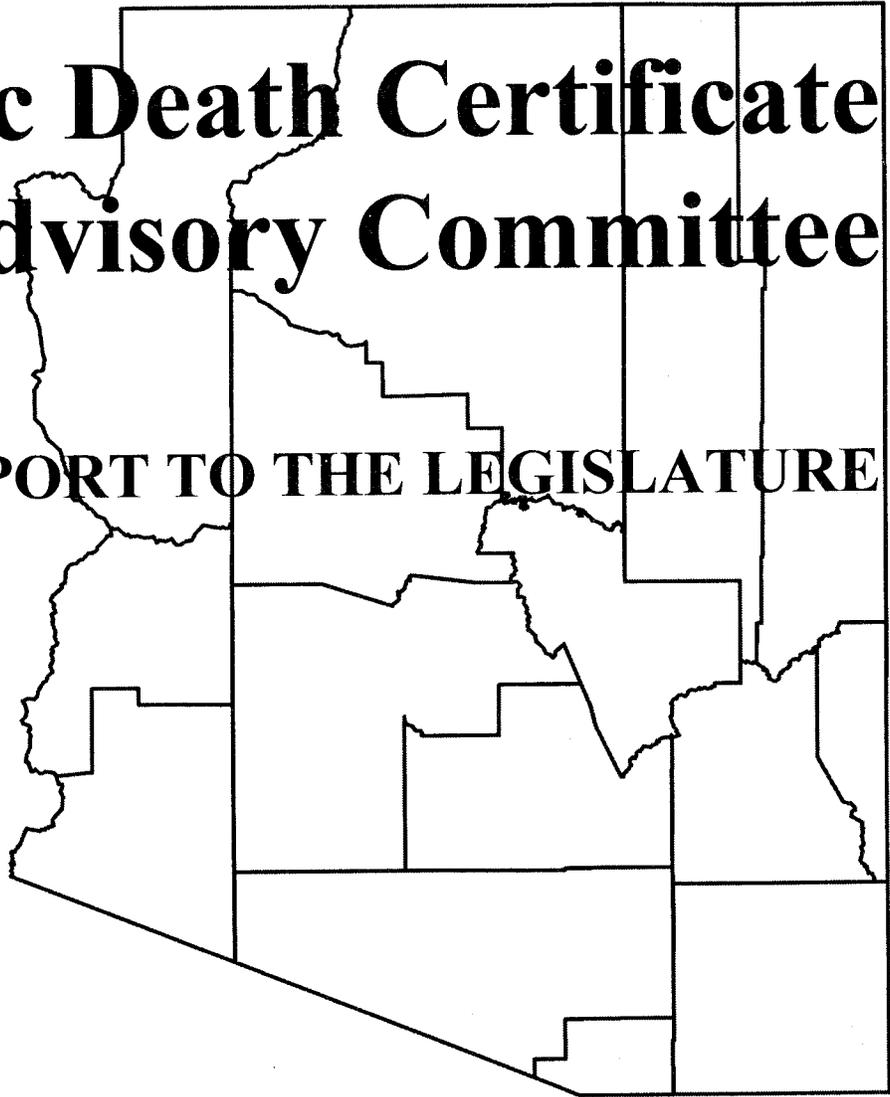



Electronic Death Certificate Advisory Committee

REPORT TO THE LEGISLATURE



Arizona
Department of
Health Services

JULY 1997

~ Leadership for a Healthy Arizona ~



Fife Symington, Governor
State of Arizona

James B. Griffith, Acting Director
Arizona Department of Health Services

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FIFE SYMINGTON, GOVERNOR
JAMES B. GRIFFITH, ACTING DIRECTOR

July 22, 1997

Lisa Block
House Research Staff
1700 W. Washington
Phoenix, AZ 85007

Dear Ms. Block:

Attached please find the *Electronic Death Certificate Advisory Committee Report to the Legislature* prepared by the Arizona Department of Health Services. In 1995, House Bill 2010 directed the establishment of an advisory committee on electronic death certificates consisting of representatives from public and private stakeholder organizations to assist the Department of Health Services develop and implement an electronic death certificate system. This report includes the findings and recommendations of that advisory committee.

As the reports indicates, an electronic death registration system is a user-friendly tool designed to simplify the process of registering deaths and improving customer service. However, the implementation of an electronic death certificate system is a complex undertaking requiring a well conceptualized, well organized, and well developed partnership among the numerous stakeholders. Without such a partnership, an electronic death certificate system could become a costly alternative to a manual system but lacking the benefits anticipated by its stakeholders.

The ultimate success of an electronic death certificate system in Arizona will be measured by the accuracy of the information, the improvements in productivity gained by the stakeholders, the improvements in customer service, and the State's ability to utilize the data for more effective program development and evaluation. By implementing the plan contained in this report, Arizona could become the model for other states desiring an electronic death registration process.

I hope this report provides direction with regard to the implementation of a unique system. If you have any questions regarding the report, please contact Ms. Marti Lavis, Chief, Legislative Services, Arizona Department of Health Services at 542-1032, or Merle Lustig, Chief, Office of Health Planning, Evaluation and Statistics, Arizona Department of Health Services at 542-1216.

Sincerely,

A handwritten signature in cursive script that reads "James B. Griffith".

James B. Griffith
Acting Director

ML:kp

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Introduction

Death care in Arizona, as in many states, has reached a critical crossroad. Arizona continues to break its own record in recorded deaths each year and, with births on the rise and the beginning of the baby boom generation reaching retirement age, this trend is projected to continue. In 1996 Arizona recorded over 36,500 deaths or more than 10 deaths per day. Moreover, Arizona citizens requested and received 220,000 certified death certificates in 1996. As a result, the manual vital records death registration system has become fraught with system and procedural inefficiencies, delays in the processing of information and data integrity issues.

To address these issues, the legislature enacted HB 2010 that established an Advisory Committee on Electronic Death Certificates to assist the Director of the Department of Health Services develop and implement an electronic death certificate system. The Director of the Arizona Department of Health Services (ADHS) has appointed an Electronic Death Certificate (EDC) Advisory Committee consisting of representation from various public and private health care organizations. The representatives on the EDC Advisory Committee come from the ADHS, Arizona Funeral Directors Association, Arizona Medical Association, Arizona Osteopathic Medical Association, medical examiners, hospitals, and county governments. A list of the EDC Advisory Committee members is included as Appendix A of this document.

The problems with the existing manual death registration process have been discussed in a previous report developed by the Arizona Funeral Directors Association that studied the re-engineering of death registration. This report is included as Appendix B of this document to provide background information and a more thorough understanding of the problems associated with the existing process. The mission of the Arizona Funeral Directors Association Committee was similar to the EDC Advisory Committee in that it focused on re-engineering the death registration process. While the Arizona Funeral Directors Association Committee justified the viability of automation, the EDC Advisory Committee focused on building a consensus among the stakeholders and identifying the steps necessary for implementation of an electronic death registration process.

The intent of this report is to clarify the issues surrounding the implementation of an EDC system, develop conclusions based on the Committee's research, and make recommendations upon which the individual organizations represented on the Committee can act.

The EDC Advisory Committee has studied the process of registering deaths in Arizona and understands the impact this process has on the parties involved. It has engaged a consultant, received information from specialized software vendors, and used other states' experiences to help formulate an approach to automate the death registration process. The results of these efforts are summarized in this legislative report. The problems with the existing process are clear, the challenges of automating such a process are understood, the solutions are identified, and the benefits of change are significant. It is this Committee's hope to receive the necessary fiscal and statutory support from the legislature to move forward with this project.

