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Topic (iii): Resource management in statistical offices and the role of the IT departments

**ROLE OF THE CHIEF INFORMATION OFFICER IN MANAGING IT RESOURCES
IN A LARGE STATISTICAL AGENCY**

Submitted by U.S. Bureau of the Census ¹

CONTRIBUTED PAPER

I. INTRODUCTION

1. This paper describes and explains techniques employed by the U.S. Bureau of the Census, specifically its Chief Information Officer, to manage IT resources within our statistical organization. It discusses the demands and challenges of managing IT resources in a large, distributed, and changing IT organization. The experience we have gained and lessons learned, some not without difficulty, may benefit others who are contemplating, planning, or in process of similar structural transitions.

2. The Census Bureau is the largest statistical agency in the United States. It is organized in such a way as to delineate the organization's two main components: Program Operations and Support Services Operations. Program Operations constitute the statistical component of the agency -- demographic,

¹ Prepared by Nancy A. Potok and Richard W. Swartz.

economic, and statistical research, methodology and standards. The central IT organization is a part of Support Services Operations, along with field data collection and administrative support. An organizational chart is attached as Exhibit 1.

3. While the Census Bureau has centralized IT organizational placement and structure, the IT organization in the Census Bureau today has evolved from a traditional centralized service organization to one with major distributed processing and management characteristics, the latter performing in harmony with a reengineered and smaller central IT. The focus of the reengineered central IT organization is infrastructure management with far less emphasis on application program development. The management of IT resources in this reengineered environment requires new, innovative approaches to be successful. This is because the split responsibilities create a unique form of competition between program areas and central IT.

4. This transition from complete centralization to a hybrid of centralization/decentralization was not a well planned, orderly, and totally controlled process. While senior management had a clear intention where it wanted to go, the transition was a bit bumpy. It was greatly affected by: (1) the technological innovation of the last decade or so that could not be fully anticipated (e.g., Internet/Intranet boom); (2) underestimated human impact of decentralizing; and (3) the institutional nature of humans to establish areas of control if and when such opportunities come available to them. The efficient management of IT resources during this transition period would challenge the best of managers.

5. This paper discusses the more challenging and demanding management of IT resources in a decentralized, distributed processing environment; that is, not under the immediate control of central IT and the Chief Information Officer. It is this grouping of IT resources that requires new and different management approaches.

II. IMPACT OF ORGANIZATIONAL CHANGE ON IT RESOURCE MANAGEMENT

6. The manner in which IT resources are managed is influenced by the environment (both physical and organizational) in which they must be managed. At the U.S. Census Bureau, the evolution from centralized to distributed processing was described recently for executive presentation as part of a broader planning document, STRATEGIC CONCEPTS AND DIRECTIONS FOR THE FUTURE, Information Technology Directorate. Relevant excerpts are provided below.

Fundamentally, the more profound changes were:

Data Processing Environment:

From: 100% centralized mainframe data processing

To: some combination of --

- ◆ centralized mainframe data processing
- ◆ dependent, decentralized, distributed data processing
- ◆ independent, decentralized, distributed data processing
- ◆ decentralized mainframe (equivalent) data processing

Programming:

From: centralized, agency-wide programming services with tailored program writing (code)

To: decentralized programming with centralized support for standard software and use of off-the-shelf software

Operating Divisions:

From: absolute reliance on centralized, mainframe data processing with limited access to dumb terminals

To: a variety of individual data processing configurations and systems decentralized throughout the Bureau using the entire range of technology available today (personal computers, workstations, distributed processing, local area networks, etc.)

Census Employees:

From: no personal computers (dumb terminals available to computer professionals only)

To: a personal computer or workstation on every employee's desk

One event, more than any, set the Bureau's IT revolution in motion. It was a decision made by the Bureau's senior management to allow the unlimited use of free standing, personal computers in program divisions. The demand for PC's immediately soared. While not apparent at first, decentralized data processing was imminent, and a new and very different agency IT philosophy had begun. This new IT environment in the Bureau required that the mission of central IT would have to change.

