

SOLVING THE YEAR 2000 COMPUTER PROBLEM

JOINT HEARING

BEFORE THE

SUBCOMMITTEE ON TECHNOLOGY

OF THE

COMMITTEE ON SCIENCE

AND THE

SUBCOMMITTEE ON GOVERNMENT MANAGEMENT,
INFORMATION, AND TECHNOLOGY

OF THE

COMMITTEE ON GOVERNMENT REFORM
AND OVERSIGHT

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SOLVING THE YEAR 2000 COMPUTER PROBLEM

TUESDAY, SEPTEMBER 10, 1996

HOUSE OF REPRESENTATIVES, COMMITTEE ON SCIENCE,
SUBCOMMITTEE ON TECHNOLOGY, JOINT WITH THE
COMMITTEE ON GOVERNMENT REFORM AND OVERSIGHT,
SUBCOMMITTEE ON GOVERNMENT MANAGEMENT, IN-
FORMATION, AND TECHNOLOGY

Washington, DC.

The Subcommittees met at 10:30 a.m. in room 2318 of the Rayburn House Office Building, the Honorable Stephen Horn and the Honorable Constance A. Morella, Chairpersons of the Subcommittees, presiding.

Mr. HORN. The joint hearing of the Subcommittee on Government Management, Information, and Technology of the House Committee on Government Reform and Oversight, and the Subcommittee on Technology of the House Committee on Science will commence.

The co-Chairwoman, Mrs. Morella, will be here shortly. To stay on schedule, I'm going to begin now with my opening remarks and show a couple of exhibits as the background for the hearing.

I certainly thank our colleagues on the Committee on Science for cooperating in this effort. We will be taking different portions of the testimony today to preside.

The efforts that both Committees have made have certainly increased public awareness about one of the most important challenges confronting us in our daily use of technology.

On April 16, 1996, the Subcommittee on Government Management, Information, and Technology held a hearing to determine the extent of the Year 2000 computer problem. The hearing revealed that there is a serious lack of awareness of the problem on the part of a great number of people in business and in government at various levels. Even more alarming was the cost estimate to the Subcommittee to remedy this problem, which was said to be \$30 billion for the Federal Government alone; possibly \$600 billion worldwide; \$300 billion in the United States, primarily in the private sector.

In response to these findings I and my colleagues developed a number of questions to better understand what federal agencies are doing to prevent a possible disaster. The responses received from federal agencies in most cases provided us with limited information on when and at what cost agencies planned to correct this potentially disastrous computer software conversion problem. Even with this limited information an outline forms which portrays a Federal

Government unable to meet the challenges of the 21st Century because of a lack of awareness and preparedness.

At this time I would like to insert a summary of the information received by the subcommittee for the record, and, without objection, that will be included.

[The documents referred to follow:]

CRS Report for Congress

The Year 2000 Computer Challenge

Richard M. Nunno
Analyst in Information Technology
Science Policy Research Division

Updated August 30, 1996



Congressional Research Service • The Library of Congress



The Year 2000 Computer Challenge

SUMMARY

Most computer systems in use today can only record dates in a two-digit format for the year. Under this system, computers will fail to operate properly when years after 1999 are used, because the year 2000 is indistinguishable from 1900. This problem could have a serious impact on a wide range of activities that use computers. Information systems must be inspected, and modified, if necessary, before January 1, 2000 to avoid major system malfunctions.

Many managers initially doubted the seriousness of this problem, assuming that an easy technical fix would be developed. Several independent research firms, however, have refuted this view, with the conclusion that inspecting all computer systems, converting date fields where necessary and then testing modified software will be a very time-consuming and costly task. Research firms predict that due to a lack of time and resources, the majority of U.S. businesses and government agencies will likely not fix all of their computer systems by the start of the new millennium. Most agencies and businesses have come to understand the difficulties involved, although some have not yet started implementing changes. Several companies have emerged offering services to work on year-2000 conversion, and software analysis products are commercially available to assist with finding and converting flawed software code.

Federal agencies are generally aware of the year-2000 challenge and most are working to correct it. Agencies that manage vast databases, conduct massive monetary transactions, or interact extensively with other computer systems, face the greatest challenge. An interagency committee has been established to raise awareness of the year-2000 challenge and facilitate federal efforts at solving it. The interagency committee has initiated several actions, such as requiring vendor software listed in future federal procurement schedules to be year-2000 compliant and specifying four-digit year fields for federal computers. The shortage of time to complete year-2000 computer changes may force agencies to prioritize their systems. Agencies may also need to shift resources from other projects to work on year-2000 efforts. State and local governments, as well as foreign organizations, will also have significant year-2000 conversion problems.

Congressional hearings have been held recently to investigate the year-2000 challenge, and several legislative provisions are moving through Congress, giving direction to federal agencies. Several options exist for congressional consideration. One option is to provide special funding to federal agencies for year-2000 conversion. While agencies are reluctant to request additional funds, some observers contend this may be necessary. Another option is to give agencies increased autonomy in reprogramming appropriated funds for year-2000 efforts. A third, less controversial, alternative is to continue to raise public awareness through hearings and oversight of federal efforts.

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The Year 2000 Computer Challenge

DESCRIPTION OF THE PROBLEM/CHALLENGE

Most computer systems in use today record dates in a format using a two-digit number for the year; for example, 96 represents the year 1996. The two-digit year field is very common among older systems, designed when memory storage was more expensive, but is also used in many systems built today. With this format, however, the year 2000 is indistinguishable from 1900. The year data field in computer programs performs various functions, such as calculating age, sorting information by date, or comparing multiple dates. Thus, when years beyond 1999 are entered under this format, computer systems will fail to operate properly. Given society's increasing reliance on computers, this problem could have a significant impact on a wide range of activities and interests worldwide, including commerce, government operations, military readiness, and the overall economy.

Computer systems of all sizes (mainframe, mini, and micro) as well as local area networks and telecommunication systems must be assessed for this problem and converted to a four digit year field where necessary. Year data fields must be corrected in operating systems, compilers, applications, procedures, and databases. Unfortunately, it is often impossible to determine whether and how a computer system needs to be modified without reviewing all of its software code. While correcting the problem for stand-alone PCs may not be difficult, experts agree that all computer systems need to be inspected, corrected, and tested before the start of the next millennium, January 1, 2000, to avoid major system malfunctions.

SHOULD WE BE CONCERNED?

Research conducted by several independent consulting firms concludes that the problem is formidable. The Gartner Group, an information technology research firm, estimates that it may cost \$30 billion to correct the problem in government computer systems of the federal agencies and up to \$600 billion worldwide. This is based on an estimated average cost of \$1.10 per line of software code. Other independent research firms, including IDC Government (an information technology consulting firm) and the Mitre Corporation (a Federally Funded Research and Development Center), do not dispute this estimate.¹

¹Because funding for Mitre Corp. is limited by Congress, working on year-2000 projects precludes research in other areas, removing an incentive to exaggerate the problem. Another independent source (Peter de Jager) places the Gartner Group estimate at the low end of the range of possible costs.

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While correcting the year field is technically simple, the process of analyzing, correcting, testing, and integrating software and hardware among all computer systems that must interact is a very complex management task. In most cases, it is too expensive to re-write software code for the entire system. The overall task is made more difficult by the plethora of computer languages in existence today, the lack of source code and documentation for older software, and the shortage of programmers with skills in older languages. As a further complication, the year 2000 is a special leap year that only occurs every 400 years to keep the calendar accurate.² Many software products will not account for the extra day needed in the year 2000.

Many business managers initially doubted the seriousness of this problem, assuming that an easy technical fix would be developed. Others suspect the software services industry was overstating the problem to sell their products and services. For example, the Information Technology Association of America (ITAA), which represents the software and information services industry, has stated that for all U.S. computing systems, estimates for fixing the year field range between \$50 and \$75 billion. Some wonder whether ITAA could be exaggerating the problem to bolster the demand for consulting services of its member companies. Some question the objectivity of the cost estimates from other research firms, since these firms are providing services for year 2000 conversion. One critic suggests that because this is one of the few software problems that lay people can understand, it is easy for software services providers to generate concern among managers and obtain additional resources for software maintenance.³

After investigating the problem, however, many computer scientists, programmers, and more recently, their managers, appear to have assessed the magnitude of the problem, and the resources and time necessary to correct it, as formidable.⁴ Most agencies and businesses are convinced that this issue warrants executive-level attention. They point to specific problems that have already occurred and numerous others that will occur if it is not fixed. All vulnerable computer systems must be fixed by January 1, 2000 to avoid widespread erroneous automatic transactions that could be irreparable. Some programs that work with future dates may encounter problems before the next millennium. Others have already had problems. Many software products that are currently on the market are not year-2000 compliant. Some potential consequences of failing to convert systems using a two-digit year are listed in Box 1.

STRATEGIES FOR CORRECTING THE PROBLEM

Software analysis tools can be useful to assess the extent of the problem for specific cases. Software tools are commercially available to assist with the conversion of year fields to four digits. Various tools can identify locations in software code where

²Leap years occur every 4 years except years divisible by 100. However, century years are leap years if they are divisible by 400, such as 2000.

³Nicholas Zvegintzov, *The Year 2000 as Racket and Ruse*, American Programmer, Feb., 1996.

⁴A recent report by J.P. Morgan Securities Inc. offers a "very conservative" year-2000 cost estimate of \$200 billion worldwide. The study also says that 50% of an organization's technology budget will be dedicated to fixing the problem from now until the year 2000.

-
- The Social Security Administration would miscalculate the ages of citizens, causing payments to be sent to people who are not eligible for benefits while those who should be eligible would not receive their payments.
 - The Internal Revenue Service would miscalculate the standard deduction on its income tax returns for persons over age 65, causing incorrect records of revenues and payments due.
 - Certain Defense Department weapon systems could fail to function properly if used during or after the turn of the century.
 - The Federal Aviation Administration's air traffic controllers could generate erroneous flight schedules that may misguide aircraft or cause takeoff or landing conflicts.
 - State and local computer systems could become corrupted with false records, causing errors in income and property tax records, payroll, retirement systems, motor vehicle registrations, utilities regulation, and a breakdown of some public transportation systems.
 - The banking industry's schedules for various loans and mortgages could be erroneously updated after the year 2000.
 - Securities firms and insurance companies could produce erroneous records of stock transactions or insurance premiums.
 - Telephone companies (both long distance and local) could record dates incorrectly, causing errors in consumers' bills or a lapse in service.
 - Credit cards with expiration dates after the year 2000 could fail the credit check that is routinely performed when a purchase is made.
 - Data on pharmaceutical drugs with expiration dates after the year 2000 would indicate that the medication has expired.
 - Medical records could become corrupted leading to improper treatment of patients.
 - Businesses of all types and sizes may make errors in their planning, budget, accounts receivable, purchasing, accounts payable, revenue, pension/loan forecasts, payroll, garnishments, material supplies, and inventories.

Box I. Potential Consequences of Failing to Address the Year 2000

date references occur, make the necessary changes, and test the upgraded system. Testing is particularly laborious because the modified software must be tested in conjunction with all possible combinations of other software programs it interacts with to ensure functioning has not changed. There may not be enough time, however, for in-house personnel at many agencies to purchase a software analysis tool, learn how to use it, and perform the software conversion and testing. According to one estimate, these tools can only reduce the human work-time by 20-30% at most.⁵ Furthermore, sharing analysis tools in most circumstances is prohibited under copyright laws.

Another consideration is whether to use contractor support, in-house personnel, or some mix of the two. Several companies have emerged offering services to work on

⁵Bruce Hall, Research Director, Applications Development and Management Division, Gartner Group, Federal Conference on Year-2000 Conversion, Dept. of Commerce, May 2, 1996.

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year-2000 conversion. Many businesses and government agencies may be able to address the problem more efficiently and effectively by hiring experienced contractors.⁶ Unfortunately, many of the firms that specialize in year-2000 conversion are already under contract with the larger private sector corporations. If in-house staff have an in-depth understanding of the software, the company may be better off working on the conversion internally. In many cases, a combination of in-house and contractor support will be used.

Several other technical issues must be considered. Many experts say that software should be analyzed, and modified if necessary, before the start of 1999, to leave ample time to test and debug the upgraded system while running in parallel with the existing system. This would leave only two and a half years to complete the conversion process. In some cases, the problem can be fixed without having to add two more digits to the year field. For example, in some cases where the date is printed rather than used for further calculations, the number 19 can be replaced by 20 in front of the two-digit year for years after 1999. This would be easier than converting to a four digit year field, and would work until the year 2100, when new computer technology should be in use. Most computer functions that calculate an age or compare two different ages will likely require changing the year field to four digits.

Another major concern is that even if a company or government agency corrects the problem within its own system, it may need to interact with other computer systems. Other systems that are not year-2000 compliant could send false information into the corrected databases, corrupting those databases. Flawed data can easily enter from the private sector into government agencies' databases, and from foreign countries into U.S. computer systems.

While the technology exists to address the problem, the two main constraints in the year-2000 challenge are funding and time. Because of the skepticism over the seriousness of the problem, computer programmers have had difficulty convincing their managers that resources should be put into this effort. The extra time taken to generate awareness at all levels in organizations has led to procrastination and delays in starting the work. Some of the blame can also be assessed to the programmers and software companies that did not use four digit year fields in their products. Correcting the year-2000 problem will prevent companies from making costly errors (or going out of business) but will not contribute to increased productivity or enable a business to provide any new service. In addition, for some organizations, analyzing, recompiling, and testing the software will require more computer resources than are currently available without interrupting normal production. Companies may well experience substantial opportunity costs resulting from the need to use resources originally planned for other software projects.

STATUS OF FEDERAL AGENCY EFFORTS

The information resources management personnel at most federal agencies are aware of the problem and are beginning to take corrective action. The Social Security Administration (SSA) identified the problem in 1989 and is the furthest along among

⁶Before hiring a contractor, some organizations have checked the validity of the contractor's assessment of the problem by running an independent software analyzer on their software code.

federal agencies. SSA plans to complete and test all software changes by December 31, 1998, and run the corrected software in production one full year before 2000.⁷

The Department of Defense (DOD) has more recently become involved with the year-2000 challenge, with the different DOD organizations at various phases of solving it. While DOD's finance community began to address the problem in 1991, for many DOD systems the work has not yet begun. A major problem for DOD is managing the efforts across all of the services and defense agencies to maximize efficiency and coordinate changes among systems that interact across organizations. DOD has adopted a decentralized approach, allowing each service and defense agency determine how to best solve its own year-2000 issues. The DOD coordinator is the Principal Director for Information Management under the Assistant Secretary for Command, Control, Communications, and Intelligence, in the Office of Secretary of Defense. This office, assisted by the Defense Information Systems Agency, serves to promote awareness, facilitate sharing of information, and avoid duplication within DOD.⁸

DOD has several unique concerns apart from other federal agencies. For example, hardware changes must be made in some weapon systems whose clocks store dates using two-digit codes. Computer chips that store dates in "firmware" may have to be replaced on missiles and other weapon components. Some of those chips, however, may no longer be in production. In addition, DOD has many unusual computer languages for which software analysis tools are not commercially available. Given the limited time and resources, DOD is focusing on correcting its mission critical systems, and using temporary fixes for other systems.

Many other federal departments and agencies face a major challenge in upgrading their computer systems for year-2000 compliance to insure the safe and continuous operations of the federal government. For example, the Department of Treasury oversees the massive databases of the Internal Revenue Service, Customs, and Bureau of Alcohol, Tobacco and Firearms.⁹ Other agencies with enormous tasks of correcting their computer systems include the Veteran's Administration, the Department of Transportation (which oversees the Federal Aviation Administration), the Department of Justice (overseeing the Federal Bureau of Investigation), and the Administrative Office of the U.S. Courts.

⁷Testimony of D. Dean Mesterharm, Deputy Commissioner for Systems, Social Security Administration, before the House Subcommittee on Government Management, Information, and Technology, April 16, 1996.

⁸Testimony of Emmett Paige, Jr., Assistant Secretary of Defense (C³I) before the House Subcommittee on Government Management, Information and Technology, April 16, 1996.

⁹Last year Treasury collected \$1.4 trillion and processed over 250 million returns. The Treasury Financial Management Service oversees a daily cash flow in excess of \$10 billion and issues 800 million payments totaling over \$1 trillion each year for all executive agencies. The Customs Service collects over \$20 billion annually in duties, taxes, and fees. Public Debt auctions \$2 trillion marketable Treasury securities annually, issues and redeems 150 million savings bonds annually, and accounts for \$4.9 trillion Federal debt and over \$300 billion in annual interest charges. All of these critical activities use computer support that must be inspected and corrected for year-2000 compliance.

Interagency Committee

Last year, the Office of Management and Budget (OMB) asked SSA to lead interagency discussions to raise awareness of the year-2000 challenge. As a result, SSA assembled an interagency ad hoc committee to facilitate the efforts of federal agencies. SSA has held several meetings with other federal agencies to help educate staff about the issue, and to provide a forum to share cross-cutting ideas and strategies. Attendance at these meetings was initially small, but has increased to over 50 participating agencies. SSA continuously reminds the agencies that they own the software and are responsible for correcting it, and that the interagency committee can only facilitate their efforts.

The interagency committee has made some progress toward helping Federal agencies deal with the problem. With committee prompting, the General Services Administration (GSA) will require all vendor software listed in future GSA procurement schedules to be year-2000 compliant. The interagency committee has developed a precise definition of year-2000 compliance for GSA to use in future schedules. Due to contractual obligations with vendors, GSA is unable to place new requirements for year-2000 compliance on existing schedules. GSA will, however, collect information on products that are on existing schedules to determine which products are year-2000 compliant. Agencies can also use the definition of year-2000 compliance when they purchase software outside of GSA schedules. For future contracts, GSA has proposed requiring "fault-free performance in the processing of data and date-related data...by all hardware and software products delivered" under a contract. Representatives of the software industry, including ITAA, opposed this requirement, because a compliant system could receive corrupted data from other non-compliant systems which could cause processing errors. GSA is working with the software industry to reach a satisfactory compromise on the contract language.

In concert with efforts of the interagency committee, the National Institute of Standards and Technology (NIST) published a Federal Information Processing Standard on March 25, 1996, regarding Federal software purchases. The announcement (change no. 1 to FIPS 4-1) recommends that for purposes of electronic data interchange, federal agencies use four-digit year elements for data transmitted among U.S. Government agencies.¹⁰ NIST did not mandate four-digit year elements for all interagency data transfer because it does not have the authority to require federal agencies to comply, and in many cases the four-digit year field will not be necessary.

The interagency committee is involved with several other activities. On May 2, 1996, the committee sponsored a conference bringing government and industry together to discuss year-2000 issues. A second meeting was held on August 21, 1996, to update federal agencies on interagency committee efforts and congressional assessments. Through committee efforts, a site on the world wide web was developed to provide the latest information on year 2000 conversion activities.¹¹ The committee is currently

¹⁰Private industry currently uses a two-digit year standard for electronic data interchange.

¹¹The address of the web page, managed by GSA, is <http://www/itpolicy.gsa.gov/library/yr2000/y201toc1.htm>. This web page is hypertext-linked to DOD and other Federal agency year-2000 web pages. Numerous other World Wide Web pages are maintained by government and private sector organizations

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developing a "best practices" report which describes how agencies can best implement a solution. It includes a comprehensive conversion plan, setting milestones for Federal agency progress over the next few years.¹² Private sector firms can also benefit from the information disseminated by the interagency committee.

Issues for Federal Agencies

Since there may not be enough time to complete year-2000 conversion for all information systems, federal agencies may have to prioritize their systems for repair. Several agencies are already admitting that there will likely be delays in other federal information technology projects due to the need to dedicate resources to year-2000 conversion. Non-critical computer systems may have to wait until after the start of year 2000. It is also possible that projects in areas other than information technology may have to be delayed or scaled back to divert funds to work on the year-2000 project. Funds may even have to be shifted from other agency accounts such as research and development, procurement, operations, or maintenance. Individual agencies are confronting how they will prioritize their internal conversion projects.¹³

Computer programmers have borrowed the term *triage* from the medical profession, which refers to the sorting and allocation of resources to treat patients in order to maximize the number of survivors in a disaster situation. Many agencies and businesses may have to use the process of triage to decide which systems to save, knowing that other systems will have to be scrapped due to the lack of time and resources.

The interagency committee recommends that government agencies (as well as private sector organizations) conduct risk-benefit analyses before starting the conversion process. These analyses could help determine which systems absolutely must be fixed, and which could be terminated if their utility is not worth the effort needed to fix them. Unfortunately, the time taken to perform these analyses may delay the process of converting software. However, completing a risk analysis before starting the conversion is critical to help prioritize information technology systems.

Even a system that is year-2000 compliant can be contaminated by incorrect data entering from external interactions. Government agencies need to ensure that data entering their computer databases from other sources (such as state, county, municipal governments, and the private sector) is accurate. To forestall contamination of federal databases, some suggest that OMB set a policy for how agencies monitor incoming data to insure its integrity. Many Federal agencies, however, would prefer to set their own rules for accepting external data.

discussing activities and available resources on year-2000 conversion.

¹²The best practices document offers a method for dividing year-2000 conversion activities into five phases: awareness, assessment, renovation, validation, and implementation. The document, currently under development, is on the web at www.year2000.com/pub/year2000/y2kfaq.txt and can be accessed only by computers with internet addresses ending in GOV or MIL. The report will be available to the general public when it is completed.

¹³Information systems managers in the House, Senate, and Library of Congress are working on the year-2000 for their systems, and expect to be compliant well before the end of the century.

STATUS OF STATE GOVERNMENTS, PRIVATE SECTOR, AND FOREIGN GOVERNMENT EFFORTS

Efforts needed to correct the problem in state and local government operations also are likely to be significant. The Gartner Group predicts that fewer than 25% of state and local government computer systems will be ready for the year 2000. The State of Nebraska estimates it will cost \$28 million to pay for the conversion of its 12,000 computer programs and 12 million lines of code. Nebraska plans to divert part of its cigarette tax to provide \$11.5 million toward conversion activities. Los Angeles county has made an initial estimate of \$30 million for conversion costs, not including planning, testing, and unexpected hardware and software upgrades.¹⁴ In Napa county, California, the government has decided to scrap its existing software and purchase a new, year-2000 compliant system.¹⁵

Major industry groups will need to make coordinated efforts to convert their software so that they can continue to interoperate as they do today. The securities industry, for example, must be able to perform stock transactions, access investor accounts, and record deposits and trades among business affiliates on a timely basis. For this to occur, all securities companies must agree on a standard year format for various types of data. The Securities and Exchange Commission's Financial Accounting Standards Board has recently decided to require businesses whose stock is publicly traded to report their year-2000 conversion costs as an expense, rather than capitalized over a period of years. Companies seeking to spread out year-2000 conversion costs may still use software leasing companies for financing. Other industries that must coordinate their year 2000 efforts include banks, insurance companies, telecommunications providers, computer manufacturers, and airlines. In addition to fixing their own systems, many computer companies are beginning to market their services in year-2000 conversion.

Foreign companies and governments appear to be further behind in addressing the year-2000 than their counterparts in the United States. In May, 1996, the Chief Executive of the British Government's Central Computer and Telecommunications Agency met with representatives of U.S. Federal agencies and congressional staff to gain insights into dealing with the challenge. The science and technology attaches at the embassies of Canada, Japan, Germany, and Australia were unable to provide an assessment of the efforts taking place in their countries. There has been limited press and government published assessments, indicating a lesser awareness of the issue in these countries than in the United States.¹⁶

¹⁴The Clock Is Ticking: Year 2000 Does Not Compute, County News, National Assn. of Counties, April 29, 1996.

¹⁵County Taps PeopleSoft to Take on the Year 2000, PC Week, July 8, 1996, page 8.

¹⁶Personal telephone conversations with foreign attaches, March-June, 1996. The Science and Technology contact at the German Embassy claims that many years ago Germany's computers were upgraded to handle the year 2000, but he did not substantiate this assertion with any written documentation or other evidence.

CONGRESSIONAL ACTIVITY

On April 16, 1996, the House Government Oversight and Reform Committee, Subcommittee on Government Management, Information and Technology held a hearing to determine the extent of the problem, and how federal agencies are dealing with it. All witnesses stressed that federal government and other computer users must address this issue immediately. Following the hearing, the Subcommittee sent a survey to 24 major federal departments and agencies to determine their level of progress in addressing the issue.

On July 30, based on survey results, the Subcommittee reported that (1) major departments are still in the initial planning stages, (2) only six agencies have cost estimates, (3) DOD has not yet completed its inventory of code which needs to be converted, (4) the National Aeronautics and Space Administration has not prepared a plan to solve the problem, (5) the Department of Transportation did not respond to the questions, and (6) the Department of Energy did not begin to address the year 2000 until a week after it received the survey. In a report-card style grading system, the Subcommittee gave four agencies an A, three a B, three a C, 10 a D, and four an F for their level of preparedness for the year 2000.¹⁷ Information obtained from the survey will be further analyzed by the General Accounting Office.

On May 14, 1996, the House Science Committee, Subcommittee on Technology, held a hearing to review potential technical solutions to the year-2000 challenge, and to discuss a possible role for government in addressing the problem. Again, witnesses stressed the urgency needed to convert all software in a timely manner in both government and the private sector.

Subsequent to these hearings, three legislative provisions were introduced as part of other bills which are now moving through Congress. The FY1997 Senate Defense Authorization bill (S. 1745) contained a provision directing DOD to assess the risk to its systems resulting from the year-2000 challenge, and to report to Congress by January 1, 1997, on the resources necessary for conversion. The bill further requires that all information technology purchased by DOD be able to operate in 2000 without modifications. DOD objected to the above language because it would stop work on many existing contracts. The provision was included in the conference bill (H.R. 3230, section 831) with the following modification: DOD can "accept offers for non-compliant products" if offerors commit to "a timetable whereby those products will be modified to achieve year-2000 compliance with minimal cost to the government."¹⁸

The Senate FY1997 Defense Appropriations bill, H.R. 3610, notes that the principal approach to dealing with the problem uses a "slow and expensive line-by-line patching method." The bill provides \$5 million for DOD to conduct studies of object-

¹⁷Media Advisory Report from Representative Stephen Horn, July 30, 1996.

¹⁸Conference report (H. Rpt. 104-727) to accompany H.R. 3230 page 774. The bill passed the House on August 1, 1996 and awaits a Senate floor vote.

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oriented application generators which may "provide a low-cost means of quickly rewriting and modernizing massive amounts of software."¹⁹

A third legislative provision is included in the FY1997 House Treasury, Postal Service, and General Government Appropriations bill (H.R. 3756). This provision directs OMB to assess the impact of the year 2000 software conversion on government agencies. The bill directs OMB to provide (1) a detailed cost estimate, (2) a strategy to ensure that all information technology, as defined by the Information Technology Management Reform Act of 1996 (P.L. 104-106), purchased by an agency will operate in 2000 without technical modifications, and (3) a timetable for implementation of the strategy. OMB must submit its report by November 1, 1996.²⁰

The House Science Committee, Technology Subcommittee, and Government Oversight and Reform Committee, Subcommittee on Government Management, Information and Technology will conduct a joint hearing on September 10, to investigate industry liability issues, state government issues, and to obtain an update on OMB's progress in preparing its report for November 1. Other congressional committees are interested in the year-2000 issue and may hold hearings to pursue their particular interests.

ISSUES AND OPTIONS FOR CONGRESS

Is the Problem Serious Enough to Warrant Congressional Action?

Many in Congress would prefer to let industry solve technical issues of this sort, allowing market forces to work and avoiding costly subsidies and counterproductive regulation. Others are concerned that this problem is so pervasive that it could affect the entire nation, including Federal, state, and local governments, businesses, and personal activities, with potentially harmful consequences to the overall economy. Some in Congress have expressed an interest in using legislation to help reduce the negative effects of what may become a crisis situation. Some are concerned that media sensationalism of the problem could affect consumer confidence in institutions, such as banks, and in public institutions that provide services to citizens. Effective management by federal officials and communication by policy makers could mitigate those effects.

