



OFFICE OF THE STATE AUDITOR

TWO COMMODORE PLAZA
206 EAST NINTH STREET, SUITE 1900
AUSTIN, TEXAS 78701

LAWRENCE F. ALWIN, CPA
State Auditor

August 10, 1998

RE: A Review of Oversight for the
State's Embedded Systems Year
2000 Repair Efforts

Members of the Legislative Audit Committee:

Less than 17 months remain until the Year 2000, and many state entities have not made adequate progress in ensuring their embedded systems will work when the Year 2000 arrives. Embedded systems are equipment with internal microchip devices such as security systems, prison control units, and certain medical equipment. Disruptions in critical state services, such as public health and safety, could occur if these systems fail.

We noted the following concerns from our work:

- Many entities lack contingency plans in case their embedded systems fail.
- Several entities reported a lack of funds as a barrier to embedded systems repair efforts.
- No entity is responsible for coordinating and reporting on statewide embedded systems repair efforts.

We recommend that the following occur:

- The Department of Information Resources Year 2000 Project Office include embedded systems in current Year 2000 contingency plan requirements.
- The Legislature (1) consider if Article IX, Section 188 funding could include embedded systems repair efforts or (2) determine the availability of other emergency funding.
- The Legislature consider broadening the Project Office's responsibilities to include gathering periodic embedded systems repair status reports from the agencies and universities.

Legislative Audit Committee
August 10, 1998
Page 2

We would like to thank the management and employees of the state agencies and universities who responded to our survey. We would also like to thank the Department of Information Resources for its cooperation and input. We have attached a more detailed discussion of these concerns. Please contact Mary Goehring, Audit Manager, at 479-4700 if you have any questions.

Sincerely,

Lawrence F. Alwin, CPA
State Auditor

cbg

attachment

What is the Year 2000 Problem?

Examples of Embedded Systems

- Security systems
- Fire alarms and sprinkler systems
- Ventilation systems
- Card key systems
- Prison control units
- Elevator Controllers
- Respirators and defibrillators
- Fax machines

A 1960s software practice was to store year values as two digits. In the year 2000, the two digits will reflect 00, which the systems may see as 1900 or 2000. The result may be a shut down or calculation error by the system. This practice also affects embedded systems. Embedded systems are equipment with internal microchip devices. These devices control or monitor the operation of the equipment. The Year 2000 may affect any device that has a clock function or acts intelligently.

Summary of Issues

Will state entities with embedded systems be ready for the Year 2000?

Many state entities have not finished inventories of their embedded systems and have not developed plans to address Year 2000 embedded system problems.

- **Eighty percent of the entities affected by embedded systems did not have contingency plans for those systems.** One entity that owns its own building did not respond to our survey. In addition, nine entities that own building facilities said that the Year 2000 embedded systems problem did not affect them.

Addressing Embedded Systems for the Year 2000

- Identify the organization's mission-critical operations
- Identify all embedded systems, especially those that are date-dependent.
- Test date-dependent systems or obtain vendor assurances.
- Plan the repair of embedded systems that fail the testing.
- Develop a plan for those systems that cannot be repaired.
- Plan for unexpected failures even if the systems pass the tests.

Many entities have not finished their embedded systems inventories. It is likely that they will not complete their embedded systems repairs before the Year 2000. Therefore, the contingency plans are critical. The development of these plans would show that state entities have taken necessary steps to protect the interests of the public. This is especially important for public health and safety entities. Industry standards suggest that entities complete their Year 2000 contingency plans by December 1998.

All state entities should develop Year 2000 embedded system contingency plans. The Year 2000 Project Office (Project Office) in the Department of Information Resources has a process that requires state entities to develop contingency plans covering Year 2000-affected software. The Project Office should expand the contingency plan requirements to include embedded systems. State entities should then begin work on these plans right away. Very little time remains before the Year 2000. State entities need the remaining time to develop and test their contingency plans and to continue working on other Year 2000 repairs.

- **Thirty-five percent of the survey responses reported the lack of resources as a barrier to embedded systems Year 2000 repair efforts.** State entities may need additional funding to repair their embedded systems. State leaders set aside \$110 million during the last legislative session to address Year 2000 software problems (Article IX, Section 188 of the General Appropriations Act). If the legislative intent of Section 188 was to include embedded systems, the Project Office should receive clarification. Otherwise, other available emergency funds may be required. Funding from the next legislative session will not take effect until September 1999. This may not give the State enough time to address many embedded systems problems. Until inventories are complete, state entities cannot estimate their repair costs.

How are state leaders receiving status updates on embedded systems repair efforts?

Texas does not have formal statewide coordination of the Year 2000 embedded systems repair efforts. The Project Office has the authority to request reports from all state entities on any aspect of the Year 2000 issue. The Project Office could coordinate the State's embedded systems repair efforts. To coordinate these efforts, the

Project Office would need to evaluate current staffing and resources and determine what additional resources are necessary.