III. THE ROLE OF CENTRAL IT

7. Central IT was never able to define itself well during this evolution. Rather, it was forced to change to meet the demands placed on it by new, emerging technology and EDP processes and systems that were evolving at breakneck speed in a decentralized environment. Central IT did take the lead on many user-beneficial initiatives, e.g. software site licenses, desktop computer support, and infrastructure design. But in terms of its operational mission and its responsibilities and authority vs. the rest of the Bureau, central IT's role often evolved reactively, rather than through proactive design. A new, radical IT philosophy had emerged in the Bureau and central IT was often forced to be reactive in supporting it.

8. As time passed, program divisions gained IT independence and created their own decentralized IT environments. Computer set-up and repair specialists emerged, LAN staffs were created, more powerful PC's - then workstations - then mini-computers were purchased, distributed processing began, and, finally, decentralized statistical survey processing came into existence. Statistical survey data, once the mainstay of central IT's large UNISYS and DEC centralized computer systems, were now being processed in both centralized and decentralized locations. Significantly, the dependence that once existed on a central IT organization waned.

9. It follows that the cost of central IT services came into question. Instead of the central IT organization charging the programs a fee for service for use of the mainframe computers, a flat rate method was instituted. The flat rate method, basically an annual fee distributed across organizational lines, was very difficult to administer because of year-to-year fluctuations caused by the cyclical nature of census and statistical survey work and funding. It did, however, produce the revenue needed to cover the cost of central IT, as mainframe use and its attendant revenue declined. And arguments concerning what some saw as the excessive cost of central IT operations in light of diminishing workloads, gained in legitimacy.

10. Although the Census Bureau's road to distributed processing was bumpy, there emerged distinct advantages to our distributed approach:

- ◆ Broadened access to human IT resources.
- ◆ Keeping the central IT manageable, both size and workload-wise.
- ◆ Broadened research resources and enhanced creativity.
- ◆ Greater financial flexibility.
- ◆ Reduced conflict between program operations and central IT operations (eventually).
- ◆ Easier product scheduling with fewer products.
- ◆ Greater program flexibility given to subject matter areas.

11. There were also disadvantages, early on, and they tended to affect management of IT resources.

- ◆ Maintaining efficient management of IT assets, human and infrastructure, in a less controlled, decentralized environment.
- ◆ Implementing standardization of products and processes.
- ◆ Maintaining an 'open system' approach and mentality between and among rather independent IT units, many with their own IT agenda.
- ◆ Dilution of technical talent in such areas as database management and systems programming.

IV. MANAGING IT RESOURCES IN A DISTRIBUTED IT ENVIRONMENT

12. An IT organization can not be fully decentralized and remain efficient. A balance must be struck between program area flexibility and overall corporate control. This balance is in a constant state of flux and must be monitored and managed carefully to assure economy and efficiency of operations and resource use. Certain service and support functions are more efficiently and economically administered centrally. A listing of the functions retained in the Census Bureau's reengineered central IT organization is provided in Exhibit 2.

13. While certain IT processes and functions can be decentralized efficiently, the Chief Information Officer must continue to bear management responsibility for the total of an organization's IT program, including competent management of all IT resources. The Chief Information Officer must fashion a proactive program to bridge the inevitable territorial conflicts and difficulties inherent in decentralization.

14. In our experience, the single most difficult obstacle to bridge in this new environment was organizational culture, followed closely by "we-they" attitudes. There sometimes seems to be an unavoidable clash between program interests and support service interests. Often, there are compelling

arguments and positions on both sides. However, organizational disagreement on IT issues and policy has to be minimized in a decentralized setting for efficient, successful distributed processing.