What Are the Options for Congressional Action?

More funding. One option is to provide specific funding for federal information resources management (IRM) offices to convert their agency software. Some in federal agencies have voiced concerns that in order to maximize additional funding, IRM managers might delay conversion efforts. Congress could, however, use a funding mechanism that matches funds dedicated by agencies to work on year-2000 conversion.

¹⁹Senate Defense Appropriations Committee Report (104-286), page 45. The bill passed the Senate on July 18, 1996, and awaits conference.

²⁰The bill passed the House on July 17, 1996, was reported out of the Senate Appropriations Committee July 23, 1996, and awaits a vote by the full Senate.

This could have the effect of stimulating agencies to put more resources on the problem. Finding new money, however, when Congress is focusing on reducing the Federal deficit will be a challenge. Some in federal agencies believe that funding could not realistically be provided until FY1998 appropriations, which will be too late for most agencies to begin work. The \$5 million provided by the Defense Appropriations bill (H.R. 3610) will not be used for any of the actual software conversion, and is relatively insignificant compared to DOD's total potential conversion costs.

Reprogramming funds. The interagency committee advocates giving federal agencies greater autonomy in reprogramming funds (i.e., shifting funds from other accounts or programs) to year-2000 efforts. Rules for reprogramming differ from agency to agency, and from year to year, however, depending on how each agency's appropriations legislation is written. Some appropriations subcommittees require approval before any funds are reprogrammed, while others allow various degrees of reprogramming among programs and accounts. Congress could create a special provision to allow agencies to reprogram for year-2000 efforts as part of a budget bill. If authorizing legislation is passed this year, agencies could begin reprogramming in FY1997. Without general reprogramming authority for FY1997, agencies will have to wait another year to seek congressional approval, which may be too late to start year-2000 conversion.

At the April 16 hearing of the House Subcommittee on Government Management, Information and Technology, DOD expressed the need to be able to shift funds more quickly than the legislative process will allow in order to meet the year-2000 deadline.²¹ DOD has had problems obtaining timely approval for reprogramming funds for all of its programs. Currently, DOD can reprogram up to \$10 million for procurement and up to \$4 million for research and development in a given program without obtaining congressional approval. To reprogram funds in excess of those levels, DOD submits an omnibus reprogramming request each year containing dozens of requested funding changes. Only those items that receive the approval of all four defense budget oversight committees can be implemented.

DOD is now proposing legislation to allow it to double the amount of funds it can reprogram without congressional approval. DOD may also seek the authority to transfer funds between accounts (procurement to research and development, for instance) without congressional approval.²² While Congress may be reluctant to give DOD such a broad authority, a special limited provision might be considered for year-2000 efforts. Civilian agencies may want to gain similar authority for year-2000 efforts, although they have not requested it. Many agencies may not yet realize that they will need additional funds for year-2000 efforts.

Continued oversight. Others suggest that Congress simply continue with its oversight and scrutiny of federal efforts, and to raise public awareness through hearings and written communication. While this may spur agencies into action, it would not help them to complete the work of software conversion. Congressional oversight can focus on how agencies are prioritizing their computer systems projects, how money is

²¹Testimony of Emmett Paige, Jr. before the House Subcommittee on Government Management, Information and Technology, April 16, 1996.

²²Pentagon to Propose Raising Thresholds for Reprogramming, Inside the Pentagon, May 23, 1996.

being spent, and how potential delays could impact government operations. The House hearing on September 10 will continue in this vein, investigating how state and local governments are preparing for year-2000 software conversion, and how industry and the federal government are handling the problem. A GAO study may provide information to enable Congress to take further action. At this point, however, GAO is conducting only preliminary research, as it has not yet received official direction from a congressional committee to investigate the year-2000 challenge.

Standards issues. In the future, vendors might face potential liability suits for failure to provide year-2000 compliant products or services. Company managers may also need to be aware of whether their information suppliers are year-2000 compliant so that their databases are not corrupted by bad data. Businesses and government agencies may require software maintenance providers to accept contract provisions that ensure that computer systems continue to function properly after the year 2000. Banks, investment companies, and insurance companies may want to know whether companies they finance are year-2000 compliant before making some investment decisions.

These concerns raise questions about how consumers and government agencies can be sure that consultants and vendors are being honest about whether their products are year-2000 compliant. At the May 14 House Science Committee, Technology Subcommittee hearing, Members raised questions as to whether the force of law is necessary to set standards for computer year fields. It was suggested that legislating a four-digit year field standard for all electronic data interchange with the federal government could help bring the computer industry into compliance, and would at least raise awareness of the problem. Industry witnesses testified that if standards are necessary, they should be developed under the auspices of the American National Standards Institute (ANSI), a private-sector, voluntary, consensus standards setting organization for the computer and electronics industry, rather than dictated by Congress. Other Members warned that legislating standards was unnecessary and might not even contribute to raising public awareness. Notably, by the time an industry consensus standard is worked out, it might be too late.

International issues. Because the United States is more heavily dependent on computers than other nations, the year-2000 is probably a greater challenge here than anywhere else. The economic impacts of businesses failing to correct the problem, both domestically and internationally, could be dramatic. U.S. businesses and government agencies will presumably lead the rest of the world in fostering awareness and in assisting in software conversion. DOD is currently discussing with the NATO allies the need to ensure their year-2000 computer capability for future military engagements or other collaborative operations, and the general sharing of data. This area may require increased attention. The State Department may need to become involved in spreading awareness of this issue internationally through the diplomatic corps at U.S. embassies in foreign countries. U.S. federal agencies and businesses may need to emphasize the urgency of correcting the problem in making international agreements. Congressional attention to this issue helps to increase awareness in other countries.

The future. This issue's sudden rise to public attention leads to the question of whether we can identify and prevent comparable technology problems before they reach these proportions. The computer industry has managed to deal with other problems reasonably well without federal intervention. Viruses, for example, became a

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widespread problem starting in the late 1980s. In response, anti-virus software was developed commercially and became widely used. Now, it is considered standard procedure for all data entering a computer to be checked first for viruses. Various security features are also now available and can be added to computing systems as threats are presented. Perhaps other unforeseen software upgrades will be necessary for widespread computer applications. As other computer-related issues continue to arise, Congress may again be faced with deciding what role the federal government should play in ensuring security and reliability in federal computer systems, and providing guidance and leadership into the digital age.

YEAR 2000 AGENCY PREPAREDNESS

	Grades	Does the agency have a Year 2000 plan?	Is there a Year 2000 Program Manager?	Does the agency have any cost estimates for Year 2000 solutions?	Did the agency respond to the questions?
Environmental Protection	D		✓		✓
General Services	D		✓		✓
Health and Human Services	D		✓		✓
Housing (HUD)	D		✓		✓
Interior	D		✓		✓
Justice	D		✓		✓
NASA	D		✓		✓
Veterans Affairs	D		✓		✓
FEMA	F				✓
Labor	F				✓
Energy	F				
Transportation	F				

MAJOR FINDINGS

- ◆ Major departments are only in the initial planning stages of the Year 2000 effort.
 - ◆ Even the most advanced agencies have not reached the final stages of solution.
 - ◆ Only **six agencies** have any cost estimates.
 - ◆ The **Department of Defense** has not yet completed its inventory of computer software code which needs to be converted.
 - ◆ **NASA** does not anticipate having a plan completed until March 1997.
 - ◆ The **Department of Transportation** did not respond to the questions as of this date.
 - ◆ The **Department of Energy** did not begin to address the year 2000 issue until a week after they received the subcommittee's survey.
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NIST promotes yyyy/mm/dd as the best way to fix dates in code

By FLORENCE OLSEN
GON Staff

The National Institute of Standards and Technology wants agencies to start using eight-character date fields to represent dates in their computer code for the year 2000.

A Federal Information Processing Standard Publication 4-1 change notice, issued March 25, asks agencies to avoid two-digit calendar and ordinal dates in any data they will exchange with others. NIST "highly recommends" using a four-digit

year representation as the standard in changing existing six-character date fields to accommodate the coming century.

Like a virus

That will expand date fields to eight characters, yyyy/mm/dd. NIST has endorsed the format recommended by the American National Standards Institute.

Without such a standard practice, any agency that repairs its software to prepare for 2000 will be vulnerable to errors when it receives data from other agencies that lacked the problem differently or not at all. It's the getting around our software, said Peter Adams, associate commissioner for systems, design and development at the Social Security Administration. "We were going to try to drive a de facto standard, and this publication notice is going to help us a lot," said Adams, who chairs the Year 2000 Interagency Committee.

Adams spoke at the recent FOSE trade show in Washington, saying

that many senior federal executives have been "in denial" about the century date problem. "There's perhaps a feeling that the information technology people got us into this. The agencies are saying, 'Oh, my God, it's falling, but they'll figure out a way to fix it.'"

She said senior managers "don't want to believe they're going to have to spend all this money" just to maintain system functions they already have.

"We're using IT dollars to get

actively dealing with the problem in 1990," she said.

SSA bought the Via/Alliance assessment tool from profit Inc. of Phoenix, Ariz., because it was the only one that they found it difficult to use because they don't use the entire Vissoft toolkit. Servers have written front-end screens for Via/Alliance and are distributing them to other programmers, Adams said.

SSA plans to have all its year 2000 software changes completed by the end of 1997 so that, beginning in 1998, it can test the new software in production mode for a full year.

She encouraged vendors to step forward and propose solutions, especially those that can offer their services through task orders against existing indefinite-quantity contracts. "I believe most agencies will have to look to those vehicles to secure services, because they don't have time to do new procurements," she said.

Even though most of the attention so far has been devoted to custom code, a large proportion of the date field problems lurk in off-the-shelf hardware and software. Vendors themselves will have to solve the century software problem where it involves hardware, operating systems, embedded software, subsystems or commercial applica-

Vendors beware

tion. Adams said that in-house effort to fix the problem in SSA's calendar application code may wind up taking 100 work-years, even with an automated tool to trace the problem. SSA must assess more than 30 million lines of code, and in some applications a surprisingly high percentage of code needs fixing. "In the initial subsystem we looked at, 30 percent of the lines of code had to change, and we got sufficiently scared that we began

ions, "because it's emanating out of their factories," said Otto Doll, director of the federal market analysis program at Input Inc. in Vienna, Va.

At some point, vendors whose products aren't ready to handle the century change and leap year should be excluded from the General Services Administration schedule, Adams said. One of her interagency committee's initiatives is to develop a standard language or standard legal language for agencies to put into their contracts with hardware and software vendors.

Another is a best-practices document that the committee hopes to circulate this fall. A third initiative is a government Web site that lists tools and services for fixing the dates.

"If you have a legacy system with good Cobol 2 source code, there are a number of really good tools on the market that can help you look through that," said Edward Hammarist III, executive director of federal operations for Infomax Software. He also

helps clients locate the source code for old applications, he said, changing to a packaged application is reasonable for administrative functions such as human resources, payroll and accounting.

"Understand the business function that your application performs, then go into the commercial market and try to find something that's close," he suggested.

"Even though some modification might be required, I encourage people not to be afraid of that. It's normal even in the commercial world."

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PROFILE *Kathleen Adams*

SSA's Adams focuses on Year 2000

Committee chairwoman raises awareness among agencies

BY ALLAN HOLMES

When Kathleen Adams agreed last year to chair an interagency committee on the Year 2000, she never thought that she would attract so much attention.

"You think about the genesis of how this thing got started," said Adams, whose full-time position is associate commissioner of the Office of Systems Design and Development for the Social Security Administration. "I thought I'd get a couple of helpers to put together a workshop and then go around to the different agencies to raise awareness about the problem.

"But it has grown into so much more, and it was a funny thing to find myself on Capitol Hill answering questions from Congressman [Steve] Horn (R-Calif.) about why every agency wasn't on the committee," she said.

The answer is that the Year 2000 Interagency Committee, as it is called, is an informal group, so agencies are not required to join. Attracting agencies to join the committee has been met with some resistance, Adams admits.

"I think one of the reasons this didn't catch on is [that] it sounds like such a boring topic," she said. "But the more you get



Kathleen Adams

"I thought I'd get a couple of helpers to put together a workshop and then go around to the different agencies to raise awareness about the problem."

into it, the more it becomes fascinating. The related issues are very, very interesting and have

profound consequences."

Since its first meeting in July

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1995, the number of federal representatives on the Year 2000 Interagency Committee has grown from three to more than 30. Adams said the committee's expansion has been aided by press coverage of the Year 2000 problem and last month's House committee hearings.

A Year 2000 conference that SSA, the Defense Department and industry groups organized last month on the problem also attracted more interest in the committee.

A Successful Strategy

The experience has convinced Adams that the recent trend to form interagency workgroups to solve governmentwide problems is a successful strategy to follow when solving cross-agency problems. By putting officials from different agencies together, "you leverage their resources," she said.

Despite the heightened awareness, Adams is convinced that four years is not enough time to reprogram all the government's systems, and some of them will fail.

As a result, agency officials should perform what amounts to technological triage, Adams said. First, agencies should take an inventory of their systems to find out how much of their program

code is date-sensitive. Agencies then need to determine if they can fix the systems with commercial off-the-shelf products.

"The rule of thumb is: If you can get 70 percent of the functionality from a COTS package, then it makes sense to buy it," she said.

The other option is to replace or redesign the system, Adams said. But given that agencies have only three and a half years left to make the changes, "those decisions have to be made quickly, and you have to get started now," she said.

Adams was tapped to chair the committee because SSA had already started reprogramming much of its software to be Year 2000-compliant. SSA started analyzing the problem in 1989.

Adams' interest in government and familiarity with SSA started when her father took a position with the agency and moved the family to Baltimore from Miami. She received a degree in English from the University of Maryland and made plans to go to law school.

To earn money for law school, she accepted a position as a health insurance policy analyst at SSA and later joined

the management internship program. She worked in SSA's district and regional offices in the budgeting, operations and systems divisions. The internship afforded Adams a working knowledge of all SSA's functions.

Like so many other professionals who plan to work for the government for a short while but end up making a career in civil service, Adams' intentions of leaving for law school faded. She liked the internship program because it allowed her to work in different positions and take on different responsibilities.

"A lot of jobs are cyclical," she said.

"Once [I] go through one or two cycles, and I can begin to anticipate what is going to happen, I just want to move on. The challenge is just not there for me anymore."

That's why Adams has settled into SSA's systems office, which develops and maintains the software that supports SSA's business functions, such as an applicant's eligibility for benefits, and assigns Social Security numbers.

"I think I could spend my life here, and I never would learn everything because technology is always changing," she said. ◀

"A lot of jobs are cyclical. Once [I] go through one or two cycles, and I can begin to anticipate what is going to happen, I just want to move on. The challenge is just not there for me anymore."

RANDOM ACCESS

THE 1,000 YEAR GLITCH

If computer programmers are so smart, how come they forgot about the year 2000?

BY STEVEN LEVY

IF YOU'VE EVER FELT THAT COMPUTERS were a scourge upon the earth, just wait three and a half years or so. Then you're really going to hate those digital buggers. As you spend the waning hours of 1999 waltzing to the strains of whoever replaced Guy Lombardo, our entire information infrastructure will be ticking toward doom, and when the big ball drops, the biggest time bomb in history will silently detonate. All because the first two digits of the new year changed from 19 to 20. This may not sound like a big deal for a machine that can count up to zillions, but then we never really bothered to tell our computers that years have four digits: to save space in databases, we used only the last two. Apparently this circumstance can wreak untold havoc, from billing procedures to factory operations, as computers mistakenly think that the year 2000 is a renaissance of good old 1900. If massive efforts aren't taken to fix the so-called Millennium Bug now—unleashing an army of programmers and spending billions of dollars—businesses might fail, airplanes could drop off radar screens and supermarkets might take perfectly good yogurt off the shelf, figuring it's 99 years past the expiration date. We may even have to reboot modern civilization, losing all information since we last performed a backup.

At least that's what a booming cottage industry of doomsayers and dread merchants have been preaching for the last year or so. It's a message that people don't want to hear. Can't this silly glitch be fixed with some quick little program? The answer seems to be no. Almost everyone who's looked at the problem agrees not only that it's profound and potentially disastrous, but that no silver bullet exists to zap it. Businesses and institutions are going to have to painstakingly go over their sometimes ancient software code, looking for in any instance where the date comes into play (these turn out to be pervasive) and then implementing fixes, one by one. Or, if companies start working at it now—or maybe yesterday—they might scrap their current applications and begin building and testing new ones. (Personal computers, mainly of pre-Pentium vintage, are affected, too.) Simply to stay in business, companies will have to throw huge resources at this problem. We may have to ask retired code-crunchers to unholster their slide rules for one last showdown.

How much will it cost to exterminate the Millennium Bug?



Stop the clock! Moving past the year 1999 is going to give many computers a sort of digital nervous breakdown

Gartner Group researchers estimate \$300 billion to \$600 billion worldwide; the federal government tab alone will be in the neighborhood of \$30 billion. A pricey neighborhood! And that doesn't account for the annoyances and potential calamities that might happen if everyone from the telephone companies to the army doesn't make good on efforts to heal its systems. (The Department of Defense's Year 2000 point man, Bob Molter, doesn't think nukes would be launched but says that without fixes, our sensors might regard, say, a troop movement in Chechnya as occurring in the McKinley administration.) Think of the Millennium Bug as the high-tech equivalent of the savings and loan crash. Like the latter, the 2000 problem came seemingly out of nowhere, a huge bill slapped on our doorstep. And like the S&L fiasco, the discovery has occurred long after the perps have flown the coop.

Still, it's worth looking at how all of this came about. In the '60s and '70s, computers had very little memory and storage space, so efficiency was essential to programmers. So they saved space by dropping the first two digits of every date, implicitly assuming that the 20th century was a permanent condition. Actually they figured that by 2000, new systems would handle the change. But companies tended to evolve, not scrap their systems. The bug got passed on. If programmers tried to warn their managers that trouble was coming, "Management said, 'That's years away, we'll fix it later,'" explains Peter de Jager, a Millennium Bug guru. "It was an error of procrastination, a conspiracy of compromise." The bill was going to come due, but it would be someone else's bill; the guilty parties figured they'd be somewhere else when the bits hit the fan. And they were right.

Even the most visible participant in that compromise, IBM, isn't exactly sewing a scarlet digit on its sleeve. IBM's Year 2000 czar, Charles Lickel, judges that the pain we'll suffer now has been justified by the benefits of saving all those lines of code for so many years. "Most of those [early] applications could not have been otherwise written," he says. While IBM now promotes awareness of the problem, it's making a buck off it, too, providing "fee services" to companies hoping to avoid fatal Millennium Bug bites. IBM also boasts that by the end of this year all its software will be 2000-compliant. That means it's selling at least some stuff now that can't handle a date change three years away? No wonder we've got trouble.

Still, it's unfair to single out IBM—everybody did it, kept evolving their flawed procedures even as the bomb kept ticking. In an industry that knows how essential it is to find glitches, no one tested for this problem because everyone already knew the outcome: if time marched on, the software wouldn't work. Time does tend to march on, and now we must spruce up billions of lines of computer code. Even then, the going will be rough, since computers have this habit of interconnectedness: bad numbers from someone else's still-buggy application could infect a corrected program. When the hideous bill for this fix arrives, computer haters will indeed have their field day. But it's a bad rap. The real culprits have themselves been around for millennia: the all too human foibles of denial, shortsightedness and greed.

FCW POLICY & PROCUREMENT

YEAR 2000

Panel cites lack of preparedness

Survey of federal agencies prompts concern on Capitol Hill

BY ALLAN HOLMES

Preliminary findings from a congressional survey indicate that most federal agencies have only just begun to develop plans to tackle the problem of reprogramming their computers to accept the Year 2000, prompting major concern among lawmakers about the possible consequences.

The survey — which was sent to agencies this spring by the House Government Reform and Oversight subcommittee on Government Management, Information and Technology, chaired by Rep. Steve Horn (R-Calif.) — shows that most agencies have yet to begin the first step — conducting an inventory of their systems.

"There's no agency that's got to the point where they have conducted an inventory, [identified a fix] and then are in the testing phase," said Susan Marshall, a staff member on the subcommittee who is compiling the results of the survey. "And as we

are being told, [agencies] really need to be in that testing phase by 1998, which is only a year and a half away. But no one is even close to it. Even [the Defense Department], which is considered a leader, just started working on this issue last year."

'They Know There's a Problem'

Olga Grkavak, vice president of the Information Technology Association of America's Systems Integration Division, said the survey "confirms our own observations, from our continual contact with the agencies, that we are concerned about how far behind they are. They know there's a problem and that it's serious, but they're having problems coming up with a plan" to solve it.

"They're not making the progress that they should," she added.

Marshall, who spoke last week at a program sponsored by the ITAA and the congressional IT working groups to inform congressional staffs on the Year 2000 problem, said Horn had not



Rep. Steve Horn

decided what to do in response to the survey results. Horn plans to use the survey to make agencies accountable for their lack of action and as a means to prod senior-level management to act.

As of last week, five agencies had yet to respond to the survey, including the departments of Agriculture, Housing and Urban Development, Energy and Transportation and the Agency for International Development. The survey will be completed no earlier than next week.

Marshall said the survey's responses will be given to the General Accounting Office "to see if there are any trends that we want them to look at in more detail, if there are other glitches that need attention, if people aren't moving forward fast enough or if there are other technical nuances that we did

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not consider but need to."

One of the primary problem facing agencies is the cost of reprogramming systems to accept the Year 2000 without causing errors and then testing them. Federal agencies, which now are preparing fiscal 1998 budgets, have indicated that they will be requesting additional money from Congress to pay for Year 2000 conversions, which are estimated to cost up to \$30 billion. ◀

Microsoft 2000 plan already nonstandard

mm/dd/yyyy won't work with other fixes

By FLORENCE OLSEN
GCN staff

Like other software vendors, Microsoft Corp. is reassuring users that its products are "Year 2000-ready," but the company so far is ignoring industry and government recommendations for standard date formats.

In 1997, the software giant will update all its products that use two-character date fields where the two absent characters are assumed to be 19, as in 1996.

The updated products "will make

it easier to assume a 2000-based year," a recent Microsoft memo said, and, for that reason, Microsoft recommends that "by the end of the century, all PC software be upgraded to versions from 1997 or later."

The memo isn't specific about whether users will have to pay for these 1997 versions or whether they will come as free software patches downloadable from Microsoft's World Wide Web site.

Federal agencies license Microsoft operating systems, office applications, and products for systems

management, database management, messaging and development. Most of these products by default use the date formats in the Windows operating systems' libraries.

For Windows 3.x, Windows 95 and Windows NT, those formats will carry over well into the 21st century, said Microsoft federal marketing manager Bruce F. Weber.

Time limit

But there's a limit to how long these operating systems will support valid dates. Windows 95 and Windows NT run-time libraries have date formats that have been hard-coded to time out at 2099.

Other Microsoft products are hard-coded to time out at odd years such as 2019, 2036 and 2049.

Based on the information Microsoft provided in the executive memo, SQL Server and Visual FoxPro are about the only Microsoft products now able to handle any date that users enter in the field.

Current versions of Access 95 time out at 1999 if users select the two-character date field option instead of the four-character date field option.

Microsoft has promised to build a longer grace period into the next major release of Access, Weber said, by pushing forward the expiration date for two-character date fields to the year 2029.

Weber attributed the lack of date field standardization in Microsoft products to "pro-

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grammer preference—some people like two digits, some like the long dates, so we try to give them that flexibility."

Although the company has advised software developers to use long date fields to avoid century confusion, Microsoft marches to its own drummer in this area, as in others.

Microsoft products follow the *mm/dd/yyyy* long-date format, which is incompatible with the *yyyy/mm/dd* format endorsed by the American National Standards Institute and the Commerce Department's National Institute of Standards and Technology.

Format discrepancies could wreak havoc in any government applications that share data, said software architect Donald Fowler of IBS Conversions Inc. in Oak Brook, Ill. "The

ANSI committee should really be on Bill Gates' case," he said.

If applications don't have valid date fields, PC users could run into trouble whenever they have

two applications—one following *yyyy/mm/dd* format and the other *mm/dd/yyyy*—that talk to each other.

Preferred format

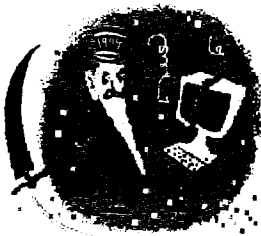
"One of those applications is going to have to be 'the owner' and make the date change," Fowler said. An agency programmer could do that by writing a program to flip-flop all the four-character fields, he said.

If agencies don't establish that kind of control, Fowler warned, their programs may run but corrupt the stored files. ■

Format discrepancies could wreak havoc. "The ANSI committee should really be on Bill Gates' case," Fowler said.

JAMES GLEICK
FAST FORWARD

Oh-Oh



ACCORDING TO SOME YEAR 2000 SPECIALISTS, THE FIRST TICK OF THE NEW MILLENNIUM WILL SET OFF APOCALYPTIC COMPUTER CHAOS.

PROPHETS OF DOOM COME OUT OF THE woodwork at the end of the millennium, and this time most of the people forecasting a new reign of Satan, if not the apocalypse itself, seem to be managers of large computer systems.

They have noticed a little problem about dates. While most humans consider today to be Sunday, June 2, 1996, most computers save a few bytes by storing the date as 06-02-96, or 960602, or some equally pithy equivalent. Unfortunately, this means that after the celebrations end on 991231, a new era will dawn with 000101. To doomsayers, those zeros look ominous.

Some are predicting that the opening seconds of the year 2000 will break a kind of havoc that can be exceeded only by the electromagnetic pulse of a nuclear attack: computers around the world crashing to a halt or, even worse, silently churning out miscalculated interest payments, lifetimes, annuities and expiration dates. There are straight-faced forecasts of widespread business failures, a stock market crash and a general depression with just one silver lining: skyrocketing salaries for computer programmers.

What is clear is that some computers will think it is 1900. If you have a typical PC, you could probably reset its clock right now to one minute before midnight. 12/31/99, turn off the machine, turn it on again and discover that you have gone back in time to 1/4/80, the strange starting date embedded in the original I.B.M. personal computer. Programs running on most of the world's mainframe computers will be confused when they subtract one year from another — subtracting from zero may be perilous — in the process of calculating details like these.

- Your age (18-year-olds may turn into minus-82-year-olds, or just plain 82-year-olds).
- The compounding debt on your latest credit-card bill (99 years of 18 percent interest?).
- The shelf life of corned beef and prescription drugs.
- The locking status of bank vaults.
- The validity of your driver's license, health insurance or latest paycheck.

A whole industry of Year 2000 specialists has burst into existence, including consulting firms that used to have more interesting, if less focused, missions: There are conferences and user groups, here is a newsletter, "Tick, Tick, Tick..." There is Wall Street fever for a few public

companies with Year 2000 expertise. There is no shortage of work for the new millenarians, and some feel it is already too late.

"By the time you get into the '98-'99 time frame, you're better served getting into the funeral business," Kevin Schick, research director for the Gartner Group, says coolly. "There will be widespread panic by then."

This is a complex technology's way of sending a delayed bill for the two bytes or two keystrokes saved every time, since the birth of computers, a data base didn't bother to store, or a person didn't bother to type, that superfluous "19." Some of the offending code has been running since the 1960's, when few of the 30-year-olds writing Cobol were in the habit of looking ahead a year, let alone a generation. In those days, when the primary input device was a punch card with 80 columns, every byte was expensive.

It's a quirk of numbers — an oversight or a necessity — and now it's time to pay up. The Gartner Group recently told Congress that the world will have to spend from \$300 billion to \$600 billion by 1999 just to get the dates straight — about as much as the United States will spend on gasoline in the same period. Federal agencies alone, they estimate, face a bill of \$30 billion.

On examination, these cost estimates are grotesquely crude. They are obtained by multiplying

one huge uncertainty — the number of lines of computer code in existence — by another: the cost per line to fix bad code. The Gartner Group has computed the average yearly salary of a programmer, the time it takes to modify a line of code, the time it takes to test the modification, an "awareness cost," the cost of making inventory of all that code, the cost of setting up work units, the cost of project management and more. A lot of guesswork there, "and then I kind of added this fudge factor that says, over time you have the cost going up," says Schick.

