

A MILLENNIUM DATE CONVERSION GUIDE



Solutions for Defusing the Millennium Bomb 



A Millennium Date Conversion Guide

Table of Contents

1	WHY THIS GUIDE?	1
2	WHAT IS THE YEAR 2000 PROBLEM?	1
3	WHAT COULD BE AFFECTED?	2
3.1	OPERATIONAL DISRUPTIONS	2
3.2	FINANCIAL LOSSES	3
3.3	LIABILITY EXPOSURE.....	3
4	WHAT CAN YOU DO ABOUT IT?	3
5	WHAT IS IHS DOING ABOUT THE Y2K PROBLEM?	4
6	SUMMARY	4
7	APPENDIX A: IHS YEAR 2000 PROJECT ORGANIZATION	5
7.1	YEAR 2000 PROJECT OFFICE	5
7.2	Y2K RESOURCE TEAMS.....	5
7.2.1	<i>RPMS Software Applications Resource Team</i>	5
7.2.2	<i>National Patient Information Reporting System Resource Team</i>	5
7.2.3	<i>RPMS Related Operating Systems and Hardware Resource Team</i>	6
7.2.4	<i>Commercial Off-the-Shelf Software & Computer Hardware Resource Team</i>	6
7.2.5	<i>Telecommunications Hardware and Software Resource Team</i>	6
7.2.6	<i>Data Exchanges/Interfaces, Databases, and Data Archives Resource Team</i>	6
7.2.7	<i>Facilities Related Systems and Equipment Resource Team</i>	6
7.2.8	<i>Biomedical Equipment Resource Team</i>	7
7.2.9	<i>Local Software Resource Team</i>	7
7.2.10	<i>Outreach Resource Team</i>	7
7.2.11	<i>Contingency Planning Resource Team</i>	7
7.2.12	<i>Acquisitions/Contracting Resource Team</i>	7
7.3	AREAS & SERVICE UNIT RESPONSIBILITY	7
8	APPENDIX B: POINTS OF CONTACT	9
9	APPENDIX C: YEAR 2000 CONVERSION MODEL	11
9.1	AWARENESS PHASE	11
9.2	ASSESSMENT PHASE	12
9.3	RENOVATION PHASE.....	14
9.4	VALIDATION PHASE.....	15
9.5	IMPLEMENTATION PHASE.....	16
10	APPENDIX C: YEAR 2000 PROGRAM ASSESSMENT CHECKLIST	18
11	APPENDIX D: SELECTED YEAR 2000 RESOURCES	21
11.1	FEDERAL GOVERNMENT LINKS	21
11.2	INDUSTRY LINKS	22

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1 Why this guide?

This paper addresses the following questions: (1) What is the Year 2000 problem and how serious is it?; (2) What are the Y2K business and legal risks facing hospitals and health care systems?; and (3) How can those risks be managed effectively? The first four pages of this guide present a general overview of the Year 2000 Problem. The remaining pages are detailed specific information on resolving the Year 2000 Problem.

2 What is the Year 2000 Problem?

You may have heard of the Year 2000 problem or Millennium date conversion by now, but do you know what it takes to ensure that your organization does not suffer any adverse effects from the damage that may occur due to this problem? The Year 2000 (or "Y2K") computer problem -- that is, the inability of most computers to process date information later than December 31, 1999 -- is much more than just a computer problem. In the case of hospitals, clinics, and health care systems, Y2K problems originating from both *internal* and *external* sources are likely to threaten the whole institution, not just those departments that are concerned directly with information technology. If not resolved, Year 2000 failures could compromise patient care, disrupt core business functions and create substantial liability exposure. To effectively address the problem, boards of directors, chief executives and other senior officers and managers must sponsor and actively support comprehensive risk management strategies across all business units.

What is the Y2K problem? Simply put, Y2K is the legacy of saving scarce and expensive computer space. Today, it costs about ten cents per month to lease one megabyte of computer storage space. But in 1963, the cost was \$175/month (in 1995 dollars), approximately one million percent higher. In order to save precious computer storage space, programmers used only two digits to code years, such as "69" for 1969. Unless these programs are changed, they will interpret the year "00," that is, 2000, as 1900.

When that happens, some computers won't work at all and others will suffer critical calculation and other processing errors. For example, a person who was born in 1935 will turn 65 in 2000, but a computer that is not Year 2000 "compliant" would subtract 1935 from 1900 and determine the age to be -35 (or possibly 35). Sorting and sequencing errors could scramble chronological patient histories and schedules for lab tests, admissions, surgeries, and office appointments. New perishable goods could be rejected by automated inventory systems as being 100 years old and current accounts could be canceled because receivables were thought to be 100 years overdue. Equipment with computerized maintenance or calibration schedules could be taken out of service automatically. Other business functions that Y2K failures could disrupt include invoicing, shipping, license renewals, employee compensation and benefits, electronic data interchange, building systems, power generation, and claims processing.

A nationally known consulting firm, the Gartner Group, estimates that converting computer systems to handle 21st century date information will cost \$400-\$600 billion worldwide. Software Productivity Research, Inc. puts the total cost, including software, hardware and database repairs, plus litigation and damage awards, at more than \$1.6 trillion. Money aside, industry analysts agree that there is little prospect that serious Year 2000 failures can be avoided entirely. Although reprogramming date codes is not difficult in isolation, locating and repairing two-digit dates contained in millions or tens of millions of lines of code poses an enormous project management challenge. According to Software Productivity Research, 22% of the best-managed information technology projects are late in being repaired, while 85% of the worst managed projects are late and 40% are canceled. Gartner Group estimates that 90% of all computerized applications will fail without Y2K corrective measures. It is safe to assume that fixing virtually every program in the world in just two years will not be completed right on time or without substantial errors.

Year 2000 problems have already begun to crop up as enterprises begin to enter post-1999 date information into their systems. Examples include rejection of credit cards with "00" expiration dates and insurance claims for policies expiring after 1999, and the inability to schedule patient appointments in 2000. Early failures can also be expected in scheduling maternity services for pregnancies coming to term in early January, 2000, contracting and purchasing goods and services for delivery after 1999, and developing multiple-year capital budgets.

It is possible that if you do not address the situation in your organization, that you may seriously threaten the operation of your organization. It is estimated that as many as 10% to 15% of organizations will fail completely if they do nothing to resolve their Year 2000 issues.

3 What could be affected?

It is highly unlikely that the impact of serious Y2K computer failures will be limited to information technology systems alone. Hospitals and health care systems must anticipate and plan for three broad categories of business and legal risks: operational disruptions, financial losses, and liability exposure.

3.1 Operational Disruptions

Health care facilities will be exposed to operational disruptions caused by failures in computer systems, embedded chips, business dependencies, and public infrastructure.

Computer systems failures can occur in the organization's own information systems, as well as in the systems of third parties upon which the institution relies. This includes all computer software and operating systems; programs that perform functions such as Word Processing, Accounting, and Payroll.

Embedded chips are non-programmable microcircuits that are "hard wired" into other pieces of equipment that may be critical to patient services or hospital operations, many of which include date calculations in their programming logic. The equipment in which the chips are embedded often is not under the control of the information technology department but usually is the responsibility of the vendors who supply and maintain them for diverse operational units of the hospital.

Embedded chip systems that should be tested for Year 2000 vulnerability include:

1. Medical devices and equipment, including infusion pumps in intravenous drips, heart defibrillators, pacemaker and intensive care monitors, MRIs, CT scans, dialysis, chemotherapy and radiation equipment, and laboratory, radiology and other diagnostic systems;
2. Monitoring and control systems, including environmental and safety equipment;
3. Fire alarm systems, including detection, sending, receiving, and suppression units;
4. Security systems, including sending and receiving units, video and surveillance systems, and badge readers;
5. Telecommunications equipment, including telephone switching equipment, call management systems, pagers and cellular phones; and
6. Building infrastructure, including heating, ventilating, and air conditioning (HVAC), energy management and lighting controls, emergency generators and lighting, uninterruptible power supplies, and elevators.