15. The first step taken by the Census Bureau was to create a "corporate" culture and attitude toward IT, organization-wide, putting to rest the "we-they" attitudes and mentalities of the past. It is here where the team building and interpersonal skills of the Chief Information Officer play a pivotal role. While a bit laborious and painstaking, we found this initial building block to be critical. A sizeable initiative was launched to create corporate bonding and team building throughout both our executive and primary operating unit levels. This initiative consisted of one-on-one meetings with all senior executive staff members and a number of key operating level managers. The agenda was open and the objective was operational bonding, as well as a candid evaluation of central IT performance from a user perspective. That initiative proceeded successfully owing to the sincerity of the effort, salesmanship, and strong leadership of our Chief Information Officer.

16. The second step was to create meaningful cooperation among all managers, program and support service alike. The Chief Information Officer created a unique organizational entity, the Information Technology Governing Board. This Board provided policy-level representation to key managers across all organizational lines. The Chief Information Officer is Chair of this Board. The Board operates with substantial independence and reports directly to the executive senior management of the agency through the Chief Information Officer, also a member of executive management. The Board is empowered to deal with any and all issues affecting IT operations in the Census Bureau, whether policy or operational. Thus far, the Board has been a success and has accomplished all that was intended. The objectives and characteristics of this Board are in Exhibit 3.

17. With a corporate approach prevailing and a solid structure in place to deal with both organizational differences and broad-based planning, three remaining resource management tools were needed to specifically enhance the management of IT resources in a distributed environment.

18. The first of these tools was a comprehensive, organization-wide "standards" program for hardware, software, and telecommunications -- a technical reference model. While such a program was already largely in place, it gained in significance as decentralization proceeded. With the enormous range of products and services available in the marketplace today and the management independence produced by distributed processing, standards are critical for both efficient resource management and operational control. Additionally, adhering to standards enables the central IT organization to provide efficient and timely user support service, as well as maintain "open systems" concepts throughout the organization. Central IT created an agency-wide help desk to support all standard products. Collaborative participation in standard setting, a logical component of distributed processing, enhanced acceptance throughout the organization.

19. The second of these tools was the establishment of organization-wide software site licenses with vendors for our standard software products. These negotiated licenses provide organization-wide use of a product or service and are extremely cost efficient compared to the alternative -- repetitive software purchases by individual users. We estimate cost savings attributable to site licenses to be in the range of \$50 million dollars over the last six years. The Census Bureau's software site license coverage includes:

- ◆ Oracle products
- ◆ SAS products

- ◆ Microsoft products
- ◆ Lotus Notes (for e-mail and calendaring)
- ◆ Netscape (for Internet applications)
- ◆ Veritas (for backup and archiving)
- ◆ Novell (operating system)
- ◆ Microsoft (operating system)

20. The third tool that was needed and only recently implemented was an enhanced IT management process for the oversight and control of all IT initiatives and assets. In the spirit of corporate behavior, the Chief Information Officer contracted with an independent, expert consulting firm to design the process, involving managers throughout the organization. The core component of this process is the Information Technology Business Plan, a standardized approach that documents the life cycle of all IT initiatives, addressing planning, budgeting, acquisition, maintenance, and disposition. A consistent, standardized approach enables the Chief Information Officer to evaluate, prioritize, and monitor IT investments over their useful life, considering both budget and operational factors. The Information Technology Governing Board, described earlier, serves as approving body for these plans and participates in priority setting, thereby enabling the Chief Information Officer to maintain control over distributed as well as central IT assets.

V. FUTURE CHALLENGES IN MANAGING IT RESOURCES

21. Today's Chief Information Officer, especially in government service, will be challenged in the future as he or she is today in not only managing IT resources efficiently but in acquiring those resources. Many of these challenges are common to large organizations in general; however, some are more unique to large statistical agencies.