So the numbers are soft and the rhetoric is Chicken Little-ish. Still, those who have plunged into old computer code and looked for quick remedies have been chastened. "The apocalyptic language that you hear?" says Capt. Don Brown, Year 2000 team leader for the Air Force. "Believe it." His group is beginning — too late, he says — to inventory the "mission critical" systems that will fail, to "make sure our weapons are working and our planes will fly." That kind of thing.

A Federal task force is now seeking assessments from every agency and department. On the bright side, surely some of the billions of lines of ancient code running here and there will turn out not to do anything at all, they will be allowed to retire gracefully. On the other hand, some software will turn out to be very expensive to fix, because the millennium problem is hard-wired in chips.

In some odd way, it is also hard-wired in the culture of computing. You can't listen to Year 2000 mavens without realizing that part of the problem is fear: fear of looking stupid, fear of telling the boss. As this millennium ends, a vast gulf still divides the people who write code from the people whose companies live or die by that code. It's hard to explain the compromises, the hacks, the byte-by-byte trade-offs, the heads that bury themselves in the sand in hopes of making a program run smoothly for a week or decade.

And meanwhile, it's hard to explain that an issue so simple a 10-year-old could have foreseen it in the 1960's will now cost any medium-size company tens of millions of dollars. Spent to gain what, exactly? I.B.M. is circulating a 180-page white paper to the industry, advising, "When you face your stockholders who will ask, 'Now that you spent XXX dollars on this project, what do we have now that we didn't have in 1995?' simply respond: 'WE STILL HAVE A VIABLE BUSINESS.'" ■

Mr. HORN. On the boards to my right and your left is a summary of the results based on a questionnaire to 24 agencies.

As you can see, we're fairly hard graders and there were very few A's, there were very few B's, there were very few C's, but there were lots of D's and F's. In brief, we don't grade on the curve. It's an absolute.

Today's hearings will focus on the extent to which personal computers will be impacted by this date conversion problem.

With the recent enactment of procurement reform, the Federal Acquisition Reform Act, and the Information Technology Management Reform Act, agencies will be purchasing more commercial products such as personal computers. Although personal computers are not the primary concern of most organizations attempting to address the Year 2000 situation, they are important because our world is increasingly dependent on interconnected systems.

In this respect I look forward to hearing from our expert witnesses on what efforts should be taken to ensure our systems will be operational at the turn of the century.

Additionally, we will be hearing from the representatives of the state governments. Some great progress has been made at the state level. This will include the Commonwealth of Pennsylvania, which has exciting stories to tell. In many instances, state, local and Federal Governments interface and interact on a daily basis in order to provide various services to the American public. Today we'll hear what efforts are taking place at the state level to meet the Year 2000 challenge with scarce human and capital resources available to them.

Finally, we'll receive an update on federal agency preparedness from the Office of Information and Regulatory Affairs, part of the Office of Management and Budget, the President's key agency to supervise, manage and operate the executive branch.

As you all know, Congress can provide foresight and oversight on this issue but the real work begins when the administration and the departments and agencies which are a part of that administration develop a plan, each one of them, and take action.

As Ms. Katzen is well aware, the information this House has received regarding federal preparedness is discouraging. It's my hope that today we will finally see provided to us some good news regarding agency action on this issue.

I'd now like to ask the co-Chairwoman, who I see has arrived, Mrs. Morella, if you'd like to preside, please do, right now. But maybe you have an opening statement and I'll take the federal group later.

Mrs. MORELLA. I do, Professor, Congressman, colleague Horn. I'm pleased to convene with you this joint hearing with your Subcommittee on Government Management, Information, and Technology to discuss several issues related to the Year 2000 problem that were not addressed in the two previous hearings.

On April 16th, Chairman Horn's subcommittee held a hearing that shed light on the origins and extent of the Year 2000 problem. It placed particular emphasis on the ability of the Federal Government to deal with the problem. Then, on May 14th, my Technology Subcommittee held a hearing that focused on the tools and practices available to correct the Year 2000 problem.

Today we'd like to expand upon what we've learned about the Year 2000 problem in mainframe computers and Federal Government systems. We will be beginning with a discussion of the effect that the Year 2000 problem will have on personal computers and PC software. While the problem may not be as dramatic for personal computer users, it does have the potential to be frustrating and costly.

I want to thank Harris Miller, President of Information Technologies Association of America, for agreeing to join us on this short notice. We had extended an invitation to Microsoft and the Business Software Alliance to testify today. Whereas they could not, Microsoft has submitted written testimony for the record and expressed a willingness to answer written questions from members.

So I would like to, without any objection, have Microsoft's testimony included as part of the record.

Mr. HORN. Without objection, it's part of the record.

[The prepared statement of Microsoft Corporation follows:]

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**THE YEAR 2000 PROBLEM:
HOW IT RELATES TO PERSONAL COMPUTERS
AND PERSONAL COMPUTER SOFTWARE**

BEFORE THE
SCIENCE SUBCOMMITTEE ON TECHNOLOGY AND THE GOVERNMENT
REFORM AND OVERSIGHT SUBCOMMITTEE ON GOVERNMENT
MANAGEMENT, INFORMATION AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES
WASHINGTON, D.C. 20515

SEPTEMBER 10, 1996

INTRODUCTION

Mr. Chairman, Members of the Subcommittees, Microsoft greatly appreciates the opportunity to share with you our perspective on the issues surrounding the transition to the year 2000, as they relate to personal computers and personal computer software.

We commend your efforts to raise the visibility of this issue while there is ample time for consumers and high technology firms to prepare critical computer-based systems for the year 2000. Microsoft's products are "year 2000-ready." Still, we are working to raise consumer awareness of this issue and develop solutions – even though our products are not directly involved in the problem. We are committed to working with others in the computer industry to encourage and assist organizations and individuals to review their information systems thoroughly to ensure they transition smoothly into the next millennium.

As noted above, Microsoft's products are year 2000 ready. Over the past twenty years, beginning with the initial work on the MS-DOS operating system¹, Microsoft has incorporated the capability to handle dates well into the next century into its products. Quality and testing practices regarding the year 2000 transition continue today. And we are including recommendations on best software development practices below.

While Microsoft's products are designed to handle the year 2000 dates and beyond, date-related problems may arise when other products are used in conjunction with our products. For

¹ An operating system is software that acts as a computer's "central nervous system" and is responsible for allocating computer memory, scheduling the execution of basic functions, and controlling the flow of information among various components of the computer system.

example, a user could make a request from their PC for date-sensitive information that was stored on a computer server². If a date was incorrect, it may be very difficult for the PC user to identify the source of their bad data. For example, the date may have been incorrectly entered by another person, incorrectly stored or retrieved by a computer, or inaccurately displayed by their PC.

Similar problems may arise for PC users connected to legacy mainframe operational systems or for those using custom-built software applications developed for a specific company or use. Many mainframe operating systems written three or four decades ago may still be in use at the beginning of the new millennium. Many of these systems will only have the capacity to store two digits to represent the year and will likely be a primary source of year 2000 date transition problems. Additionally, custom software applications, including macros, may not meet the same rigorous programming standards as commercial applications and may not process dates properly. If such problems do arise, end users may incorrectly attribute the error caused by mainframe- or custom-based application to their PC software or operating system.

Given the possibility for date-related problems to occur when January 1, 2000 arrives, Microsoft encourages all organizations and individuals to examine the information systems critical to their day-to-day operations. Such a review may include evaluating their readiness for

² Computer "servers" store shared information and coordinate the activities of multiple "clients," usually individual PCs.

this change, addressing any known problems that would prevent a smooth transition, and developing backup plans in the event that problems do occur.

THE YEAR 2000 ISSUE

Historically, computer software has been programmed to make assumptions about the century when given a date that only uses two digits to represent the year (e.g., storing the year 1996 as "96"). In fact, using just two digits was considered a clever programming approach to achieving good performance and making efficient use of valuable data storage space. Although these assumptions have been perfectly acceptable the past few decades, they are potential cause for concern for software used in the year 2000 and beyond. Specifically, this abbreviated date format makes it difficult for an application or computer user to distinguish between dates starting with 19xx and 20xx.

Such assumptions may cause problems when processing dates entered by the user, stored in files, or received from other electronic equipment such as cash registers and gas pumps. Using these assumptions might produce the wrong results when computing ages of inventory or people, calculating interest payments, or any other calculation which involves dates or elapsed time. The majority of potential year 2000 software problems can be traced in one way or another to these assumptions. A special case of this two-digit problem is software which displays or prints dates using an algorithm that assumes all years are in the range 1900 to 1999. It may display a date in the year 2003 as "1903."

The solutions to these kinds of problems are fairly minor – a small change to the existing software to use different assumptions for 2-digit year data, or simply using 4-digit year data. However, in some cases it may be difficult for a consumer to detect in advance that a change needs to be made. Or, particularly in the case of more personalized software created by small third-party vendors, the solution may be more complicated because the original coders may not be available. While some consumers facing this situation may choose to upgrade their existing software or purchase new software, they will have several other options at their disposal should such problems arise. Many may choose to modify the assumptions built into their existing software, work around the problems, or simply ignore them.

While all Microsoft products can process four-digit year data well into the next century, it is possible that application software developed by third-party software developers could perform incorrectly if developers have not used the built-in date formats and functions supplied by Microsoft's products. Analysts³ specializing in this issue estimate that approximately three percent of applications will have year 2000 errors at the end of 1999. Therefore, organizations and PC users should take steps now to determine whether their software falls into that estimated three percent category, and to ensure that all of their vital applications smoothly transition to the next century.

³ Data from Gartner Group research note: "PCs and the Year 2000", by N. Jones, Applications Development & Management Strategies, Strategic Planning note number SPA-980-1278, January 30, 1996.

MICROSOFT'S PRODUCTS TODAY

From day one, Microsoft has been preparing its products for dates well into the next century. All of Microsoft's operating systems (MS-DOS, Windows 3.x, Windows 95, and Windows NT) can handle files created up to the year 2108. It should be noted that date stamps on file systems do not tend to cause problems. What tends to be most relevant to organizations and PC users is how the date field in an operational system represents a date (like a database that contains accounting records or patients' dates of birth). Win32® (the Windows® 95 and Windows NT® programmatic interface used by software developers) is capable of handling dates for 119 years starting from 1980 – so applications which rely on the Win32 format support dates up to the year 2099. All of Microsoft's database products (Microsoft Access, Visual FoxPro, and Microsoft SQL Server) have the ability today to handle four digit dates up to the year 9999. It should be noted that Microsoft Access database product shipping today stores these short hand dates "00" to "99" as "1900" to "1999," but will be updated to recognize shorthand dates into the 21st century with the next major release of Access, due out in 1997. Excel, Microsoft's spreadsheet application, has a working date range from 1900 to 2078. These product date limits are summarized in Table 1 below. Note that most of Microsoft's other products rely on the operating system or database provided dates, and thus are not itemized below.

Product Name	Year Limit
Microsoft Access 95 (full 4-digit "YYYY" year)	9999
Microsoft Access 95 (2-digit "YY" year shorthand)	1999
Microsoft Access (2-digit shorthand in next major version)	2029
Microsoft Excel 95 ("YYYY" year)	2078
Microsoft Excel 95 ("YY" year)	2019
Microsoft Excel - next major version ("YY" year)	2029
Microsoft Excel - next major version ("YYYY" year)	9999
Microsoft Project 95 (and previous versions)	2049
Microsoft SQL Server™	9999
MS-DOS® file system (FAT16)	2108
Visual C++® (4.x) runtime library	2036
Visual FoxPro™ ("YYYY" year)	9999
Windows 3.x file system (FAT16)	2108
Windows 95 file system (FAT16)	2108
Windows 95 file system (FAT32)	2108
Windows 95 runtime library (WIN32)	2099
Windows for Workgroups (FAT16)	2108
Windows NT file system (FAT16)	2108
Windows NT file system (NTFS)	future centuries
Windows NT runtime library (WIN32)	2099

Table 1. *The last year handled by current versions of specific Microsoft products.*

MICROSOFT'S PRODUCTS IN 1997

Although Microsoft's products are ready for the year 2000 today, many users may opt to upgrade their PC software prior to the next century for ease of use. As the Table above illustrates, many of Microsoft's products can handle the two-digit shorthand for years well into the next century. Others require the full four digits to be used.

Many users today prefer typing a short hand form of date when entering information into their computer. When entering "September 10, 1996," rather than spelling this out as 9/10/1996,

one can type *9/10/96* using just the last two digits of the year. Microsoft's products take these two digits, in this case assuming the full year to be 1996, and permanently stores that as a complete four digit year. In 1997, those Microsoft's products that assume the year from these short dates will be updated to make it easier to assume a 2000-based year. Here are two specific examples:

➤ The last three major versions of Microsoft Excel (versions 7.x, 5.x, and 4.x) already are year 2000 savvy. Excel recognizes the short hand years from "00" to "19" as "2000" to "2019" respectively. In addition, Excel assumes the short hand years from "20" to "99" are "1920" to "1999." The user can easily override these assumptions by typing all four digits of the year. The next major version of Excel, due out in 1997, will update these assumptions to store "00" to "29" as "2000" to "2029" and "30" to "99" as "1930" to "1999." One more update for Excel will extend its recognized four digit year range from 1900 to 2078 today to a valid range from 1900 to 9999 in the next major version.

➤ Similarly, the Microsoft Access database product shipping today stores these short hand dates "00" to "99" as "1900" to "1999." The next major release of Access, due out in 1997, will be updated to store "00" to "29" as "2000" to "2029" and "30" to "99" as "1930" to "1999" just like Excel. Access already recognizes four digit dates up to the year 9999.

MICROSOFT SUPPORTS GOVERNMENT STANDARDS TODAY

Concern has been expressed that Microsoft products do not conform with broadly accepted date formats. A recent article in the *Government Computer News*⁴ incorrectly asserted that, "Microsoft products follow the *mm/dd/yyyy* long date format which is incompatible with the *yyyy/mm/dd* format endorsed by the American National Standards Institute [ANSI] and the Commerce Department's National Institute of Standards and Technology [NIST]." In fact, Microsoft products support the ANSI/NIST standard but also accommodate other globally recognized standards. Microsoft's products are sold worldwide and are designed to be flexible and support the standard date formats from the 70+ countries in which we do business. Microsoft's products follow the standards relevant to their product area (e.g., the Microsoft Visual C++ development system follows the ANSI standard date format for the C++ language) and our Windows-based operating systems properly handle the standard date format *yyyy/mm/dd* endorsed by ANSI and NIST today. For example, to make this change on a Windows 95-based system, a PC user can go to the Control Panel, double click the Regional Settings icon, then select the Date tab and enter "*yyyy/mm/dd*" in the "Short date style" field. Then the applications running on the system, like Exchange or Windows Explorer, will use the NIST format.

⁴ "Government Computer News"; Volume 15, Number 17; July 15, 1996; page 1; article titled "Microsoft 2000 plan already nonstandard".

RECOMMENDATIONS FOR SAFE DATES

Microsoft's development tools and database management systems provide the flexibility for people to represent dates in many different ways. It is important that organizations provide training for all of their developers (including those using macro languages or building custom database reports using products like Microsoft Access) to use date formats that accommodate the transition to the year 2000. Recommendations for safe date formats include:

- Use the operating system runtime library's date format and routines as much as possible;
- Use long dates (*mm/dd/yyyy*) when short hand dates (*mm/dd/yy*) may be misinterpreted as outside of the current century;
- If a development environment or database has a formal date format, use it;
- When creating a custom date format with a programming language, development tool, or database, use a date format that captures more than the last two digits of a year and include testing to ensure a smooth transition into the next century;
- Do not assign hidden meaning to special dates. One technique that has been used is to associate the special date "9/9/99" with a piece of information that should never be erased or should be erased after a short time period. Problems can occur in this type of software when the special date is reached that could cause all data to be erased;
- Validate that backup procedures are working properly in late 1999 so that valuable information is not permanently lost in case a serious problem occurs;

➤ Remember that 2000 is a leap year. Some examples of the impact of missing this could be credit card or mortgage interest calculations that were off by a day, or not being able to tell what day of the week starts March of 2000 or January of 2001.

In addition to these system management guidelines, there are certain software products (such as Microsoft's Systems Management Server, a part of the Microsoft BackOffice family) which can be used to identify and fix programs and applications affected by date problems. Products such as SMS can be used to check for and inventory known defective modules, distribute and run test programs to search for problem modules, distribute fixes to problem systems, and remotely help users to install fixes or diagnose problems.

ADDITIONAL ASSISTANCE

Many organizations may seek outside assistance when planning for a smooth year 2000 transition. Since nobody has direct experience with computers crossing a major century boundary, it will be necessary to look at companies that have expertise related to the type of systems to be inspected and potentially updated. Other sources of advice on this topic can be obtained from industry analyst firms like Gartner Group⁵ and from Internet sites such as IBM's Web site⁶.

⁵ Gartner Group, 56 Top Gallant Road, Stamford, CT 06904-2212 (203-964-0096)

⁶ IBM System 390 home page: <http://www1.s390.hosting.ibm.com/stories/tran2000.html>
IBM Software home page: <http://www.software.hosting.ibm.com/year2000/index.html>

OTHER POTENTIAL PC SOFTWARE ISSUES

The list below highlights other software, related to PCs, that should be closely inspected for potential century transition problems:

► When hardware vendors build PCs, they embed low-level software (called BIOS⁷) that may result in the date on a PC being reset to January 4, 1980 rather than January 1, 2000. This same result can occur when the PC battery runs out of power. One simple and low-tech way to avoid this is to leave the PC running at the turn of the century so that the operating system can ensure a smooth transition to the year 2000. In the event that the date is reset to 1980, the easiest fix is to set the correct date by hand the first time the system is used on or after January 1, 2000. There are utilities that can do this, but it is generally more work to install the utility than it is to reset the date by hand. If using a Microsoft operating system, one can manually reset the PC to the correct year 2000 date using the MS-DOS “date” command or the “Date/Time” service in the Control Panel on Windows-based systems. While this BIOS problem is not related to Microsoft products, Microsoft intends to do what it can to provide a free solution⁸ that will correct a PC’s system software, before the fact, to prevent this from happening:

► Some companies provide alternative software to handle some of the core system services like dates for Windows-based systems that use a third-party runtime library (i.e., not Win32):

⁷ A brief definition for BIOS (Basic Input Output System): Software in a computer chip (also called firmware) used to manage the low-level input and output functions of personal computer hardware. The operating system is layered on top of the BIOS.

⁸ Nominal Internet access fees may apply.

- Mainframe-based or other existing server-based applications that are accessed from a PC; and
- Custom-built application software especially if it was developed for one user or one company and therefore may not have had extensive year 2000 testing performed.

Such software libraries could contain date-related functions that do not operate correctly in the year 2000.

Different types of complex systems like vehicles, manufacturing machinery, chemical compounds, and even government or business organizations, may have individual components which operate correctly according to their target specifications, but may not function correctly as a system when connected with many other components. For this reason, Microsoft believes that information systems should be evaluated as a whole for their year 2000 readiness.

CONCLUSION

It is critical to raise public awareness of the year 2000 impact on information systems. Consumers should give the highest priority to evaluating and fixing mission-critical functions that could operate incorrectly or stop altogether if year data is incorrectly interpreted. Then an organization or end user needs to determine whether resources should be applied to address less critical concerns such as a user needing to type in two more numbers to identify the desired year clearly.

Congress can provide a valuable service by encouraging all levels of government – federal, state, and local – as well as companies providing computer-based solutions, to take seriously the need for planning a smooth transition into the year 2000. It is important to start

evaluating existing information systems for year 2000 problems right away. Many business processes involve calculating events in the future: Drivers licenses which are valid for one year; elevator inspection permits which span two years; business licenses that are renewed every three years; car payments that extend for five years; and mortgages or government bonds that last for 30 years. Software applications supporting these tasks can encounter year 2000 problems long before we reach the year 2000.

While Microsoft's products are year 2000-ready, as a leader in the PC software industry. Microsoft feels an obligation to raise the visibility of this issue, so that the public and private sector can avoid costly mistakes through reasonable preparation. Microsoft will use many different channels including its Internet Web sites (<http://www.microsoft.com/cio/year2000.htm>) to continue communicating the latest information regarding the year 2000 issue.

As organizations start new software development projects, they should use software and systems that are year 2000 ready today and follow the safe date recommendations detailed above. Microsoft's products have long been ready for the year 2000, and we are committed to working with our customers -- governments, businesses, and individuals -- to make the transition into the next millennium a smooth one.

Mrs. MORELLA. I'm also pleased to have two representatives of state government with us today. Dan Houlihan, the First Vice President of the National Association of State Information Resources Executives, and Larry Olson, Deputy Secretary for Information Technology of the Commonwealth of Pennsylvania.

As I'm sure these gentlemen will inform us, States are facing a Year 2000 crisis that's just as daunting as the Federal Government. In fact, the two problems are very much related. The federal/state cooperation involved in most government programs requires that all government systems be updated by the turn of the century for those programs to continue to work effectively. And I'm pleased that the Commonwealth of Pennsylvania has initiated a comprehensive program to address the Year 2000 problem. I look forward to learning the details and I hope that it can be used as a model for other States to emulate.

We will conclude today's hearing by talking with Sally Katzen, of the Office of Management and Budget, regarding the status of federal computer systems. Both of the Subcommittees represented here today have had ongoing discussions with OMB on this issue. We've had report language placed in the Treasury Postal Appropriations bill that requires OMB to report to Congress on November 1st with the strategy, timetable and cost of correcting the Year 2000 problem in each federal agency. I regret that the Senate has not yet acted on that legislation, but I'm hopeful that it will be passed this week and the Year 2000 provision enacted as soon as possible. Indeed, even without that we have said to our federal agencies, "We need to see your plan, timetable and cost as soon as possible."

As we learned in our earlier hearings, the solutions to the Year 2000 problem are not quick or easy. Immediate action and proper management are critical. I know that the Federal Government agencies are aware of this and Congress will continue to use its authority to ensure that they get the job done.

Chairman Horn has indicated to you his tough but very accurate grading system, and as a former professor, I would agree that it is very accurate and justified. We hope that there will be significant improvement that will be shown.

I hope to learn also today that state governments and the personal computing industry have heard that message also and that work has already begun to ensure that all computers function properly in the new millennium, only 39 months away.

So now, Mr. Chairman, I would like to then defer to the Ranking Member of the Subcommittee on Technology, Mr. Tanner, for his opening statement.

Mr. TANNER. Thank you, Madam Chairwoman. I appreciate this hearing. I appreciate the people who are here and want to welcome everyone. There is no reason for me to belabor the importance or the magnitude of this Year 2000 problem. Everyone here is aware of it and aware of the seriousness of it.

Since we had a Technology Subcommittee hearing on this issue some time ago we've heard from several larger companies, from some of the state and federal agencies. We haven't heard from small and medium sized manufacturers, companies that use a computer system for billing and accounting needs but don't particularly

have a computer support person or group. We don't have, therefore, a good assessment of where they stand and I'm afraid that some of these folks don't know they have a problem in the first place.

Paraphrasing John Donne, who said, "No man is an island," no local area network or no computer system is an island is very much something that we ought to be considering in this discussion this morning. For better or worse, increasing use of the Internet and electronic commerce link computers locally, nationally and globally. Fixing some without others as a whole means that the system won't function.

I am particularly concerned—the Chairlady mentioned Microsoft—I'm particularly concerned that they're not here because there is a question about interoperability. There is a good article in the Government Computer News in July about this, different standards that have been adopted and the fact that they will not be compatible. This is a serious question. This is a serious matter. I hope that our witnesses can shed some light on it today and we look forward to their testimony.

Thank you.

Mr. HORN. Thank you.

Without objection, I'd like to place in the record the opening statement of Mr. Davis, of Virginia.

[The opening statements of Mrs. Maloney and Mr. Davis follow:]

STATEMENT OF HONORABLE CAROLYN MALONEY

GOVERNMENT MANAGEMENT SUBCOMMITTEE HEARING ON SOLVING THE YEAR 2000 COMPUTER PROBLEM

SEPTEMBER 10, 1996

Thank you, Mr. Chairman. The last hearing we held on this issue was last April—April 16. Since then, a number of people have awakened to this issue. I hope that through this hearing, we can continue the process of bringing this problem to the attention of the American public, and especially American businesses who could stand to be hurt if their system is not fixed.

We learned from our last hearing that there is a great diversity in how prepared people are for this change. Some businesses are well ahead of the pack. They understand the scope and severity of the problem and are setting about getting it solved. The banking and insurance industry cannot afford to be ill prepared when the year 2000 gets here.

Others, we discovered, are not so well prepared. Unfortunately, many of our government agencies fall into that group. I was distressed to learn that over half of the agencies we surveyed are only beginning to address this problem. I hope that today we will hear what plan OMB has for turning things around. I am pleased that Sally Katzen is here today. She has a stellar reputation for leadership.

As big as the government problem is, however, there is a bigger problem looming in the private sector among small businesses. Thousands of companies have been formed over the past 10 years that used computers for basic business functions like inventory and billing. How will these companies be affected? How will they find a fix for their problem, and what will it cost? Will they have to throw away their old computers and start over? Will they have to invest in new software?

I hope we will get answers to some of these questions today. More important, I hope that today's hearing will make many of those small business owners aware of the potential disaster facing them in a few short years.

OPENING STATEMENT OF CONGRESSMAN TOM DAVIS OF VIRGINIA

JOINT HEARING

HOUSE SUBCOMMITTEE ON GOVERNMENT MANAGEMENT, INFORMATION,
AND TECHNOLOGY AND HOUSE SUBCOMMITTEE ON TECHNOLOGY

SEPTEMBER 10, 1996

I would like to thank Chairman Horn and Chairwoman Morella for holding this hearing and for keeping the issue of Year 2000 Conversion on the "front burner." The issue of Year 2000 Conversion is an important and crucial problem that must be addressed by the federal and state governments. As we all know, computers currently use two digit date fields and thus will fail to recognize the date entry of the next millennium at midnight on January 1, 2000. If this problem is not addressed, on the last day of the year 1999 computers in the United States and all over the world will automatically flash "00"—these computer systems will interpret this date as the year 1900 rather than correctly as the year 2000.

Dates play an incredibly important role in each of our daily lives and in all of the functions that the government provides. The failure of a computer system or computer scanner to recognize and understand a date can have a profound impact on our nation. Your driver's license could prematurely expire; or the Social Security Administration may recognize 25-year-olds as 75-year-olds and vice versa. Without the conversion to the four digit date, as is needed for the Year 2000 issue, our entire government computer system could potentially fail. And in today's world, while we may be able to address the computer needs of the Federal Government, we must also recognize that computers throughout this nation and around the world are inter-related and inter-dependent. Therefore, we must be cognizant of how this issue is going to impact state governments which obviously interact with federal systems. And as the former head of government in Fairfax County, Virginia, which is one of the largest local jurisdictions in the nation, I can appreciate the dependency that state and local governments have on their computer systems and the potential chaos that this problem may cause.

The potential loss and confusion that could result from not addressing this issue also extends to the private sector. Many Americans today rely on their personal computer for a variety of functions. I am pleased that we will address hardware and software concerns for these personal computer users and attempt to ascertain which systems may or may not be Year 2000 compliant.

Again, thank you Chairman Horn and Chairwoman Morella for holding this important joint hearing.

Mr. HORN. It is so done.

We have a tradition on the Government Reform and Oversight Committee of swearing in all witnesses. So, if you don't mind, gentlemen, if you'd stand and raise your right hand.

[Witnesses sworn.]

Mr. HORN. The clerk will note that all three witnesses have affirmed.

Let me just say our practice is that your written testimony is immediately part of the record after you're introduced. We'd like you to summarize it as best you can. We don't want to cramp your style but if you could sort of do, if the co-Chairwoman would agree, five to ten minutes of summary. It leaves more time for the members to ask questions. We won't shut anybody off completely but don't read the whole statement. That is already in. Hit the high points. That will be very helpful.