In June, 1997, the Center for Devices and Radiological Health of the Food and Drug Administration informed medical device manufacturers that "some computer systems and software applications currently used in medical devices, including embedded microprocessors, may experience problems beginning January 1, 2000 due to their use of two-digit fields for date representation." It is important to test these devices to determine whether they will have operational, calibration, reporting or other problems after 1999.

Business dependencies pose external Y2K operational risks. Even if a hospital takes care of its own Year 2000 problems, it may still experience business interruptions if third parties upon which it depends fail to do so. Health care systems cannot function effectively without reliable support from medical insurance payers, claims clearinghouses, banks, and suppliers of hundreds or thousands of other goods and services, all of which are potentially vulnerable to Y2K failures.

Public infrastructure failures are also possible. Hospitals cannot operate without power, water or police and fire protection. Public transportation is essential to many employees and patients.

3.2 Financial Losses

As the health care industry continues to consolidate and cut costs, institutions face increasing financial pressures. Year 2000 failures by providers or payers could result in late, miscalculated or rejected claims for payment. Also, the direct costs of making computer systems compliant are increasing dramatically in a sellers' market of Y2K vendors and consultants. Economic losses may occur in the form of decreased market share, reduced acquisition value (due to an unreliable information infrastructure) and, as the trend toward public ownership accelerates, lower stock values.

3.3 Liability Exposure

It should come as no surprise that lawsuits would follow Year 2000 failures. Hospitals and their key decision-makers may face malpractice claims, personal injury and wrongful death suits, actions against directors and officers, enforcement of licensing, accreditation and other regulations, and, for publicly-held corporations, shareholders suits. Directors and officers must be particularly careful to avoid personal liability for failing to exercise due diligence and reasonable business judgment in connection with foreseeable Year 2000 problems. In addition, if Y2K expenditures or problems may be considered "material" to the business of the hospital or health care system, disclosures may have to be made to accountants, auditors, shareholders, business partners, and regulators to fulfill fiduciary or other legal obligations in certain kinds of transactions.

4 What can you do about it?

First and foremost, Year 2000 management requires active executive involvement to provide adequate financial and human resources and sustained effort across the organization. Once senior management support is secured, hospitals must systematically assess their Y2K business and legal risks and develop comprehensive compliance plans.

To do this you must take a number of steps:

1. Start right now and appoint someone to manage your "Year 2000 Project".
2. Initiate a campaign of awareness throughout your organization. Let everyone know the potential problems you could be facing, and let them know the actions you are taking to resolve them.
3. Take a complete inventory of all computer software and hardware that your organization utilizes.
4. Take a complete inventory of all systems that could be controlled by a computer chip. There are many of these, and some are not as obvious as others are.
5. Contact your suppliers asking them for written assurance that their products are "Year 2000 Compliant". If they are not compliant, ask what plans are in place to ensure that they will make them compliant.
6. From your inventory, select what systems are critical to the operation of your organization. Prioritize these systems and address them beginning with the most critical. You may not have time to complete everything before the deadline, and so you must look at your most important systems first.
7. Test your systems. Note that you must be very careful when testing systems for Year 2000 functionality. In many cases, you cannot just set the date forward and test out the program. If you do this, it is possible that some of your software licenses could expire due to the software thinking it was sometime in the future. It could also be that some of your programs have "file expiry" dates sometime in the future, and these files could be lost permanently. For "embedded systems", you will probably require the assistance of your vendor to test them, as most of these systems do not have a keyboard that allows you to change the date and simulate the Year 2000.

Keep in mind that some systems may fail before 2000. This is due to the way that some programmers used date fields to indicate "end of file", or other program exit points. You may also have systems that project into the future, and so they may fail before 2000. An example of this would be a program that calculates your mortgage. This program will almost definitely project payments and interest beyond 2000, and so it could produce flawed

results if not corrected. If any of your systems do fail, take corrective action. The vendor or supplier may have to be contacted in some cases to advise you how to do this. It could involve a simple change, or it could require extensive effort to resolve the problem.

8. Test your systems again after the corrective action has been taken. You may have missed something, or you may have introduced a new "problem" to the system.
9. Prepare contingency plans. Imagine the worst case scenario, and ask yourself if your organization can survive without your computer systems. Can you get by on manual systems? How long could you survive this way? What other actions can you take to ensure that your organization will function effectively in the Year 2000 and beyond?

These "general" steps are the major steps to ensuring you are Year 2000 compliance. Appendix C: Year 2000 Conversion Model and Appendix D: Year 2000 Program Assessment Checklist present a structured approach and a checklist to aid organizations in planning, managing, and evaluating their Year 2000 program. This information incorporates guidance and practices identified by leading organizations in the information technology industry as presented in GAO's Year 2000 Computing Crisis: An Assessment Guide.

5 What is IHS doing about the Y2K problem?

The Indian Health Service has been actively involved in resolving Year 2000 issues over the past year, and we would like to pass on some of the things we have learned, to enable you to save both time and effort when you tackle your own organization's problems. The organizational structure of how IHS is addressing the Year 2000 Problem is presented in Appendix A: IHS Year 2000 Project Organization.

From a national level, the IHS has the overall responsibility for:

- Developing an administration-wide plan in accordance with Federal guidelines
- managing the IHS' Year 2000 compliance effort to ensure continuing quality service to American Indians and Alaska Natives (AI/AN)
- Promoting the exchange of information among the Tribes, Urban health programs, Areas, vendor community, national development staffs and procurement offices
- Tracking and reporting activities to senior HHS and IHS management, the Office of Management and Budget (OMB), the General Accounting Office (GAO), and Congress
- Renovating RPMS so that it is Year 2000 compliant
- Developing NIPRS so that it is Year 2000 compliant
- Providing national level points of contacts as indicated in Appendix B: Points of Contacts

6 Summary

In order to preserve quality patient care, maintain business operations and avoid liability, hospital directors, officers and managers must develop and implement systematic risk management strategies in the short time remaining to meet the Year 2000 challenge. Exercising due diligence on all fronts to prevent or minimize Y2K failures must become a priority for all health care institutions. The problem is very real, and very pervasive. It is in your own best interest to treat this problem seriously, and to make it a top priority for your organization.

Remember,

- It is not just a problem within your Information Technology department. It is your whole organization that could be affected.
- It is not just something that will affect the big organizations. It will have an effect on your organization as well.
- It is not just a mainframe problem. It affects PCs and the software that runs on them as well.

- It is not just someone else's problem. It is yours as well. *Take action now!*

7 Appendix A: IHS Year 2000 Project Organization

7.1 Year 2000 Project Office

In recognizing the importance of this project, the Director of the Indian Health Service, Dr. Michael Trujillo issued an agency wide memorandum declaring that the addressing of the Year 2000 issue is the top information technology priority. The memorandum called for an appointment of a Year 2000 Coordinator at each Area (regional) Offices to compliment the efforts at the national level. Dr. Trujillo has designated that Dr. Richard Church, the IHS Chief Information Office (CIO) has ultimate oversight responsibility for the Y2K. He will be assisted by the Director of Division of Information Resources (DIR), James Garvie. This oversight function directs (and redirects) resources, sets the overall project direction, and regularly reviews the project status.

There are many, diverse systems that can be affected with the Year 2000 problem. These systems are throughout the Indian Health Community. To address this problem within the available time there needs to be considerable Y2K solution activity proceeding in parallel. This activity must be coordinated to insure that all-important areas are addressed and that resources are used efficiently. Accordingly, the CIO established a full time Year 2000 Project Office headed by Mr. Raymond Willie.

The Year 2000 Project Office has the overall responsibility for: developing an administration-wide plan in accordance with Federal guidelines; managing the IHS' Year 2000 compliance effort to ensure continuing quality service to American Indians and Alaska Natives (AI/AN); promoting the exchange of information among Area Offices, the vendor community, and national development and procurement offices; and tracking and reporting activities to senior DHHS and IHS management, the Office of Management and Budget (OMB), the General Accounting Office (GAO), and Congress.

