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Getting Federal Computers Ready for 2000

Report of the U.S. Office of Management and Budget

February 6, 1997

The Year 2000 computer problem is a seemingly simple one: assuring that computers will recognize the correct year when the year 2000 arrives. If software programs are not prepared to handle the change of date on January 1, 2000, there is a risk to government information systems and the programs they support.

This report responds to 1997 appropriations language which directs OMB to submit to the House Committee on Appropriations, the House Committee on Government Reform and Oversight, and the House Science Committee a report which includes: a cost estimate to ensure software code date fields conversion by the year 2000; a planned strategy to ensure that all information technology, as defined by the Information Technology Management Reform Act of 1996, purchased by an agency will operate in 2000 without technical modifications; and, a time table for implementation of the planned strategy

The report is to be submitted with the President's 1998 budget. (Committee Report accompanying Public Law 104-208.)

BACKGROUND

People often use short hand to describe the year. When asked what year it is, we answer "97". When we fill in the date on paper forms we write 2/2/97. The same approach was used in designing many computer systems.

With the arrival of the year 2000, people will know that the year "00" stands for 2000. However, the hardware and software in many computer systems will not understand this new meaning. Unless they are fixed or replaced, they will fail at the turn of the century in one of three ways:

they will reject legitimate entries, or

they will compute erroneous results, or

they will simply not run.

Many systems which compare dates to decide which is earlier will no longer work. Comparisons of dates permeate Federal computer systems -- they are how inventories are maintained (e.g., last in, first out), how the order of filings is handled (e.g., first come, first served), and how eligibility is determined (e.g., an applicant must have filed before a certain date).

Systems which calculate length of time also may not compute accurately. Computations of length of time are common in Federal computer systems -- they are how benefits are computed (e.g., based on length of time), how eligibility is determined (e.g., based on length of service), and how expiration dates are calculated (e.g., expires after three years).

There are other possible effects of the date change in computer software, depending on the assumptions made and programming technique used by the designer of the software. For example, information relevant to a year could be found by using the year to find the information in a table. For example, information about 1997 would be at the 97th location in the table. Such a technique would fail in the year "00" because there is no 0th location.

IMPACT

The potential impact on Federal programs if this problem is not corrected is substantial and, potentially very serious. Federal agencies are therefore taking steps to ensure a smooth transition, and fixing the problem is generating, a high level of interest and energy. The challenge for the next three years is to manage that interest and energy effectively and efficiently so that the systems upon which Americans all depend will operate smoothly through the year 2000 and beyond.

There are several unique characteristics of this problem that shape the Federal strategy for addressing it. First, it has an unmovable deadline. Unlike other computer development or maintenance activities, the deadline for fixing the year 2000 problem is not set administratively, but by the problem itself. Repairs must therefore be fully tested and

implemented by December 31, 1999. This characteristic makes *time* the single most critical resource.

Second, unlike a normal system development or maintenance activity, many systems must be tackled concurrently. Comparisons and computations using dates permeate computer systems within the Federal government, throughout State and local governments, and in the private sector. There is thus a real potential for substantial strain on another key resource -- *expertise*.

Third, *complexity* is increased by concurrent changes to multiply systems and elements within a system (e.g., the operating system). Because computer systems inter-operate and share data, the modified systems must be tested together. Furthermore, all of these changes must be made and tested while the current systems continue to operate.

CHIEF INFORMATION OFFICERS

Federal management of information technology has dramatically changed in the past year as a result of the Clinger-Cohen Act of 1996 (formerly known as the Information Technology Management Reform Act of 1996)(40 U.S.C. 1401 et seq.). That Act established Chief Information Officers (CIO's) in each Federal agency with responsibility for maintaining a sound information technology architecture for the agency. In addition, Executive Order No. 13011 (July 16, 1996) established the Chief Information Officers Council, chaired by OMB, as the principal interagency forum to improve agency practices on the use of information technology. Year 2000 issues have been discussed at every CIO Council meeting to date. Agency CIO's acting within their agencies and through the CIO Council will provide the leadership and assure that the work is done to address the year 2000 computer problem.