I think we'll just go down the line in the order in which it is here. Mr. Harris Miller, president of the Information Technology Association of America.

And, Mrs. Morella, the co-Chair, I'd like you to sit in the chair and I'm going to move where I can enjoy the testimony.

Mrs. MORELLA. Meaning I won't enjoy it there?

Mr. HORN. You won't enjoy it here. This is one of the worst podiums ever designed by humankind.

[Laughter.]

Mrs. MORELLA. Mr. Miller, you may proceed with your testimony.

**TESTIMONY OF HARRIS N. MILLER, PRESIDENT,
INFORMATION TECHNOLOGY ASSOCIATION OF AMERICA**

Mr. MILLER. Thank you, Chairwoman Morella. At least I'll try to make my testimony tolerable, if not enjoyable in that seat.

Chairwoman Morella, Chairman Horn, and members of the Subcommittees, I'm Harris Miller, President of the Information Technology Association of America.

ITAA represents 9,000 member companies in the software, services, Internet, telecommunications, electronic commerce, systems integration, and computer consulting businesses throughout the United States. We have been working with your subcommittees, and stand ready to continue to work with you and the entire Congress to provide the critical leadership to help the nation and the entire world come to terms with this Year 2000 date change challenge. You all deserve tremendous commendation for leading the charge on this important issue.

For the past 18 months, our Year 2000 Task Force has been assisting federal, state and local government agencies, companies both in the United States and abroad and other organizations to get educated, get motivated and, most of all, get started with their conversion programs. We want to work with you to expand these efforts.

We take this issue very seriously, as we should. The Year 2000 date conversion challenge is arguably the largest and most complex global information management challenge society has ever faced.

Now, the Year 2000 is usually thought of as a mainframe computer issue, a situation confined to so-called legacy systems—older, larger software programs and data center operations. While it is true that most code in need of correction will be found in these environments, the two digit date reference issue is present in all types of computer platforms and computational devices, including personal computers, the topic you've asked me to address today.

Now, let me be clear up front why relatively little attention has been focused on the PCs in the Year 2000. One of the hallmarks of the PC market is constant updating and upgrading. The so-called Moore's law, named after Gordon Moore of Intel, says that computing power doubles approximately every 18 months. We're all aware of the constant introduction of more powerful and sophisticated software. This means that products, both hardware and software, in the PC market have relatively short user lives.

I, for example, have had at least five different PCs since I bought my first one in 1982, and many new software programs with constant upgrades. This is true of most individuals who own PCs.

On the other hand, large hardware systems and software programs have turned out to have very long lives, much longer than anyone expected when they were first put together. Programs written in the 1960s and 1970s, developed when two digit date references were standard, are often still in use today. The programs have developed like onions over the years with the core not chang-

ing but various functionalities added around them. Contrast that with the software market for PCs, where whole new programs come out quite frequently.

So the basic distinction between the rapid turnover in the PC industry and the long life of larger systems is why the challenge in the mainframe area is so much larger and more difficult.

Having raised this distinction, we still must recognize that the Year 2000 date change poses several issues to the personal computer user, both as the machine is used in so-called standalone mode and is used in conjunction with other machines, as Congressman Tanner referenced.

With the assistance of my Management Information Systems Director, Martin Ennis, I will demonstrate that some PCs, if turned off on New Year's Eve 1999 and turned back on again when we have transitioned to the new century will have as their automatic date January 4, 1980 rather than January 1, 2000.

Martin's going to run this demonstration PC up to 11:59 p.m., on December 31, 1999, shut it down, turn it back on a minute later and we'll see what comes up.

What's going to come up, I will tell you in advance, is January 4, 1980.

After that he will run it again doing the same operation except he will not shut it down, just leave it run from December 31, 1999 into the Year 2000 and you will recognize that the computer does recognize that the date is January 1, 2000. But I want to emphasize that even if the date does come out wrong on the PC, as it will if it comes up January 4, 1980, the fix is relatively simple. Put in the right date.

I'll let Martin continue with the demonstration while I continue with my testimony, to keep to Chairman Horn's admonition to try to keep the testimony time down.

In terms of issues that standalone PC users should pay attention to in the Year 2000 situation, it really affects three primary areas. Number one, the Bios chip of individual machines; number two, the operating system that generally comes bundled with new computers; and, number three, the commercial software purchased and used in those machines.

The Bios chip, as the Subcommittees know, provides the basic input/output system or the Bios of a PC. Most Bios chips now that have date clocks built into them are quite well able to handle the Year 2000 and will not have the kind of problem that Martin is going to be demonstrating.

However, older machines may require the PC user to take corrective actions, manually resetting the date by either running a system utility program, as it's called, or issuing an appropriate hand entered operating system command. Nevertheless, I would still encourage consumers to ask the dealer or manufacturer when they're buying a new product whether the product they're purchasing is Year 2000 compliant.

Moving from the Bios chip to the operating system software, it's also an issue, though less of a concern. You have very detailed, written testimony from Microsoft explaining that from the earliest versions of their Disk Operating System—the DOS system, set up over 20 years ago—they can handle the conversion into the 21st

Century. This really is not a problem and it should not require a purchaser to obtain a new operating system or operating system upgrade for MS-DOS or Windows. I've also been told this is true of the Apple system and the IBM systems.

So the problem being faced in the operating system should basically not occur. The problem is more likely to occur because of the date clock in the Bios chip.

The third area of problems is in the commercial software products that you might purchase to use on a PC such as a word processing package, or spreadsheet software, or a database management program. Some of them are and some of them are not Year 2000 compliant.

Software publishers are well aware of the Year 2000 situation and should be moving rapidly in this direction. Some already have what we refer to as "Year 2000 savvy products," which means that if you enter into the system the date 02 it will assume that you mean 2002. You can, of course, manually override that if you wish to but most of the products will assume that.

Have we gotten to the first demonstration here? Okay. We've got the date up there. What does it say?

Mr. ENNIS. January 4, 1980.

Mr. MILLER. It says January 4, 1980. So we ran the clock up to December 31, 1999, shut down the computer totally, turned it back on and it came back on to January 4, 1980. Obviously, if you're a PC user and you come to work on January 1, 2000, you have to manually enter the correct date into the system to be sure you don't enter that data into the system using that date stamp.

Now Martin will rerun it using the December 31, 1999, and leaving the system on. You'll see that it does convert over to the Year 2000.

To return to the testimony directly, Madam Chairwoman, the situation for most commercial software products is that they are Year 2000 compliant or Year 2000 savvy. Again, you have an explanation. For example, in the Microsoft written testimony of their specific products, some of them they say are still not Year 2000 compliant, but they are providing an upgrade, and those will be soon available.

Again, I think the best advice I can give consumers is when they are purchasing new software to make sure they ask the vendor, ask the reseller, whoever it may be, whether the products are, in fact, Year 2000 compliant.

Let me move on to the issue that Mr. Tanner raised, which is the fact that more and more computers are not operating in a standalone mode but are, in fact, part of local area or wide area networks, on line services, Internet, home banking, electronic commerce or similar phenomena. In fact, in my written testimony I use the same metaphor Mr. Tanner used, the John Donne metaphor, because more and more computers are not an island, they're not standing alone. They are, therefore, to the extent they are connected to a system, susceptible to Year 2000 corrupted data or programs.

If the data being fed into your PC are corrupted because the mainframe or the other PC you are getting data from or the client server system it is getting data from are corrupted, then obviously

the data you receive will be corrupted, anything you do internally in your own PC will be corrupted and, in turn, to the extent you turn around and pass that data back on to somebody else, you again are dealing with corrupt and invalid data.

So if you see the PC not as a standalone machine, Madam Chairwoman, but as a link in a network clearly this points out the fact that the Year 2000 problem has to be solved across the board.

So what can we do about it? As I mentioned previously, the ITAA Year 2000 Task Force has been in the lead in the education efforts in the marketplace. We've produced a White Paper and a Buyer's Guide. We've conducted educational seminars for government agencies and private sector companies. We are out on the road constantly. Just in the last few months I have spoken in many major cities in the United States as well as in France and Spain. Later this month, I'll be speaking in Canada and in Singapore.

I can tell you from firsthand experience, members of the subcommittees, that as far behind as we are here in the United States, the rest of the world, unfortunately, is even farther behind in dealing with the Year 2000 challenge.

We have started meeting regularly with other trade associations in critical markets such as financial services, telecommunications and manufacturing to assist them in educating their members.

I'm also very pleased to report that ITAA will introduce in a few weeks industry's first Year 2000 Certification Program. Chairman Horn, in your first hearing this spring you asked whether ITAA could create a certification program. We took your question to heart and, working with the Software Productivity Consortium, of Herndon, Virginia, have crafted a program that we think will be of enormous benefit to anyone seeking assurance about Year 2000 risks to their software. We thank you for that idea, Mr. Chairman, and we'd be glad to keep you fully briefed as it develops.

Let me conclude with a few simple observations.

Number one: the information technology industry is working aggressively to address the Year 2000 issue, yet governments, industries, companies and individuals, both here and abroad, are still waking up to the threat posed by the situation. Hearings such as this are invaluable in raising awareness and creating a call to action.

Number two: PCs are not the primary concern of most organizations attempting to address the Year 2000 situation. But because PCs are important and because our world is increasingly interconnected, we must address the Year 2000 challenge for PCs also.

Number three: the electronic interdependencies between nations are significant and growing. We must address this issue not just within the United States but we must address it internationally.

Number four: PCs are used in home office desktops and in multinational corporations. No matter how they come into play, the chances are that, sooner or later, all risk, some exposure to a Year 2000 corrupt data situation.

Finally, regardless of the platform—mainframe, client server, PC—ITAA is prepared to continue working closely with the Congress and the Executive Branch aimed at expediting Year 2000 solutions.

Thank you for allowing me to testify and I stand ready to answer any questions the Subcommittee may have.

[The prepared statement of Mr. Miller follows:]



Testimony of

Harris N. Miller

President

The Information Technology Association of America

On

The Impact of the *Year 2000*
Date Change Situation on PC Users

For

Joint Committee Hearing

House Science Committee
Technology Subcommittee

and

House Government Reform and Oversight Committee
Government Management, Information and Technology
Subcommittee

United States House of Representatives

September 10, 1996

Chairman Horn, Chairwoman Morella, and Members of the Subcommittee. I am Harris Miller, President of the Information Technology Association of America. ITAA represents 9000 member companies in the software, services, internet, telecommunications, electronic commerce, systems integration, and computer consulting businesses throughout the United States. In October, we will be celebrating our 35th Anniversary, at our conference Chaired by your Senate colleague Frank Lautenberg (D-NJ), a former ITAA Board Chairman. As we have over the past year, ITAA stands ready to work with your Subcommittees and the entire Congress as it provides the leadership so necessary to help the nation and the world come to terms with the pressing Year 2000 date change challenge.

For the past 18 months, ITAA's Year 2000 Task Force has been assisting federal, state, and local government agencies, companies in the private sector here and abroad, and other organizations get educated, get motivated, and most of all, get started with their conversion programs. We want to work with Congress to expand these efforts. The ITAA Year 2000 Task Force, and its many program initiatives, demonstrate that the information technology industry takes the Year 2000 very seriously.

That is as it should be. The Year 2000 software conversion is arguably the largest and most complex global information management challenge society has ever faced. The schedule will not slip on this one. Line-by-line, program by program, we have to face this date change situation head-on.

Year 2000 is often thought of as a mainframe computer issue, a situation confined to so-called "legacy systems"—older, large software programs--and data center operations. While certainly most code in need of correction will be found in these environments, two-digit date references--the "century uncertain" nub of the Year 2000 problem--are present in all types of computer platforms and computational devices, including personal computers, the topic which you have asked me to address today.

Let us be clear up front why relatively little attention has been focused on PCs and the Year 2000. One of the hallmarks of the PC market is constant updating and upgrading. The so-called "Moore's Law," named after Gordon Moore of Intel, which says that computing power in PC's doubles every 18 months and the constant introduction of more powerful and sophisticated software means that products—hardware and software—in the PC market have relatively short user lives. I have had at least five different PCs since I bought my first in 1982, and many new software programs with many upgrades. This is true of the vast majority of individual and business users.

Large hardware systems and software programs, on the other hand, have turned out to have very long lives, much longer than anyone expected when they were first installed. Programs written in the 1960s, developed in an era when using a two-digit date reference was standard practice, are often still in use today. These programs have developed like onions over the years, with more and more layers being added, unlike a word processing

package which might be replaced in total every year or two as upgrades become available.

This basic distinction between the rapid turnover in the PC industry and the long-life of larger systems is why the challenge in the mainframe world may be so much larger and more difficult.

Having raised this distinction, we still must recognize that the Year 2000 date change poses several issues to the personal computer (PC) user, both as the machine is used in standalone mode and as it is used in conjunction with other machines. I will address each in turn.

Standalone PC users should pay attention to the Year 2000 situation as it affects three primary areas: the BIOS chip of individual machines, the operating system that generally comes bundled with new computers, and the commercial software purchased for those machines.

The BIOS chip provides the basic input/output system—or BIOS—of a PC. Equipment manufacturers in the last 18 months have modified their products and now market devices capable of accurately recognizing and manipulating dates beyond 1999. For instance, standard newer Intel products will handle the transition to the Year 2000. Similarly, all new models of IBM PCs announced in 1996 will automatically address the update of the Year 2000. However, throughout the industry, older machines may require the PC user to take corrective actions: manually resetting the date by either running a system utility program or issuing an appropriate operating system command. Having said this, I still encourage anyone buying a personal computer today to ask the dealer or manufacturer whether or not the equipment is Year 2000 compliant.

PC operating system software is also an issue, although less of a concern. Going back 20 years, the first version of MS/DOS ever shipped could handle dates up to the year 2099. While the problem I described in the BIOS hardware may require the PC user's attention, there is no need to address it by purchasing a new operating system or operating system upgrade for MS/DOS or Windows, the nation's most prevalent operating systems. On the contrary, for those of you familiar with Windows, the adjustment can be made with a few simple mouse clicks in the control panel. And once this change is made, it never needs to be made again. The situation is no more serious than if a power failure forced you to reprogram the clock on your VCR.

Commercial software products, including word processing, database management, and spreadsheet software, may or may not be Year 2000 compliant. Software publishers are well aware of the Year 2000 situation and should be moving rapidly in this direction. Some already offer Year 2000 savvy products, capable of assuming that a low two-digit value entered in the date field refers to the 21st century. Again, it pays to ask the relevant questions. I encourage consumers to ask about Year 2000 plans for their favorite software products. If a particular product is not Year 2000 compliant today, when will it

be? If dates are an important part of the work performed by a particular application, that software publisher should be able to provide a clear answer. If answers are not forthcoming, shop around.

With the rise of the Internet, online services, local and wide-area networks, home banking, electronic commerce and similar phenomena, PCs are more frequently connected to other computers whether they be in the same house, the same office, or somewhere across the globe. With apologies to John Donne, no PC will be an island in the years ahead and all may become susceptible to Year 2000-corrupted data or programs. That goes back to the early point I was making about mainframes and the way we think about the Year 2000 challenge. Those people who believe this is a situation only for mainframes are mistaken. It is important to remember that all computing takes place in a larger context. While the PC you use in your home or office may be "clean" as far as Year 2000 goes, the mainframe or midrange platform at your bank, or local government agency, or supplier site or corporate headquarters may not be. Invalid data can be transferred from mainframe to PC and, as a result, to and between PCs, as easily as any other platform. Finding and correcting two-digit date fields is one thing; finding and correcting invalid data passed from machine to machine and from network to network across a rapidly proliferating global web is a truly daunting prospect.

So what can we do? As I mentioned, ITAA's Year 2000 Task Force has been leading the industry's efforts to educate the marketplace. Starting with a white paper that defines the issue, the task force has gone on to publish a Year 2000 Buyers Guide and to sponsor numerous educational seminars for government agencies and private sector companies. ITAA speakers are also out on the road every month, addressing conferences and seminars on this important topic. I have delivered many of these presentations personally, including several overseas. I can tell you from first hand experience that as far behind the curve as we may think we are, America is out in front of the curve when compared to our international counterparts.

We recently republished our Directory of Year 2000 Solution Providers and launched a weekly Internet-based newsletter called ITAA's Year 2000 Outlook. We have started meeting regularly with associations in various vertical user markets such as financial services, telecommunications, and manufacturing to assist them in educating their members.

I am also pleased to report that ITAA will introduce in a few weeks the industry's first Year 2000 certification program. Chairman Horn, in your first Year 2000 Congressional hearing, you asked whether ITAA should create a certification program. We took your question to heart, and working with the Software Productivity Consortium of Herndon, VA, have crafted a program that we think will be of enormous benefit to anyone seeking assurance about Year 2000 risks to their software.

I will conclude with a few simple observations:

- The information technology industry is working aggressively to address the Year 2000 issue, yet governments, industries, companies and individuals, both here and abroad, are still waking up to the threat posed by this situation. Hearings such as this play an invaluable role in both raising awareness and creating a call to action.
- PCs are not the primary concern of most organizations attempting to address the Year 2000 situation, but because the PCs themselves are important and because our world is becoming increasingly interconnected, we must address the Year 2000 challenge for PCs also.
- The electronic interdependencies between nations are significant and growing. We must address the Year 2000 situation on both a national and international basis.
- PCs are used on home office desktops and in multinational corporations. No matter how PCs come into play, chances are that sooner or later all risk exposure to the Year 2000 situation.
- Regardless of the computer platform, ITAA is prepared to continue working closely with Congress and the Executive Branch aimed at expediting Year 2000 solutions.

Thank you.



For more information contact the following designated representative:

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Mrs. MORELLA. I think you may have mentioned, Mr. Miller—and thank you for the work that ITAA has been doing to confront this challenge and find the solutions and work on them.

I'm now pleased to hear from Mr. Daniel Houlihan, who heads the Data Processing Oversight Commission, State of Indiana, on behalf of the National Association of State Information Resource Executives [NASIRE]. Boy, that's quite an acronym.

Mr. Houlihan.

**TESTIMONY OF DANIEL D. HOULIHAN, EXECUTIVE DIRECTOR,
DATA PROCESSING OVERSIGHT COMMISSION, STATE OF INDIANA,
ON BEHALF OF THE NATIONAL ASSOCIATION OF STATE INFORMATION RESOURCE EXECUTIVES**

Mr. HOULIHAN. Thank you very much for this opportunity to share information with you about what state governments are doing about the Year 2000 challenge.

I am here representing the National Association of State Information Executives, or NASIRE for short. NASIRE is a professional association made up of individuals within the 50 state governments that have statewide responsibility for information technology policy planning and implementation.

The message I hope to leave you with here today is that state governments do indeed understand the complexity and the magnitude of the challenges that they are facing, that they do remain confident. They really have no choice. They will not fail their citizens. They are coming together. They are marshalling their resources and they will meet the challenge.

First let me advise you of some of the actions that NASIRE has taken and has on the planning horizon. I'll speak briefly about some of the activities we see taking place within the States and then finally close with some of the serious risks that States see and some of the opportunities that we see that the Federal Government might be able to help.

To date we have surveyed our memberships twice, once in the spring and most recently this past August, to gauge the level of activity and planning that's going on within the States. We held an educational session at our mid-year conference in April to assist members in sharing information on activities that the various States have going on to resolve the problem. And we have established an ad hoc committee to develop an aggressive strategy to help the States deal with the Year 2000 conversion efforts.

In addition, we will be holding a Year 2000 symposium early in December for state coordinators. This is designed to help them pull together information in order to meet the spring legislative sessions where they will have to request funding to solve the problem.

I'd like now briefly to share some of the information that we've garnered from our recent survey of our state points of contact. As you will see, States are at various levels of preparedness, much like we see with the federal agencies listed on the grading sheet over here.

I will tell you that all States are actively involved in solving the problem. About 75 percent of the States reporting are heavy into the planning process; 25 percent have reported that they have already started testing and doing some implementation; 60 percent

of the States have received briefings and full support from the executive branch; and 70 percent reported that they are in the process right now of seeking full support from their respective legislative bodies.

The cost dimension for overhauling the state computer systems clearly is causing States the most difficulty. Many States are in the process right now of trying to come up with realistic cost estimates and the estimate ranges that we have seen vary widely. Clearly it's safe to say that the numbers are still in a very fluid state. While not all States have progressed to the same level of accomplishment, they're all actively involved in readying themselves for what lies ahead.

As they take a serious look at what lies ahead they see the following potential risks: as you know, States do not have the luxury of deficit spending. We'll have to deal with this issue by making some very, very tough business and fiscal decisions. As a result, maintenance of current applications, new systems and meeting the Year 2000 problem are all going to be competing for a relatively fixed amount of resources. States will also have a crisis, if you will, in terms of finding the right kind of programming talent, enough of that and at a reasonable cost, to meet the challenges that they face. Finally, individual efforts by local state and Federal Government may mean that we each reinvent the wheel and create solutions that are not compatible with one another and we certainly need to be sensitive to that.

On the federal side, many of the business processes that the States have in place are the result of federal mandates. What the Federal Government does or fails to do could have a great impact on the States. The States view the following areas as opportunities where federal agencies can help.

We believe that the federal agencies need to share with the States as soon as possible what they are doing or are planning on doing about fixing their Year 2000 problems, especially for those programs that directly affect the States.

Federal agencies must continue the information sharing that is already taking place, and I believe we need to expand that to include both state and local government. Clearly the emphasis must be placed on calls to action, for the time for worrying about this problem is past.

The States also need to know at the soonest opportunity what funding support the federal agencies will be providing for fixing the Year 2000 for those systems or programs that have been mandated.

And as this is clearly a national crisis, the States encourage the federal agencies to ensure that they do not impose unreasonable reporting requirements on the States at the last minute. And, in addition, federal agencies, we would ask, strive to minimize changes to some of the existing programs and coordinate those changes with the state leaders.

In conclusion, let me say that NASIRE's mission is to be the leading forum for addressing the opportunities, implications and challenges of improving the business of government through the application of technology. We are committed to working with the state leaders to help them help themselves in meeting this very serious challenge.

Therefore, on behalf of NASIRE and the 50 States which we represent, I appreciate the opportunity to offer testimony today. Thank you.

[The prepared statement of Mr. Houlihan follows:]

Testimony on the Century Date Change Problem

Presented before the Subcommittee on Technology, Committee on Science

US House of Representatives

By Daniel D. Houlihan, Executive Director

Data Processing Oversight Commission, State of Indiana

on behalf of

The National Association of State Information Resource Executives (NASIRE)

September 10, 1996

Introduction

Let me first express my appreciation for the opportunity to appear before your committee to provide testimony on how state governments are dealing with the challenges that the Year 2000 is bringing our way. I am here today representing the National Association of State Information Resource Executives, or NASIRE for short. I am currently the first-vice president of NASIRE and next month will take over as its president.

NASIRE is a professional association made up of individuals within each of the fifty state governments that have state-wide responsibility for information technology policy, planning, and implementation. These individuals go by different titles in different states, the most common title of which would be that of chief information officer.

My testimony this morning will focus on actions already taken or actions being taken both individually by the various states and collectively by the states through NASIRE to deal with the century date change problem. The message that I hope to leave with you today is that state governments do indeed understand the magnitude and complexity of the problem that they are facing, have marshaled their resources, and are coming together to meet the challenge.

While state governments do not know exactly, just yet, all the steps that must be taken to solve all the issues they face, they remain confident. They have no other choice, for they will not fail their citizens.

Let me first advise you of the actions which NASIRE has taken and those activities we have on the planning board. I will then follow with information on the status of activity taking place in the states. Finally, I will close with some of the more serious risks that states face and some of the areas where the federal government can help.

NASIRE Activities

To date, NASIRE has been able to do the following:

- Through our interaction with members, we have validated that the members have identified the Year 2000 Century Date Change issue as their top priority.
- We surveyed our membership twice, once in the spring and most recently in August, to gauge the level of planning activity among the states on this issue.
- We held an educational session in April at our mid-year conference to assist our members in sharing information on the variety of activities which individual states had already undertaken to resolve the problem.
- Appointed an ad-hoc committee to develop an aggressive plan to assist the states in planning for the Year 2000 century date change.

In addition, we have the following activities in various stages of progress:

- We will be holding a Year 2000 symposium in early December for the state coordinators, data center directors, and senior level information resource management officials. The symposium will address assessment, sample requests for proposals, inventory, strategy and planning, transformation, and implementation. It is designed to help state technology leaders to prepare for their spring legislative sessions.
- We will be offering Year 2000 home page links from NASIRE's StateSearch, a directory of state government information by subject areas located on the world wide web and a moderated Year 2000 listserv for information exchange on best practices among the states.
- We are preparing a talking paper for information resource managers' use in explaining the problem and solution to policymakers. The talking paper will be available in different media.
- We will continue to track state and federal legislative discussions and share that information with our members.

Activities in the states

I would like now to briefly share some of the information garnered from our most recent survey of our state points of contact. This second Year 2000 survey, which we sent out in early August, was completed by 30 states. As you will see from what follows, states are in various levels of preparedness, much as is the case among federal agencies. While only 30 states were able to respond to the written survey, we have ascertained via teleconferences that most of the other states are involved in activities similar to those who responded in writing:

- All states are actively engaged in solving the problem. About 75% of the states reported they are in the planning phase, while approximately 25% reported they are already testing plans and implementing system changes.
- While information technology services tend to be decentralized in the states, more than half of the respondents indicated they have a central point of coordination for the Year 2000 conversion.
- Of the 30 states reporting, 60 percent reported they had the full support and understanding of the executive branch on the issue. Seventy percent reported they are in the process of seeking the full backing of their respective legislatures. The other states are not too far behind.
- The cost dimension of overhauling the state computer systems is causing states the most difficulty. Many states are in the process of trying to determine realistic cost estimates as we speak. The estimated cost of the states surveyed were wide ranging. It is safe to say that the numbers are still very fluid at this time.
- The estimated lines of code that must be assessed or converted in the individual states fell between 300,000 to over 97 million lines.
- Completion dates for the states' Year 2000 projects ranged between 1997 and December 1999.

While not all states have progressed to the same level of accomplishment, all states are actively involved in preparing themselves for what lies ahead.

Potential risks

As state governments take a serious look at what lies ahead, they see the following potential risks:

- States do not have the luxury of deficit spending and will have to deal with this issue by making some very hard business and fiscal choices. As a result, maintenance of current systems, new application systems, and fixing the Year 2000 problem will all be competing for a fixed amount of financial resources.
- States will be facing a crisis of trying to find enough skilled programming resources. They will have to be creative in where to find solutions. Being provincial in where the talent comes from may not be a luxury that states or the federal government can afford.
- Individual efforts by local, state, and federal government may mean they each reinvent the wheel and end up creating solutions that are not compatible with one another.

Opportunities for the federal government to help

Many of the business processes that states have in place today are the result of federal mandates. What the federal government does or fails to do in support of these mandated programs can materially affect the states. While the states are moving ahead and cannot wait for the federal government to complete all its actions, they do see the following areas as opportunities for the federal government to help:

- The various federal agencies need to tell the states, at the earliest possible opportunity, what the federal government has already done or is planning to do to fix their Year 2000 problems, especially those programs that directly affect states.
- Federal agencies must continue the information sharing that is already taking place and expand that effort by working with local and state government. In addition, despite the almost endless supply of magazine articles about and web pages dedicated to the Year 2000, emphasis must be placed on calls to action. The time for worrying about the problem is over.
- The states need to know at the soonest opportunity what funding, both type and level, the federal agencies will provide to fix the Year 2000 problem within the programs that they have mandated.
- As this is clearly a national crisis, the states encourage the federal agencies to ensure that they do not impose unreasonable reporting requirements or impose legitimate reporting requirements on states at the last minute.

- Federal agencies must strive to minimize changes to existing programs. Such changes should have prior coordination with and approval of the respective state program leaders.
- With the pervasive need to share information between business processes at the state level, new mandated federal requirements should include special funding to meet system integration requirements.