7.2 Y2K Resource Teams

To allow for parallel efforts and to best use existing expertise IHS has organized its Y2K project into resource teams. The broad technical categories represented by each team have many Year 2000 issues. Therefore, each Y2K team leader will use their own staff as the nucleus of their Resource Team. There will be Resource Teams corresponding to the technical categories. Each resource team will be responsible for collecting inventory and status information from the twelve IHS areas for that team's category of systems. Resource Teams will also give guidance on acceptable vendors and versions of compliant systems as well as on contingency plans. These Resource Teams (RT) are:

7.2.1 RPMS Software Applications Resource Team

The Resource and Patient Management System (RPMS) is the heart of the medical facilities information resource management activities. The core RPMS modules are developed in the MUMPS programming language (Massachusetts General Hospital Utility Multi-Programming System, now known as M), and are maintained and distributed nationally. Developers write and maintain these applications using a defined set of M programming tools, operating system environments, and documentation guidelines. RPMS includes workstations and personal computers with graphical user interfaces (GUI) and local software developed by IHS employees. It encompasses the links that allow commercial-off-the-shelf (COTS) software and products, such as office automation, Internet browsers, and telemedicine systems, to be used with existing and future technologies. It also interfaces with many types of biomedical devices. RPMS is a vital part of the total computer systems environment that provides information resources and support at IHS health care facilities.

7.2.2 National Patient Information Reporting System Resource Team

The National Patient Information Reporting System (NPIRS), formerly referred to as the "Data Center," is responsible for receiving, processing and national reporting on all patient demographics and patient care related activity for the IHS. NPIRS is comprised principally of data generated and exported from the Patient Care Component and the distributed Patient Registration components of RPMS. These data are used to report workload

activity, support national budget requests, generate revenue through a centralized Third Party Billing system, and assist the IHS in distribution of resources.

7.2.3 RPMS Related Operating Systems and Hardware Resource Team

The RPMS Related Operating System and Hardware Team is responsible for the Year 2000 compliance of the hardware architecture and operating system environment for RPMS. The current hardware standard for RPMS is the IBM RS/6000 and, as such, most of the information contained in this section pertains directly to the RS/6000. A number of legacy host and small facility operating environments that support RPMS exist within IHS. The standard RPMS platform currently being procured by IHS is the IBM RS/6000 running AIX. Other environments that host RPMS include various implementations of UNIX, DOS, and Windows NT. Currently at most sites, RPMS is hosted on one of the three UNIX platforms (UNIX, SCO UNIX, and AIX) described in this section. Because NPIRS is also hosted on an RS/6000 running AIX, this team is also responsible for the Year 2000 compliance of the NPIRS operating system and hardware. At the national level, IHS will inform all sites, as which version of all the software listed above is Year 2000 compliant. It will be the site responsibility to insure that the Year 2000 compliant version of the software is installed.

7.2.4 Commercial Off-the-Shelf Software & Computer Hardware Resource Team

There are many commercial off-the-shelf software (COTS) packages in use at IHS facilities. These include various versions of PC operating systems, office automation products, communications software, desktop publishing software, and project management software. In addition, there are server operating systems and utilities, Internet services packages, network management tools, database management systems, software development environments, and operating systems utilities. In addition to personal computers on employees' desks, there are servers for printer and file sharing, automated phone systems, voice mail and fax back services, computers for electronic mail, computers in fax machines and in network hubs and switches, and computers that monitor system activity. These systems are often highly inter-linked and interdependent.

7.2.5 Telecommunications Hardware and Software Resource Team

Telecommunications hardware and software includes items such as voice and data switches, digital multiplexers, transmission devices, and data networking products and their associated firmware and software. Support systems include billing, service ordering, network management, and event tracking systems and their associated operating systems and application software.

7.2.6 Data Exchanges/Interfaces, Databases, and Data Archives Resource Team

Another critical aspect of achieving Year 2000 compliance across these product categories is the consideration of data interfaces between systems within a product category, between systems in different product categories, and between IHS systems and organizations/systems outside IHS. In the development of this plan, the term "data interfaces" refers primarily to the exchange formats between systems sharing data containing date-sensitive fields. Year 2000 compliance cannot be certified until data interfaces have been identified, analyzed, tested, and implemented successfully. There may be as many database files as there are application programs in the IHS inventory. Today's relational database structures encourage large numbers of interrelated files. If any file has a two-digit year field, then it will have to be thoroughly assessed. If one database must be changed to be made Year 2000 compliant, then databases and programs linked to it may also need to be changed. Data archives might have to be converted if the databases to which they refer are upgraded for Year 2000 compliance. Each facility is encouraged to conduct an inventory of all local databases to ensure compliance.

7.2.7 Facilities Related Systems and Equipment Resource Team

Facility-related system products are vitally important to IHS in providing quality health care service. Included in this classification are elevators; heating, ventilating, and air conditioning (HVAC) equipment; lighting systems; security systems; and disaster recovery systems. Involvement of engineering, information resources, facilities management, acquisition, and administrative personnel at all IHS sites will be necessary to assure that facility-related equipment is confirmed to be Year 2000 compliant.

7.2.8 Biomedical Equipment Resource Team

Biomedical equipment includes a wide range of devices that record, process, analyze, display, and transmit medical data. Some examples include computerized nuclear magnetic resonance imaging (MRI) systems, cardiac monitoring systems, tissue and gas analyzers, cardiac defibrillators, and various laboratory analyzers. Some devices interface and exchange data with RPMS application systems and other IHS system products. Medical devices in medical research facilities are being inventoried and assessed for Year 2000 compliance. Year 2000 compliance for biomedical equipment and systems is a high priority for the IHS.

7.2.9 Local Software Resource Team

Many special purpose programs have been developed in IHS. These have been written by Area Information Resource Management (IRM) staff or other system users on-site, or have been imported from other organizations. They generally meet a local need or extend the functionality of nationally released software. These software applications are more likely to be non-compliant for Year 2000, but probably have fewer users and potentially less mission and financial impact.

7.2.10 Outreach Resource Team

The President's February 4, 1998, Executive Order on the Year 2000 Conversion included the following statement.

Section 1. Policy. (a) It shall be the policy of the executive branch that agencies shall:...(2) assist and cooperate with State, local, and tribal governments to address the Y2K problem where those governments depend on Federal information or information technology or the Federal Government is dependent on those governments to perform critical missions.

Therefore, as a major part of the Indian Health Year 2000 Project's effort to reach out to all Native American health care organizations - particularly those which are not directly part of the Indian Health Service - the IHS is distributing information to tribes and other Indian health organizations on the Year 2000 problem and the methods and procedures that Indian Health is following to achieve Year 2000 compliance.

7.2.11 Contingency Planning Resource Team

Because of the risks of Year 2000 related system failures - including risks due to external dependencies - agencies must have effective business continuity and contingency plans in place to reduce the risks of Year 2000 related business failures. For the Indian Health community, business failures can impact the availability and quality of health care provided to Native Americans and Alaska Natives.

7.2.12 Acquisitions/Contracting Resource Team

Many commercial information technology products in the marketplace and systems that agencies are acquiring may experience operational difficulties at the turn of the century. This is the result of the inability of many of those products and systems to accommodate the change from the year 1999 to the year 2000. We must anticipate and address this problem now by acquiring, wherever possible, only products and systems that are or will be year 2000 compliant.

7.3 Areas & Service Unit Responsibility

Area Directors have the ultimate responsibility to develop and execute Year 2000 compliance plans within their areas. Area Directors are responsible for health care information systems initiatives and have the primary responsibility for Year 2000 compliance activities in their respective Area. Each Area Director has the responsibility to complete a system products inventory, develop an Area Year 2000 Compliance Plan specific to that area, execute the Plan within their area of responsibility, and to report Plan progress to the IHS Project. Area Directors are ultimately responsible for achieving Year 2000 compliance for all system products in their Area.