Background/Overview

Under the existing manual death certificate registration process, the funeral director maintains responsibility for the certificate until all the data elements are gathered by the family, physician, and county. In other words they act as a "hub" or central registry for the certificate. The family provides basic demographic and personal information on the deceased. The attending physician or medical examiner provides the cause-of-death and other required medical information. The county issues the burial permit to the funeral director or the family depending on who has assumed responsibility for the burial process of the deceased and conducts public health surveillance. The State of Arizona is responsible for maintaining the central registry through which all certified copies of death certificates are issued, preparing statistical reports on the health status of Arizona citizens, and creating public health programs to address issues raised by the data.

Since the funeral directors serve as the hub for information and are unable to bury the deceased until the death certificate is completed and the burial permit is in hand, a significant amount of driving, faxing and phone calling needs to take place for each occurrence. This can cause the obvious problems of delays in the burial process, poor customer service, data integrity and redundancy issues for the State, increased operating expenses for the funeral directors, security exposures for the families of the deceased, and several other issues that typically accommodate a manual registration process. Each of these areas will be addressed and greatly improved upon by the institution of an Electronic Death Certificate system.

Automation of death registration appears to be fairly straightforward. It could be assumed that by replacing the manual forms and mail/fax systems currently in use with a central "server" that stores all the data in a single database, by utilizing one of the several software packages that are available from specialized software vendors, and by selecting one of the many communications options and/or the Internet, the death certificate could be routed through the information superhighway until all the data elements for proper death registration have been completed.

So why then are no states able to lay claim to a successful EDC system? Several issues exist within the death certificate process that make it unique. These issues can be categorized into two groups, procedural issues and technological issues. The following sections detail each issue and describe how the EDC Advisory Committee recommends each be addressed to arrive at a functional solution. As will be illustrated in this report, some issues that exist will not be solved by automation alone. A complete solution will require difficult process changes (possibly legislatively mandated changes) in addition to technology to ensure that maximum benefits are achieved.

Procedural Issues

Embarking upon a project such as EDC involves the cooperation of all the organizations influenced by such a project. This in-and-of-itself represents the core of the procedural issues facing the EDC project. Unlike most systems where the data elements are all entered into a central server, EDC requires data elements to be collected from many sites. Funeral home directors, physicians, medical examiners, hospitals, nursing homes, the State of Arizona, and each county are involved when someone dies. The diversity of the stakeholders creates issues within the data collection process that need to be addressed in order to make an EDC functional.

- **Physician Participation and Education**

The paradox between the death registration process and the collection of the data elements is the thorniest of the challenges facing an integrated, automated EDC. The Arizona Revised Statute (A.R.S. 36-327) states that "The funeral director... who first assumes custody of a dead body or dead human remains is responsible for executing and filing the death certificate." Furthermore the statute states that the medical certification on the death certificate shall be completed and signed within 72 hours by the physician in charge of the patient's care for the illness or condition resulting in death. Adherence to this statute is necessary for an EDC system to work efficiently whether the registration of the patient's death occurs manually or electronically.

Yet the funeral directors are often challenged by the effort to acquire cause-of-death and physician signatures within 72 hours. They are concerned that they often spend many hours in pursuit of the attending physician to acquire this information to complete the certificate and bury the deceased.

To the physicians the existing process is time-consuming and cumbersome. In addition, the process requires a knowledge of coding and other related factors that are often so unclear as to require several attempts before accurate completion. Physicians frequently avoid the inevitable process of registering their patient's death because engaging in this problem-laden process takes away from their productive time of healing and attending to their patients. Furthermore, they are concerned with the accuracy of the data collected, the inability to do research or access information relating to their deceased patients, and the need to include additional information on the death certificate form. The physicians hold the key to the completion of the death certificate. No one else involved in the process is qualified or legally obliged to identify cause-of-death other than the physicians.

A report published in the March 13, 1996 edition of the Journal of the American Medical Association (JAMA. 1996;275:794-796) entitled "*Accuracy of Death Certificate Completion - The Need for Formalized Physician Training*" references a study that was done to test the theory that cause-of-death education is needed at all levels of the medical community. This study involved analyzing 6 typical death cases and asked each participant (consisting of general internists, internal medicine residents, and senior medical students) to determine the underlying cause-of-death each of which were coded by a professional nosologist. Each case was measured for different degrees of accuracy using certified methods published in the New England Journal of Medicine

(1985;313:1263-1269); *"The autopsy as a measure of accuracy of the death certificate"*. The agreement percentage, when compared to the official cause-of-death for each case, ranged from a low of 14.7% in one case study to a high of 98.5% in another case study. The overall accuracy percentage for the study measured 72.7%. It was concluded that training on death certificate completion needs to be included as an integral part of physician education.

If ADHS is to achieve the objectives of creating public health programs that are meaningful based on vital records data, it is critical that the proper cause-of-death be identified by the attending physician in a timely manner. Without the proper education of the physicians on ICD-9 and National Center for Health Statistics coding requirements for the physicians, it is unlikely that high levels of accuracy will be maintained in a death registration system.

Physician participation is essential, whether having to fill out a form manually or electronically. A move to an electronic system will not, in-and-of-itself, provide incentive nor encourage participation in the death registration process by the physicians. People die in hospitals, nursing homes, their own homes, and many other places. Clearly these dynamics make certifying deaths a challenging issue. Despite this challenge, it is necessary for the physicians to attend to the matter of registering their patients with the State of Arizona after they die both for completion of patient care as well as statutory reasons.

- **Demographic Data Entry Versus Electronic Death Certification**

The issue arises as to the level of participation needed in order to ensure an optimal return on an EDC investment. The taxpayers of Arizona deserve a cohesive system that returns to them the benefits of an automated process. The greater the participation in an EDC system by each stakeholder, the greater the benefits.

Chart 1 (Appendix C) describes a process where funeral directors use an EDC system but physicians do not. This scenario is a typical implementation of a so-called EDC system in other states. When funeral directors enter the demographics of a deceased person into a computer and transmit that information to the State electronically, some benefits are realized. These benefits include improved efficiency and accuracy of the demographic information. Under this scenario however, the funeral directors must still pursue the key medical information related to the cause-of-death manually from the doctors. The primary issue of timely medical information continues to exist as with a completely manual system. Consequently, Chart 1 is a demographic data entry system that is fairly easy to implement, has a relatively low cost, requires no statutory changes, and offers little benefit to the stakeholders and the general public. An automated means of transmitting the demographics of the general public from the medical community to the State of Arizona already exist in other public health networks. The demographics are not the key piece of information in an EDC system. The medical information tied to the patient is the critical element necessary to complete the certificate.

Chart 2 (Appendix C) describes an EDC system in which all stakeholders participate in the EDC process. This arrangement depicts the full impact and benefits that can be realized through the

electronic transmission of accurate medical data associated with the deceased. Full participation, however, does not mean that each physician must buy a computer system specified by the State of Arizona. Full participation simply means the enforcement of the existing State statute requiring registration of death within 72 hours of occurrence. It is the EDC Advisory Committee's belief that the EDC system would be utilized by physicians without any additional legislation if a system was in place that made it simpler to enter cause-of-death and authorize the certificates. Re-designing the process and eliminating its inefficiencies might create enough incentive and offer the benefits necessary to encourage the physicians to participate in an automated alternative. Although the flow of information looks similar to Chart 1, Chart 2 describes a comprehensive medical information network that demands participation from each stakeholder. With this participation, not only are the problems associated with the current process eliminated, but each stakeholder receives substantial benefits. The funeral directors benefit from a more cost-effective process. The medical community and the State of Arizona have the tremendous benefit of accurate and timely medical information. The general public benefits from a streamlined process that shortens the administrative burden currently accompanying the death of a loved one. To implement a full EDC system requires significant research and investment. The characteristics of this solution involve carefully designed networks (some of which may already be in place), possible statutory changes, and education of the stakeholders to ensure each of their roles are understood and accurately fulfilled.