Conclusion

NASIRE's mission is to be the leading forum for addressing the opportunities, implications, and challenges of improving the business of government through the application of information technology. We are committed to working with the leaders in state government to help them help themselves respond to this challenge. We are confident that the states will meet the challenge and will pull together to get the job done. On behalf of NASIRE and the fifty states which it represents, I thank you for this opportunity to share our perspective with you.

Mrs. MORELLA. Thank you, Mr. Houlihan, on behalf of NASIRE.

I would now like to turn to Mr. Larry Olson, who is the Deputy Secretary for Information Technology, Commonwealth of Pennsylvania, for his oral statement.

TESTIMONY OF LARRY OLSON, DEPUTY SECRETARY FOR INFORMATION TECHNOLOGY, COMMONWEALTH OF PENNSYLVANIA, GOVERNOR'S OFFICE OF ADMINISTRATION

Mr. OLSON. Thank you very much, Chairwoman Morella, Chairman Horn, distinguished members of both Subcommittees, ladies and gentlemen.

On behalf of Pennsylvania Governor Tom Ridge, I want to thank you for this opportunity to talk with you about the joint obstacle we face in tackling the Year 2000 date field problem. I sincerely appreciate this chance to share with you the approach the Ridge Administration is taking in meeting this challenge.

I want to commend the Chairs Morella and Horn and the membership of both Subcommittees for the foresight shown in making this difficult topic a matter of vital public discussion. Your concerted action to gather technical experts and policy leaders from around the country to learn from their experience is admirable.

In fact, the primary theme in my testimony this morning is the observation that no single entity—whether a government body, a private business, or a public service group—can afford to take a self-centered approach to the Year 2000 dilemma. This is a common problem, and, as a result, it is the position of the Ridge Administration that we must seek shared solutions as well.

In my comments today, I will focus on three main principles that underscore our Year 2000 strategy: leadership, management, and education. Pennsylvania is the nation's fifth most populous State, with over 12 million residents, so the number of people who could be affected adversely is considerable.

As Chief Information Officer, I've been assigned the responsibility to develop our response to the problem through the Governor's Office for Information Technology, which I head. Charles Gerhards, behind me, has managed the details of developing the Ridge Administration's action plan. He is here with me today to help answer any technical questions that you might have. Charlie is the Director of our Central Management Information Center.

As I am sure you have already learned, there is no easy software "fix" available for converting existing software to make it Year 2000 compliant. There is a hazard, however, in getting distracted by the technical dimension of this challenge and missing the fact that this is first and foremost a project management challenge.

The emphasis should not be on the fine details of making specific alterations to various computer programs. Instead, a more productive approach, we feel, is to take a system-wide view of the problem—of the bigger picture—to ensure that changes to some computer systems are not undone by incomplete modifications on other interconnected systems. A more comprehensive strategy is also essential in order to guarantee that this imposing and immovable deadline will not be missed.

The Standish Group of Boston, Massachusetts has released the revealing statistic that only 16 percent of all information tech-

nology projects are completed on time and within budget. Incredibly, that means the vast majority of IT projects—84 percent—do not meet their time deadlines or their financial goals. That figure should serve as a striking reminder of the immense challenge presented by the Year 2000 problem.

While many States are focusing only on the conversion of their own internal computer resources to meet Year 2000 computer standards, Pennsylvania is initiating a state-wide outreach effort to inform businesses, local government and citizens across the commonwealth about this common threat and to promote shared solutions.

With this goal in mind we've established a Year 2000 link on the Pennsylvania homepage on the World Wide Web. That address is www.state.pa.us. We applaud the efforts of federal groups like the General Services Administration and the National Institute of Standards and Technology, who established similar informational web sites.

So we do not need to address only our internal program modifications, but we need to work in unison with outside vendors, local governments, businesses and the Federal Government, with which we frequently exchange data. Our goal is not only to safeguard the State's computer systems but to make every effort to protect the public and private computer resources throughout Pennsylvania.

We would encourage the Subcommittees to consider the Federal Government's comparable responsibility to public and private groups across the nation while formulating your own Year 2000 plan of attack.

In closing, I'd like to thank both Subcommittees for this opportunity to describe Pennsylvania's Year 2000 action plan, which is based, again, on leadership, management and education.

I've also brought along some additional documents connected with the Year 2000 campaign in Pennsylvania that I would like to have included in my testimony as part of the public record.

Charlie and I would be happy to answer any questions you might have.

[The prepared statement and attachments of Mr. Olson follow:]

**TESTIMONY OF LARRY OLSON
DEPUTY SECRETARY FOR INFORMATION TECHNOLOGY
COMMONWEALTH OF PENNSYLVANIA
GOVERNOR'S OFFICE OF ADMINISTRATION
SEPTEMBER 10, 1996**

Introduction

Chairwoman Morella, Chairman Horn, distinguished members of both Subcommittees, ladies and gentlemen. On behalf of Pennsylvania Governor Tom Ridge, I want to thank you for this opportunity to talk with you about the joint problem we face in tackling the Year 2000 date field problem. I sincerely appreciate this chance to share with you the approach the Ridge Administration is taking in meeting this challenge.

I want to commend Chairwoman Morella and Chairman Horn, and the membership of both subcommittees, for the foresight shown in making this difficult topic a matter of vital public discussion. Your concerted action to gather technical experts and policy leaders from around the country to learn from their experience is admirable. In fact, a primary theme in my testimony this morning is the observation that no single entity -- whether a government body, a private business, or a public service group -- can afford to take a self-centered approach to the Year 2000 dilemma. This is a common problem, and, as a result, it is the position of the Ridge Administration that we must seek shared solutions, as well.

In my comments today, I will provide some brief historical background on how the Commonwealth of Pennsylvania is confronting the Year 2000 date field problem. I will then focus on the three main principles that underscore our Year 2000 strategy: leadership, management, and education. While we don't profess to have all the answers to this very complex problem, we do believe that we have crafted an innovative approach that is already proving its worth in aggressively meeting the Year 2000 deadline.

Pennsylvania's Response

Pennsylvania is the nation's fifth most populous state, with over 12 million residents, so the number of people who could be adversely affected is considerable. As a first step, Governor Ridge directed Lieutenant Governor Mark Schweiker and Secretary of Administration Tom Paese to assemble an action team within the Office of Administration to study the dimensions of the problem and formulate a plan for making the commonwealth's executive agencies Year 2000 compliant. They, in turn, asked me to coordinate this effort through the Governor's Office for Information Technology, which I head. Charles Gerhards has managed the details of developing the Ridge Administration's action plan, and he is with me today to help answer any technical questions you might have. Charlie is the director of our Central Management Information Center.

As I am sure you have already learned, there is no easy software "fix" available for converting existing software to make it Year 2000 compliant. In most cases, the task ahead will require that computer specialists inspect each program's lines of code to identify date field locations, make the necessary changes, and then test for Year 2000 compatibility. There is a hazard, however, in getting distracted by the technical dimension of this challenge and missing the fact that this is first and foremost a project management challenge.

Obviously, the work to be done is tedious and time-consuming. But, it is the opinion of our state that our response will succeed only if we pay detailed attention to coordinating a disciplined and unified conversion process. The emphasis should not be on the fine details of making specific alterations to various computer programs. Instead, a more productive approach, we feel, is to take a system-wide view of the problem -- of the bigger picture -- to ensure that changes to some computer systems are not undone by incomplete modifications on other interconnected systems. A more comprehensive strategy is also essential in order to guarantee that this imposing and immovable deadline will not be missed.

The Standish Group of Boston, Massachusetts has released the revealing statistic that only 16 percent of all information technology projects are completed on time and within budget. Incredibly, that means that a vast majority of IT projects -- 84 percent -- do not meet their time deadlines or their financial goals. That figure should serve as a striking reminder of the immense challenge presented by the Year 2000 problem if we are to save the computer systems on which we so heavily rely from a twenty-first century collapse. The fact that 84 percent of all IT projects fail to meet their projected time lines or cost estimates should also motivate us to take prompt and decisive action in eliminating this threat.

I would like to emphasize, too, the most unique aspect of our strategy in Pennsylvania -- a characteristic that may be of interest to you as you develop your own plan of attack: While many other states are focusing only on the conversion of their own internal computer resources to meet Year 2000 standards, Pennsylvania is initiating a statewide outreach effort to inform businesses, local governments and citizens across the commonwealth about this common threat and to promote shared solutions.

Our goal is not only to safeguard the state government's computer systems but to make every effort to protect public and private computer resources throughout the state. We would encourage the subcommittees to consider the federal government's comparable responsibility to public and private groups across the nation while formulating your own Year 2000 plan of attack.

Leadership, Management and Education

On August 27, the Ridge Administration put into motion a Year 2000 action plan based on three guiding principles. The first of these principles is Administration leadership. In August, during a three-hour executive briefing for the leaders of the state's executive agencies and legislature, Lieutenant Governor Schweiker discussed the Ridge Administration's identification of the Year 2000 problem as a major threat to the quality of life in the Commonwealth, and he repeatedly stressed the Administration's commitment to lead a successful response in meeting this challenge. By their prioritization of Administration resources to study and attack this computer date dilemma, and their public statements of concern, the Governor and Lieutenant Governor have made clear that the Year 2000 problem is an Administration priority. This strong statement of support from the Governor's office is essential if the Year 2000 problem is to receive immediate and consistent attention from managers at the agency level.

The second founding principle of the administration's action plan is strong project management. It is our opinion in Pennsylvania that the date field changes that are necessary to achieve Year 2000 readiness are not, on their own, especially difficult to achieve. The challenge lies in the scope of the problem: the fact that these six-digit date fields are scattered throughout thousands of programs on the state's computer systems, and the alteration of these date fields requires extensive coordination among various agencies. This situation is further complicated by the myriad of interconnections that link our modern computer networks. So, we need to not only address our own internal microcode modifications, but we need to work in unison with outside vendors and other groups with which we frequently exchange data. As you take a step back and consider the Year 2000 challenge from a system-wide perspective, the magnitude of the problem and the complexity of its solution becomes more clear.

The third principle guiding our plan of attack is our commitment, to the best of our ability, to educate businesses and local governments across the state about the Year 2000 deadline and encourage the exchange of information that can help them take corrective actions. With this goal in mind, we have established a Year 2000 link off the Pennsylvania home page on the World Wide Web. The address for this new Web site is: [<http://www.state.pa.us>]. This Year 2000 resource will efficiently provide many state citizens, and hopefully residents of other states, with simplified access to educational materials and key vendor contacts. We applaud the efforts of federal groups, like the General Services Administration and the National Institute of Standards and Technology, to establish similar informational Web sites. While we are planning other outreach projects to spread the word on the Year 2000 problem, we believe our new Web link is a good first step that will grow in value as it evolves.

In closing, I would like to thank both Committees for this opportunity to describe Pennsylvania's Year 2000 action plan and I would be happy to answer any questions you may have.

**Presentation by Thomas G. Paese
Secretary of Administration
Commonwealth of Pennsylvania
Year 2000 Executive Briefing
Harrisburg, Pennsylvania
August 27, 1996**

GOOD MORNING. I'M TOM PAESE, SECRETARY FOR THE GOVERNOR'S OFFICE OF ADMINISTRATION. I MUST SAY THAT I'M STRUCK BY AN INTERESTING CONTRAST THAT PRESENTED ITSELF THE LONGER I LISTENED TO THIS MORNING'S PRESENTATIONS. FOR WHILE TECHNOLOGY HAS HISTORICALLY SIMPLIFIED OUR LIVES AND MADE THEM MORE COMFORTABLE, THIS SEEMS TO BE A CASE IN WHICH JUST THE OPPOSITE IS TRUE.

FOR EXAMPLE, IN THE HIGH-TECH WORLD THAT WE'VE CREATED, THE MINIATURIZATION OF ELECTRONIC DEVICES IS COMMONPLACE. COMPUTERS AND COMMUNICATIONS EQUIPMENT KEEP SHRINKING IN SIZE. YET THEIR CAPACITY TO DO MORE -- AND DO IT FASTER -- CONTINUES TO EXPAND. IN TRANSPORTATION, JET AIRPLANES AND OTHER MODERN MODES OF TRAVEL HAVE SIMILARLY SHRUNK OUR PLANET. AS A RESULT, IT'S REALLY NOT ALL THAT UNCOMMON TO MEET SOMEONE YOU KNOW ON THE OTHER SIDE OF THE GLOBE.

WE'VE COME TO EXPECT THAT NEW TECHNOLOGY ALWAYS MEANS BETTER LIVING. AND GENERALLY IT HAS. BUT THE YEAR 2000 PROBLEM CHALLENGES THAT COMMON ASSUMPTION.

CERTAINLY, NO ONE CAN LEAVE THE AUDITORIUM THIS MORNING WITHOUT A FOREBODING SENSE OF THE SACRIFICES WE ALL WILL HAVE TO MAKE IN ORDER TO CORRECT THE YEAR 2000 PROBLEM. WE OWE A DEBT OF GRATITUDE TO THE NATIONAL EXPERTS WHO HAVE COME HERE TODAY TO AWAKEN US FROM WHAT LANGDON WINNER WOULD CALL OUR "TECHNOLOGICAL SOMNAMBULISM." ACROSS THE UNITED STATES, PRIVATE BUSINESSES AND STATE AND LOCAL GOVERNMENTS ARE SLEEPWALKING -- THEY ARE ASSUMING SOME MAGICAL SOFTWARE FIX WILL COME TO SOOTHE THEIR TROUBLED YEAR 2000 DREAMS. BUT THIS MORNING WE HAVE BEEN FORCEFULLY AWAKENED. AND WE SHOULD BE GRATEFUL. GRATEFUL TO DENNIS SMITH, A PROFESSOR AT CARNEGIE MELLON; SUSAN THOMAS OF UNISYS, RICHARD KEARNEY WITH K-P-M-G, AND KEVIN SCHICK WITH THE GARTNER GROUP. WE THANK YOU FOR TRAVELING TO THE COMMONWEALTH TO SHARE YOUR KNOWLEDGE WITH US. NOW LET US HOPE THAT WE TAKE IT TO HEART AND ACT RESPONSIBLY ON YOUR ADVICE. (PAUSE)

THERE IS ANOTHER CONTRAST THAT HAS BEEN EVIDENT IN THE PRESENTATIONS HEARD HERE TODAY. FOR WHILE THE UNDERLYING THEME IN MOST OF THE MESSAGES HAS BEEN ONE OF IMPENDING DISASTER, THERE HAS

ALSO BEEN HOPEFUL MENTION OF SOLUTIONS.

WITHOUT A DOUBT, MANY OF THE FACTS WE HAVE HEARD THIS MORNING HAVE BEEN SOBERING. SOME WOULD SAY DISHEARTENING. WE HAVE LEARNED OF THE TREMENDOUS EXPENSE THAT WILL BE REQUIRED JUST TO KEEP OUR COMPUTERS UP AND RUNNING -- THAT'S WITHOUT ANY IMPROVEMENT IN PERFORMANCE WHATSOEVER. WE HAVE LEARNED JUST HOW COMPLICATED THIS PROBLEM WILL BE TO SOLVE BECAUSE OF THE MULTIPLE INTERCONNECTIONS THAT EXIST TODAY AMONG COMPUTER NETWORKS. WE HAVE BEEN FOREWARNED OF BUSINESSES THAT WILL SHUT DOWN, JOBS THAT WILL BE LOST, SOCIAL SERVICES THAT WILL COLLAPSE. SO, WHILE THIS IS A PROBLEM WE WOULD PROBABLY RATHER LOSE IN OUR DREAMS, THE CONSEQUENCES OF NOT ACTING ARE SO DISTURBING THAT WE CANNOT REST ANY LONGER.

AS DIRE AS THESE POSSIBILITIES SEEM, THERE IS STILL TIME TO ACT. IN FACT, TIME IS OUR ALLY IF WE USE IT WISELY. AND THAT PROMISING MESSAGE HAS BEEN AS MUCH A PART OF TODAY'S DISCUSSIONS AS THE TALES OF DOOM AND GLOOM. WE CANNOT BURY OUR HEADS IN THE SAND ANY LONGER. WE SIMPLY CANNOT CONTINUE TO SIT ON OUR HANDS.

OUR RESPONSIBILITY TO THE CITIZENS OF THIS STATE DEMANDS THAT WE ACT, AND ACT DECISIVELY. THE STRATEGIC PLAN THAT HAS BEEN PRESENTED HERE TODAY BY LARRY OLSON AND CHARLIE GERHARDS IS ONE STRESSING DISCIPLINE AND PUBLIC RESPONSIBILITY. IT, TOO, WILL KEEP US ALL FROM GETTING MUCH SLEEP, SINCE IT DEMANDS LONG HOURS TO MEET ITS AGGRESSIVE DEADLINES. BUT IT IS A PLAN THAT CAN SUCCEED.

THE COMMONWEALTH'S YEAR 2000 PROJECT IS BASED ON THREE FUNDAMENTAL PRINCIPLES: LEADERSHIP, MANAGEMENT COMMITMENT, AND EDUCATION.

THE FIRST OF THESE PRINCIPLES -- LEADERSHIP -- IS CLEARLY IN EVIDENCE TODAY. BY THEIR ACTIONS PROMOTING THE COMMONWEALTH'S YEAR 2000 PROJECT, GOVERNOR RIDGE AND LIEUTENANT GOVERNOR SCHWEIKER HAVE DEMONSTRATED, ONCE AGAIN, THE ADMINISTRATION'S COMMITMENT TO TACKLING DIFFICULT PROBLEMS AND GUIDING THE COMMONWEALTH TO A MORE PROSPEROUS FUTURE.

HERE IN PENNSYLVANIA, AS ELSEWHERE IN THE WORLD, THE COMPUTER DATE-CHANGE PROBLEM HAS LONG BEEN IGNORED, DESPITE ITS SERIOUS CONSEQUENCES FOR US ALL. THE RIDGE ADMINISTRATION, HOWEVER, IS MEETING THIS CHALLENGE HEAD-ON AND HAS SOUGHT TO FIND THE MOST EFFECTIVE SOLUTION AVAILABLE. AS THE YEAR 2000 PROJECT DEMONSTRATES, THERE IS NO LACK OF LEADERSHIP IN THE GOVERNOR'S OFFICE TODAY.

THE SECOND PILLAR OF THE YEAR 2000 PROJECT -- MANAGEMENT COMMITMENT -- DEMANDS YOUR RECOGNITION OF THE PROBLEM AND YOUR

PROMISE TO TAKE DECISIVE ACTION. BY HIS PARTICIPATION TODAY, THE LIEUTENANT GOVERNOR HAS DEMONSTRATED THE ADMINISTRATION'S SUPPORT FOR THIS INITIATIVE. BUT THE DAY-TO-DAY WORK OF CARRYING THIS PLAN THROUGH TO COMPLETION RESTS ON YOUR SHOULDERS.

THE OFFICE FOR INFORMATION TECHNOLOGY WILL MAKE ITS RESOURCES AVAILABLE TO PROMOTE THE EXCHANGE OF INFORMATION AMONG AGENCIES, SO THAT WE CAN MOVE FORWARD TOGETHER IN MEETING THIS CHALLENGE. BUT IT IS UP TO EACH OF YOU TO ASSIGN THE NECESSARY RESOURCES TO THIS TASK TO ENSURE THAT DATE-CHANGE DEADLINES ARE MET AND COMPUTER SYSTEMS STAY OPERATIONAL. DO NOT LET THE YEARS REMAINING LULL YOU INTO A FALSE SENSE OF SECURITY BUT STAY VIGILANT TO YOUR CHARGE.

A FINAL KEY COMPONENT OF OUR YEAR 2000 PROJECT IS THE NEED FOR STATEWIDE EDUCATION. WE IN STATE GOVERNMENT ARE IN POSITIONS OF PUBLIC SERVICE. AS A RESULT, WE HAVE A RESPONSIBILITY, NOT ONLY TO MAINTAIN OUR COMMONWEALTH COMPUTER SYSTEMS BUT TO ALERT BUSINESSES, LOCAL GOVERNMENTS AND ALL STATE CITIZENS TO THE SEVERE CONSEQUENCES OF THE DATE-CHANGE PROBLEM. WE WILL ACCOMPLISH LITTLE IF WE KEEP OUR OWN COMPUTERS ON-LINE WHILE OTHER PUBLIC AND PRIVATE COMPUTER SYSTEMS ACROSS THE COMMONWEALTH ARE CRIPPLED THROUGH NEGLECT.

EDUCATION IS ESSENTIAL. FIRST, TO GAIN BROAD PUBLIC AWARENESS OF THE PROBLEM. SECOND, TO SHARE HELPFUL INFORMATION, INCLUDING OUR OWN EXPERIENCES, TO PROVIDE COMMON SOLUTIONS TO THIS SHARED THREAT.

IN THIS MODERN INFORMATION AGE, ONE OF OUR GREATEST ASSETS IS OUR READY ACCESS TO USEFUL INFORMATION. WE MUST USE OUR COMMUNICATIONS TECHNOLOGIES TO EDUCATE OTHERS OUTSIDE STATE GOVERNMENT ABOUT THE YEAR 2000 PROBLEM. THE ADMINISTRATION'S ACTION TODAY TO ESTABLISH AND MAINTAIN A YEAR 2000 LINK TO THE PENNSYLVANIA HOME PAGE IS AN INNOVATIVE FIRST STEP.

ALTHOUGH THIS YEAR 2000 ISSUE IS TECHNICALLY CONFUSING TO MANY PEOPLE, ITS SOLUTION IS NOT, FIRST AND FOREMOST, A TECHNICAL ONE. INSTEAD, THE SOLUTION WILL COME FROM ADMINISTRATION LEADERSHIP, WELL IN EVIDENCE TODAY. THE SOLUTION WILL COME FROM A STRONG MANAGEMENT COMMITMENT, WHICH WE EXPECT FROM YOU, THE AGENCY EXECUTIVES. AND, FINALLY, THE SOLUTION WILL COME FROM AN EDUCATIONAL OUTREACH PROGRAM TO OUR BUSINESSES AND LOCAL GOVERNMENT LEADERS, SO THAT THE ENTIRE STATE CAN MOVE INTO THE TWENTY-FIRST CENTURY WITH CONFIDENCE.

WHILE THE REST OF THE COUNTRY CONTINUES TO SLEEPWALK AROUND THE YEAR 2000 PROBLEM, WE MUST DEMONSTRATE TO THE WORLD WHY PENNSYLVANIA IS "A LEADER AMONG STATES AND A COMPETITOR AMONG

NATIONS." WE MUST ADDRESS THE YEAR 2000 CHALLENGE AND MEET THIS PROBLEM BOLDLY. THE CONSEQUENCES OF NOT ACTING ARE UNACCEPTABLE. AND THE PUBLIC'S TRUST DEMANDS THAT WE MOVE AHEAD AGGRESSIVELY. LET'S USE THE KNOWLEDGE AND TOOLS WE'VE OUTLINED TODAY TO EFFECTIVELY MEET THIS CHALLENGE. SO OUR COMPUTERS CAN STILL COMPUTE, AND WE CAN ABLY SERVE THE STATE'S CITIZENS, WELL BEYOND THE YEAR 2000.

**REMARKS OF
LIEUTENANT GOVERNOR MARK SCHWEIKER
YEAR 2000 PRESS CONFERENCE
HARRISBURG, PENNSYLVANIA
TUESDAY, AUGUST 27, 1996**

Picture this -- planes become stranded in air because radar screens go blank, prison cell doors fly open, banks close because they have no way of tracking money, car crashes fill the highways because traffic lights are out, and business across the world comes to a complete standstill.

Unfortunately, this is not a scene from a science fiction movie. This is the way Pennsylvania could look on January 1, 2000 - unless, we act now.

I realize these are extreme examples of how the Year 2000 computer problem could impact Pennsylvania, but Governor Ridge and I want each and every one of you to understand the magnitude of this problem - and, most importantly, to let you know that there is still time to fix it.

Because folks, I am confident that the Commonwealth's agencies will be ready for the millennium - we're working on it now. I am here to make sure that the rest of Pennsylvania embarks on solving the Year 2000 challenge. If we don't, the effects of this computer disaster on Pennsylvania's economy will be devastating.

Consciously or not, every one of us has come to depend on computers to carry out our daily activities. We pay for our groceries at the supermarket with MAC cards. Our paychecks are direct deposit. We pay other bills by check or electronic transfer. We may even help our children surf the 'Net' for information on reptiles for a science report.

Ladies and gentlemen, we have come to a point in our society where our entire existence is almost completely based on the use of computer technology. And the problem is it is transparent. Many of us don't see this technology, so we don't fully understand its importance - we just assume it works.

Well, in 174 weekends, we are not going to be able to make that assumption.

You are not going to be able to assume that your paycheck will arrive in the mail or that your doctor's bill will get filed with your health insurance company. This is all information provided by computers. So if you think of information as money, or as cash - you know that its full value is only understood when you don't have any.

So, how did this happen? - let me give you some background.

For some 50 years - we have programmed most computer software to run on dates - dates we have entered into computer applications as six-digit figures. Two digits for the month, two for the day, and two for the year. But, as we approach the year 2000, we're beginning to see that this date standard has serious shortcomings. Instead of understanding "00" as the year 2000, different computers will read it as different years because they will revert "00" back to their base date.

If you're thinking how does this affect the Pennsylvanian who doesn't even have a

computer. Well, if that person receives a paycheck, social security or health care benefits, or even has a checking account - you can bet they'll sit up and take notice if they can't access their money.

So, how do we ensure that these catastrophes do not occur? We must prepare ourselves and our computers to move into the 21st century. And that's why I'm here today.

Today, Governor Ridge and I are calling on all businesses and local governments across Pennsylvania to tackle this issue head-on. We are asking them to take the Year 2000 challenge. Public and private computer systems worldwide will also be impacted. Factory orders may be lost. Customers might be denied access to their banking accounts. Environmental systems in buildings may shut down. Even the Department of Defense is working to ensure that weapons systems don't malfunction. All types of computers - from mainframes to desktop PC's -- could potentially be crippled by this simple oversight in the way computers handle dates.

Now, a natural first reaction might be, "Why can't somebody just write a new program to go in and automatically change all of the date codes?" I wish it were that easy. Because each line of computer code is different for each program, someone must actually read each individual line of computer code for every program and then manually change the necessary date codes.

Pennsylvanians must understand the magnitude of this problem. It will not go away. The Year 2000 deadline will not slide -- it is immovable. Pennsylvanians will either meet it or, come January 1, 2000, our computer systems will fail. Public services in Pennsylvania and everyday business transactions could be brought to a standstill. Obviously, these catastrophic results cannot be allowed to occur.

The Ridge Administration has already taken the Year 2000 challenge by developing a plan of attack to minimize the impact of the computer date dilemma on the Commonwealth of Pennsylvania. For the past six months, experts with the Governor's Office for Information Technology have been assessing the scope of the problem and drafting solutions for commonwealth agencies.

Today, we put that plan of attack into motion, to ensure that when the calendar changes to the Year 2000, Pennsylvania's crucial public services will not be jeopardized. They will continue to function.

This morning, we held an executive briefing at the State Museum of Pennsylvania in Harrisburg to detail our plan for Year 2000. Leaders from all state agencies and the legislature were updated on the Ridge Administration's plan to address this issue and heard presentations from state and national technology experts.

As you might imagine, the task of completing this transition -- searching all the state agencies' computer programs to fix these date codes -- is an enormous undertaking. But, under the plan we've created, we have taken the steps necessary to minimize the workload.

We expect that all state agencies will have their computer systems updated by the end of 1998. This way -- our technicians have an entire year to test and "debug" the changes -- to guarantee the proper operation of the commonwealth's computer systems into the coming

millennium.

It is important to note that, at this point, each agency is not only responsible for bringing its computer systems up to speed but also for funding the project within its already existing budget.