For IHS, the Year 2000 Problem has both technical and geographical dimensions. The technical categories address the technical dimension. That is, what does compliance mean for, say, facilities or telecommunications and what products are compliant? For the IHS, the areas and the sites within areas reflect the geographical dimension. That is, where are the systems in question located and what is their status? For this reason, each of the 12 Area Directors will name an Area Y2K Coordinator. The Area Coordinator will operate in a manner similar to the IHS Y2K Project

Office. This means each Area Coordinator will name a Resource Team reflecting expertise in the 12 technical categories. An Area Coordinator with his/her Resource Team is called an "Area Compliance Achievement Team." These Area Compliance Achievement Teams must help ensure Y2K compliance for site systems within the area and report on their progress to the respective Resource Teams/Steering Committee members.

IHS health care facilities will have proximate hands-on responsibility to ensure that Year 2000 compliance efforts are fully implemented at the service unit level. In coordination with Area Directors, health care facility managers will implement compliance activities through all phases of the Year 2000 effort.

8 Appendix B: Points of Contact

Listed below are the organizational and contact information for members of the IHS Year 2000 Project.

Indian Health Year 2000 Project Team

Year 2000 Project Office

Name	Responsibility		E-Mail
Dr. Richard Church	Chief Information Officer Director, Division of Information Resources	(301) 443-0750	RChurch@hqe.ihs.gov
Raymond Willie	Year 2000 Coordinator	(505) 248-4411	Raymond.Willie@mail.ihs.gov
James Garvie	Deputy Director, Division of Information Resources	(301) 443-0750	JGarvie@hqe.ihs.gov
Gene Robinson	Year 2000 Project Office Support	(505) 248-4210	Gene.Robinson@mail.ihs.gov
Dan Aiken	Year 2000 Project Office Support	(505) 248-4206	Dan.Aiken@mail.ihs.gov

Year 2000 Resource Team Leaders

Name	Responsibility	Telephone	E-Mail
Notah Begay Dan Clark	National Patient Information and Reporting System	(505) 248-4150 (505) 248-4159	Notah.Begay@mail.ihs.gov Daniel.Clark@mail.ihs.gov
Dr. Mark Delaney Rick Pullen	Resource and Patient Management System-Related Operating System and Hardware	(505) 248-4202 (505) 248-4203	Mark.Delaney@mail.ihs.gov Rick.Pullen@mail.ihs.gov
Carl Gervais George Huggins	Resource and Patient Management System Software Applications	(505) 248-4197 (505) 248-4191	Carl.Gervais@mail.ihs.gov George.Huggins@mail.ihs.gov
Richard Crooke	Commercial Off-the-Shelf Software and Computer Hardware	(301) 443-2554	RCrooke@hqe.ihs.gov
Tom Fisher Richard Luarkie	Telecommunications Hardware and Software	(505) 248-4219 (505) 248-4468	Tom.Fisher@mail.ihs.gov Richard.Luarkie@mail.ihs.gov
Arthur Gonzales Michael Dellaney	Data Exchanges/Interfaces, Databases, and Data Archives	(505) 248-4192 (505) 248-4359	Arthur.Gonzales@mail.ihs.gov Michael.Dellaney@mail.ihs.gov
Dennis Taddy Bill Lowe	Facilities Related Systems and Equipment	(301) 443-1852 (301) 443-3121	DTaddy@hqe.ihs.gov WLowe@hqe.ihs.gov
Tony Kendrick Bruce Parker	Outreach	(301) 443-3593 (505) 248-4360	TKendrick@hqe.ihs.gov Bruce.Parker@mail.ihs.gov
Mark Thomas Bill Lowe	Biomedical Equipment	(301) 443-7998 (301) 443-3121	MThomas@hqe.ihs.gov WLowe@hqe.ihs.gov
John Daugherty Aly Chapman	Contingency Planning	(918) 342-6200 (505) 248-4190	JDaugherty@mail.ihs.gov Alyssia.Chapman@mail.ihs.gov
Area Y2K Coordinators	Local Software	See below	See below
Carol Silverman	Acquisitions/Contracting	(301) 443-5774	CSilverm@hqe.ihs.gov

Area Year 2000 Coordinators

Name	Responsibility	Telephone	E-Mail
Tim Amstutz	Nashville Area	(615) 736-2440	Timothy.Amstutz@mail.ihs.gov
Tony Peterson Thad Banley	Aberdeen Area	(605) 226-7581 (605) 226-7694	Tony.Peterson@ihsabr.ihs.gov TBanley@abraa.aberdeen.ihs.gov
Richard Crooke	Headquarters East	(301) 443-2554	Richard.Crooke@mail.ihs.gov
Garfield Little Light Ray Darneal	Billings Area	(406) 247-7102 (406) 247-7159	GLittleLight@bilb2.billings.ihs.gov Ray.Darneal@mail.ihs.gov
Ron Wood Tony Davis	Navajo Area	(520) 871-5812 (520) 871-5874	RWood@navajo.ihs.gov Tony.Davis@mail.ihs.gov
Debrah Ward Eric Gregory	California Area	(916) 566-7001 (916) 566-7020	DWard@mail.ihs.gov Eric.Gregory@mail.ihs.gov
Dorothy Dupree Richie Grinnell	Albuquerque Area	(505) 248-4500 (505) 248-4600	DorothyD@albmail.albuquerque.ihs.gov Richie.Grinnell2@mail.ihs.gov
Neal Holt	CRIHB	(916) 929-9761	NHolt@crihb.ihs.gov
Frank Williams Fonda Jackson	Portland Area	(503) 326-7279 (503) 326-5592	FWilliams@pao.portland.ihs.gov Fonda.Jackson@mail.ihs.gov
Luke McIntosh Dale Keel	Oklahoma Area	(405) 951-3717 (405) 951-3810	LMcIntos@mail.ihs.gov FKeel@mail.ihs.gov
Dennis Mattix	Tucson Area	(520) 295-2531	Dennis.Mattix@mail.ihs.gov
Charlene RedThunder Richard Perrault	Bemidji Area	(218) 759-3412 (218) 759-3381	Charlene.Red-Thunder@mail.ihs.gov Richard.Perrault@mail.ihs.gov
Russell Pittman	Alaska Area	(907) 729-1997	RPittman@akanmc.alaska.ihs.gov
Gary Breshears Roland Tanner	Phoenix Area	(602) 364-5039 (602) 364-5288	Gary.Breshears@phx.ihs.gov Roland.Tanner@mail.ihs.gov

Information System Coordinators

Name	Responsibility	Telephone	E-Mail
Tim Amstutz	Nashville Area	(615) 736-2440	Timothy.Amstutz@mail.ihs.gov
Thad Banley	Aberdeen Area	(605) 226-7694	TBanley@abraa.aberdeen.ihs.gov
Richard Crooke	HQE	(301) 443-2554	Richard.Crooke@mail.ihs.gov
Ray Darneal	Billings Area	(406) 247-7159	Ray.Darneal@mail.ihs.gov
Tony Davis	Navajo Area	(520) 871-5874	Tony.Davis@mail.ihs.gov
Tom Fisher	HQW	(505) 248-4219	Tom.Fisher@mail.ihs.gov
Eric Gregory	California Area	(916) 566-7020	Eric.Gregory@mail.ihs.gov
Neal Holt	CRIHB	(916) 929-9761	NHolt@crihb.ihs.gov
Fonda Jackson	Portland Area	(503) 326-5592	Fonda.Jackson@mail.ihs.gov
Joseph Lucero	Albuquerque Area	(505) 248-4566	JLucero2@mail.ihs.gov
Dennis Mattix	Tucson Area	(520) 295-2531	Dennis.Mattix@mail.ihs.gov
Richard Perrault	Bemidji Area	(218) 759-3381	Richard.Perrault@mail.ihs.gov
Russell Pittman	Alaska Area	(907) 729-1997	RPittman@akanmc.alaska.ihs.gov
Kevin Rogers	Oklahoma Area	(405) 951-6074	Kevin.Rogers@mail.ihs.gov
Roland Tanner	Phoenix Area	(602) 364-5288	Roland.Tanner@mail.ihs.gov

9 Appendix C: Year 2000 Conversion Model

This compliance plan divides all Year 2000 compliance project activities into five broad phases - awareness, assessment, renovation, validation, and implementation. Management of the project is based on this five-phase structure for assigning and scheduling tasks, planning resource allocation, and tracking progress. This approach follows the basic Year 2000 conversion model described in GAO's Year 2000 assessment guide, which suggests that the process be managed in five interrelated and overlapping phases: awareness, assessment, renovation, validation, and implementation. This information incorporates guidance and practices identified by leading organizations in the information technology industry as presented in GAO's Year 2000 Computing Crisis: An Assessment Guide.