Automated systems are only as good as their weakest link. If a physician or funeral director continue to register deaths the "old way" by manually completing cause-of-death, the fact that one or the other has an automated means of entering the information into a computer system offers little benefit to anyone including the general public. The benefits physicians are looking for including improved efficiencies, better information in a central registry to develop meaningful public health programs, and an improved research database that is easy to access and that contains up-to-date information are not accomplished under this scenario.

The key to full participation is the benefit realized by the stakeholders, enforcing the statutes currently in place and making proper death registration an integral component of physician training. The importance of the cause-of-death data is summarized in the JAMA article referenced earlier in this report.

- **Responsibility for the Entry and Accuracy of the EDC Data**

Under the existing manual process, the County Registrars are the first to receive the completed death certificate forms. These manually processed forms are subjected to several edits and checks by the counties. Initial edit checks have identified an error rate of thirty-three to forty-eight percent (33%-48%) in some counties. Once the data elements of the death certificate have been gathered, edited and checked, and the burial permit issued, the completed form is mailed to the ADHS' Office of Vital Records. The information is then entered into the ADHS' main computer system where the central registry is maintained by the State of Arizona. Facilitating the collection of all the needed data elements is the responsibility of the funeral directors. They currently collect all data elements within and outside their control. In an automated system, each stakeholder would

take ownership of their data elements to ensure timeliness and accuracy. In an EDC environment, the hardware and software are simply mechanisms to assist the participants in adhering to the time and accuracy requirements of the death registration process.

Using this approach, it is no longer necessary to route the death certificate to a County Registrar prior to certification. However, it is critical to the counties to continue to be able to issue and charge for death certificates to its county residents. All required information can be collected from the family, funeral director, and attending physician. By providing an EDC system in which the central server is located at ADHS, funeral directors and physicians can enter necessary information from a series of easy-to-use screens and menus. As the funeral directors will attest, coordinating the necessary data to complete death registration presents a challenge. However, by centralizing this function at the Office of Vital Records, using technology, and enforcing existing state statutes, the procedural change of empowering each stakeholder with the responsibility of entering their respective data elements should reap substantial benefits.

- **Funding Sources**

There are several phases of this project that involve network design and procurement of computer hardware/software applications. Funding alternatives to support these phases were discussed by the Committee. The benefits of an EDC system are primarily directed at the general public in the form of improved customer service. However, significant benefits also exist for funeral directors, the State of Arizona, physicians and the federal government. Funeral directors will be able to lower their operating expenses. The State of Arizona should have better quality information to report to the federal government agencies requiring this data. Physicians will have access to a network filled with valuable information for research and analysis, and will save resources through the use of a more efficient system. The federal government will be able to access death information sooner facilitating better public service and optimizing the ever-depleting Social Security fund.

The value realized from an EDC helps determine the funding alternatives for this project. Discussions with other states suggest several ways automation projects pertaining to vital statistics are funded. Following are examples of four possible funding sources for this project and a case study from Iowa.

- Apply a surcharge to each certified copy of a death certificate. Currently there is a \$1.00 surcharge applied to each certified copy to fund the Child Fatality Review Board. A similar surcharge could be applied to fund EDC that could begin immediately in order to generate revenue to offset initial capital expenditures for hardware and software.
- Arizona Legislative appropriation for the necessary capital expenditures and operating expense to ADHS for the server component of an EDC system.
- Apply for federal grants (specifically, Social Security).
- Obtain financial assistance from the private sector (i.e. funeral directors, hospitals, nursing homes, etc.) for personal computers.

More than likely, a combination of some or all of these options will be needed to properly fund this project. Initial capital expenditures for the main system and ongoing expenses could be handled through a combination of legislative appropriation, a surcharge and federal grants. The private sector has the expense of procuring the necessary equipment and software licenses in order to participate in the new EDC system. The issue of funding needs to be discussed further by all the affected parties. This is the type of project that requires a commitment to change and investment by everyone involved.

Iowa Case Study:

Iowa's Vital Statistics office has been a completely manual operation since inception. Slight progress was made with the advent of microfilm and microfiche as a way to store and retrieve birth and death certificates. Yet the process continued to be cumbersome and prone to errors. Furthermore, each request for certified copies of birth and death certificates required two days to process. The charge for certificates was six dollar (\$6), regardless of the type.

Several years ago, the Iowa legislature approved a four dollar (\$4) surcharge on all certificates raising the total cost to ten dollar (\$10). This surcharge went into an automation fund setup to pay for a fully integrated vital statistics system including births and deaths. The four dollar (\$4) were available to the automation fund for four years. Since this fund was established, Iowa has made tremendous strides in improving customer service, staff efficiencies, and data integrity. Most applications have come online with the exception of death registration which is currently in process.

Iowa's Office of Vital Statistics recently received approval for a two-year extension on their surcharge fund and assumed full ownership of the monies collected. The Office of Vital Statistics in Iowa determined that the four dollar (\$4) surcharge was adequate to completely fund their office including staffing, other operating expenses, and capital expenditures. In exchange for the control of the four dollar (\$4) surcharge, Iowa's Office of Vital Statistics gave up all state appropriations during the two-year extension. This four dollar (\$4) surcharge generates approximately one million dollars annually. It is their hope that the Iowa legislature will continue to allow them to be a fully fee-funded organization.

Technical Issues

Unlike the Electronic Birth Certificate implementation which included the State Office of Vital Records, eighty (80) hospitals, and several county registrars, the number of potential participants involved in implementing the EDC may well exceed several thousand. These stakeholders include physicians and funeral homes statewide, numerous county registrars, medical examiners, hospitals, nursing homes and the State Office of Vital Records. Furthermore, the EDC project is ongoing in that new users of the system will continually be coming online. As new doctors, funeral homes, medical examiners and others establish businesses in Arizona, they will have to use and interface with the EDC system. With the advent of managed care, large medical providers will come and go, affecting a significant number of patients. All these issues need to be understood prior to the implementation of EDC. *EDC is a user friendly tool designed to simplify the process for the private sector, provide a better information foundation for the public sector, and provide improved customer service for the general public.* In order to implement electronic death registration in the State of Arizona, the following technical issues will need to be resolved.

- **Single Purpose Network Versus a Global Network**

When several organizations are connected together to contribute to a single database, it is important to determine the characteristics of the network by which these organizations will disseminate their information. The network design is critical to the overall success of a project such as EDC where data elements are collected from a variety of sources. Two general categories of networks were considered as possible options for the EDC network.

Single purpose network: This type of network is the kind that is typically used to link a collection of users needing to access or contribute to the same database. Under this design, a main computer system (or in today's vernacular -"server") provides the application(s) needed for people within a department or organization. These users can be connected directly to the server if they are in the same building, or, they can be connected remotely to the server with dedicated or dial-up phone lines from another facility. Regardless of the location of the users, the network and its components are established for the sole purpose of utilizing a single set of applications across a finite, static user base. Electronic Birth Certificates and Newborn Screening are two examples of existing single purpose networks in use at ADHS.

Global network: A global network is established to provide a more dynamic and flexible computing environment for its users. Not only does a global network accomplish the same objectives of a single purpose network, it also provides controlled access to other networks such as existing public health networks and the Internet. A main server is still required to store the data and applications. However, instead of running cables and setting up phone lines directly from the users of the system to the server, users are connected using technologies specifically designed for a hybrid computing environment. This is done by connecting the server to the global information superhighway. Users then tap into the applications either through locally established "addresses" or remote service providers. With the understanding that there are complex issues to work out under this scenario

such as security, confidentiality, standardization, and access, global networks provide the users access to more information and, with its large number of potential users, simplifies the implementation of a project such as EDC. Existing public networks such as the Internet or the phone systems can be utilized for the different stakeholders to participate in EDC. Access to these networks already exists in many cases so no new dedicated connections to a server would have to be established for a stakeholder to begin to utilize an EDC system.