So the commonwealth will be ready - will you? It's not too late for the rest of Pennsylvania to beat the clock -- if action is taken now! By drawing attention to this topic, the Ridge Administration is sounding a rallying cry across the state. We strongly encourage any group with computer resources to analyze the date-readiness of its systems and to make the necessary date changes well in advance of the Year 2000. We challenge all Pennsylvanians: local governments, county commissioners, teachers, neighborhood grocery store owners, doctors, and businesses large and small. No one is immune!

We do not, however, expect Pennsylvanians to do this alone. The Ridge Administration is sponsoring an informational link on the Pennsylvania World Wide Web home page that provides all Pennsylvanians with the pertinent data and industry contacts they will need for meeting this computer challenge. The web site will be an evolving resource, growing in value as it is constantly updated and expanded. We encourage public and private groups across the state to take advantage of this electronic information source and to contact us with suggestions as to how it might be improved. The Year 2000 link is on the Pennsylvania home page and is available immediately.

In addition to the home page, we are currently looking into other ways to best disseminate this information to Pennsylvanians without Internet access.

Pennsylvania, the clock is ticking. State agencies will be prepared to successfully enter the new millennium and we want Pennsylvania businesses, as well as county and local governments, to share the success with us. By taking the Year 2000 challenge today, you and the Ridge Administration are ensuring that Pennsylvania's computer resources will be protected and that we will remain "a leader among states and a competitor among nations."

I would now like to open the floor to questions. We have gathered some of the best state and national experts on this topic to field your questions.

Larry Olson is the state's chief information officer. As head of the Office for Information Technology, he is overseeing the conversion of agency computer systems for Year 2000 compliance.

Charles Gerhards is the director of the state's Central Management Information Center. He has been responsible for the development of the action plan we are implementing today.

We are also fortunate to have with us Kevin Schick, Director of the Year 2000 Strategies division of the Gartner Group. The Gartner Group is recognized worldwide as a leading management consulting firm and has considerable experience in handling Year 2000 conversions.

Thank you again for coming today, and I now open the floor to questions for our technical experts.

NEWS RELEASE

OITPR - 103

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PENNSYLVANIA TAKES AGGRESSIVE STANCE ON COMPUTER PROBLEM

HARRISBURG (Aug. 27) -- Pennsylvania Lt. Gov. Mark Schweiker today called upon local governments and businesses to follow the Ridge administration in developing strategies to fix a problem that could cripple computer systems worldwide by the year 2000.

Speaking at an afternoon press conference at the State Capitol, Schweiker described the administration's commitment to aggressively tackle the Year 2000 date field problem, a computer glitch that threatens to create havoc for computer systems not equipped to recognize dates beyond the current century.

"Today, Gov. Tom Ridge and I are calling on all local governments and businesses across Pennsylvania to join us in tackling the Year 2000 issue head-on," Schweiker said.

"By drawing attention to this topic, we are sounding a rallying cry across the state. We strongly encourage any group with extensive computer resources to analyze the date-readiness of its systems and to make the necessary date modifications well in advance of the Year 2000," Schweiker added.

During a three-hour executive briefing earlier in the day, experts from the state's Office for Information Technology were joined by a panel of renowned industry specialists in describing the current situation and detailing the state's corrective program for safeguarding its agencies' computer systems.

Charles Gerhards, director of the state's Central Management Information Center, explained that it has been common practice in the software industry to represent dates as six-digit figures, with two digits each used for the month, day and year. For example, August 27, 1996 would be represented in a computer program as 08/27/96.

This practice assumes the date occurred in the 1900s, since there are no digits assigned to identify the century. While this hasn't been a problem in the past, this oversight could cause

some computer systems to produce erroneous data or shut down altogether as the 21st century approaches, Gerhards said.

Since dates are used extensively in state computer systems to calculate such things as license and permit renewals, tax collection statements, and payroll and social benefit payments, the impact of the Year 2000 computer dilemma could cascade across various critical state services.

With this in mind, the state has spent the past six months planning its response to the Year 2000 challenge.

Under the state's plan, computer programs that have outlived their useful life would not be corrected but would be scrapped. Other software programs still of value might not be modified if they contain dates that are deemed unnecessary for making calculations. This would conserve personnel efforts for the conversion of "mission-critical software" essential to the state's day-to-day operations, Gerhards said.

Priorities are already being established for the changes necessary to mission-critical software, he added, so that the most important applications will get the earliest attention.

Under the plan detailed by Gerhards, the Year 2000 Project will be coordinated by the Governor's Office for Information Technology (OIT). Each executive agency under the governor's jurisdiction will be responsible for conducting its own software conversions, but, according to Gerhards, the OIT will continue to monitor progress and serve as a focal point for information exchange and problem solving.

The time line for the state's Year 2000 Project calls for all date conversions to be completed by the start of 1999, leaving a full year for quality assurance testing.

In addition to Gerhards and Schweiker, several other Ridge Administration officials and some of the industry's best-known Year 2000 experts participated in today's briefing. Secretary of Administration Thomas Paese noted the commonwealth's leadership position in addressing the problem and highlighted the role state government could play in alerting local governments and statewide businesses to the multiple dimensions of the date conversion task.

Industry speakers included Kevin Schick, a senior industry analyst with the Gartner Group; Susan Thomas, director of the Unisys worldwide TEAM 2000 Program; and Richard Kearney, a principal with the KPMG consulting firm. These three Year 2000 specialists spoke on the nature of the problem and recommended approaches for taking timely corrective actions. The morning's agenda also included a panel discussion moderated by Dennis Smith with Carnegie Mellon University's Software Engineering Institute.

Larry Olson, chief information officer for the state, stressed the soundness of the commonwealth's action plan.

"By this action today, Pennsylvania is taking the lead among the 50 states in safeguarding our computer resources and ensuring that essential public services to state residents will not be impacted as we move into the 21st century," Olson said.

He said information on the computer date problem would be made widely available through a Year 2000 link to the Pennsylvania home page on the World Wide Web [http://www.state.pa.us/Technology_Initiatives/year2000/index.html].

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3-1996

POLICY DIRECTIVE

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YEAR 2000 PROJECT -- POLICY DIRECTIVE TO AGENCIES

The Ridge Administration's effort to meet the Year 2000 challenge has been managed through the Office for Information Technology (OIT), under the Governor's Office of Administration (OA). The state's chief information officer, Larry Olson, who manages the OIT, decided to attack the date-change problem on two fronts.

Early in 1996, Olson instructed Charles Gerhards, director of the Central Management Information Center (CMIC), to conduct a large-scale assessment of the executive agencies' computer resources and their vulnerability to the Year 2000 date-change problem. This assessment was focused only on agencies' "mission-critical" software resources; that is, software programs deemed essential for an executive agency to fulfill its public service function.

The second element of Olson's Year 2000 strategy was a policy directive to state agencies informing them of the date-change problem. This directive requires that application developers conform state software projects to meet established Year 2000 date formats; it also halts the acquisition of any new software unable to recognize the eight-digit date field standard. Paragraph three of the directive instructs agencies to be sure that any on-going software modifications affecting date fields establish and maintain compatibility with an eight-digit date standard. Paragraph four establishes the OIT policy that any new software purchases be Year 2000 compatible.

By taking this prompt action, the Office for Information Technology quickly established a policy mandate intended to minimize the number of agency software programs that would have to be modified in order to meet Year 2000 date standard requirements

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AGENCY ASSESSMENT

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YEAR 2000 PROJECT -- AGENCY READINESS ASSESSMENT

Early in 1996, Larry Olson, the state's chief information officer, and Charles Gerhards, director of the Central Management Information Center (CMIC), instructed agency managers to conduct an assessment of their computer systems and their vulnerability to the Year 2000 date change problem. In particular, the agencies were asked to identify those "mission critical" software programs that were most at risk of failure due to the shortcomings of the six-digit, date field standard and its inability to recognize changes in century. "Mission critical" software was understood to mean those programs that are essential for the agencies to meet their day-to-day public service obligations to Pennsylvania citizens and other public and private sector groups. A final report on the Year 2000 readiness of the state's 36 executive agencies was completed in June.

CMIC staff members collected the Year 2000 estimates submitted by executive agencies and then performed calculations to determine the work force requirements for making the necessary software modifications. Their report concluded that the five organizations with the greatest number of mission critical applications in jeopardy are, in descending order: the Department of Environmental Protection, the Executive Offices, the Department of Labor and Industry, the Department of Revenue, and the Department of Transportation.

Those figures can be somewhat misleading, however. Since an application represents a system of programs, the CMIC staff also asked agencies to break the number of software applications down into a more specific figure on the number of programs that will need modifications. Following this revised focus, the Department of Environmental Protection was no longer among the top five agencies in terms of required Year 2000 software changes. Instead, the Liquor Control Board moved into the top five.

Working off agency estimates, CMIC researchers performed preliminary calculations to forecast: the employee work days (based on 7.5 hours-per-day) needed to make the software changes, the translation of work days into comparable work years, the number of software programmers needed to handle the anticipated work load within a two-year time frame, and the cost in salary and benefits to pay qualified state employees to make the date-change modifications. A two-year time line was allotted for managing the software alterations in order

Mrs. MORELLA. I thank the three of you very much for the insight that you've provided. I guess I'll start off the questioning with Mr. Miller.

Press reports have indicated that Microsoft is producing software that does not comply with the NIST, ANSI standard. In the absence of Microsoft, except for the written testimony, which I guess you've seen, I wonder if you would like to or could enlighten us as to why software companies would deviate from the standard?

Mr. MILLER. Clearly it's a market-driven decision. Any vendor, whether it be Microsoft or anybody else, has to decide when it is putting a product on the market what they think will give them the most competitive advantage in the marketplace.

It seems that Microsoft has decided in terms of the built in standard date format that they have—it is different than the ANSI standard, but as they pointed out to the Subcommittees in their written testimony, in fact, their system accommodates, they say, more than 70—some people say more than 150—standards worldwide that are used to express dates. And with a couple of simple clicks of the mouse button on a control panel on a Microsoft based operating system one can simply change the date field if one chooses to use the ANSI standard rather than the date standard that the Microsoft product comes with. I assume Microsoft and other vendors will simply decide over time whether they want to continue—I'm not privy to their inner thinking about this but normally what it comes down to is a market-driven decision.

Mrs. MORELLA. I just wondered, in terms of your response about whether that corrects the input and output of the data.

Mr. MILLER. Basically what that would do, Madam Chairwoman, if you make the changes—as they mention in their testimony—any programs that you would run on top of that operating system would then have the date fit in in the format that you changed it to. If you didn't make the change it would have the format that Microsoft has built into their Windows 95 or other operating system you might have. If you make the change, then you could use the NIST or the ANSI standard.

Of course, again, because all of these companies are global—Microsoft and many other of my member companies sell 50 percent or more of their products abroad—they're constantly wrestling with this. I recently came back from Europe and, of course, they write their dates quite differently than we do. They resent the idea that somehow America hegemony is trying to impose date standards. I guess if Microsoft were testifying in another market abroad, they would probably be accused of somehow trying to also upset the marketplace.

Mrs. MORELLA. This is also troubling to find out that our allies throughout the world are even further behind than we are.

Mr. MILLER. It is quite troubling. We are very pleased to be able to work with our sister association in the United Kingdom, which in turn has been working with the British Department of Trade and Industry. We held a joint seminar last month that had over 300 attendees.

So that's the good news, that they're starting to wake up. But they're really quite far behind in terms of their planning and recognizing the seriousness of the problem.

Mrs. MORELLA. You also mentioned your certification program for the Year 2000. Would you like to comment a little bit more about that?

Mr. MILLER. Yes, Madam Chairwoman.

The issue has been raised by the user community, "How do we know that the products and services that we're being provided by the vendors are Year 2000 compliant? Particularly if they're coming in to upgrade or help us fix products and services, how are we going to be comfortable with the fact that they're going to be Year 2000 compliant and both correct the existing problem and not introduce new problems?" I think that's the issue Chairman Horn raised back in his hearing earlier this year.

So what our project that we have developed in conjunction with the Software Productivity Consortium, a group of expert software engineers who come in and do systematic analysis of products and services developed by software and service vendors, is a very extensive review of company products and services to indicate that, in fact, they have the processes, the methodologies, the expertise necessary to ensure the consumer that they have taken all reasonable professional steps, industry standard steps—that they have the expertise, they have the knowledge to make their products Year 2000 compliant.

This certification will involve a very extensive review. The questionnaire that we have developed has been in development now for over two and a half months. We consulted experts literally all over the world to fashion that questionnaire. We currently have a prototype test going on in the marketplace that will be concluded this weekend. The questionnaire should be finalized by early next week and we'll publicly announce this project right at the beginning of October.

What the process will involve is that companies will provide answers to this questionnaire, which the last time I looked was about 30 pages long, plus extensive supporting documentation to validate the information. That will be reviewed by an independent panel of experts at the Software Productivity Consortium. If they find that the system and processes and procedures are, in fact, acceptable then that company, that vendor will be issued a seal of approval by the Year 2000 certification process.

If, in fact, there are shortcomings in the Software Productivity Consortium review, ITAA will inform the vendor of the shortcomings and ask them to resubmit their application after they've been able to establish that they are providing the necessary corrections.

We're particularly concerned about this, Madam Chairwoman, because of the shortage of resources that are developing already out there. We don't want to get in a situation where you get the Roofing, Sheeting, Siding and Year 2000 Company coming along and saying, "We know you're in trouble. We know that you're running out of time. We know that the best and most legitimate vendors out there already have their books filled with clients. Therefore, we're going to step in and provide Year 2000 service, particularly to the customers who are late awakening to this issue."

So we think by having the certification program we hope to be able to screen out those vendors who do not have legitimate prac-

tices and methodologies, at the same time helping legitimate ones who may have pretty good processes and procedures but not quite as good as the government would expect or as the private commercial user would expect to make sure that they have absolutely top notch processes and procedures for their software and their services.

Mrs. MORELLA. I commend Chairman Horn for suggesting this at his hearing and I want to commend you for this ambitious undertaking. It sounds like it's pretty expensive and extensive, yet you're going to have some responses to that questionnaire by October 1st. So I hope you share it with us. It's coming up in about three more weeks, just about the time we'll be adjourning the 104th Congress.

Mr. MILLER. We'll be pleased to brief you, Mr. Horn and any members of the Subcommittee or your staffs as the program develops. And we'll certainly give you a pre-release, detailed explanation of the program so that you're fully aware of how we're developing it.

Mrs. MORELLA. Thanks, Mr. Miller.

I want to ask the two representatives of the various state governments, I wonder, does the National Governors' Association have an official policy on 2000 conversion? If they do, is it going to be introduced in the winter meeting? I think that's one thing you mentioned in January.

Mr. HOULIHAN. NASIRE staff works with both the National Governors' Association and the National Council of State Legislatures to try and coordinate the various issues that we do have in common. I am not aware right now if they have a policy statement coming out.

Mrs. MORELLA. Mr. Olson?

Mr. OLSON. We have not heard anything from the National Governors' Association. The only group that we have been contacted by has been NASIRE briefly, back in the spring, and then recently, back in August.

Again, one of our concerns is that there's been very little recognition from some of the different larger national groups. So we certainly welcome involvement.

Mrs. MORELLA. Maybe it should be suggested that there be some kind of a policy adopted or resolution to come up to. I would think, their imprimatur would be of some importance.

I also wonder as a liaison to the States—and we're going to be hearing from OMB in the next panel—what agency do you think would be best in the Federal Government to connect with the States? Would it be GSA, for instance, which is what the suggestion has been?

Mr. HOULIHAN. I think GSA, the Office of Management and Budget. I think those rather than the various federal agencies—for example, Health and Human Services, they deal with similar organizations in the States. There's a functional group that interacts with Health and Human Services within the States. There is, for example, departments of transportation that have a professional association. And also the employment training associations, professional associations to interact with the Department of Labor.

So I think the channel of communication has got to flow probably not through a single means but through multiple means.

Also, within the States most of the States have what would be called a Chief Information Officer, as Mr. Olson is within Pennsylvania. That's the point of contact that NASIRE deals with. So I think we've got to exercise as many possible avenues of getting information back and forth between the States and the Federal Government.

Mrs. MORELLA. Mr. Houlihan, what are some of the innovative things that States are doing to respond to the 2000 conversion problem? I ask that because I remember hearing that the State of Nebraska had a unique approach in terms of funding, at least.

Mr. HOULIHAN. If I recall, the State of Nebraska made a decision to divert two cents of their existing tax on cigarettes to help fund this particular issue. I think each State is individually wrestling with how they are going to fund it.

The price tags that we see published from various state governments—I think we need to be careful, because first off, if you realize that within the States themselves they do have staff already on board working in information technology organizations and working on systems that support the various state agencies. So while you might see a dollar amount that is not necessarily new dollars but that could be a combination of existing resources that are going to have to be diverted to support that particular initiative and in addition to that then some new money would be requested.

I think the real challenge, as Mr. Olson has alluded to, is really pulling together at the state level all of those entities that will be involving the city and county organizations in addition. So the real challenge is bringing together the right people, getting them in the right room and working through the issues and setting a common strategy.

Mrs. MORELLA. A final question. Do you see a role for the Federal Government? Yes, we are asking our agencies to all come up with a plan and a time table and the cost. We hope to liaison out with the States. Can you see in terms of States and localities as well as the private sector that the Federal Government, that Congress has a role to play? Just curious. Mr. Olson, would you like to try that one?

Mr. OLSON. Yes. I think clearly the Federal Government can provide a tremendous benefit in leadership, in making sure that this problem is clearly recognized, that it's a problem that has to be addressed immediately, that it cannot be delayed.

What we have been trying in Pennsylvania is having the Governor, Lieutenant Governor clearly making a statement to all state agencies that this is now an administration priority. And also telling that to the businesses and local governments, that as the state government is now addressing it you need to address it.

So I think from the Federal Government if we had a very clear sign and recognition and also building that awareness and outreach with state governments, local governments and businesses too that would provide a tremendous benefit to the entire nation, I believe.

Mrs. MORELLA. Would anyone else like to comment on that? Should we have a requirement that the Federal Government cannot do business with any State or entity that has not converted?

Mr. HORN. That might delay implementation to choice opportunity.

Mr. MILLER. I would like to suggest something slightly different in terms of what the Federal Government can provide in terms pushing the private sector.

I think you've already seen an example, Madam Chairwoman, with the Office of the Comptroller of the Currency. They put out a notice several months ago to all the banks that they are in charge of regulating saying, "You must become Year 2000 compliant by the end of 1998." So whenever there's a federal agency with regulatory power over private businesses, then one way to get top management attention—and frequently what we hear is the trick in this, as we've discussed, is getting top management attention to this issue—which isn't really sexy. It usually isn't something that value adds but it's something a company has to do—is to have, for example, the Security and Exchange Commission or the Office of the Comptroller of the Currency and other people involved in regulatory matters saying, "You are hurting your company. You have a certain fiduciary responsibility as a top manager, CEO, CFO, CIO to make sure that your company is Year 2000 compliant."

That will get the attention of the top management perhaps in a way that merely having the MIS director show up and say, "We have to fix this 2000 problem." They would say, "Go away. Just fix it. Don't worry about it. It's no big deal." But if suddenly the Federal Government or Federal Government regulatory agencies are saying, "This is important," then I think that gets their attention.

I'm not saying that we have all the answers but we do hear over and over again that frequently it's tough to get the top management of companies to pay attention to this issue, whether you're talking about a multi-billion dollar business or a small business.

Mr. HOULIHAN. Madam Chairwoman, I would also add that a lot of States are going out with written correspondence to the companies that they do business with—the hardware, the software manufacturers; the people who put in switching equipment for telecommunications networks—requesting that those manufacturers advise the State whether or not their product is or is not Year 2000 compliant and when that will be Year 2000 compliant. That will give the States then a base of information that they can make those decisions as to whether or not they will continue to do business with that particular company or not or whether they need to go find a substitute vendor who will offer a similar service.

Mrs. MORELLA. You're suggesting that or you're letting the States know this is what is happening, and maybe it would be something for them to follow or emulate.

Mr. HOULIHAN. Many are already doing that and we would suggest that is a good strategy for all of them to take up.

Mr. OLSON. I might add one thing, Madam Chairwoman. One of our concerns, clearly as stated here, is our dealings with other people. We clearly recognize that we are linked to local governments, businesses and the Federal Government and that is a concern. When we fix the computer programs in Pennsylvania state government what do we do and how do we deal with other ones that we do not have the confidence that they have also worked on that, whether that's third party providers, businesses, local government

or federal agencies? So that is a concern that we're going to be looking at to see how we deal with outside groups.

Mr. MILLER. Obviously, one of the objectives of our certification program is to give state officials, businesses, Federal Government officials assurances that the products and services that they are going to be purchasing are Year 2000 compliant.

Mrs. MORELLA. Very good. I want to thank you.

I now want to turn to Chairman Horn for any questioning he may have.

Mr. HORN. First, a bit of administration. I want to note for the record that a quorum was present at the end of my statement. We need to do that just for the official nature of the hearing.

Let me also include the statement of the Ranking Member on the Subcommittee on Government Management, Information, and Technology, Mrs. Maloney, of New York. I'd like to include it, Madam Chairwoman, after Mr. Tanner's statement and before Mr. Davis's so we'll have them all in the record at the beginning of the hearing.

Mrs. MORELLA. With no objections, so ordered.

Mr. HORN. I want to commend each of these witnesses. I sit through a lot of hearings and you have been, really, some of the best testimony I've heard in the sense of being succinct, organized, to the point, with recommendations. If it's sitting in the Science Committee room and we have the preciseness of science maybe I'll hold all my hearings over here.

[Laughter.]

Mr. HORN. I was very impressed with what all of you have had to say.

Let me just ask a few questions. Mr. Miller, in your testimony you talked about the Bios or basic input/output system of a personal computer. Could you provide a more detailed explanation of how this impacts the date fields and what equipment manufacturers have done in the past 18 months to correct the problem?

Mr. MILLER. Basically, Mr. Chairman, the Bios chip, the basic input/output system, happens to be where most people put their date clock when they build the systems. It's where it's done.

To go back to the earliest days of the PCs, back in the early 1980s every time you turned off your computer and you turned it back on you had to manually reenter the date. Then they started putting in separate little chips that had clocks built into them. They had batteries with them and when the battery ran down one day, you turned on your computer and you had to manually enter in the date because the battery had run out, therefore the clock had run out.

What has evolved over the years is now the manufacturers are actually building the date clock into the Bios chip which underlies the operating system. Unfortunately, I guess, from the perspective of the discussion today, when these calendar clocks were originally built into the Bios chips in the 1980s and into the early 1990s they didn't take account of the transition to the Year 2000. This was, again, partly because the same reason we had the generic problem with the Year 2000: memory was at a premium, the chips only held so much information and the standard was two digits. So the pres-

sure was not on to put four digit date fields built into the automatic calendar clocks or built into the Bios systems.

But as it has become more recognized by the manufacturers, most of whom are U.S. manufacturers who build these Bios chips that, in fact, some of these PCs are, in fact, going to last into the 21st Century—and they shouldn't assume that people get new PCs every six months or every 12 months—they began over the last 18 months or so to build in the fact that the date field will now not do what you saw up here with the demonstration that Martin Ennis did, it will not revert back to January 4, 1980. For every PC that you buy today, the Bios chip should not create that kind of problem. Again, we would suggest that customers when they go into vendors ask the question specifically.

Mr. HORN. Well, isn't there some way you could certify that to your national association and say, "This is in conformity?"

Mr. MILLER. We haven't looked at that certification so far but I guess we could. It's something we could certainly look at, Chairman Horn.

Mr. HORN. It seems to me since you represent the industry as a whole this would be a type of certification I'd appreciate your undertaking—the other one you mentioned—that would have a lot of credibility. I don't want to go into a store and ask a 17 year old out of high school on minimum wage what that is—that they won't know more than most of the experts in the room, I don't knock that but I'd like a little assurance and I think your label would do it, which is what started us down the certification track.

Mr. MILLER. Sure.

Mr. HORN. Let me ask another one here that interests me. We talked a lot about the corrupted data and one system can corrupt another system. Over the last few months one of the more challenging issues seems to be the issue of clean information systems receiving corrupted data from other sources.

This really is for all of you: is there any way for, say, a home personal computer user to prevent corrupted information from entering a sanitized system? We now have equipment that blocks out phone calls you don't like, can we test a corrupted system coming into a sanitized computer?

Mr. MILLER. I'm not aware of any products currently on the market. However, some software firms have indicated they are looking into that possibility—not a guarantee, but sort of a screening system. If you've got data coming in that said, "This transaction was done on December 31, 1903" it might at least raise a red flag. But as far as I know, that's still in development.

That's not actually currently available, but I suspect those are the kinds of products and services you're going to see developed over the next few years. The industry has shown a remarkable ability to figure out ways to get around these kinds of problems. I suspect you'll see something like that being developed.

Mr. HOULIHAN. Mr. Chairman, I would also echo that. I think when we started down the road we started seeing a lot of viruses affecting personal computers. The industry out there responded and brought in some virus checking software, and I would suspect we'll see the same phenomenon in existence here.

Mr. HORN. Mr. Olson?

Mr. OLSON. I also agree.

Mr. HORN. That's short and succinct.

I'm interested in the state/federal relationship and your senses as two people at the grass roots here in the state government. Seeing all those programs we interact between the Federal Government and the state government, how far along do you judge the Federal Government from your standpoint is in handling this problem and what would you recommend to them that you're already doing?

Mr. HOULIHAN. The individuals that I interact with right at this point in time I don't believe are satisfied with the level of information that they are receiving from the federal agencies that they interact with.

I believe that the issue is that the federal agencies are working right now to get their arms around the issues that they have to deal with. Clearly, the need for communication right now is paramount. The States are trying to do all they can to handle the workload at their particular level and they're going to do all they can to make sure that they don't fail in terms of the systems that they have to manage.

The issue is really one of tell us what you're doing and what you're not going to do so we have that information and then can make a decision about how we're going to respond at the local level rather than looking to the Federal Government to provide all the answers to the States.

At the program level the Department of Labor with the employment organizations, Health and Human Services with the welfare organizations, the Department of Transportation with the transportation organizations and so on, that interaction has got to take place and it's got to take place very quickly.

Mr. HORN. Yes, Mr. Olson?

Mr. OLSON. I might just add that it is something that is of significant concern to us. In Pennsylvania we've had very little contact with federal agencies. Pretty much the only information that I'm aware of that we've received from the different agencies to our state agencies has been the recognition that there won't be any federal money to help us clean our systems, really any cooperation and helping us set common standards. We have not had any communication at all. That certainly is a concern to us.

We've decided, clearly, that we cannot wait and that we have addressed this, we've been working on this for a year now, we've identified our mission critical activities, which in Pennsylvania makes up over 28,000 programs that we're currently working on.

So we are clearly working on this now. We're addressing it. We don't want to wait. Because again, the project management, that time deadline is so crucial to us.

One of our concerns is as we go along in six months will we all of the sudden get something coming down when the federal agencies finally wake up which we'll say, "We should do it this way," when we've already started another way. That's certainly a concern of ours.

Another concern of ours is your report card over here.

Mr. HORN. That doesn't give you much hope, does it?

Mr. OLSON. No, it doesn't. I'd love to get a copy of that, if I could.

Mr. HORN. I think they're available on the press table. At least I asked to have them available. If not, see the staff afterwards.

Is there a way that the States, in looking at their own databases, can see which ones the Year 2000 problem have absolutely no affect on? In other words, there is not a date calculation in there to come out with an age or an eligibility time or whatever? Have you gone through, say, in Pennsylvania and tried to sort those out, what you don't have to worry about versus what you do? Or somehow do you find this problem permeates every type of governmental function one way or the other?

Mr. OLSON. We think there's a real opportunity in that part of our action plan is to really start assessing more in detail the mission critical activities and we will then go to more than just the standard applications we have in the Pennsylvania state government.

What our plan focuses on is that every agency has an opportunity now to start looking at the applications that they are using in their agencies, first to see if we even need that application any longer at all. You know, this is an opportunity that we could go back and in a lot of these programs a lot of these applications have been going on for so long they kind of forget why we ever needed them. This is an opportunity. We're telling the agency, "Start looking at that. If you don't need that program eliminate it altogether."