9.1 Awareness Phase

It is essential that executive management be fully aware of the Year 2000 problem and its potential impact on the enterprise and its customers. It is the responsibility of the chief information officer to provide the leadership in defining and explaining the importance of achieving Year 2000 compliance, selecting the overall approach for structuring the agency's Year 2000 program, assessing the adequacy of the existing information resource management infrastructure to adequately support the Year 2000 efforts, and mobilizing needed resources.

Key Processes:

1. *Define the Year 2000 problem and its potential impact on the enterprise* - Developing and publishing a high-level assessment of the Year 2000 issue provides executive management and staff with a high-level overview of the potential impact of the Year 2000 problem on the enterprise.
2. *Conduct a Year 2000 awareness campaign* - A Year 2000 awareness campaign is an important first step to raise the awareness of executive management and line staff about the potential impact of the Year 2000 problem on the agency's operations.
3. *Assess the adequacy of the agency's program management capabilities, including*
 - policies, guidelines, and processes for program and project management, configuration management, quality assurance, and risk management
 - staffing levels and skill mix

The ability to successfully manage the Year 2000 program will depend on the degree to which the agency has institutionalized key system development and program management practices and on its experience in managing large-scale software conversion or system development efforts. With only a few activities within federal agencies operating above level 1 on the Software Engineering Institute's Capability Maturity Model, most information resource management organizations lack the basic policies, tools, and practices necessary to successfully manage a large-scale Year 2000 program. While there may not be enough time to achieve a higher maturity level, agencies should assess, and upgrade, if needed, their information resource management capabilities. Agencies should consider the establishment of an enterprise competency center to provide training and to foster adherence to proven industry system development and program management practices. Agencies also need to consider soliciting assistance from organizational entities experienced in performing or managing major software conversions.

4. *Develop and document a high-level Year 2000 strategy* - A high-level Year 2000 strategy provides the agency's executive management with a roadmap for achieving Year 2000 compliance. The strategy should discuss key Year 2000 issues, including the program's management structure, program metrics and reporting requirements, the mix of enterprise-wide solutions, and initial cost and schedule estimates.
5. *Obtain and formalize executive management support within your organization through issuance of*
 - Year 2000 policy directive
 - Year 2000 program charter

The management support for the agency's Year 2000 strategy should be formalized by the issuance of a Year 2000 policy directive and/or Year 2000 program charter. Without such support, information resource managers may not be able to mobilize adequate resources to implement the strategy and to interact with other organizations and data sources.

6. *Establish Year 2000 executive management council* - A committee or a council needs to be established within the agency to continually coordinate with the programmatic and functional area managers on priorities and potential mission impact if certain processes and systems malfunction. A process for quick conflict resolution on priorities between programmatic and functional areas is also needed.
7. *Appoint a Year 2000 program manager and establish an agency-level Year 2000 program office* - It is essential that agencies appoint a Year 2000 program manager and establish an agency-level program office to manage and coordinate the enterprise's Year 2000 program activities. The solutions of the Year 2000 problem extend beyond simple software conversion, hardware upgrades, and database restructuring. The problem--and the solutions--involve a wide range of dependencies among information systems; the need to centrally develop or acquire conversion and validation standards, inspection, conversion, and testing tools; the need to coordinate the conversion of cross-boundary information systems and their components; the need to establish priorities; and the need to reallocate resources as needed.
8. *Identify technical and management points of contact in core business areas* - A Year 2000 program should not be viewed as a system development or maintenance effort managed by the information resource management organization, but rather as an enterprise-wide effort requiring the input and cooperation of all organizational units. Thus, it is important that the technical and management staff of the core business areas work closely with the Year 2000 project teams in the assessment and testing process.

9.2 Assessment Phase

Federal agencies may not have enough resources, skill, or time to convert or replace all of their information systems. Agencies must determine what systems are mission-critical and must be converted or replaced, what systems support important functions and should be converted or replaced, and what systems support marginal functions, and may be converted or replaced later. The Year 2000 problem is not just an information technology problem, but is primarily a business problem. Thus, the process of identifying and ranking information systems should not be limited to a simple inventory of applications and platforms, but must include assessments of the impact of information systems' failures on the agency's core business areas and processes. The assessment should also include systems using information technology, which operate outside the traditional information resource area, including building infrastructure systems and telephone switching equipment.

Key Processes:

1. *Establish Year 2000 project teams for business areas and major systems* - Multi-disciplinary project teams consisting of domain experts in relevant functional areas, system and software specialists, operational analysis specialists, and contract specialists need to be established with explicit objectives and time schedules. Access to legal advice is also a necessity.
2. *Define Year 2000 compliance*
3. *Focus on core business areas and processes and develop a Year 2000 assessment document* - Information systems are not created equal. Systems supporting mission-critical business processes are clearly more important than systems supporting mission support functions-- usually administrative--although these are necessary functions. A focus on core business areas and processes is essential to the task of assessing the impact of the Year 2000 problem on the enterprise and for establishing the priorities for the Year 2000 program.
4. *Assess the severity of an impact of potential Year 2000-induced failures* - An assessment of the severity of Year 2000 failure needs to be done for each core business area and associated processes.

5. *Conduct an enterprise-wide inventory of information systems for each business area* - An enterprise-wide inventory of information systems and their components provides the necessary foundation for Year 2000 program planning. A thorough inventory ensures that all systems are identified and linked to a specific business area or process, and that all enterprise-wide, cross-boundary systems are considered.
6. *Use inventory data to develop a comprehensive automated system portfolio and identify, for each system*
 - links to core business areas or processes
 - platforms, languages, and database management systems
 - operating system software and utilities
 - telecommunications
 - internal and external interfaces
 - owners
 - the availability and adequacy of source code and associated documentation
7. *Analyze portfolio and identify for each system*
 - non-repairable items (lack of source code or documentation)
 - conversion or replacement resources required for each platform, application, database management system, archive, utility, or interface
8. *Prioritize system conversions and replacements* - An agency must determine priorities for system conversion and replacement by ranking based on key factors, such as business impact and the anticipated failure date. An agency also needs to identify applications, databases, archives, and interfaces that cannot be converted because of resource and time constraints.
9. *Develop Year 2000 program plan, including*
 - schedules for all tasks and phases of the Year 2000 program
 - master conversion and replacement schedule, including identification of systems and their components
 - assessment and selection of outsourcing options
 - assignment of conversion or replacement projects to Year 2000 project teams
 - risk assessment
 - contingency plans for all systems
10. *Identify, prioritize, and mobilize needed resources* - Achieving Year 2000 compliance will require significant investment in two vital resources--money and people. Accordingly, agencies will need to make informed choices about information technology priorities within their organization by assessing the costs, benefits, and risks of competing projects. In some instances, agencies may have to defer or cancel new system development efforts and reprogram the freed resources to achieve Year 2000 compliance.
11. *Develop validation strategies and testing plans for all converted or replaced systems and their components. Identify and acquire automated test tools and develop test scripts.* - The testing and validation of the converted or replaced systems will require a phased approach. For example, an approach developed by IBM includes four phases:
 - Phase I--unit testing--focus on functional and compliance testing of a single application or software module.
 - Phase II--integration testing--test the integration of related software modules and applications.
 - Phase III--system testing--test all of the integrated components of an information system.
 - Phase IV--acceptance testing--test the information system with live operational data.