Each of these alternatives has connectivity and telecommunications issues that will need to be addressed. Several network topologies exist, each having different implementation considerations. Furthermore, bandwidth and other technology limitations exist on most global networks limiting access and causing performance problems. However, pent-up demand for high speed networks and access to the Internet are driving technology improvements that address these issues.

Determining which network design is best suited for an EDC application in Arizona is critical. These alternatives need to be defined further in a detailed systems plan. The security and access issues are the main concerns associated with a global network. However, it is evident that global computing is here to stay. In order to be positioned for the new millennium, it is important for the medical community to participate and utilize the resources made available through these networks.

- **Arizona Specific Software Requirements**

In surveying other states, software vendors, and consultants about these issues, it became evident that EDC implementation differs from state to state. Of the very few software solutions available, each requires significant modifications to conform to Arizona specific requirements. Software vendors in this marketplace offer data entry screens complete with very robust edits and checks to ensure the integrity of the death registry. However, each field needs to be evaluated by Arizona to determine proper field lengths, whether or not a field needs to be made optional or mandatory, and the addition of fields specific to Arizona such as tribal affiliation for the Native American population. Each of these items is unique to Arizona and would need to be programmed into the new EDC system. The magnitude of these changes will directly impact the cost of the project and are largely dependent on the selected software vendor. Most of these changes are very simple and some are even included in the license fees of the software vendors. However, it is necessary to identify these changes and assign time frames and costs before entering into a contract with a selected software vendor.

- **User-Friendly System That Provides Incentives for Physicians**

In order to optimize the use of an EDC system, it is important to insure that EDC is easier and more convenient to use than filling out today's manual forms. Special features that aid the physician in assigning the proper cause-of-death need to be included in order to provide incentives for the physicians to use the system. These features may include:

- Multiple comment lines, prompts, and lists of possible conditions to assist physicians to enter accurate information that leads to the official cause-of-death;
- A field on the EDC system to record the deceased's health plan number;
- Electronic signatures using a personal identification number (PIN);
- Menu-driven cause-of-death information.

- **Residence of the Information and Integration with Existing State Systems**

The physical location of the EDC application server needs to be determined since the Vital Records Office and the ADHS Information Technology Services (ITS) office are in two separate locations in Phoenix. Currently, the ITS department maintains the vital statistics database. An electronic death registration system will distribute the data entry across multiple stakeholders including the Vital Records Office. There are several network and hardware configurations that will satisfy these requirements. Each of these alternatives needs to be analyzed to assess risks, costs, and efficiencies. The resulting cost/benefit analysis will be used to determine the final network configuration.

ADHS is in the process of re-engineering all of its applications into a client/server environment. With most of the applications having been legacy programs written and developed in outdated technology, initiatives such as EDC were technologically difficult to implement. With the advent of client/server and open computing, technology now facilitates projects that allow multiple organizations to collaborate and share information in a single virtual system such as EDC. The Information Technology Services (ITS) Department within ADHS is currently on schedule to eliminate all legacy programs and move fully into client/server by the end of 1998. Several programs are migrating to client/server including birth certificates and immunization. Appendix D details the "Application Framework" adopted by ADHS to implement new applications such as EDC. It is within this framework that an EDC solution will be expected to fit in order to meet the client/server initiative currently underway at ADHS.

In order to support an EDC system, ADHS must upgrade its client/server infrastructure to handle the additional workload and capacity brought on by EDC. ADHS' role in projects such as EDC is geared towards the "server" side of client/server environment. There are multiple "clients" with EDC (e.g. funeral directors, physicians and medical examiners) but there is only one "server," ADHS. ADHS is the custodian of the data ensuring its integrity, security and accessibility.

The software applications used at Vital Records are closely integrated and extremely interdependent. When one application changes, several interfaced programs are impacted. Defining these interfaces will be critical to the implementation of an EDC system.

The most critical interface to be established is the one between the birth registry and death registry. The interface is known as birth/death matching and is used for many applications. One of these applications is called B.D.S.I. or Birth Death Social-security Interface. This program is invoked each night and records all the deaths registered with ADHS. The output from this program provides a list of those deaths that occurred in Arizona that have a corresponding Arizona birth record. This program then flags each of the birth files and marks them as "deceased". According to ITS, this program is one of the most critical with various elements being reported to the National Center for Health Statistics (NCHS). This program and the interface between the birth and death registry provide the sole protection from birth certificates and social security numbers being issued to a deceased person. Consequently, this interface needs to be included as a part of the EDC project since a change to the death registration process and programs that support it directly impact the interface programs to the birth registry.

- **Time Constraints with Existing Systems**

Existing legacy systems that support the death registry at ADHS are scheduled to be eliminated by January 1, 1999. Consequently, the evaluation of the most appropriate approach needs to be completed. The alternatives include identifying and purchasing a pre-written EDC software solution that meets Arizona's requirements or building a custom application through a combination of contractors and/or existing ITS staff. Even with an off-the-shelf solution, preliminary investigation indicates that a significant amount of modifications to an EDC application will be necessary.

Furthermore, the overall coordination of an EDC project that addresses each of the technical and procedural issues discussed in this report represents a challenge within the time constraints described above.

- **Potential EDC Cost Components**

Following is a list of potential system components and staffing requirements related to an EDC system. These are typical capital and operating elements incurred when implementing a computer-based application. Actual costs and proposed budgets will be determined once the Project Investment Justification is completed.

Potential Components of an EDC Solution

Capital Components

- ADHS server hardware
- Systems and database software licenses
- EDC application software licenses
- EDC Application modifications
- ADHS implementation and training
- Cabling and networking equipment
- Consulting services, as necessary

Operating Components

- ADHS technical staff
- Stakeholder training
- Telecommunication expenses
- Server hardware and system software maintenance
- EDC application software maintenance

Conclusions & Recommendations

The original intent of the EDC Advisory Committee was to develop a detailed design of an electronic death certificate system and to identify the costs associated with its implementation. The overall objective was to take a tedious data entry process and automate it to improve productivity among those participants in the process. As the Committee progressed through the project it became evident that, before the detail work could begin, significant issues associated with death registration that have existed for decades needed to be understood by each of the Committee members. Moreover, by highlighting these issues and attempting to address them, greater benefits could be realized from resolving these issues than were part of the original scope of this Committee. After developing an appreciation for the other concerns, the Committee began to discuss the importance of fully integrating each of the stakeholder organizations into a single death registration network. The consequences of doing this reach well beyond a hardware and software solution. It became evident that system design, cost, and implementation issues would have to be studied further in order to remove the inefficiencies associated with the existing process. The scope of the Committee subsequently changed with the focus moving away from technical products toward procedural issues.

The Electronic Death Certificate Advisory Committee recommends to the Legislature that it continue to pursue the development of an EDC system. Like other state-wide programs ADHS has implemented, EDC requires detailed analysis and significant procedural changes. It is not a system that can be immediately bought, installed, and implemented. Moreover, the most challenging issues to address are not related to technology. Physician education on proper death certificate completion and legislative enforcement policies are examples of the issues that need to be dealt with in order to realize the benefits of an EDC system.