22. Hiring and retaining top flight IT professionals in the U.S. Federal Service is becoming increasingly difficult, not due to labor shortage but rather intense competition for quality human resources. In the United States, the competition between the private and public sectors for IT professionals is intense. Quite recently, the U.S. Federal Government increased pay rates in an effort to better attract computer professionals. Even with pay rate adjustments, we are finding it difficult to compete and attract top IT talent to the federal sector. This condition elevates the importance of maintaining a proper and economical mix of IT resources between outsourced (contract) services and internally provided services.

23. Acquisition of financial resources to accommodate a support service as dynamic and changing as Information Technology is truly challenging. The level of innovation and improvement in IT processes and products and the speed with which these phenomena occur create an ongoing challenge. Today's technology is fleeting and quickly replaced with new concepts, innovation, and faster hardware. It seems impossible to retain 'state of the art' standing and, at the same time, be conservative in defining future financial needs. Yet, there is a demand for conservatism in budgeting. A mentality of fiscal conservatism seems at odds with the dynamics of IT, but it exists nonetheless.

24. Particularly in the statistical community, the issue of data security and confidentiality has moved to the forefront. In the United States, the confidentiality of data collected by the Census Bureau is protected by law. With the explosive role of Information Technology in data collection, processing, and dissemination, investment in impenetrable firewalls and other security measures has been mandated. This

is due to innovative technological changes, such as Internet, Intranet, and electronic data dissemination programs. Also, internet data collection, which the Census Bureau experimented with in its year 2000 Population and Housing Census, will add emphasis to security and confidentiality concerns. The acquisition and management of IT resources to support a secure and safe IT environment for sensitive data can only grow in importance.

25. In distributed IT environments, Chief Information Officers will be challenged to move large amounts of data in and across various platforms in a consistent way. The techniques employed by the Census Bureau that were discussed earlier, i.e., standards, site licenses etc., assume greater importance when traditional, centralized resource management is not available.

VI. WHAT HAVE WE LEARNED AND HOW CAN OTHERS BENEFIT FROM OUR EXPERIENCE

26. Over the past 15 years, the U.S. Census Bureau's Information Technology program has been transformed from a centralized service organization to a decentralized, distributed one. During this experience, certain lessons have become clear, particularly in hindsight. The most important of these from the perspective of sound IT management practice follows.

27. First, a corporate mentality and approach are essential to manage IT resources successfully in a decentralized environment. A corporate view must take precedence over individual operating styles and preferences, if the total of an IT program is to operate harmoniously and effectively. This means cooperation across organizational lines from the senior management level to the operating level. "We-they" scenarios undermine effective decentralization if allowed to flourish.