In 1995, OMB formed an interagency working group on the year 2000, chaired by a representative of the Social Security Administration. That working group was recently adopted as an official working group of the CIO Council.

PLANNED STRATEGY

The Government's strategy is predicated on three considerations.

First, senior agency managers will take whatever action is necessary to address the problem once they are aware of its potential consequences. Those consequences would, after all, directly affect their ability to carry out the agency's essential functions.

Second, there can and will not be a single solution. Solving this problem requires technicians and engineers to write or revise software code and to replace hardware. A "silver bullet" is a logical impossibility. There is only a need for hard work, strategically directed, and plenty of it.

Third, given the limited amount of time, emphasis will be on mission critical systems. In many agencies such systems are large and complex, which means they will require the most time and be the most challenging to fix.

The Federal strategy relies on the newly established CIO's to direct that work and to follow industry's best practices. Those best practices include five phases:

- * raising management *awareness* of the problem,
- * *assessing* the scope of the problem by inventorying systems and deciding which ones to change, replace or discard,
- * *renovating* the system to be changed,
- * *validating* and testing the changed systems, and
- * *implementing* the revised systems (including developing a contingency plan).

Detailed steps in each phase have been developed by the interagency working group on the year 2000 and are available for agencies on the GSA sponsored year 2000 home page at <http://www.itpolicy.gsa.gov>.

SCHEDULE

OMB, in consultation with the CIO Council, has set government-wide milestones (shown below) for completion of the *majority* of the work in each phase of agency year 2000 activities. These phases, while sequential, overlap. For example, the awareness phase continues throughout the entire process.

Government-wide Year 2000 Milestones

Phase	Completion Measure	Completion Date
Awareness	Agency Strategy Approved by CIO	12/96
	Inventory and Scope Completed	3/97
Assessment	System Plans & Schedules Approved by CIO	6/97
Renovation	Coding Completed	12/98
Validation	Management Sign-off	1/99
Implementation	Integrated Testing Completed	11/99

Attachment A to this report shows major agencies' current progress and plans for completing each phase. In many cases the plans consolidate milestones from individual components and systems within the agency. Agency CIO's are taking steps to accelerate their year 2000 activities to meet these goals.

COST

OMB Memorandum No. 97-02, "Funding Information Systems Investments" (October 25, 1996), outlines the policy criteria to be used in making funding decisions for all investments in major information systems. One of these criteria is that the investment be consistent with the agency's year 2000 compliance plan. In addition, agencies are funding year 2000 work by redirecting resources from other planned activities (e.g., modernization), because it does not make sense to spend money on upgrades if the basic system will fail to operate. These policies are reflected in funding decisions for major information systems in the President's 1998 budget.

Agencies estimate that they will spend \$2.3 billion between FY 1996 and FY 2000 on the year 2000 computer problem. Attachment B includes agency-by-agency estimates of the cost to ensure that systems will work smoothly through the year 2000. The estimates cover the costs of identifying necessary changes, evaluating the cost effectiveness of making those changes (fix or scrap decisions), making changes, testing systems, and contingencies for failure recovery. The estimates do not include the costs of upgrades or replacements that would otherwise occur as part of the normal system life cycle. They also do not include the Federal share of the costs for state information systems that support Federal programs. The figures provided by agencies are preliminary estimates. Better estimates will become available after all agencies have completed the assessment phase.

GOVERNMENT-WIDE ACTION

Five government-wide actions compliment individual agency efforts.

1. OMB is *raising the awareness* of the most senior managers in Federal agencies to the magnitude of this problem;
2. The Chief Information Officers Council and the interagency working group on the year 2000 are promoting the *sharing* of management and technical expertise;
3. The government is *acquiring* only year 2000 compliant information technology, using standard contract language;
4. OMB and the CIO Council are *removing barriers* that could impede technicians fixing existing systems; and
5. OMB is *monitoring* agencies' progress to assure they are on schedule.

1. Raising Awareness

The President' Management Council, comprised of the chief operating officers of major departments and agencies has discussed the year 2000 problem on several occasions. OMB has been meeting individually with those chief operating officers to ensure they are appreciated the risk this problem poses and the difficulty of solving it.