To facilitate the continued pursuit of an EDC system, we recommend that the EDC Advisory Committee be retained through the January, 1998 legislative session. The Committee has strong representation from both the public and private sectors all of whom are committed to making the changes and investment necessary for an EDC system. *In addition, the Committee recommends the establishment of three subcommittees who would address specific aspects of the EDC implementation and make recommendations to the EDC Advisory Committee who, in turn, would make recommendations to the ADHS Director, the Governor, and to the Legislature.* The three subcommittees are as follows:

① **EDC Project Application Subcommittee:** This subcommittee should be chaired by the Information Technology Services (ITS) Department of ADHS and will include representation from all stakeholders. The objective of this subcommittee is to develop a detailed system plan that outlines the necessary technology components of a userfriendly EDC system. This detailed system plan should take approximately three months to develop and include the following components:

- ❑ Cost benefit analysis of networking alternatives;
- ❑ Analysis of hardware and equipment needed for each stakeholder;

- Application software analysis including specific vendor's packages;
- Preliminary cost projections;
- Implementation schedule to complete the project;
- Project Investment Justification.

② **EDC Legislative Subcommittee:** This subcommittee should be chaired by the Legislative Services Office of ADHS. The objectives of this subcommittee are: (1) to study existing statutes and recommend additional policies or legislation that would encourage participation in the EDC process and; (2) to propose recommendations on funding sources. The time table to complete these tasks should be approximately three months and can happen simultaneous to the detailed system plan developed by the EDC Project Application Subcommittee.

③ **EDC Physician Implementation Subcommittee:** This subcommittee should be chaired by the Arizona Medical Association (ARMA). The objective of this subcommittee is to develop a physician implementation plan that will make technological, educational, and process recommendations related to the physicians which can be incorporated in an EDC system. Recommendations should be made to the EDC Advisory Committee within the same three-month window given to the other two subcommittees.

Each subcommittee will report to the EDC Advisory Committee monthly to insure that objectives and time tables are met. The EDC Advisory Committee will present their findings and recommendations during the January 1998 Legislative Session. The findings will include specific capital and operating budget requirements, required legislative changes, and a comprehensive implementation schedule.

It is important to keep the EDC project focused on achieving measurable objectives and benefits. Each subcommittee must stay focused on the aspects of EDC for which they are responsible. For example, the subcommittee responsible for developing a detailed system plan needs to ensure their plan facilitates communication between all stakeholders of the process and to optimize the investments in hardware and software. The subcommittee responsible for legislative changes needs to leverage state statutes to encourage full participation by the stakeholders. And, the subcommittee responsible for physician implementation needs to develop a plan for their medical constituents that facilitates accurate recording of critical medical information. The EDC Advisory Committee is responsible for providing direction to the subcommittees, summarizing their research to the legislature, clarifying funding sources, addressing other issues, and identifying an implementation schedule.

Developing a schedule and tracking progress to this schedule are critical to the project's success. Although a comprehensive implementation schedule can only be developed in a detailed system plan, the EDC Advisory Committee recommends that the following milestones be addressed by the EDC Advisory Committee with input from the subcommittees.

Milestones for EDC Implementation

Key Milestones

Complete and present legislative report
Establish EDC subcommittees
Subcommittees present final plans to EDC Advisory Committee
EDC Advisory Committee recommends plan to the ADHS Director, Governor and Legislature
Budget approved by Legislature and Governor
ADHS issues RFPs for EDC hardware & software
ADHS selects EDC application software vendor
Software vendor and/or ADHS make software changes
Stakeholder implementation

Summary

The ultimate success of an EDC system in Arizona will be measured by the accuracy of the medical research database it creates, the improvements in productivity gained by the participating stakeholders, the improvements in customer service, and the resulting public health programs developed by ADHS.

The procedural changes needed to facilitate an EDC solution pose the biggest challenge. Without a well conceptualized, well organized, and well developed partnership among all of the stakeholders, an EDC could become a costly alternative to a manual system lacking the benefits anticipated by its supporters. By achieving the milestones and implementing the plan contained in this report, Arizona could become the model for other states desiring a new death registration process centered around the implementation on an EDC system.

APPENDIX A:

**ELECTRONIC DEATH CERTIFICATE ADVISORY
COMMITTEE MEMBERS LIST**

ELECTRONIC DEATH CERTIFICATE ADVISORY COMMITTEE

ADVISORY MEMBERS	
Director's Designee Arizona Department of Health Services Director's Office	Marti Lavis
Director's Designee Arizona Department of Health Services Director's Office	Rosalie Lopez
Manager of Vital Records Arizona Department of Health Services	Renee Gaudino
Office Chief, OHPES Arizona Department of Health Services Office of Health Planning, Evaluation & Statistics	Merle Lustig
Urban Medical Examiner Office of the Medical Examiner Maricopa County	Frank Ciaccio
Rural Medical Examiner	Sharon Sanford (<i>Resigned</i> <i>1/22/97</i>)
Urban Hospital Good Samaritan Regional Medical Center Health Information Management Department	Joy Crawford
Rural Hospital Casa Grande Regional Medical Center	Tracy Calvert
Urban Funeral Home Arizona Funeral Director's Association	Bill Proctor
Rural Funeral Home Simes Mortuaries	Gail Simes
Arizona Medical Association (AZMA)	Thomas Ross, M.D. 4/18/97
Osteopathic Physician	Jan Zieren, D.O.
Local Registrar - Urban County Maricopa County Department of Public Health Services	Sarah Santana
Local Registrar - Rural County Yavapai County Health Department	Evelyn Wilson

APPENDIX B:

ARIZONA FUNERAL DIRECTORS ASSOCIATION REPORT

A rizona

A utomated

D eath

R egistration

Re-engineering Death Registration

for the

21st Century

Ms. Marti Lavis

November 8, 1995

Dear Ms. Lavis:

On behalf of the Arizona Funeral Directors Association and the Committee For Re-engineering Death Registratrion in Arizona, I thank you for attending today's meeting.

It has been very heartening to find such broad and enthusiastic support for this project among the many potential users of the proposed system.

The impetus for such projects is usually some immediate problem which affects oneself or ones industry or, as in this case, the customers of that industry. However, as we progressed in our research, we found that the process of gathering and compiling vital statistics has appreciable impact on many more professions and entities than our own.

Finally, we began to appreciate the vast benefits of automated vitals registration to the ultimate users of statistics. Federal, state, and county governments, health care planners, public health agencies, and a host of others whose missions are truly matters of life and death, need better and more timely data on which to base decisions. Automated vital statistics systems can result in more focused allocation of scarce resources to public health imperatives so that those who supply and use the information, as well as those who ultimately must pay the bill for it, will benefit.

Again we thank you for your interest and support for this important project, and for attending today.

Sincerely,



Mary V. Melcher, CPA
Co-chair
AFDA Committee

AN AUTOMATED VITAL STATISTIC SYSTEM FOR ARIZONA

BACKGROUND

The collection and compilation of birth, death, and marriage statistics in the United States is important to all of us, indeed the term *vital statistic* is a very apt one in more than one sense.

Disease detection, tracking, and control; health care planning and funding decisions, and myriad other important functions of both the public and private sectors depend on accurate and timely information about births, deaths, and marriages.

For all the years it has been done, the process of this collection has been an arduous and labor intensive one. As the country has grown in numbers and as needs for data have increased, so has the complexity of the data collected. As a nation and as a state, we can no longer afford lengthy delays between the event and the transmission of data to users---changes occur too fast now for manual systems to suffice.

A NATIONAL PERSPECTIVE

Birth certification is slowly being automated across the country, with both Oregon and Washington online with completely paperless systems and many other states embarking on similar birth certification projects. Development of automated death certification systems is underway in several states as well. New Hampshire has had both an automated birth and death certification program for several years and it has proved to be efficient, fast, cost-effective, and accurate.

The Steering Committee For Re-engineering Death Registration is a coalition of people from all parts of the public and private health care sectors, from government, from private sector businesses, and from federal agencies, such as the Centers For Disease Control and the National Center For Health Statistics. The Committee's objective is a paperless system of death certification in the United States by the year 2,000.