Regardless of the selected validation and testing strategy, the scope of the testing and validation effort will require careful planning and use of automated tools, including test case analyzers and test data libraries.

12. *Define requirements for Year 2000 test facility* - Agencies may have to acquire a Year 2000 test facility to provide an adequate testing environment and to avoid potential contamination or interference with the operation of production systems.
13. *Identify and acquire Year 2000 tools* - Agencies should identify and acquire Year 2000 tools to facilitate the conversion and testing processes.
14. *Address implementation schedule issues, including*
 - the identification and selection of conversion facilities
 - time needed to put converted systems into production
 - the conversion of backup and archival data
15. *Address interface and data exchange issues, including*
 - the development of a model showing the internal and external dependency links between enterprise core business areas, processes, and information systems
 - the notification of all outside data exchange entities
 - the need for data bridges and filters
 - contingency plans if no data are received from an external source
 - validation process for incoming external data
 - contingency plans for invalid data
16. *Initiate the development of contingency plans for mission-critical systems.* - Agencies should initiate the development of realistic contingency plans--including the development of manual and contract procedures--to ensure the continuity of core business processes.
17. *Identify Year 2000 vulnerable systems and processes operating outside the information resource management area* - Identify and assess Year 2000 vulnerable systems and processes outside the information resource management area, including telephone and network switching equipment, and building infrastructure systems. Develop a separate plan for their renovation.

9.3 Renovation Phase

The renovation--conversion, replacement, or retirement--phase involves making and documenting software and hardware changes, developing replacement systems, and decommissioning eliminated systems. Renovation involves conversion of an existing application; replacement deals with the development of a new application; elimination focuses on the retirement or decommissioning of an existing application or system component. In all three cases, the process must also consider the complex interdependencies among applications, hardware platforms, databases, and the internal and external interfaces. All changes to the information systems and their components must be made under configuration management to ensure that changes are adequately documented and coordinated throughout the agency. Equally important is the need for each agency to assess dependencies and to communicate all changes to the information systems to internal and external users.

Key Processes:

1. *Convert selected applications, databases, archives, and related system components* - In converting application systems, consider changes in operating systems, compilers, utilities, domain-specific program products, and commercial database management systems.
2. *Develop data bridges and filters* - Ensure that all internal and external data sources meet the Year 2000 date standards of the converted or replaced systems. Develop bridges or filters to convert non-conforming data.

3. *Replace selected applications, platforms, database management systems, operating systems, compilers, utilities, and other commercial off-the-shelf (COTS) software* - Ensure that replacement products are Year 2000 compliant, including their ability to properly handle the leap year adjustments. Direct contract specialist and legal staff to review contracts and warranties.
4. *Document code and system changes* - Implement and use configuration management procedures to ensure that all changes to information systems and their components are properly documented and managed.
5. *Schedule unit, integration, and system tests* - Schedule unit, integration, and system tests following the conversion of individual application and software modules. Coordinate scheduling with other project teams to ensure that all components--including data bridges or filters--are available for testing.
6. *Retire selected applications, platforms, database management systems, operating systems, utilities, and COTS software* - Prepare to retire replaced applications, platforms, database management systems, operating systems, utilities, and COTS software upon the successful completion of acceptance testing.
7. *Communicate changes to information systems to all internal and external users* - Communicate changes to the agency's information systems and components, and specifically all changes to date formats for data exchanged with other systems or external organizations. Document changes through the configuration management process.
8. *Track the conversion and replacement process and collect project metrics* - Track the conversion and replacement projects and collect and use project metrics to manage cost and schedule.
9. *Share information among Year 2000 projects and disseminate lessons learned and best practices* - Ensure that project staffs understand the need to collect and disseminate information on lessons learned and best practices. Develop dissemination strategy and tools, such as Intranet web sites and newsletters.

9.4 Validation Phase

We expect that agencies may need over a year to adequately validate and test converted or replaced mission-critical systems for Year 2000 compliance, and that the testing and validation process may consume over half of the Year 2000 program resources and budget. The length of the validation and test phase and its cost are driven by the complexity inherent in the Year 2000 problem. Agencies must not only test Year 2000 compliance of individual applications, but also the complex interactions between scores of converted or replaced computer platforms, operating systems, utilities, applications, databases, and interfaces. Moreover, in some instances, agencies may not be able to shut down their production systems for testing, and may thus have to operate parallel systems implemented on a Year 2000 test facility. All converted or replaced system components must be thoroughly validated and tested to (1) uncover errors introduced during the renovation phase, (2) validate Year 2000 compliance, and (3) verify operational readiness. The testing should account for application, database interdependencies, and interfaces. The testing should take place in a realistic test environment. A Year 2000 test facility may be required to ensure adequate testing of licensed software and converted applications while preventing the contamination or the corruption of operational information systems and related databases. Agencies should assess their testing procedures and tools to ensure that all converted system components meet quality standards and are Year 2000 compliant.

Key Processes:

1. *For each converted or replaced application or system component develop and document test and compliance plans and schedules* - Establish a compliance validation process. Most suppliers of COTS software do not disclose their source code or the internal logic of their products; therefore, testing should be complemented by a careful review of warranties and/or guarantees.

2. *Develop a strategy for managing the testing of contractor-converted systems* - In many instances, the agency will contract for the conversion of selected systems and their components. The contract conversion must be closely managed to ensure that the contractor follows the agency's Year 2000 conversion standards. In addition, the agency must ensure that the contractor-converted systems are adequately tested.
3. *Implement Year 2000 test facility* - Testing the converted or replaced systems and their components for Year 2000 compliance will likely require an isolated test facility capable of simulating Year 2000 requirements. The test facility should provide sufficient disk storage for large test databases and multiple versions of the application software.
4. *Implement automated test tools and test scripts* - The use of computer-aided software testing tools and test scripts has the potential to significantly reduce the testing and validation burden. Test management tools may help in the preparation and management of test data, in the automation of the comparison of test results, in scheduling and incident tracking, and in managing test documentation.
5. *Perform unit, integration, and system testing* - Using a phased approach, perform unit, integration, and system testing. Use selected testing techniques to ensure that the converted or replaced systems and accompanying components are functionally correct and Year 2000 compliant. The testing should include regression, performance, stress, and forward and backward time testing.
6. Define, collect, and use test metrics to manage the testing and validation process
7. *Initiate acceptance testing* - Acceptance testing is the final stage of the multiphase testing and validation process. During this phase, the entire information system--including data interfaces--is tested with operational data. In general, acceptance testing should be done on the Year 2000 test facility with duplicate databases to avoid risk to the production systems and the potential contamination of data.

9.5 Implementation Phase

Implementation of Year 2000 compliant systems and their components requires extensive integration and acceptance testing to ensure that all converted or replaced system components perform adequately in a heterogeneous operating environment. Because of the scope and complexity of the Year 2000 conversion changes, integration, acceptance, and implementation will likely be a lengthy and costly process. Once converted or replaced and subsequently tested, Year 2000 compliant applications and system components must be implemented. Since not all system components will be converted or replaced simultaneously, agencies may be expected to operate in a heterogeneous computing environment comprised of a mix of Year 2000 compliant and non-compliant applications and system components. The reintegration of the Year 2000 compliant applications and components into the agency's production environment must be carefully coordinated to account for system interdependencies. Parallel processing--where the old and the converted systems are run concurrently--may be needed to reduce risk.

Key Processes:

1. *Define transition environment and procedures* - The transition from the current environment to Year 2000 compliant systems will be difficult and complex. First, some key components of the agency systems--Year 2000 compliant databases, operating systems, utilities, and other COTS products--may not be available until late 1998 or early 1999. Second, external data suppliers may not plan to complete their conversion and testing until 1999. Third, the testing, validation, and correction processes may take much of 1999. Fourth, replacement systems may not be ready for testing until late 1999. As a result, agencies may be forced to operate--at least for a time-- parallel systems and databases.
2. *Develop implementation schedule* - The Year 2000 implementation schedule must not only deal with uncertainties common to all large system development efforts, but also should indicate all major milestones and the critical path for the completion of the Year 2000 program.
3. *Resolve data exchange issues and interagency concerns, including ensuring that*

- all outside data exchange entities are notified
- data bridges and filters are ready to handle non-conforming data
- contingency plans and procedures are in place if data are not received from an external source
- contingency plans and procedures are in place if invalid data are received from an external source
- the validation process is in place for incoming external data

All data issues and interagency concerns should be resolved prior to acceptance testing and implementation. Bridges and filters should be in place to handle non-conforming data received from external sources, and contingency plans and procedures should be in place to handle no data or bad data situations.