Raising awareness is a continuing challenge. OMB will continue to assist the agencies in this area as new senior officials comes into the government during 1997. The recent inclusion by the General Accounting Office of year 2000

on its list of "high risk" areas will also assist in focusing attention to the immediacy of the problem.

2. Sharing Expertise

Some Federal agencies have considerable experience working on this problem. The Social Security Administration, for example, has been actively engaged since 1989. The interagency working group is taking advantage of such experience and promoting the sharing of expertise and solutions across agencies.

The interagency working group has also developed a list of products that are being used by Federal agencies, along with information about whether they will work through the year 2000. That list is available on the year 2000 World Wide Web page for Federal managers' use. The Defense Information Systems Agency has developed a similar list of generally available products, which is also available from the year 2000 Web page. This information is invaluable to managers as they evaluate the extent of the year 2000 problem in their system.

The President's budget includes resources to establish a dedicated year 2000 program office at GSA. Such an office will provide a core of expertise government-wide to assist agencies in formulating approaches and evaluating options to solve the problem in their systems.

3. Acquire Only Products that are Year 2000 Compliant

At the recommendation of the CIO Council and the interagency working group, agencies have stopped acquiring information technology that will not work in the year 2000. Regulatory language to effect this strategy was developed by the interagency working group on the year 2000 and the CIO Council, approved by the Federal Acquisition Regulation Councils, and published in Federal Acquisition Circular 90-45 (December 1996).

That language defines year 2000 compliant to mean

"information technology that accurately processes date/time data (including, but not limited to, calculating, comparing, and sequencing) from, into, and between the twentieth and twenty-first centuries and the years 1999 and 2000 and leap-year calculations. Furthermore, year 2000 compliant information technology, when used in combination with other information technology, shall accurately process date/time data if the other information technology properly exchanges date/time data with it."

Finally, GSA is revising its Multiple Award Schedule contracts to assure that products on those schedules identify whether they are, or when they will be, year 2000 compliant. This will help agencies to acquire only year 2000 products from those schedules.

4. Removing Barriers

Solutions to the year 2000 problem in operational systems require technicians to undertake the time-consuming work of analyzing and fixing systems. There are, however, things that only can be done to speed this work. The interagency working group is helping to identify such measures, and the CIO Council is working expeditiously to implement them. One example is specifying a standard way to communicate dates among agencies. At the urging of the interagency working group, the National Institute of Standards and Technology (NIST) amended the Federal digital date standard to a 4-digit year and strongly encouraged agencies to follow it *for data interchange among agencies*. (1) In January 1997 the CIO Council adopted the NIST standard for all data exchanges among agencies. Based on common industry practice, the NIST standard will probably become a formally adopted standard through the normal standards-development process. The Council adopted it now because agencies can not afford to wait on a lengthy formal process. Technicians need answers today.

5. Monitoring Progress

OMB will require agencies to report their progress quarterly. The interagency working group and CIO Council are helping OMB develop that reporting requirement. This report will be used by OMB to monitor agency activity to assure that year 2000 activities remain on schedule. With the assistance of GSA, OMB will publish a summary of these reports within one month of their receipt.

CONCLUSION

The Federal government is making considerable progress in addressing the year 2000 problem in Federal computer systems. We are also well aware of the work that has yet to be done, and appreciate that there is a limited amount of time left to do it -- less than 35 months. But the new CIO's are working hard to accelerate agency activities to address this challenge, and we are confident that the problem will be solved without disruption of Federal programs.