THE ARIZONA CHALLENGE

Rapid population growth, particularly in urban areas of Pima and Maricopa Counties, has slowed the collection, compilation, and transmission of vital statistic information, especially death certification, very seriously.

At the same time, needs of county, state and federal authorities for more and more detailed information has added

to the complexity of the task.

In peak winter months, consumers are waiting 30 to 40 days (total turnaround), just to obtain this needed legal document.

Some duplication exists in the present processing systems, and responsibility and lines of accountability are not clearly fixed for the basic parts of the death certificate. The system has grown inefficient and costly. Finally, the storage of voluminous paper records uses enormous financial and physical resources at the present time---resources which could be applied to other, more vital governmental functions.

We propose that, rather than waiting until the present system totally breaks down, or until a nationally mandated system is imposed upon us, that Arizona move forward to develop and implement a system that fulfills the needs of users and public alike, while producing high quality, timely statistical data.

THE PAPERLESS DEATH CERTIFICATION SYSTEM FOR ARIZONA

The technological challenge for today's equipment and software is elementary. If ever a task was suited to computerization, it is this. The system needed is a very economical, PC based one, using a central server which can be accessed by the three inputting parties to the process---medical (physicians, medical examiner, hospitals) governmental (county and state), and the funeral director.

A series of prompts and edits will ensure that the correct information is entered and will even screen causes of death for acceptability and logic. Information which appears in more than one place, will only have to be entered once.

In the New Hampshire experience, errors were reduced from over 18% to less than 1% and the time to create the master file from six months to six weeks. The state's computer is available for entry of data around the clock, 365 days a year. Burial transit permits are available to the funeral home within minutes rather than hours or days, thus improving service to the public.

FUNDING OF THE SYSTEM

New Hampshire's Bureau of Vital Records secured a federal grant which helped them get started on their project. In addition, a surcharge was levied on the first certified copy which completely paid for all the equipment, software, and training necessary and which in fact has now produced a

sizable surplus. Officials are actually considering **reducing** or eliminating the surcharge.

Ms. Rene Gaudino, Administrator and Registrar of Vital Records for Arizona, has been successful in securing a Social Security Administration grant in the amount of \$ 96,000 for development of the automated birth certification program. Because of the enormous monetary impact on the Social Security System of even small delays in transmission of death data, we are confident that a similar grant could be obtained for automating death registration as well. From a practical and economic standpoint, it would be well to begin now on the death certification phase so that the systems are compatible, since some users will be common to both the birth and death certification systems.

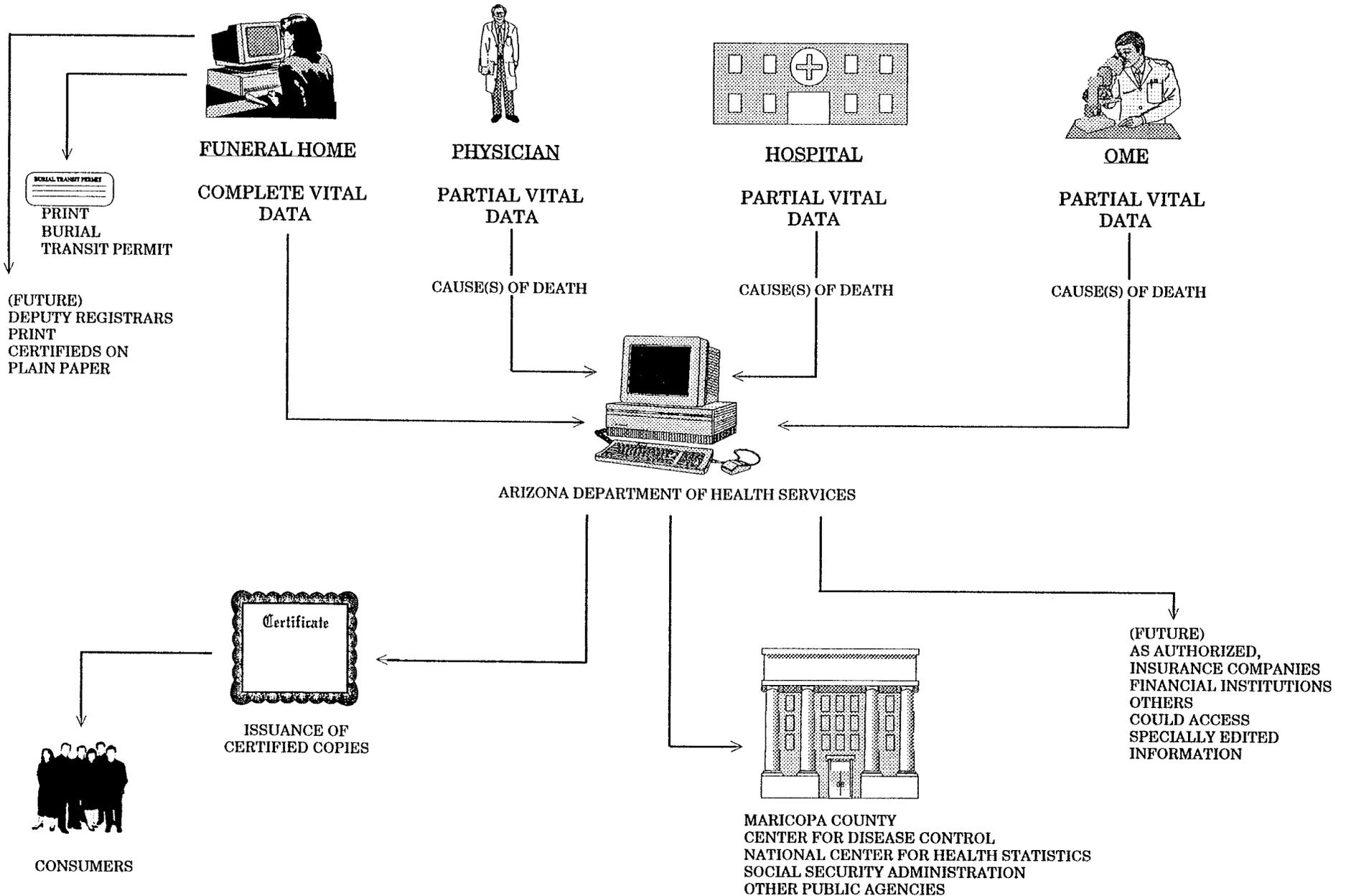
A small surcharge on the first, or even all, certified copies, added to a grant, would pay for the system.

CONSUMER ISSUES

Consumers now pay \$ 6.00 per certified copy (\$1.00 of which is a surcharge for a Child Fatality Review Fund established pursuant to ARS 36-3504). There has been no resistance to the \$6.00 charge. There is however, a great deal of dissatisfaction with the very long delays which are encountered in peak months, by consumers waiting for these all important documents. A modest additional charge would not encounter opposition, due to the relative importance of the need. Overall, enhanced consumer satisfaction with government services would result simply by virtue of the fact that final arrangements could be expedited, as well as settlement of estates, accessing of funds, and the multitude of other tasks which attend every death.

November 8, 1995
AFDA Committee For Re-engineering Death Registration
Mary V. Melcher
William Proctor
Paul Gabriel

INITIATION OF DEATH CERTIFICATE - SOURCE DEPENDING ON PLACE, EXISTENCE OF AN ATTENDING PHYSICIAN AND CIRCUMSTANCES OF DEATH



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APPENDIX C:

**CHART 1: EDC PROCESS, FUNERAL DIRECTOR ON-LINE
– CERTIFYING PHYSICIAN MANUAL**

**CHART 2: EDC PROCESS, FUNERAL DIRECTOR ON-LINE
– CERTIFYING PHYSICIAN ON-LINE**

CHART 1

State of Arizona Electronic Death Certificate Process Funeral Director Online - Certifying Physician Manual

Automation Characteristics

- Low cost
- Low value
- Electronic interfaces w/ County
- Manual interfaces w/ Medical Examiner
- Manual interfaces w/ other physicians
- Manual interfaces w/ hospitals
- Hardware/software project
- Data entry system

How parties are impacted

Funeral Director: Some assistance with physicians from State.
Physician: No change to existing process and no additional incentive.
State: Significant workload increase - mostly manual.
Counties: No longer involved in the death certificate process. Still have ability to issue certified copies and generate revenues.