Then to look at the next layer of programs or which programs really are not date sensitive, and we think there are a lot in there, that in looking at it there might be an opportunity—we just recognized it might fail. It's not going to hurt us but we need to look at how it impacts all the other different linkages that people use that data for. Then we go down to the ones we clearly know are date sensitive, we're addressing that.

So we're looking at kind of a three staged approach in looking at all those. It's something that to us is going to be very difficult to really look at, again, the information in the one application, where does that go? We might not be using the information for a date sensitive application but somebody else someplace else might. So we need to worry about that.

Mr. HORN. Has Pennsylvania sorted out which programs they interact with the Federal Government on? Let me give you an example.

Two months ago I had a call from Commissioner of Revenue of Massachusetts, Mr. Adams. He was saying, "I have just passed and adopted as law my debt collection bill I've been fighting for." He said, "That's a great invention as far as I'm concerned. I'm going to make millions off it running my state tapes against federal tapes and finding out the deadbeats."

Now, with a simple little thing like that how many situations do you have where you run state tapes against federal databases in a cooperative way in order to get the data you need to administer the law?

Mr. OLSON. We have quite a few. I would say in our mission critical activities or applications a significant number of those have data exchanges, you know, with the Federal Government. So that is something that we have to look at.

In a lot of aspects we have been running tapes with the Federal Government. We've also been comparing tapes with other States around Pennsylvania to look for those kinds of areas—people live on border areas and move back and forth. So we're looking at all those areas.

Part of our assessment with the state agencies is requiring the agencies with all their applications, focused primarily on mission critical right now, to look at what kind of linkages there are, whether it's federal agencies, third party providers or local governments. So that's one of the criteria. That will be one of the first critical areas for agencies to identify.

Mr. HORN. A lot of people that are either hearing the hearing in the room or watching it on television will say, "Okay, that's government talking to government, business talking to government. What's the effect on me, the average citizen?" Do you have any advice for them?

Mr. OLSON. This is something—in Pennsylvania these applications, especially our mission critical applications, deliver needed services to the citizens of Pennsylvania. If we cannot deliver those clearly they will be harmed and they will be hurt. Whether that's traffic lights, whether that's receiving retirement payments, all the way through.

Also, one of our concerns—and this is why we're taking business outreach so critical and making it so critical is that we do not want Pennsylvania businesses to all of the sudden start failing in their delivery of services with the other companies and other citizens around Pennsylvania and the nation. If they start failing in their ability to deliver their service that means they're going to go out of business, the clients are going to go to somebody else, and we're going to lose jobs. That clearly is something that Pennsylvania citizens should concern themselves about.

Mr. HORN. Any other suggestions? Mr. Houlihan?

Mr. HOULIHAN. Mr. Chairman, if I might add to your previous question on looking at the systems.

Really, States are into pick and shovel work. What they're able to do initially is figure out how many systems they've got and within that how many programs and within that how many modules and how many lines of code. But it doesn't become intuitively obvious looking at that where the date problem is.

So the challenge that they're faced with is bringing in tools to help look at each of those lines of code and figuring out then what lines have to be fixed and what needn't be fixed.

Also, some of the experiences that we've had when you get into looking at some of the older systems you find out that certain modules have not been used in years even though that program has been around for quite a while. So there's a little bit of a silver lining in that we're able to make some application systems more efficient.

I think the other challenge that is facing us is that a lot of these systems are now requiring more and more integration. The programs are requiring more and more integration.

Clearly, we've got the employment reporting system that States are being faced with as we look at dead beat dads and some of the things that we're trying to do with those programs. Looking to

where perhaps licenses are affected and if somebody is not paying their child support then maybe we need to go in and affect their particular license in an area. So now the integration of systems as we move forward is going to become extremely complex.

Mr. HORN. Mr. Miller, do you want to comment on any of this?

Mr. MILLER. I would like to echo something Mr. Houlihan said about the silver lining.

We're here today outlining a lot of problems and concerns. The Subcommittees are properly raising the red flag. But I'm hearing more and more from businesses and governments that the positive side of this is much more extensive than they initially anticipated.

Frequently you'll find, particularly as companies have accreted other companies over the years, they'll have five or six or 10 or 15 software programs to manage their personnel systems simply because no one ever bothered to integrate them. Each little bureaucracy within that organization has been maintaining that system. Its costing the company tens of thousands, if not hundreds of thousands of dollars they don't need to be spending.

This has forced them to go back and say, "Okay, let's chop away five or 10 of those personnel programs. We don't need all of those systems. Let's just have one and make sure it operates correctly."

The other thing that I think it's important to note is that there are some success stories. The Year 2000 conversion is happening more and more. At the seminars and the training programs that we put on, Mr. Chairman, we are inviting users to come and talk about how they've managed to succeed in doing the Year 2000 conversion, and some of them tell some very positive stories. Some of them aren't finished yet, some of them are still in status, but they are very, very positive statements.

So I think one of the tasks the subcommittee has is a double edged sword—on the one hand, to alert people to the problem and make them focus on it, whether you're talking about a state government, the Federal Government or the private sector. But also, to let them know there is medicine that works out there, this is not an insoluble problem, that companies and organizations have done it.

One of the things we're going to be doing, Mr. Chairman, is putting together a list of some of these success stories, doing some case studies. My staff are working on that now. We hope by the end of the year to have a publication that we can share that States, localities, Federal Government and private organizations will find useful to deal with this in a systematic way.

Mr. HORN. Do you see the modernization happening at the federal level?

Mr. MILLER. There's more discussion than decision at this point, is my take on that. Obviously, Ms. Katzen can answer more directly. But my sense is that most federal agencies, particularly some of those you gave some of your lower grades to a few months ago, they're still at the analysis stage. They haven't made the tough calls yet that you have to make to get to that modernization and re-engineering. Because that frequently means some tough calls like we're going to eliminate some staff positions or eliminate some programs. Somebody has proprietary interest over those.

The private sector is probably a little more capable of making those decisions a little more quickly, a little more hard-heartedly than sometimes happens at a federal agency.

But, on the other hand, I've been allowed to attend a couple of the federal interagency meetings to discuss various topics on behalf of ITAA, and I know this topic has been on the agenda. But Ms. Katzen would have to tell you exactly what she would assess the status of that.

Mr. HORN. One of the things that concerned me in part of your testimony is the fact that chief executives are not paying much attention to this. Having been a chief executive for 18 years, I would advise my colleagues, "Wake up. Look in the mirror. Go to the office and start asking questions."

How many of the agencies do you have now in, let's say, Mr. Olson, in Pennsylvania and what's the knowledge in the other States where the States increasingly have a Chief Information Officer. Governor Wilson, of California, has one in his cabinet. I had a Chief Information Officer in my university cabinet 20 years ago. So the idea is not new, it's just doing it.

Do you see that trend and is that what's missing in some places where we can't place responsibility and we don't have the ear of somebody that can translate the technical gobbledygook that scares executives into what the consequences are, intended and unintended, for a particular operation?

Mr. MILLER. We find the trick from people we hear are successful is that they get the CFO or CEO to sit down for five minutes and they say, "Here is what happens when our mission fails." One large director of an MIS company said he went in to the CFO and he said, "For four months we're not going to be able to bill. That equals X-number of millions of dollars." The guy said, "Now I get it. How much money do you need? How much staff resources?" So it took going in and demonstrating the consequences of the failure to deal with the Year 2000, to really get the attention focused. Once the attention was focused they're going full steam and they're doing great.

Some of the industries, like the securities industries, have moved very aggressively because they understand the consequences of dealing with it. They've been very, very up front. We've been meeting with them very regularly. I'm addressing their board next week. They helped pull together a coalition because they understand the horrendous consequences for the securities industry and the confidence of the people who buy and trade securities if the system doesn't work. They also understand it's a manageable project.

But unfortunately, Mr. Chairman, I'd still say that's the exception rather than the rule.

Mr. HORN. Any other comments you'd like to make on this, Mr. Houlihan?

Mr. HOULIHAN. Mr. Chairman, I think the trend towards having some individual responsible at the state level for information technology is a trend that we will continue to see move forward. That individual may not be called the chief information officer in all States but it would have general responsibility.

I think that's one of the other silver linings in this process is that we are realizing that the systems we have in States today have de-

veloped, as you know, in a vertical fashion and don't provide horizontal views of information to the chief executive at the state level. This is an opportunity as we look at our new systems to build in that horizontal integration as we move forward. I think we're going to see that trend continue of having somebody responsible at the state level for information policy and planning.

Mr. HORN. Mr. Olson, any comment?

Mr. OLSON. Two different comments. One on the Chief Information Officer. Pennsylvania has never really had this position before and previously we've never really had a strong commitment to technology. And also, how do we start looking strategically at the use of technology? That has changed now and it's really helped us I think in preparing for Year 2000.

The one thing I might mention, again to stress some of the comments earlier today, is the outreach to businesses. Really, in Pennsylvania, all over the State what we have been trying to do in a couple of different areas—one, I have now been working with Chief Information Officers of Pennsylvania universities, to work with them, to really kind of share information, work back and forth and build the understanding with their organizations. Also, to do some joint research with them together with state agencies.

We've also talked briefly so far, and we're going to be expanding that in the next month or so, is our dealings with the Pennsylvania Chamber of Commerce and also the Pennsylvania Business Roundtable to come up with an actual public awareness approach for getting the word out to the CEOs and the CFOs so they can start seeing it and really start then questioning their organizations. We've already seen that in some recent actions we've taken.

Scott Elliott, who works on my staff, has been working with Pennsylvania newspapers in getting them to understand that this is critical. They've been running a significant number of articles, large articles, in some cases half page articles on the front pages of the business sections. In other cases—in Pittsburgh it generated, we feel, an editorial in the Pittsburgh Sunday paper.

When the executives—again, whether it's a small, medium or large sized firm—start reading that, they then come back that Monday morning and start asking questions. And I think that's what's really critical.

We have also recently, on the 27th of August, had a major meeting in Harrisburg where the Lieutenant Governor announced our approach to over 200 state agency executives and clearly made a statement that this is a top priority for the Ridge Administration and it will get fixed. I think that clear message from the leadership made sure there weren't any misunderstandings with state agencies. That was a big benefit.

We also had that day quite a few people, some of whom have testified here before, Kevin Schick of the Gartner Group, Dick Kearney of KPMG Peat Marwick, Susan Thomas of Unisys, and also Dennis Smith of the Software Engineering Institute out of Carnegie Mellon.

We are putting together that program in kind of an hour video that we want to then share with Pennsylvania businesses to, again, kind of educate people around the State. We are trying to come up with new ways of getting that message out because that is critical.

Mr. HORN. One of the things maybe you could educate us on, this is a technical question which I don't understand—I think the Gartner Group, when they said the \$600 billion world wide, the \$300 billion U.S., the \$30 billion Federal Government—they based that on so-called “looking at changing a line of code” and the estimate was maybe one dollar every time you have to deal with a line of code.

What I'm not clear on is is that comparable? How would you define a line of code? What do we mean by it? Does it have a price? If the price is one dollar for conversion or what? Explain it in simple English to me.

Mr. HOULIHAN. The cost is a life cycle cost. It's not one dollar to fix this individual line of code but it's really the total cost involved in having a team of people come together.

Mr. HORN. Give me the definition on a line of code.

Mr. HOULIHAN. A line of code is a single statement in a program that says you know, “Go get date field and insert it here.” That's a line of code.

Mr. HORN. You cannot define it then by the amount of space it takes up to give the instruction?

Mr. HOULIHAN. No. A line of code is going to vary depending upon the task that that particular line of code in the program is being asked to perform.

Mr. HORN. So it's a readjustment of that line that you get the 30 million lines of code, which is \$30 million or something. Can you really put a price tag on it?

Mr. HOULIHAN. What they've been able to do, Mr. Chairman, is take a group of people, have them look at an application system and maybe that application system is 100,000 lines of code. What is involved in looking at that 100,000 lines of code, finding out those lines of code that have dates in them, reprogramming those so the system works, doing the testing and then checking the results to make sure that all of that work that has been done produces the correct result.

So you take the total amount of costs that were involved in that process and then you can come up and say for that 100,000 lines of code we should put X-dollars in. So it's a dollar, it's a dollar fifty, it's two dollars per line of code. It's a life cycle cost.

Mr. HORN. This is presumably based on how much time it takes—professional time—to adjust those lines, and you're sort of getting an average number here, I gather?

Mr. HOULIHAN. Yes, you are. It all depends on the complexity of the system and those other applications to which that system interfaces.

Mr. HORN. Thank you.

Mr. MILLER. I think it's also important to understand, Dr. Horn, why even though the date reference is the Year 2000, why it's so important that this change be done more quickly than that. A critical part of the process and a critical part of the cost is the so-called testing phase, the last phase. It's fine to go in and change all the lines of code and make all the changes. Then you have to make sure it still does what the program is supposed to do. That you haven't inadvertently by making the change in the date fields or some other set of instructions. Instead of having someone drive to

the Capitol they follow the instructions and they now drive into the Potomac River.

So it takes time to do that testing. In fact, some of the estimates are that 40 to 50, maybe as much as 60 percent of the costs of fixing that line of code—40 to 50 to 60 cents of every dollar to fix that line of code—may be spent in terms of professional resources and time to do the testing.

So if you actually get done with all your reprogramming and your program management and changing all the lines of code on December 31, 1999, you say, "A-ha, we beat the deadline." Well, you didn't beat the deadline because you haven't tested anything and you have to make sure that testing goes on. So it's absolutely essential. That's what we keep emphasizing: even though it seems like a long time until the Year 2000, in fact, time is very short because that testing phase is very difficult.

Also keep in mind, Mr. Chairman, that of course, while you're doing the testing you've got to be running your same systems. You can't suddenly say, "We're going to shut down the House personnel system for the next six months and no one's going to get a paycheck and no one's going to submit their time sheets and nothing's going to happen in the House while the House personnel system is upgraded and tested."

You have to run this testing in the evenings or on weekends or you have to go out and rent space on another system to run all these tests after the changes have been made. So it's not just literally somebody sitting down and saying, "Well, instead of a two digit year we're going to have a four digit year." That's just a relatively small part of the cost of the process. Planning how you're going to make that change and testing the change has been made correctly is the bulk of that one dollar per line cost estimate that you hear about from the Gartner Group.

Mr. HORN. Thank you.

Mrs. MORELLA. So you only have 27 months to get the conversion in order so that you'll have a year for the testing, which brings you to the 39 months, which is the Year 2000.

Mr. Olson?

Mr. OLSON. I might just add actually for our mission critical applications, 525 of them at roughly 28,000 programs to support that we are requiring our state agencies to actually be complete by July 1998, giving us 18 months for testing on the mission critical activities. Then for all other programs we're requiring December 1998 to do that as it relates to just one program.

Unfortunately, we didn't bring it with us but one of our payroll programs that we use as an example is 10,000 lines of code to run that one program. We're estimating around \$7,500 to go through that 10,000 lines and identify which lines of code have the date field that was talked about and then those are the lines you have to come back in and fix. So it's a nice example to kind of show. In this one application 10,000 lines there were only, I think, around 15 different lines that had to be fixed but someone had to go through and identify all those lines that would have to be fixed and then find somebody to figure out how to fix them because it could be on old language.

Mrs. MORELLA. I hate to go back to testimony from May but I remember somebody mentioning in testimony the number of people hours it would take to do this, and it's just absolutely phenomenal.

Mr. MILLER. The bottom line is you just can't do it all. That's why I think, as Mr. Houlihan and Mr. Olson were suggesting, there's a certain amount of systemic triage here. You've got to identify the mission critical aspects of your operations. You have to identify the programs to support those and get to those right away. If you try to fix everything, if you treat everything equally, you're never going to get done.

Mrs. MORELLA. You've got to establish your priorities.

Mr. MILLER. You'll go into the Year 2000 and you'll still be sitting there trying to do everything. So that's why the management stage of this, the initial process management stage of this is so critical. The testing stage is critical. Fixing the code in most cases is relatively easy and fairly simple. It's the front end and it's the back end which are really so important to this.

Mrs. MORELLA. That's very enlightening.

I just wondered, Mr. Houlihan, do you have a list of where each one of the 50 States that belongs to your organization is—what the status is? I would be very interested in looking at it and I think Chairman Horn would probably be too. I'll tell him to be careful in grading.

[Laughter.]

Mr. HOULIHAN. We have the survey results that the various States provided us. They don't necessarily belong to us but they do volunteer some information with us.

I can tell you that of the folks that responded to our last survey those who are sort of into the implementation stage include Illinois, Kansas, Kentucky, Louisiana, Nebraska, New Mexico, North Dakota and Texas. Now, this is not a complete list, I must advise you, because a lot of the States did not get an opportunity to get their survey results into us. But a lot of States are in the implementation stage.

Mrs. MORELLA. What about Maryland?

Mr. HOULIHAN. I don't have them on this particular list.

The other item I would mention, since part of the testimony had to do with personal computers, is that many States are sort of fiscally disadvantaged and so a lot of the computers that state employees are using are 286 and 386 computers. And state governments aren't necessarily worried about the Year 2000 problem, they're worried about the fact that the software now that's needed to run business and government is so complex that these smaller platforms won't get the job done regardless of the Year 2000 issue. So States have to move in a direction to replace those processing platforms.

Mrs. MORELLA. Mr. Olson, you wanted to comment?

Mr. OLSON. I might just mention before the survey is used to have a report card issued on it, actually we're not included because I guess we had around a week to respond and a lot of States had a problem with that. And actually, the week we received the survey was the week that we had the big announcement and the big event on Year 2000 so it was a little late. We do now have it at NASIRE so hopefully now we'll get that updated.

Mrs. MORELLA. Very good.

Mr. MILLER. Could I just go back to Chairman Horn's last question?

Maybe the way to explain it also to lay people is to think of a line of code as a set of directions. If you were trying to tell someone how to get here to the Capitol from RFK Stadium in the East you'd tell them go left, go right, go left, go right, go left, go right. If you're telling them how to get here from Rock Creek you'd say go right, go left, go right, go left, go right, go left. It's the same principle. Now you're telling it a different way. It's similar, you have one set of directions—turn on this street, turn on that street—but now instead of saying two digit date fields you've got to say four digit date fields.

So in a sense, as you can see, simply changing a left to a right is not hard to do. But understanding the difference when you're coming from the east or the west, that's the analogy to the management challenge. Management is critical.

And, number two, actually driving it one time to make sure that when you drive it in reverse you don't, in fact, run into a one way street and end up going the wrong way. Those are the critical aspects of changing those directions.

So I would say similarly, in rewriting the lines of code in a program, it's not actually expanding the date field or other ways to do it so-called through logic. That's not, in most cases, the difficult part. It's planning it and it's testing it.

Mr. HORN. On the cost, let me ask you, can you do most of this with training your own staff or do you have additional money that you must use to bring in outside people? Maybe you bring them up just to train your staff which will then do the job. How is that worked out at the state level?

Mr. MILLER. In any enterprise—state, federal, private sector—there are various ways to approach it. The program management, the process management, can either be done with internal staff or outside consultants, depending on how you run your normal operations. I don't think there's a given answer one way or the other.

In terms of identifying the date fields, estimating the costs, trying to figure out the logic, there are various software tools out there which are provided by commercial vendors that companies or government agencies can purchase which will facilitate the process. They won't actually do the conversion but they'll help you estimate the cost, help you find the date fields. Then you need the separate process of actually doing the date conversion. Sometimes you can use the software tools, sometimes it must be done manually. Then there are various testing tools you can use.

Whether you do that internally or externally really depends a lot on how you generally handle information technology. If the general trend in your agency or your company is to outsource it, then you're probably going to need to outsource most of this work also. If your general trend is to do IT internally, you might be able to do most of this internally, though you probably will need to buy some of these software tools to ease the project management.

Mr. HOULIHAN. I would add that that goes back to the tough fiscal end business decisions that I alluded to earlier. You've got to either decide if you're going to fix the Year 2000 problem, you're

going to develop a new application or you're going to enhance an existing application. So those business decisions have got to be made. If you don't have enough staff internally you're going to have to go out and bring in some additional resources and those are the challenges.

But I think, to echo Mr. Miller's comments, most States are taking a very hard look at bringing in automated tools because that will cut down on the man hours required for this project.

Mrs. MORELLA. I want to thank the three of you. You've done an excellent job of outstanding testimony. But even beyond that, the kind of work that underlies it, not so much in preparing the testimony but in the work that you're doing to help us with awareness as well as the action toward the 2000 conversion.

Mr. Tanner had an emergency meeting and so he is going to be submitting some questions for this panel, if that would be okay, for the record.

We're going to switch to our second panel, and there's going to be a brief break while we change the chairs of the Subcommittee.

Thank you very much.

[Brief recess.]

Mr. HORN. Ms. Katzen, if you wouldn't mind, we'll administer the oath.

[Witness sworn.]

Mr. HORN. Thank you very much. We appreciate your coming. Sorry for the wait but, as you know, at this time of year we're doing a lot of different things around here. That's why I was absent for five minutes.

But welcome. You know the ground rules better than anybody. The statement is in the record. If you would like to summarize it in your own words as we go—we've got all the time in the world but I'd like to hear a succinct summary and then we'll get to some questions.

TESTIMONY OF SALLY KATZEN, ADMINISTRATOR, OFFICE OF INFORMATION AND REGULATORY AFFAIRS, OFFICE OF MANAGEMENT AND BUDGET

Ms. KATZEN. Thank you, Mr. Chairman, Madam Chairwoman. I'm very happy to be here. I appreciate your invitation to appear before this Subcommittee to participate in your hearing on solving the Year 2000 computer problem.

I have been following with great interest the activities of these Subcommittees over the last several months as you have addressed this important issue.

I will not take time in my oral comments to describe the cause of the problem, you've had a number of very competent witnesses who have given chapter and verse on the subject. Nor will I describe the potential implications if federal systems are not corrected. They can be substantial and potentially seriously interfere with the achievement of agencies missions.

Because such adverse consequences are not an option, fixing the problem has already generated a high level of interest and energy in the federal agencies. The challenge we face is how to assure that this interest and energy is effectively and efficiently channeled to

fix the systems upon which we depend so they will operate smoothly through the Year 2000.

Now, our strategy is predicated on two key assumptions. First: that agency managers, like the CEOs that were described in the previous panel, when made aware of the potential consequences of this problem, will take whatever action is necessary to address it. And, secondly: solving the problem requires technicians to fix software codes and engineers to replace hardware. There is no magic bullet, nor is there any policy pronouncement that will solve the problem.

To address the management challenge our strategy has been first to raise the awareness of the senior managers in federal agencies to the dimensions of the problem. Second, to promote the sharing of both management and technical expertise. Third, to remove the barriers that may slow down or impede technicians' fixing systems.

With respect to raising awareness, OMB is, I believe, well positioned to raise senior managers' awareness of this problem. We've already brought the Year 2000 problem to the attention of the President's Management Council, where it has been discussed several times. OMB's Deputy Director for Management, John Koskinen, also wrote to the deputy heads of the departments and agencies concerning this issue and I wrote to the chief information officers to raise their awareness and apprise them of the ongoing interagency activities to help them address the problem.

Last month we had the first meeting of the new Chief Information Officers' Council and Mr. Koskinen raised the issue, challenging them to find ways that they as a government-wide body could facilitate solutions to the problem.

I cannot overstate the importance of frequent discussion of the problem, and I was cheered by Mr. Houlihan's reference to very frequent channels of communications at virtually every and all levels.

I think one has to remember one's own initial reaction on hearing about the problem—disbelief of the difficulty and of its magnitude. As a non-technical person myself, all of my instincts told me it can't be that big a problem. "I know zero zero is 2000 and computers are supposed to be quicker than humans. We should be able to fix this." And I think all the managers will have to go through such a denial phase as they struggle to come to grips with what is in reality a very difficult and very serious problem that will not just be solved with the wink of an eye.

The second aspect is sharing expertise. Some of the agencies have been working on this problem for quite some time. The Social Security Administration, for example, has been tackling it since 1989. To promote the sharing of expertise and solutions across agencies we established an interagency working group which is chaired by Kathy Adams, of the Social Security Administration, who has been one of your witnesses in one of your past hearings.

This group has undertaken and has pending a number of projects. Last month it posted best practices on a special home page that the General Services Administration has created for the Year 2000 information sharing. If you haven't checked it out it's interesting to look at and see the various kinds of information which are available now for those who are interested.

The group is also developing a list of products that are being used by federal agencies along with information about whether they will be 2000 compliant. Very valuable to managers as they're trying to see which of their systems will be 2000 compliant.

And there are a growing number of conferences, some of which were referenced here today, and others of which I know you know about sponsored by the interagency working group, by GSA, by NIST, just to name a few, where expertise is being shared.

With respect to removing barriers, as I said, solutions to the Year 2000 problem require technicians to be fixing systems. There are, however, some things that we can do to facilitate this work. We've asked the interagency group to identify any such measures and we will implement them expeditiously.

One example is the standard way that agencies will communicate dates among one another. NIST has amended the standard this past spring so that agencies will use four digits for the year fields. While this will probably eventually be done formally through the process, we thought it important that technicians know the answers now.

Another example is standard contract language to assure that the new products that agencies buy will work through the Year 2000. GSA has developed such language in consultation with the vendors and, presuming that the working group agrees, we intend to encourage agencies to begin using it this fall.

OMB is also, of course, looking at the question of funding. We have established a rebuttable presumption that funding for the Year 2000 fixes will be reprogrammed from existing funds. It does not make sense to spend money to upgrade systems if the basic system is going to fail. Also, agencies cannot afford to waste one of the most crucial resources, and that's time, waiting until fiscal year 1998 funds are available to begin fixing their systems. They must immediately redirect funds from other sources.

And, finally, given the current budget climate, which is one of the things that the Chairman was undoubtedly referring to when he was talking about the things we're all trying to do this month, it is not likely that new funds will be available to solve this problem.

Now, in response to a request we made this summer, agencies are currently developing cost estimates as part of their budget submissions, which will be available in February. They will cover the cost of identifying necessary changes, evaluating the cost effectiveness of making those changes—this is the fix or scrap decisions that you heard referred to in the last panel—making those changes, testing the systems and contingencies for failure recovery. So as of this spring we will have concrete estimates of the cost of this problem.

I note that in the House Treasury Postal Language that Mrs. Morella referred to earlier it calls for an OMB report on November 1st of this year. With respect, I would suggest that that may be a little early. We will have the numbers that are real in February and it seems appropriate, I believe, and more productive to have that information available with the submission of the President's budget in February and to have the strategic plan as part of the government-wide strategic plan of information resources that's

called for by the Information Technology Management Reform Act. And I would request your consideration of the deadline on that particular report in terms of providing more productive information.

One other quick point I'd like to make. The "R" in OIRA, the Office of Information and Regulatory Affairs, leads me to be quite familiar with the private sector's view about government regulation. It was somewhat of a surprise to hear Mr. Miller suggest that there was a role for the regulatory agencies to play, at least in alerting, if not mandating the regulated entities to the existence of this problem. He referenced the SEC and the steps that it has taken with respect to its regulated entities. There are a number of other agencies where this is equally appropriate.

I chair the regulatory working group, which is the senior policy officers of the various regulatory agencies, and have on our September agenda the Year 2000 problem to discuss this aspect with them as well.

Now, while we have made a start, we, like the Subcommittees, are concerned about the limited time we have left and the very large amount that remains to be done. We know that this management challenge is great. We have recruited the best managers in government, our new Chief Information Officers, for this assignment and we hope to give them whatever support we can. Together we will accelerate agency activities to address this challenge.

I'd like to close by thanking the Subcommittees for holding hearings on this important subject. I cannot overstate the importance of your involvement and of your constant reminder of the significance of this issue and the need of the agencies to move quickly to its solution.

I'd be happy to answer any questions you might have.