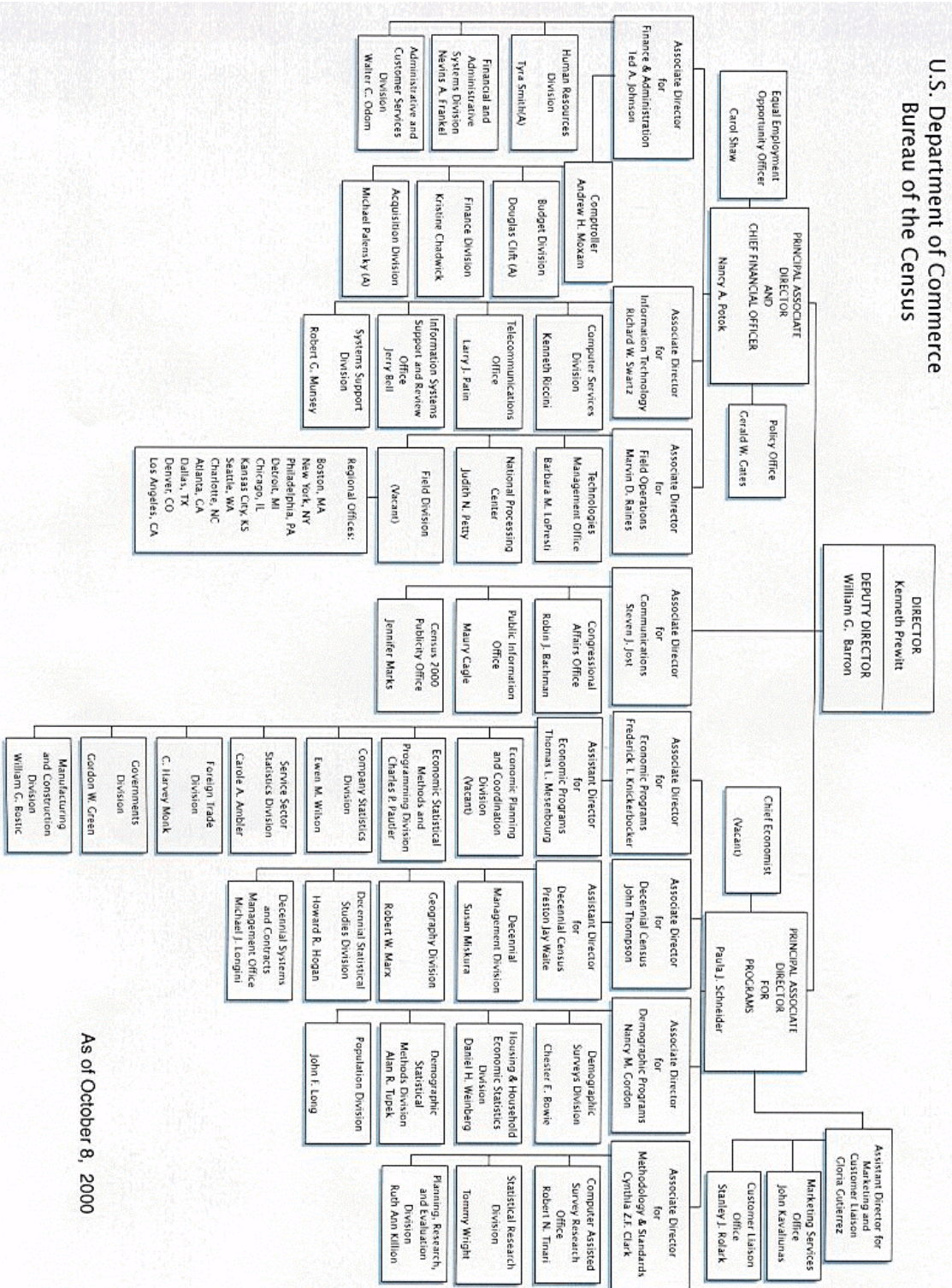
28. The Census Bureau concluded that the most successful way to assure a corporate approach was to fashion our leadership and work processes more like those of a private corporation, yet within the restraints of our government. So the Census Bureau chose to create its version of a private sector board of directors, the Information Technology Governing Board. The combination of intra-agency cooperation and the Board have changed the Information Technology culture of our agency.

29. The Chief Information Officer must actively lead IT resource management in either a centralized or decentralized environment. However, this is especially critical in a decentralized environment. Ultimately, key IT resource decisions must be made and few organizations will consistently accomplish this by committee. The Chief Information Officer must ultimately make those decisions, but in an informed and corporate setting.

30. Roles and responsibilities must be clearly understood. All parties in the IT environment must understand the roles and responsibilities of each other as they pertain to centralized and decentralized IT operations.

31. For example, as our decentralized scheme evolved and owing to some combination of telecommunications innovation and operational demands, the Census Bureau found itself with six decentralized local area network systems. Each alone is efficient and meets the operating needs of those they service. When taken as a whole, however, they are not cost efficient because they are redundant. While we are in process of correcting this condition, the cure is far more difficult than it should have been. Clear definition of roles and responsibilities in local area network management early on would have eliminated the need for a later remedy.