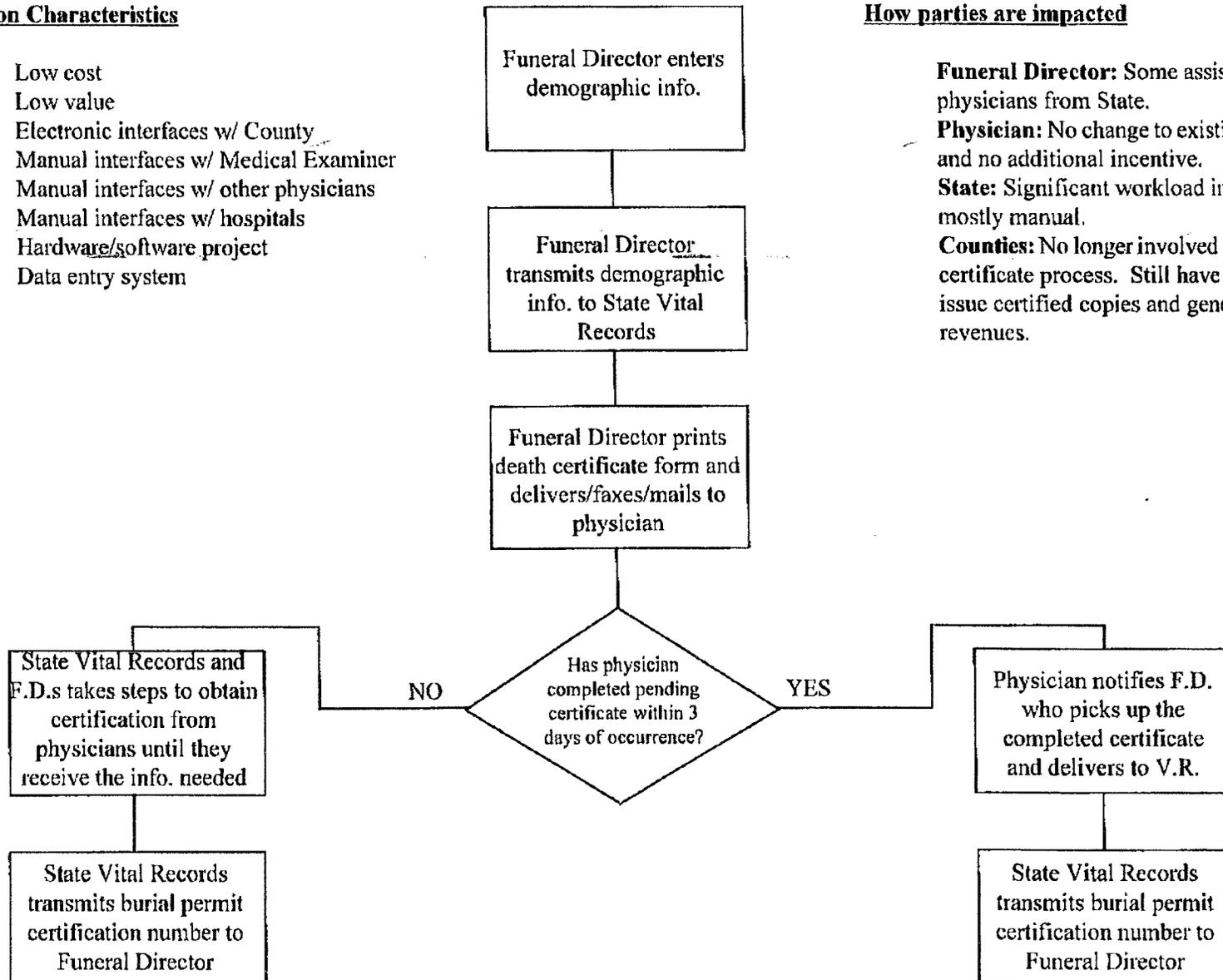


CHART 2

State of Arizona Electronic Death Certificate Process Funeral Director Online - Certifying Physician Online

Automation Characteristics

- High cost
- High value
- Electronic interfaces w/ County
- Electronic interfaces w/ Medical Examiner
- Electronic interfaces w/ other physicians
- Electronic interfaces w/ hospitals
- Systems integration and networking project
- Complete EDC system

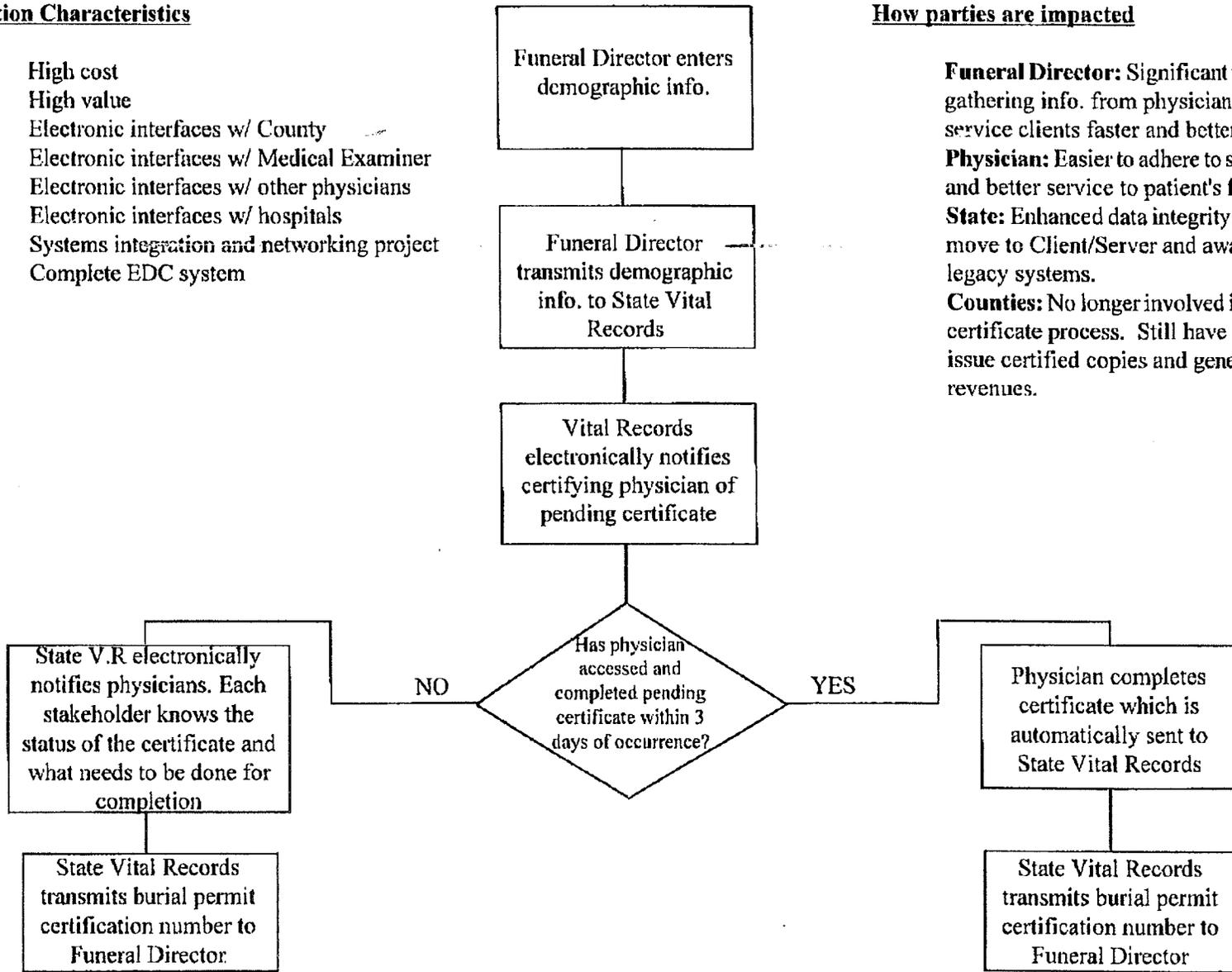
How parties are impacted

Funeral Director: Significant relief from gathering info. from physicians. Can service clients faster and better.