4. *Deal with database and archive conversion* - Because the conversion of large databases from 2-digit to 4-digit year fields is a time consuming effort, agencies may consider off-site conversion alternatives.
5. *Complete acceptance testing* - In general, formal testing uncovers about 80-90 percent of software errors, with the remaining 10-20 percent of errors discovered during operations. Acceptance testing should be completed no later than Fall of 1999, to allow sufficient time for the correction of software errors discovered following implementation.
6. *Implement contingency plans as necessary* - Implement contingency plans to ensure support for business functions and processes that may be interrupted by the failure to achieve Year 2000 compliance of a specific mission-critical system.
7. *Update or develop disaster recovery plans* - All Year 2000 compliant systems--including the converted and replaced systems and related databases--should have disaster recovery plans for the restoration of operations and data in case of extended outage, sabotage, or natural disaster.
8. *Implement converted and replaced systems* - Reintegrate the converted and replaced systems and related databases into the production environment.

10 Appendix C: Year 2000 Program Assessment Checklist

This information incorporates guidance and practices identified by leading organizations in the information technology industry as presented in GAO's Year 2000 Computing Crisis: An Assessment Guide.

Awareness

- Has the agency defined and documented the potential impact of the Year 2000 problem?
- Has the agency conducted a Year 2000 awareness campaign?
- Has the agency assessed the adequacy of its program management policies, capabilities, and practices, including configuration management, program and project management, and quality assurance?
- Has the agency developed and documented a Year 2000 strategy?
- Does executive management support the Year 2000 strategy?
 - The agency has
 - Year 2000 policy directive
 - Year 2000 program charter
- Has the agency established an executive management council or committee to guide the Year 2000 program?
- Has a program manager been appointed and a Year 2000 program office been established and staffed?
- Has the agency identified technical and management points of contacts in core business areas?

Assessment

- Has the agency defined Year 2000 compliance?
- Has the agency identified core business areas and processes?
- Has the agency assessed the severity of potential impact of Year 2000-induced failures for core business areas and processes?
- Has the agency conducted a comprehensive enterprise-wide inventory of its information systems?
 - The agency has
 - system inventory listing components and interfaces for each system
 - comprehensive plan to identify and eliminate obsolete code
- Has the agency developed a comprehensive automated system portfolio?
 - The agency's portfolio identifies
 - links to core business areas or processes
 - platforms, languages, and database management systems
 - operating system software and utilities
 - telecommunications
 - internal and external interfaces
 - owners
 - the availability and adequacy of source code and associated documentation
- Has the agency analyzed its system portfolio and identified for each system
 - non-repairable items (lack of source code or documentation)
 - conversion or replacement resources required for each platform, application, database management system, archive, utility, or interface
- Has the agency prioritized its system conversion and replacement program?
 - The agency's prioritization process includes
 - ranking by business impact
 - ranking by anticipated failure date
 - identification of applications, databases, archives, and interfaces that cannot be converted because of resource and time constraints
- Has the agency established Year 2000 project teams for business areas and major systems?
- Has the agency developed a Year 2000 program plan?
 - The agency's program plan includes
 - schedules for all tasks and phases
 - master conversion and replacement schedule
 - assessment and selection of outsourcing options
 - assignment of conversion or replacement projects to project teams

- risk assessment
 - contingency plans for all systems
- Has the agency identified and mobilized required resources and capabilities?
- Has the agency developed validation strategies and testing plans for all converted or replaced systems and their components?
- Has the agency analyzed and identified requirements for a Year 2000 test facility?
- Has the agency identified and acquired Year 2000 tools?
- Has the agency considered implementation-scheduling issues?
 - The agency's program plan addresses
 - where conversion will take place (data center or off-site location)
 - time needed to place converted systems into production
 - conversion of backup or archived data
- Has the agency addressed interface and data exchange issues?
 - The agency has
 - analyzed dependencies on data provided by other organizations
 - contacted all entities with whom it exchanges data
 - identified the need for data bridges or filters
 - made contingency plans if no data are received from external sources
 - made plans to determine that incoming data are valid
 - developed contingency plans to handle invalid data
- Has the agency initiated the development of contingency plans for critical systems?
- Does the impact assessment document identify Year 2000 vulnerable systems and processes outside the traditional information resource management area that may affect the agency's operations?
 - The assessment document addresses the impact of potential Year 2000 induced failure of
 - telecommunication systems, including telephone and data networks switching
 - equipment
 - building infrastructure

Renovation

- Is the agency meeting its budget and schedule in the conversion of targeted applications, platforms, databases, archives, or interfaces?
- Is the agency meeting its budget and schedule in developing bridges and filters to handle non-conforming data?
- Is the agency meeting its budget and schedule in the replacement of targeted applications and system components?
- Is the agency documenting all code and system modifications and using configuration management to control changes?
- Is the agency scheduling unit, integration, and system tests?
- Is the agency meeting its budget and schedule in eliminating targeted applications and system components?
- Is the agency communicating the changes to its information systems to all internal and external users?
- Is the agency tracking the conversion and replacement process and collecting and using project metrics to manage the conversion and replacement process?
- Is the agency sharing information among Year 2000 projects?
 - The agency is disseminating
 - "lessons learned"
 - best practices

Validation

- Has the agency developed and documented test and validation plans for each converted or replaced application or system component?
- Has the agency developed and documented a strategy for testing contractor-converted or replaced applications or system components?
- Has the agency implemented a Year 2000 test facility?
- Has the agency implemented automated test tools and scripts?
- Has the agency performed unit, integration, and system tests on each converted or replaced component
 - The agency's testing procedures include the following types of tests

- regression
 - performance
 - stress
 - forward and backward time
- Is the agency tracking the testing and validation process and collecting and using test metrics to manage the testing activities?
 - Has the agency initiated acceptance tests?

Implementation

- Has the agency defined its transition environment and procedures?
- Has the agency developed and documented a schedule for the implementation of all converted or replaced applications and system components?
- Has the agency resolved data exchange issues and interagency concerns?
- Has the agency dealt with database and archive conversion?
- Has the agency completed acceptance testing?
- Has the agency implemented contingency plans?
- Has the agency updated or developed disaster recovery plans?
- Has the agency reintegrated the converted and replaced systems and related databases into the production environment?

Program and Project Management

- Has the agency established a Year 2000 program management structure?
 - The agency has
 - appointed a Year 2000 program manager and established a Year 2000 program team
 - identified technical and management representatives from each core business area
- Based on the assessment of its program management capabilities, has the agency developed and implemented policies, guidelines, and procedures to manage a major program?
 - The agency's policies, guidelines, and procedures include
 - configuration management
 - quality assurance
 - risk management
 - project scheduling and tracking
 - metrics
 - budgeting
- Is the agency monitoring the Year 2000 program to ensure that projects are following required policies and procedures for configuration management, project scheduling and tracking, and metrics?