32. A strong and creative Chief Information Officer is fundamental in either a centralized or decentralized environment, but certainly more so in the latter with regard to resource management. The attributes of the Chief Information Officer reach beyond mandatory technical competence and must embrace a cadre of human resource and organizational skills. Clearly, this presents the Chief Information Officer with added institutional challenge, but also opportunity. The building of a corporate sense, bonding between different organizational units with inherently different sets of disciplines and priorities, interpersonal management skills that go beyond technical competency, vision, salesmanship, and leadership must emanate from the Chief Information Officer. The Chief Information Officer must lead and manage IT resources through consensus building and corporate attitude, as opposed to the traditional dictatorial rule often associated with centralization. Unless the total IT organization has confidence that the Chief Information Officer will represent their best interests, along with his or hers and those of the institution, the likelihood of efficient IT resource management and the success of a decentralized IT program is easily jeopardized.



BUREAU OF THE CENSUS
Information Technology Directorate

Summary of Central IT Support and Service Activities

Enterprise Infrastructure

1. **HARDWARE:**

- ◆ statistical data processing services and systems management (UNISYS, DEC, SGI, SUN)
- ◆ Bowie Computer Center management (off-site data processing facility)
- ◆ corporate tape library services

2. **SOFTWARE:**

- ◆ corporate software acquisition and support (site licenses)
- ◆ software training

3. **TELECOMMUNICATIONS:**

- ◆ voice mail support and service (including cell phones and beepers)
- ◆ electronic mail services
- ◆ Internet support (including firewall and infrastructure support)
- ◆ wide area network management
- ◆ local area network management (administrative operations only)

4. **OTHER OR CROSS-CUTTING:**

- ◆ IT standards (technical reference model)
- ◆ Intranet support and services
- ◆ data archiving and back-up
- ◆ data and knowledge management/metadata
- ◆ corporate level research management
- ◆ technical consultation services to users
- ◆ on-call program support to users (special projects)
- ◆ corporate IT seminar program
- ◆ IT committee management
- ◆ IT Governing Board management and leadership
- ◆ desktop computer services (hardware [PC] purchases, software deployment, help desk, PC repair, etc.)
- ◆ procurement and contract administration
- ◆ strategic and long range planning and coordination

BUREAU OF THE CENSUS
Information Technology Governing Board

Objectives and Characteristics

Introduction:

The Information Technology Governing Board was established on April 20, 2000 to assist the Chief Information Officer (CIO) in planning and managing Census IT operations and resources. The Board is a consulting and decision making body which represents the interests of all organizational areas in the Bureau. It is a professional resource to the Census Bureau's Executive Staff, functioning much like a corporate board of directors. Board members bear the joint responsibility of representing their Directorates as well as the corporate interests of the Census Bureau.

Membership:

The CIO in consultation with Principal Associate Directors will appoint the seven member Board. The CIO will serve as Board chairperson. The Chair and the respective Associate Director must approve additions and changes to the Board.

Objectives:

- ◆ create a cross-organizational group to assure Bureau-wide representation and perspective in IT planning and management (a corporate view)
- ◆ provide diverse organizational input into corporate decisions
- ◆ assure IT systems, resources and processes are compatible and meet corporate operating needs
- ◆ develop, review and set priorities for IT strategic plans and goals
- ◆ assist the CIO in administering an enhanced IT management process, including the review, prioritizing, approval and monitoring of IT Business plans
- ◆ assure operating units represented are in compliance with corporate decisions and directions
- ◆ capitalize on the broad range of skills and experience available throughout the organization.

Operating Characteristics:

The Board will have standing monthly meetings and published meeting notes. Special meetings will be convened as needed. The Board will employ a corporate, consensus oriented decision process, with the Chairperson and CIO ultimately responsible. The Board will appoint special committees and task forces to undertake projects and issues requiring examination and evaluation. Such groups will report findings to the Board for decision making. The broad agenda for this Board may encompass any and all IT matters deemed appropriate by the Chair.