Steps to Achieve Year 2000 Success

1. Establish a Year 2000 Steering Committee
2. Establish Year 2000 Program Management
3. Appoint Year 2000 leaders in each business unit
4. Create business awareness
5. Identify all business elements
6. Assess the business impact
7. Estimate the effort required
8. Prioritize actions
9. Obtain resources and funding
10. Create project plans and schedules
11. Execute the projects
12. Test and certify
13. Build Year 2000 contingency plans
14. Audit to verify Year 2000 readiness
15. Practice ongoing, sound management

(Source: Information Systems Audit and Control Association)

State entities are independently addressing their embedded systems problems. A coordination effort would provide a communication channel for entities with common problems. This would reduce duplicate efforts, which are very costly for the State. This function could also provide state leadership with status updates of the Year 2000 embedded systems repair efforts. This would be similar to what the Project Office currently does for software.

The 75th Legislature required state entities to report on any Year 2000 embedded systems problems by November 1998. The Project Office has distributed an embedded systems inventory tool. It will use this tool to gather information for the report to the Legislature. The efforts of the Project Office will not replace each entity's responsibility to resolve their Year 2000 embedded systems issues. Each entity should be performing the "Steps to Achieve Year 2000 Success" to ensure that it is on track.

Objectives and Scope

Our goal for this project was to answer the following questions:

- Will state entities with embedded systems be ready for the Year 2000?
- How are state leaders receiving status updates on embedded systems repair efforts?

We surveyed 178 state agencies and universities. Three entities did not respond to the survey. We limited our work to compiling these responses. This survey only addressed the embedded systems portion of the Year 2000 problem. We did not gather any information related to personal computers or software. We discussed our work with the Project Office and included their comments in this report.

This project was not an audit. Thus, governmental auditing standards did not apply. All data was self-reported by the agencies and universities.



DEPARTMENT OF INFORMATION RESOURCES

Carolyn Purcell, Executive Director (carolyn.purcell@dir.state.tx.us)
P.O. Box 13564 ♦ Austin, TX 78711-3564 ♦ <http://www.dir.state.tx.us>
Tel: (512) 475-4700 ♦ Fax: (512) 475-4759

BOARD OF DIRECTORS



HARRY RICHARDSON,
CHAIR

STANFORD KENNETH
ARMSTRONG

WALTER "BOB"
BRADLEY III

JAMES BRIDGES

CHARLES
GILNSOHN

ROBERT BARBERICH

REPRESENTATIVE
SCOTT DORTCHER

REPRESENTATIVE
ROBERT JONELL

JENNIFER
STAMPF FJ11

August 7, 1998

Larry Alwin
State Auditor
State Auditor's Office
206 E. 9th St., 19.100
Austin, TX 78711-2067

Dear Mr. Alwin:

The Project Office concurs with the State Auditor's Office on the criticality of embedded systems in Texas government, especially systems integral to the provision of public health and public safety to the citizens of Texas. We share your concern that so little seems to have been done.

Current Project Office staffing limits our ability to coordinate embedded system repair efforts. We have no one with embedded systems experience or expertise on staff. Without engineering expertise, we can't vouch for the integrity of information the agencies/universities provide related to repair efforts. We could contract for the expertise, however, the cost could be substantial to do any comprehensive audits of repair efforts. The current budget for the Project Office will not accommodate such expenditure. Agencies and universities can independently contract for these services.

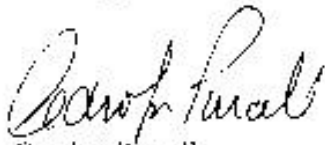
We will include embedded systems as part of business contingency planning. This will be done through a supplemental letter to agency and university CEO's requiring such plans. As you have indicated in your report, the Project Office has already distributed an embedded systems inventory tool that will be used to gather information for the November 1998 facilities report required by Article IX, Section 131.

It is important to note that lead-time will be required to fix or replace embedded systems that will cause problems in the new millennium. It is unreasonable to expect that all such repairs can be made subsequent to the beginning of the next biennium (September 1, 1999). We concur with your recommendation to fund embedded systems repairs. It may be prudent to consider emergency appropriations in order to begin the embedded systems remediation as early as possible. Universities have the lion's share of physical plant in Texas government and can be expected to have the greatest need for help to fix their embedded infrastructure.

Larry Alwin
August 7, 1998
Page 2

As you declare in your report, each state agency and university has the obligation to effectively address Year 2000 problems in the embedded systems in their enterprise. We would be happy to discuss other opportunities to address embedded systems.

Sincerely,



Carolyn Purcell
Executive Director

CP:ym

cc: Shannon Porterfield, Director, Year 2000 Project Office