Agency Progress and Plans for Achieving Year 2000 Compliance

Agency	Awareness	Assessment Scope	Assessment Schedule	Renovation	Validation	Implementation
Agriculture	11/96	4/97	6/97	9/98	9/99	10/99
Commerce	8/96	12/96	3/97	12/98	1/99	10/99
Defense	12/96	3/97	12/97	12/98	6/99	11/99
Air Force	6/96	3/97	5/97	1/98	7/98	12/99
Army	12/96	3/97	3/97	9/98	12/98	10/99
Navy	12/96	3/97	12/97	12/98	6/99	11/99
Education	12/96	2/97	6/97	9/98	9/98	3/99
Energy	6/96	1/97	1/97	1/99	1/99	12/99
HHS	11/96	1/97	6/97	12/98	1/99	11/99
HUD	11/96	4/97	6/97	12/98	7/99	11/99
Interior	12/96	4/97	7/97	12/98	1/99	11/99
Justice	3/96	9/96	9/96	12/99	12/99	12/99
Labor	12/96	3/97	6/97	12/98	6/99	12/99
State	6/96	12/96	6/97	9/98*	10/98*	8/99*
Transportat'n	12/96	8/97	12/97	12/98	1/99	11/99
Treasury	5/96	4/97	7/97	12/98	12/98	11/99
VA	1/97	1/98	2/98	11/98	12/99	12/99
AID	11/96	3/97	6/97	11/98	7/99	7/99
EPA	12/96	3/97	6/97	12/98	1/99	11/99
FEMA	12/96	3/97	6/97	12/98	1/99	11/99
GSA	11/96	3/97	6/97	12/98	1/99	10/99
NASA	1/97	2/97	3/97	6/99	7/99	12/99
NSF	9/96	1/97	6/97	6/98	12/98	12/99
NRC	6/96	6/97	9/97	3/99	4/99	11/99
OPM	12/96	3/97*	6/97*	12/98	11/99	12/99
SBA**	4/96	6/96	9/96	12/98	12/98	12/99
SSA	3/96	3/96	5/96	11/98	12/98	11/99

* -- Applies to Mission-critical systems only

** -- Replacing system through planned migration to client/server environment

ESTIMATED AGENCY YEAR 2000 OBLIGATIONS

(Dollars in Millions, by Fiscal Year)

Agency	1996	1997	1998	1999	2000	TOTAL
Agriculture	2.6	20.0	34.3	26.6	5.7	89.2
Commerce	2.3	16.2	33.6	28.3	9.3	89.7
Defense						
Air Force	0.0	98.5	259.7	14.8	0.0	371.0
Army	0.0	87.0	87.0	44.0	0.0	218.0
Navy	3.0	24.0	26.0	22.0	15.0	90.0
D - Other	N/A	N/A	N/A	N/A	N/A	290.6
Education	0.0	0.2	3.0	4.0	0.0	7.2
Energy	1.8	21.2	44.7	43.5	16.9	128.1
HHS	27.7	42.9	14.5	5.6	0.0	90.7
HUD	0.7	11.0	35.0	15.0	6.2	67.9
Interior	0.2	2.6	4.5	2.2	1.8	11.3
Justice	0.3	2.5	8.9	10.3	0.2	22.1
Labor	1.7	5.3	4.6	2.2	1.5	15.2
State	0.5	47.6	56.4	29.1	1.6	135.2
Transport'n	0.2	12.4	22.1	39.7	6.1	80.4
Treasury	1.3	55.0	102.0	119.1	41.0	318.5
VA	4.0	49.0	49.0	42.0	0.0	144.0
AID	0.0	0.2	1.0	0.0	0.0	1.2
EPA	0.8	3.3	6.8	5.6	2.3	18.8
FEMA	3.8	4.4	3.0	3.2	1.2	15.6
GSA	0.2	0.5	0.6	0.2	0.0	1.6
NASA	0.0	6.6	14.4	10.6	1.1	32.6
NSF	0.0	0.2	0.3	0.1	0.0	0.6
NRC	N/A	2.6	2.9	2.9	0.9	9.3
OPM	1.7	0.3	0.9	0.6	0.2	3.7
SBA	2.7	2.3	1.9	0.0	0.0	6.9
SSA	2.2	15.4	9.5	6.0	0.0	33.1
TOTAL	57.7	529.1	826.4	477.5	110.9	2292.4

Notes:

1) These estimates cover "the costs of identifying necessary changes, evaluating the cost effectiveness of making those changes (fix or scrap decisions), making changes, testing systems, and contingencies for failure recovery". They do not include "obligations for upgrades or A-11, Section 43.2(c))

3) N/A means "not available"

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