallace, Carla Buczinski, and Cheryl M. Landman. U.S. Census Bureau. Washington, DC. 1999.

Office of the Associate Director for Information Technology. Consultations with Richard Swartz, Acting Associate Director. U.S. Census Bureau. Washington, DC. 1999.

Office of the Principal Associate Director and Chief Financial Office. Contributions from TaShunna Marshall, Special Assistant. U.S. Census Bureau. Washington, DC. 2000.