11 Appendix D: Selected Year 2000 Resources

11.1 Federal Government Links

Indian Health Year 2000 Project - The purpose of this Indian Health Year 2000 Web Site is to facilitate communication and provide information and tools to assist all organizations serving Indian health interests to become Year 2000 compliant. The IHS Year 2000 Project Office maintains this site. - <http://www2.ihs.gov/y2k/>

The President's Council on Year 2000 Conversion - "The year 2000 problem is one of the great challenges of the Information Age in which we live. My Administration is committed to working with the Congress and the private sector to ensure that we minimize Year 2000-related disruptions in the lives of the American people." - President Clinton, 3/20/1998. - <http://www.y2k.gov>

Senate Special Committee of the Year 2000 Technology Problem - The purpose of the special committee is (1) to study the impact of the year 2000 technology problem on the Executive and Judicial Branches of the Federal Government, State governments, and private sector operations in the United States and abroad; (2) to make such findings of fact as are warranted and appropriate; and (3) to make such recommendations, including recommendations for new legislation and amendments to existing laws and any administrative or other actions, as the special committee may determine to be necessary or desirable. - http://www.senate.gov/committee/y2k_juris.html

Senator Bennett's Y2K Page - Speeches and Statements on the Year 2000 problem. Senator Bennett is the Chairman of the Senate Special Committee on the Year 2000 Technology Problem. <http://www.senate.gov/~bennett/y2k.html>

House Subcommittee on Government Management, Information, and Technology - This Subcommittee of the House Ways and Means Committee has been instrumental in raising awareness of the Year 2000 computer date problem within the Federal government and beyond. - <http://www.house.gov/reform/gmit/y2k/index.htm>

Department of Health and Human Services - This is the Year 2000 site for HHS. <http://www.acf.dhhs.gov/programs/oss/y2k!/y2k.hm>

CDC Y2K Project - This is the Year 2000 Project site for the Centers for Disease Control and Prevention. - <http://www.cdc.gov/y2k/y2khome.htm>

Veterans Benefits Administration Year 2000 Project - This is the Year 2000 Project site for the Veterans Benefits Administration. - <http://www.vba.va.gov/projects/y2k/y2k.htm>

Health Care Financing Administration Millennium Project - This is the home page for HCFA's Year 2000 project. - <http://www.hcfa.gov/y2k/default.htm>

FDA's Center for Devices and Radiological Health Year 2000 Site - This FDA site is focused on medical devices and the Y2K issue. - <http://www.fda.gov/cdrh/yr2000/year2000.html>

NIST Year 2000 Site - This is the home page for the National Institute of Standards and Technology's Year 2000 web site. - <http://www.nist.gov/y2k/>

GSA Public Building Service Year 2000 Vendor Product Database - A database of Facility Systems compliance data. Information is direct from vendor and is NOT guaranteed by GSA. http://globe.lmi.org/lmi_pbs/y2kproducts/

GSA IT Policy OnRamp from the Office of Information Technology - Central GSA repository for Y2K facilities information. - <http://www.itpolicy.gsa.gov/>

Year 2000 Information Directory - The federal government has joined the fray with its Year 2000 Information Directory sponsored by the General Services Administration and the Chief Information Council Subcommittee on Year 2000. - <http://www.itpolicy.gsa.gov/mks/yr2000/y201toc1.htm>

Federal Year 2000 Commercial Off-the-Shelf (COTS) Product Database - A centralized repository of information to all Federal Agencies which will speed the research and investigation of products being done by each agency. - <http://y2k.policyworks.gov/>

Year 2000 Computing Crisis: GAO Reports and Other GAO Publications - Many links to helpful GAO reports and publications. Note: The GAO makes its documents available in PDF format, which requires Adobe Acrobat Reader. - <http://www.gao.gov/y2kr.htm>

Year 2000 Telecommunications Issues - Sponsored by the Chief Information Officers (CIO) Committee on Year 2000. The General Services Administration (GSA) Office of Government wide Policy maintains this site. - <http://www.itpolicy.gsa.gov/mks/yr2000/tele.htm>

Recommended Year 2000 Contract Language - Note: Compliance with the August 22, 1997 Final FAR Rule on Year 2000 Compliance can be achieved by following this memo, developed for the CIO Council Sub-Committee on the Year 2000. - <http://www.itpolicy.gsa.gov/mks/yr2000/contlang.htm>

Y2K Federal Acquisition Guidance - Memorandum for Agency Chief Information Officers, and senior procurement executives. - <http://www.itpolicy.gsa.gov/mks/ombmemo.htm>

11.2 Industry Links

Vendor 2000 - Electronic Data Systems has launched a Web site providing free access to businesses, government agencies, and individuals seeking information on Year 2000 product compliance. The site, Vendor 2000, currently includes information on more than 129,000 products from more than 3400 vendors and is growing daily. <http://www.vendor2000.com/>

NSSN - Billing itself as the National Resource for Global Standards, NSSN BASIC is a free online information service providing access to bibliographic information for more than 225,000 approved standards. - <http://www.nssn.org/>

Ed Yourdan's Site - This link takes you to Ed Yourdan's home page, which has many Year 2000 links. Be sure to follow the link to his Y2K links and resources. Lots of good material here. - <http://www.yourdon.com/index.htm>

IT2000 - This is the National Bulletin Board for the Year 2000, which serves as a clearinghouse of information on the Year 2000 and a global forum on how the Information Technology industry worldwide is gearing up for the Millennium challenge. - <http://www.it2000.com/>

Year 2000 Research Center - Will you be ready when the clock strikes? This Research Center provides links to relevant Web sites, articles and white papers, and an online discussion area. Aimed at CIOs, but helpful to all who are responsible for Y2K compliance. - <http://www.cio.com/forums/y2k/index.html>

Dr. Ed Yardeni's Economics Network Center for Cybereconomics - Besides articles and a list of Y2K resources, there is a Questionnaire To Assess Year 2000 Compliance, that is not only useful to monitor your organization's progress but also affiliated organizations and institutions. <http://www.yardeni.com/cyber.html>

The Year 2000 Journal - The magazine dedicated to the discussion of the Y2K century date problem, covering specific aspects of the millennium date conversion. - <http://www.y2kjournal.com>

The Millennium Problem in Embedded Systems - The information on this Web site by the United Kingdom's Institution of Electrical Engineers is intended to provide information and guidance on the Year 2000 problem (and

other date problems) as it affects embedded systems.

<http://www.iee.org.uk/2000risk>

Microsoft Year 2000 Resource Center - This is the place to find out about the Y2K compliance status of Microsoft's software: Windows, Office, development products, etc.

<http://www.microsoft.com/year2000>

Lotus and the Year 2000: A Perspective - In response to daily requests from existing and potential customers, Lotus has compiled this overview of the issues that the impending arrival of the new millennium presents, and the compliance status of various Lotus software products.

<http://www.lotus.com/world/uk.nsf/8eedc7b0ca2d78278525630f004e7aba/00002126>

Rx2000 Solutions Institute - The Rx2000 Solutions Institute site, one of the few specifically devoted to health care, includes a list server so that interested parties can receive email updates.

<http://www.rx2000.org/>

Legal & Management Information on Y2K - Sponsored by the law firm Williams, Mullen, Christian & Dobbins, this site includes legal and management information on Y2K. - <http://www.y2k.com>

Metro Detroit Healthcare Y2K User Group - The Metro Detroit Healthcare Y2K User Group site is loaded with links to articles and other organizations. - <http://www.mmue.com/year2000/index.html>

Society for Information Management Year 2000 Working Group - The Society for Information Management Year 2000 Working Group has online discussions about Y2K infrastructure problems, including embedded systems and medical equipment. - <http://www.simnet.org>

Year 2000 Information Center - This Year 2000 Information Center run by Peter de Jager is a vast clearinghouse for all sorts of Y2K information including articles, events and news.

<http://www.year2000.com>

The Law, Politics, and Business of Year 2000 - ComLinks examines "the technological and human issues that will shape the next millennium," including Y2K. - <http://www.comlinks.com>

Information Technology Association of America - The Information Technology Association of America contains analytical papers and information on ITAA's Year 2000 Certification Program.

<http://www.ita.org/>

Gartner Group - This site, run by the Gartner Group, offers "research and analyses of significant IT industry developments and trends," including Y2K. - <http://www.gartner.com/>

RPMS FAQ - The Year 2000 Project Office has created a page of Y2K information as it relates particularly to the RPMS platform. This page will be updated, as new information becomes available.

<http://www2.ihs.gov/y2k/RPMSY2Kfaqs.htm>