[The prepared statement of Ms. Katzen follows:]



EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

STATEMENT OF SALLY KATZEN
ADMINISTRATOR
OFFICE OF INFORMATION AND REGULATORY AFFAIRS
OFFICE OF MANAGEMENT AND BUDGET
BEFORE THE
SUBCOMMITTEE ON TECHNOLOGY
OF THE COMMITTEE ON SCIENCE
AND THE
SUBCOMMITTEE ON GOVERNMENT MANAGEMENT, INFORMATION, AND TECHNOLOGY
OF THE COMMITTEE ON GOVERNMENT REFORM AND OVERSIGHT
U.S. HOUSE OF REPRESENTATIVES

September 10, 1996

Good Morning. I am Sally Katzen, Administrator of the Office of Information and Regulatory Affairs (OIRA) in the Office of Management and Budget (OMB). OIRA has been given the Federal leadership role for information technology management under the Paperwork Reduction Act of 1995 and the Information Technology Management Reform Act of 1996.

I am pleased to appear before the Subcommittees today to participate in your hearing on "Solving the year 2000 Computer Problem". Hearings such as this one are very helpful in raising awareness of, and better understanding of a seemingly simple problem: assuring that computers will recognize the correct year when the new millennium arrives.

We often use short hand to describe the year. When asked what year it is we answer "96". When we fill out the date on paper forms we write 9/10/96. This same approach was used in designing many of our computer systems.

As we enter the next century, we will all know that the year "00" in our short hand stands for 2000. However, the hardware and software of many of our computer systems will not understand this new meaning. Unless they are fixed, they will fail at the turn of the century, in one of three ways:

They will reject legitimate entries, or

They will simply not run, or

They will compute erroneous results.

Many systems that compare dates to decide which one is earlier will no longer work. Comparisons of dates permeate computer systems -- it is 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 computers check for entry errors (e.g., an applicant must have filed before a certain date.) Concern on this issue is already becoming apparent. I understand that ATM cards are not dated later than December 1999 because many ATM machines would reject the cards as expired, given that a year of "00" would appear to be earlier than the current year. "96".

In addition, systems that calculate length of time will not compute accurately. Computations of length of time are also prevalent in our computer systems. It is how benefits are computed (e.g., based on length of time), eligibility is determined (e.g., based on length of service), and expiration dates are calculated (e.g., expires after 3 years).

I am advised that there are other possible implications in computer systems depending on the assumptions made by the designer of the system. For example, information relevant to a year could be found in a computer application by using the year to find its relative location in a table. So, for example, information about 1996 would be at the 96th location in a table. Such a technique would fail in the year "00" because there is no 0th location.

The Problem.

You have already heard testimony from a number of witnesses about the potential impact on Federal programs if this problem is not corrected. It is indeed substantial and potentially very serious. But because such adverse consequences are not an option, fixing the problem has already generated a high level of interest and energy in Federal agencies. The challenge we face is how to assure that this interest and energy is effectively and efficiently managed to fix the systems upon which we depend so they will operate smoothly through the year 2000.

Our Strategy.

Our strategy is predicated on two key assumptions:

First, that agency managers, when made aware of the potential consequences of this problem, will take whatever action is necessary to address it. Those consequences would, after all directly affect their ability to perform their basic functions.

Second, solving the problem requires technicians to fix software code and engineers to replace hardware. There is no so-called "silver bullet", nor can the problem be solved with a policy pronouncement.

There are also some unique characteristics of this problem that are factors in our strategy for addressing it. First, there is an unmovable deadline. Unlike other development or maintenance activities in systems, the deadline for fixing the year 2000 problem is not set administratively, but by the problem itself. Solutions chosen must therefore be fully implemented by December 31, 1999. This characteristic makes time the single most critical resource in working toward a solution. We have slightly less than 40 months left.

Second, unlike a normal system development or maintenance activity, many systems must be fixed concurrently. As I mentioned earlier, comparisons of dates and computations using dates permeate our computer systems. That is true within each organization, as well as across all organizations. There is thus a real potential of a substantial strain on the other key resource needed to fix systems -- expertise.

Third, the complexity is increased by the concurrent fixes being made to other systems and to parts 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 fixes must be made while the current system continues to operate. Some have invoked the analogy of re-building a rocket ship while it is on its way to the moon.

To address this management challenge, our strategy is to (1) raise the awareness of the most senior managers in Federal agencies to the dimensions of this problem, (2) promote the sharing of both management and technical expertise, and (3) remove barriers that may slow down or impede technicians fixing systems.

1. Raising Awareness

OMB is well positioned to raise senior manager awareness of this problem. We have brought the year 2000 problem to the attention of the President's Management Council where it has been discussed several times. In addition OMB's Deputy Director for Management, John Koskinen, wrote to the deputy heads of the departments and agencies concerning this issue and I wrote to the Chief Information Officers of the agencies to raise their awareness and apprise them of on-going interagency activities to help them address the problem. Last month at the first meeting of the new Chief Information Officers Council, Mr. Koskinen raised the issue challenging them to find ways that they, as a government-wide body, could facilitate solutions to the problem.

As we continue to raise this problem with senior managers, it is helpful to remember one's own initial reaction on hearing about of it: disbelief of its difficulty and of its magnitude. As a non-technical person myself, all of my instincts told me this can't be that big of a problem. I know that "00" will be 2000, and computers are supposed to be a lot quicker than humans. All managers will go through such a denial as they struggle with their instincts. For this reason, it is critical that they hear of the problem early and often, discussing it many times with different sources.

Once managers are convinced it is a real problem, then they must overcome the shock of how much it will cost to fix. It is like taking a car in for a tune-up and finding out you need a rebuilt engine. The car is running fine now -- it can't possibly cost that much to simply keep it running. Not so. This price shock leads to the decision of whether to repair the car, discard it, or use the money for a new better car.

It is precisely this decision, whether to fix the old system, discard it, or replace it with a new one, that must be made by managers soon. In our budget guidance this year, we have asked them to make it now.

2. Sharing Expertise

Some Federal agencies have been working on this problem for quite some time. The Social Security Administration, for example, has been actively engaged since 1989. To promote the sharing of expertise and solutions across agencies, we established an inter-agency working group, chaired by Kathy Adams of the Social Security Administration. That group has been effective in raising awareness of the problem, sharing expertise on ways to address the problem and in identifying impediments that may slow technicians' fixing systems. I understand that Ms. Adams testified at an earlier hearing of the Subcommittee about the activities of that working group. In our view, under her leadership, that working group has been very successful. Last month, for example, the group posted "best practices" on the special home page that the General Services Administration has created for year 2000 information sharing.

The interagency working group is currently developing 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 will be made available on the GSA home page for Federal managers' use. The Defense Information Systems Agency is developing a similar list of generally available products which will be on its home page. This information will be very valuable to managers when they are evaluating how much of a problem year 2000 will be on their systems.

There are also a growing number of conferences where expertise is being shared. In the Spring, the interagency working group sponsored one that was attended by more than 500 Federal employees. Last month, GSA sponsored another which focussed on best practices for addressing the problem. In part as a result of the urging of this Subcommittee, the National Institute of Standards and Technology (NIST) is planning an international conference on the year 2000 problem for early next year.

3. Removing Barriers

As I noted earlier, solutions to the year 2000 problem require technicians to be fixing systems. There are, however, some things that we can do to facilitate this work. We have asked the interagency working group to identify any such measures, and we will expeditiously implement them. One example is a standard way to communicate dates among agencies. At the urging of the working group, NIST amended its Federal standard this past spring suggesting that agencies use a standard of 4 digits for year fields. This standard will probably eventually become a formally adopted standard, but we intend to urge agencies to adopt it now because we do not believe we can afford to wait on the lengthy formal standardization process. Technicians need to know the answer now.

Later this week the inter-agency working group will meet to discuss standard contract language to assure that the new products that agencies buy will work through the year 2000. GSA has discussed the proposed language with vendors and they have reached a workable solution. Presuming that the working group recommends it, we intend to promulgate that language for agencies to use in all new acquisitions.

Funding

OMB is of course looking at the question of funding. We have established a rebuttable presumption that funding for the year 2000 fixes will be reprogrammed from existing funds. It does not make sense to spend money on upgrades if the basic system will fail. Also, agencies cannot afford to waste the most critical resource -- time -- waiting until fiscal year 1998 funds are available to begin fixing their systems, they must immediately re-direct funds from other sources. Finally, given the current budget climate, it is not likely that new funds will be available in any event.

It is difficult to estimate the total cost of fixing the year 2000 problem. We have seen estimates as high as \$30 billion to fix this problem in Federal systems, but those estimates are based on back of the envelope calculations. To get a better handle on the cost issue, we asked agencies to include in their 1998 budget submissions an estimate of their true costs.

Those estimates, which will be available in February, will be submitted pursuant to Section 43 of OMB Circular No. A-11, "Data on Acquisition, Operation and Use of Information Technology". They are to 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. Accordingly, as of this Spring we will have some concrete estimates of the cost of this problem.

I note that in the House Treasury Postal Service and General Government Appropriations Report there is a requirement for OMB to report on (1) the cost of ensuring the year 2000 date conversion and (2) a planned strategy for assuring that purchased information technology will operate through the year 2000 and (3) a timetable for implementation of that strategy. The report is to be submitted by November 1, 1996. While we of course would comply with the requirement if enacted, the November 1 deadline may be counterproductive. As I noted above, we will have concrete cost estimates based on the President's budget proposal available in the Spring. Numbers provided any sooner will not take into account the program trade-off and re-programming decisions of the agencies in either their information resources management planning or in their budget decisions. Those decisions are integral to cost effective allocation of resources to solving the year 2000 problem. We therefore believe that it would be more effective to provide the cost estimate requested at the time of the President's budget submission, and the strategic planning information as a key part of the government-wide strategic plan for information resources required by the Information Technology Reform Act of 1996.

Other Actions

Over the next several weeks we will be considering further steps to address the problem government-wide. One idea under consideration is to establish a dedicated program office with support from GSA, to provide a core of expertise government-wide. Another idea under consideration is the creation of a joint public-private advisory committee on year 2000 issues. We will rely on the advice of the CIO Council in formulating approaches and evaluating options as to how they will help agencies solve the problem in their systems.

Private Sector Systems

Thus far I have been discussing our strategy for addressing Federal systems. There is also a question of the Federal government's public safety role with respect to private sector systems, particularly those that support critical functions. Here we will also take an active awareness-raising approach as well.

As Administrator of OIRA, I chair the Regulatory Working Group, which includes the senior regulatory policy officers from the various departments and agencies. At our next meeting, I plan to discuss the year 2000 computer problem with them in order to emphasize the significance of it. It is important that those that oversee critical facets of our economy and society understand this problem and its potential implications for the sectors they oversee. So, for example, the Treasury Department needs to understand the potential implications of the year 2000 problem on the banking community and the Department of Transportation on the airline industry.

Conclusion

While we have made a start, we, like the Subcommittees, are concerned about the limited time we have left, and the large amount that remains to be done. We know that this management challenge is large -- and we have recruited the best managers in government, our new Chief Information Officers for this assignment. Together we will accelerate agency activities to address this challenge.

I thank the Subcommittees for holding hearings on this important subject. They are contributing materially to the awareness and understanding of the year 2000 problem, and so to its solution.

I would be happy to answer any questions that you may have.

Mr. HORN. Well, we appreciate your statement. Your last comment reminds me of something I wrote 30 years ago when I did a book on the Senate Committee on Appropriations. That the wise administrator goes back to the agency and blames Congress for forcing action. Frankly, I think that's what's needed here. As you look at some of those charts up there two secretaries didn't even know about it, and one of them still doesn't. I guess she's still flying somewhere. But there's just no response.

That leads me to the overall question—has this ever been a topic of the meeting of the President's cabinet? Has anybody said, "We have a problem"? It seems to me, as I'm familiar with President Eisenhower's cabinet, and even some later, that saw some value in that institution, that's one way to get them all in the room. Who are the chief executives of the agencies and get them to sort of know we have a problem out there and it isn't something you can leave to the techies, if you will.

Ms. KATZEN. The concept is right, and we have within the Clinton administration something called a President's Management Council, which is the COO—not the chief executive.

Mr. HORN. You're talking about the deputies.

Ms. KATZEN. The deputies. And in some instances—Ms. Cheder, from SSA, she actually comes to meetings. I've been to a number of these meetings and you will either get the number two, sometimes the number three, often from time to time the number one, who will be in attendance. This has been discussed at that President's Management Council with very high attendance and very great interest.

With respect to the two that didn't know about it, I can tell you—and I think you have already received Transportation's—

Mr. HORN. I just checked on it.

Ms. KATZEN. And I just actually spoke with the Deputy Secretary in the past several days, who was telling me further things about what they are doing beyond what they have already reported to you.

I understand the Department of Energy's report is ready to go. It's roughly a 20 page report. It should be here some time this week, I was told.

One of the things that this does is not go back to the agencies and blame the Congress but go back to the agencies and underscore the significance of this. You were a professor at a university, there's sort of nothing that focuses attention like the final exam. Some of us are more compulsive than others, some of us have only gotten A's in our lifetime and we strive to continue that sterling record. And when I can appeal to their better instincts to improve themselves and not leave themselves in this kind of situation it has been very effective. I'm not placing the blame on Congress, I'm thinking that we ought to work together.

Mr. HORN. That's great. We don't mind having the blame, we just want to see the problem solved. And the problem comes with a solution when, A: you pin responsibility within the agency. Has that been done now? There are a lot of laggards. You can see the check marks. They haven't done that.

Ms. KATZEN. There is. One of the factors here is that the Information Technology Management Reform Act created the position of

Chief Information Officer. It is very clear we did not want to just take the IRM official who was a senior person and an experienced person but more of a technical person and simply put that person in the CIO slot. What we wanted was someone who was effective in managing the technical issues.

So, fortunately, the agencies and departments did not rush out and simply designate their IRM official as the CIO. They went through a recruiting process, a very careful search to find a competent person. That delayed for several months having on board the CIO official.

We had the first meeting of the CIO Council, which was established by the President's Executive order implementing ITMRA, in August.

Mr. HORN. Have all the CIOs been picked?

Ms. KATZEN. All but, I believe, one, and it's not one of the problem departments.

Mr. HORN. Presumably they're the ones that have the responsibility so everybody can now answer the questionnaire except one.

Ms. KATZEN. And that one has a working CIO, an interim CIO.

Mr. HORN. Now, are these CIOs being totally a CIO? Let me explain why I ask the question. One of the things that galls me, no matter how bright they are—we have a couple of cases where Assistant Secretaries for Management and/or Administration have appointed themselves or been designated by the Secretary to be the Chief Financial Officer. Now, that's just nutty. Because if you're going to do the job of Chief Financial Officer you don't have the time to run the rest of the management functions of the agency, yet that is what some in the executive branch are doing and we wonder why some of the operations under them are disaster areas.

In other words, this operation needs focus. And if the Chief Information Officer is supposed to do 30 other things as some sort of a management type and, "Oh, yes, we've got to meet Congress's mandate on this, let's make Willy the Chief Information Officer." Have we got any of those overlapping situations—which I think are just plain wrong and I'm going to get something in the law next year to solve the problem.

Ms. KATZEN. One of the provisions of the Information and Technology Management Reform Act is that the CIO will have information technology management as his or her primary responsibility. That has been very helpful to us again, in focusing attention on someone who will be devoting the principal tasks in this area.

Mr. HORN. What's "primary?" 51 percent and here she is spending 49 percent somewhere else? It completely undercuts what we're trying to accomplish.

Ms. KATZEN. I think what we're trying to be sensitive to, responsive to and implement is the spirit of the act and the Congressional desire and our own desire to have this be a person who is competent and effective and fulfill these responsibilities. It's something we're trying very hard to make sure will happen.

It is impossible, I believe, in the Federal Government, with the variety of circumstances that exist in agencies to have a black letter law and say, "It's all one way or it's all another way." Different agencies have different missions, have different responsibilities, have different structures and we can't change the entire Federal

Government to accommodate this one. We're working within these and have made the conditions of service as a CIO very clear, very explicit and in some instances have said that we will be reviewing the situation within a year's time and if we are not satisfied that the intent has been met then there will have to be a reevaluation and a reappraisal—reappointment in that particular agency.

So I think I have no dispute with your concerns here. I think they're legitimate issues that you raise that we too are trying to deal with and I think are actually making significant progress.

Mr. HORN. Well, I hope you're right that there are some things we don't have to re-learn every time, and one is that when you've got major jobs to be done you ought to let that person do the job, have full focus on the responsibilities. If we had Inspector Generals spending 49 percent of their time on something else nothing would happen there. And they don't, fortunately.

But when it came to CFOs somebody thought, "Well, gee, we've got a two-fer here. We can get one person in the job, they can do two jobs." You can't do two jobs. Those are very responsible jobs.

I think about one case in mind and under that person is the biggest basket case in the Federal Government on mismanagement. I'm going to be holding a hearing on that so if you'll look at my hearing schedule the next few weeks you'll know who I'm thinking about. That person should be giving full time to helping straighten that agency out. No, they're doing a million other things, and you just can't get those things accomplished. And I don't want to see the CIO system go down the drain like some of the CFO system is going down the drain.

Now, what I'm after is the degree to which the Director of OMB or the Acting Director is making sure, one: we've got someone in place that has the clear responsibility for the problem; two: there is a plan being developed; three: there's a cost related to that plan. Because they need to come up to the appropriations committees if they need extra funds and not just come in with a year to go or something. And we've been saying that for a year, at least, on general problems with agencies, that they've got to plan ahead.

And, as you know—and that's one of the things I want to raise with the November versus February thing. Most of those agency figures should have gone to OMB by November so that OMB can make its recommendations on behalf of the President to the Congress in late January or early February. It just seems to me November is a good way to force a little action on this because we're talking about the budget for fiscal year 1998 that begins October 1, 1997, and ends September 30, 1998. That is not too long from the Year 2000 and we need to really have some actual figures that the appropriation subcommittees can deal with.

You noted here that the House Treasury Postal Service and General Government Appropriations Report is into the situation in a big way, and they should be. They've got the right series of worries. But I think the executive branch has to show the Congress some real data next year. Can it be done by reprogramming?

Personally, I think a whole lot of it could be solved by simply reprogramming money the agency already has. We know the old game, they often say, "Gee, this is a chance to get a few million more out of the Congress. Let's tell them what a crisis this is and

we don't have any money." Any Cabinet Secretary that can reprogram and solve this problem shouldn't be a Cabinet Secretary—and that goes for the Deputy Secretary, which apparently is who is deeply involved.

So I just think that we've got to take it seriously and not drift into next year with that report. I don't think February is acceptable. I think what the Committee is saying essentially November 1st is because that's when they get their regular data up through their own system. There is no reason they can't make that estimate by November 1st, and nothing focuses the mind like an execution, as we know.

Ms. KATZEN. We do know that. Let me just reiterate OMB's rebuttable presumption is that the funds will come from existing reprogramming.

Mr. HORN. I think you're right.

Ms. KATZEN. That's our rebuttable presumption.

Mr. HORN. That's a good one.

Ms. KATZEN. Second: the information will come in in November but there will be trade offs that are involved in terms of either scrapping programs or scrapping different types of upgrades in favor of doing these kinds of fixes. Those are the kinds of discussions that take place within OMB and with the President's senior advisors during the months of November and December and early January, which is why the budget comes up in February. If you get November 1st that isn't even when we have the actual data, but it would also be without having had any of what has always been traditionally the productive exchange of views during the winter months that produces the budget.

So I appreciate the desire to get the information as soon as possible and we will give you the information whenever you ask for it. The better information will be following the decisionmaking process on these trade offs, not in advance of it. And we have issued the 811 request for information from the budgets this summer. We said that they had to include this kind of information. They will be sending it in as part of the submission. If we have to accelerate that we may or may not have as valid data, and I simply had asked if you would consider getting appreciably better data somewhat later in the process.

Mr. HORN. I think there's a philosophical problem here as to where trade-offs are made. I would think the agency should make the trade-offs, not Big Daddy in OMB. Now, we all know they play games with OMB and OMB plays games with Congress and so on and so on. I understand all that. That's true in business, it's true in non-profits, you name it. But this is the time for them to say, "Hey, this program over here which has nothing to do with information resource management is something we should have killed a long time ago. We need the money to do this, let's kill it." In other words, let's make an executive decision and let's say that money is going to go over to solve this problem. And it doesn't need Big Daddy up in OMB, I would hope, to hold their hands to get the problem solved.

That's what bothers me. And that's why it should be made by November because that's the time—September-October traditionally are when the agencies are dealing with their estimates and

what they're going to ship to OMB. They should be making those trade-offs, not have their little hands held and say, "Gee, do you really think you should kill that program that's been in since 1920 and nobody gives a hoot about?" Let them kill it.

Ms. KATZEN. With deference, I do not believe that is the process that is engaged in nor the characterization of Big Daddy holding hands. There are often very serious discussions that occur involving a variety of considerations and that has traditionally been part of the process. But I can't sit here and say that we will be holding their hands.

Mr. HORN. Well, you are if it's after November.

Ms. KATZEN. I'm concerned that somehow I failed to communicate what the process is. We will be getting information from the agencies. Some of that will include the trade-offs, some of those will be valid and some of those will proceed. In other instances we will be discussing with the department or agency to minimize grandfathering if that is the case, or the traditional Washington maneuver if that is the case, and I don't think that that can be fairly be characterized as a Big Daddy. It is part of the process.

I simply raise this to remind you of the timing and the value of having the additional consideration given to the raw figures before they're released in a report to Congress, because we take a certain pride—you've asked OMB to do this, OMB has a very high standard of professionalism and if we're producing and preparing a report we'd like it to be the best that it can be. And I simply wanted you to be aware of the time constraints on the earlier deadline.

Mr. HORN. Well, I can appreciate that. You're dealing with the appropriations committees on this one. It's their deadline. It just seems to me on their request that the agencies have to be told we're going to get at that problem earlier and you're going to send them the final estimate, after you've traded it off within the agency and we need to ship it up to them and we'll need it by, let's say—well, you can work it out with the chairman of appropriations if it should be, say, November 15th when the election's over or something and everybody can focus a little. But the data are there sitting in the agency, they can pull it together.

Mrs. MORELLA. Mr. Chairman—

Mr. HORN. I now yield to the good woman detective as opposed to the bad man.

Mrs. MORELLA. No, it was actually on that point. We worked to get that amendment and Treasury Postal for November 1st because it really just simply asks for an alertness and awareness of a plan, the cost and a timetable. It is not inviable. It doesn't mean that after the plan is put together it can not change or be crafted to meet the various minutia or exigencies or slight changes that may come about. It just seemed as though that's the time for the deliberations for next year's budget that takes place.

And again, whether it be November 15th, I'd have no problem with that. I think there is a serious problem in just postponing it until February, even though I recognize that you want it to be perfect. You want to have gone through every single layer of trade offs and whatever. I think if we don't move it now—and I understand it is not moving now—it is not. That language, even though the bill is not law, has been ignored. I mean, you haven't ignored it but it's

being ignored by agencies and they should know that this is an emergency and that they should begin to respond to it.

I further think that the President should be making a statement—I mean, we're talking about something happening from the top. Should be making some kind of a statement to the effect that this needs to be done and needs to be done now. We need to establish the importance of it and I think it can only come from department heads and certainly the president. Maybe the cabinet members should be alerting them to it.

But I think to wait until a budget comes out in February is far too late, and as we've already heard altogether from now, there are still only 27 months before the final year for the testing to take place.

So, respecting what you say and your thoroughness, and I understand that's where you're coming from—you want it to be totally accurate—I would still—Chairman Horn and I both agree that we should be moving toward that November deadline. You do mention that of course you could do it if you had to in your statement.

Ms. KATZEN. We would. And I said that both orally and in my written statement here.

I also want to emphasize that the fact that we would be producing a report any time after tomorrow does not mean that we are waiting until after tomorrow to be doing the work. The agencies received their grades this summer, they came back for the first day of school after Labor Day with a host of subjects before them and this was one. I've had calls from some of these agencies already in the last week or so as they are focusing on this and the work will go on. It will not wait for the report. The planning is being done by a number of the agencies.

Let us not lose the fact that some of them got A's and B's and even some of the C's have plans. The A's and B's all have costs and so do some of the C's. Indeed, I think one of the D's has a cost. But these are things that are being put together and they are not waiting for the report. That was to wrap it together and provide an overall estimate.

We will do what we are asked to do and you have my commitment on that.

Mrs. MORELLA. Again, if we're using the analogy of the grades—and I know like five agencies are doing reasonably well—then we tend to respond to deadlines. Otherwise, we tend to put things off unless we have a deadline that is before us. Which is why, again, I think November is absolutely doable.

Ms. KATZEN. As a regulator I know that some of the best regulations that may be written are those that use market incentives to enhance the good instincts of the regulated entities.

What I had hoped to communicate in my oral comments were that many of these agencies clearly understand that their ability to achieve their mission depends upon their fixing this problem. Social Security Administration, which has been in the forefront, knows full well what needs to be done. Its been working on it for several years, not because solely it likes to get A's but because it can't do its job and it wants to make sure that it will be able to do its job. Its deadline is a full year in advance of 2000, it's January 1999.

Mrs. MORELLA. But they started in 1989.

Ms. KATZEN. That's correct, they started working on it. But also some of the expertise and some of the information that they have has enabled others who have gotten a somewhat later start to be able to work more efficiently.

But we have a number of agencies whose self interest is clearly at work and I think that we should be very careful about suggesting that the Federal Government is not being responsive. Some are not being as responsive as we would like, that is clear. But there are others who have been quite responsive and should be commended for their activities.

Mrs. MORELLA. We think you are responsive and you'll bring back our message. Thank you.

Thanks, Mr. Chairman.

Mr. HORN. What are you doing with the ones that haven't been responsive? Does the director give them a call? Do you give them a call? Does the Presidential assistant give them a call? Does the Vice President give them a call?

Ms. KATZEN. As I mentioned, I have spoken with either the responsible person or his or her superior in each of the departments or agencies that have been least responsive. We have begun to tackle the next group. As we work up page two and move towards page one I expect to be in touch with all of the departments and agencies at a very senior level within the next several weeks.

Mr. HORN. You know the Gartner Group estimated the \$30 billion figure for the Federal Government. Has the experience the executive branch had so far such as the 1989 beginning of the Social Security Administration to work on the various codes they have, which are crucial, and some of the other agencies up there that have been working on this and thinking ahead of their brethren, is that estimate of Gartner off just based on current judgement of how many lines of code might exist, or is it just too early to tell?

Ms. KATZEN. I think it's too early to tell. There are some indications it may be off. The Department of Defense, which is one of the departments that has a cost estimate, estimated their costs at \$1 billion. A back of the envelope suggests they've got roughly half the lines of code in the Federal Government, which would put the operating figure at somewhere closer to \$2 billion rather than \$30 billion.

There is obviously a large range there. We hope to have, in November or otherwise, a much better handle on that number at that time. I tend to think it's on the high side but until I have the information I don't think I can give you a more precise answer.

Mr. HORN. Okay. That's good. The November 1st deadline will focus that, and we appreciate it.

Are there any other questions my colleague has?

[No response.]

Mr. HORN. Well, let me just thank you very much, Ms. Katzen, for coming, and tell your colleagues we wish them well and we'll look for timely reports.

I want to thank the staff that worked on the hearing from both Subcommittees. With the Subcommittee on Government Management, Information, and Technology, it's Russell George, the Staff Director, right in the middle of the group; Mark Uncapher, Coun-

sel; Susan Marshall, to my left, your right, the professional staff member on this hearing; Erik Anderson, our faithful clerk; and a new member, Brook Musser, an intern with us.

From the Science Committee Technology Subcommittee, Bob Cook, of the professional staff and Kathi Kromer, the clerk.

And for the Minority, on Government Management, Information, and Technology: Mark Stephenson and David McMillen; and from the Minority, on Science: it's Mike Quear; and the court reporter is David Hoffman.

We thank you all for coming.

This hearing is adjourned.

[Whereupon, at 12:55 p.m., the hearing was adjourned.]

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