Physician: Easier to adhere to state statute and better service to patient's family.

State: Enhanced data integrity, facilitates move to Client/Server and away from legacy systems.

Counties: No longer involved in the death certificate process. Still have ability to issue certified copies and generate revenues.



APPENDIX D:

**CLIENT/SERVER
APPLICATION SYSTEMS STRATEGY
TECHNICAL FRAMEWORK**

Arizona Department of Health Services

Office of Information Technology Services

Client/Server
Application Systems Strategy
Technical Framework

revised June 3, 1997

Notice

This document was prepared by the Arizona Department of Health Services (ADHS), Office of Information Technology Services (ITS). The information contained within is the property of ADHS and should not be duplicated in any form without the written permission of the Arizona Department of Health Services.

Comments, suggestions and questions regarding this document should be forwarded to Mark Manson, ITS Office of Technical Services.

The information and content of this document is subject to change without notice.

Introduction

The Arizona Department of Health Services (ADHS) develops and manages programs to serve the public health needs of all Arizonans. These programs involve administration, regulation, prevention and intervention. All aspects require the collection, management and distribution of information.

As part of the agency's continuing efforts to improve the delivery of services to the citizens of Arizona, ADHS continually evaluates new methods, programs and technologies. A primary strategy of the agency, is the move from *legacy* based information systems (traditional Main Frame, Host based, proprietary environments) to a more "open" distributed environment. As part of this strategy, the agency is currently engaged in the development and deployment of *client/server* based application systems. The Office of Information Technology Services is ultimately responsible for the transformation of the agency's information systems.

Office of Information Technology Services

The Office of Information Technology Services (ITS) is responsible for management of the agency's information resources. This responsibility includes the evaluation of new technologies.

Recently, ITS evaluated several popular and current technologies to better deliver information to those most in need within and outside the agency. This evaluation has led ITS to recommend the development and deployment of client/server based information systems. This recommendation is based on the following premises:

- Accessibility to information
- Integration with existing software products
- Modularity of application and data components
- Scalability of application systems
- Faster response to information needs
- Better development tools

- Strategic direction of primary and industry vendors

To facilitate the development and purchase of software solutions for the agency, ITS has developed a *Technical Framework* providing an outline for the development, selection or evaluation of software based application solutions. The purpose of this technical framework is to ensure that both internally developed and externally acquired software solutions can be integrated at an acceptable level and perform effectively within the agency's computing platform, and as required, be supported by ITS staff.

Current Operating Environment

The agency currently supports information systems and services on five platforms:

1. IBM platform and associated devices
2. Bull HN platform and associated devices
3. Sun Microsystems platform
4. Local/Wide Area Networks (Novell)
5. Personal Computers

The Bull HN system is targeted for removal by December of 1998 after all current legacy systems are migrated to another platform or replaced by acquired software solutions.

The IBM platform is targeted for specific application systems within the agency, with limited plans for expansion.

The Sun Microsystems platform is the preferred choice for data management and warehousing of critical agency information. The agency's Local/Wide Area Network, based on Novell Netware 3.x, provides departmental and enterprise functions such as word processing, spreadsheet analysis, electronic mail and local information processing.

Personal Computers, in most cases, provide the desktop interface to the various platforms. The agency is gradually replacing (almost complete at this time) all non-intelligent workstations connected to the IBM, Bull HN or Sun,

with personal computers to better utilize the agency's array of information resources, and allow for a more desired graphical user interface (GUI).

Technical Framework

The technical framework exists to help formalize the agency's strategic hardware and software objectives. This framework will ensure acceptable levels of integration among the various application systems and databases, and define the minimum and optimum environments for application solutions deployed within the agency. Adopting a technical framework in no way negates a solution that might function outside the defined scope.

The technical framework is categorized by functional area:

- User Interface
- Database
- Network
- Operating System
- Development Tools

User Interface

The *User Interface* is that portion of the application which manages the way an end-user interfaces with the application. The agency currently encourages the following presentation services:

1. Microsoft Windows 3.11 and Win-95 (full graphical interface)
2. DOS (character mode, and graphical emulation)
3. ASCII Terminals (character mode)

Database

As part of the agency's overall strategy to better manage data resources and provide improved access to information, a central data repository is critical. The agency has selected Oracle as the primary data management facility. The following database services are supported:

1. Oracle 7.x (Enterprise)

2. Paradox (Departmental)
3. ODBC (Open Database Connectivity) compliant database

Network

The network infrastructure provides the middleware through which all other components communicate. The agency's Wide Area Network (WAN) is based on Novell Netware 3.12. A SUN Sparc2000 and individual servers are connected through various routers, gateways and communication services. The pre-dominant protocols include Ethernet, SPX/IPX, and TCP/IP.

The agency supports the following network components:

1. Novell Netware 3.12 (moving to 4.11)
2. TCP/IP
3. SPX/IPX

Operating System

The agency supports the following operating environments:

Client Side

1. Microsoft Windows 3.11 and Win-95
2. Novell 3.12 (moving to 4.11)
3. DOS 6.x

Server Side

1. Unix/Solaris (2.5)
2. Microsoft NT 4.0 (in Beta)

Development Tools

The selection of development tools can play a significant role in the productivity, management, flexibility and performance of an application system. With this in mind, the agency has selected development tools that compliment a client/server strategy using Oracle as the primary database. These tools include:

1. Oracle Designer/2000 CASE tool
2. Oracle Developer/2000 (Forms 4.5, Reports 2.5)

3. Borland Paradox for Windows
4. Borland Delphi for Windows
5. MITI SQR Report Writer

Minimum and Optimum Configurations

The applications within the agency should, at some level, accommodate the development, deployment and management requirements of the agency. As a further definition of these requirements, the following *Optimum* and *Minimum* frameworks are provided for reference when considering an application project or solution. The Optimum solution best compliments the agency's current and future objectives. A Minimum solution provides the minimum necessary to accommodate data sharing and application integration.

Optimum

<u>Category</u>	<u>Product/Service</u>
User Interface	Microsoft Windows 3.11 / 95
Database	Oracle 7.x
Network	TCP/IP, Novell Netware
Operating System	Microsoft Windows 95, SUN Solaris
Development Tools	Designer/2000, Developer/2000, Delphi
Client Workstation based	Personal Computer, Intel Pentium
Server	SUN (Unix/Solaris)

Minimum

<u>Category</u>	<u>Product/Service</u>
User Interface	DOS, ASCII Terminal
Database	ODBC compliant relational database
Network	SPX/IPX
Operating System	DOS, SUN Solaris
Development Tools	Borland Delphi for windows,

Client Workstation
Server

Borland Paradox for Windows
ASCII Terminal
PC-Server (Novell)

Conclusion

There is never a “one-size-fits-all” solution to any information systems problem. Often, several possible solutions are identified for a given situation. These solutions must be balanced with the needs of the application and the needs of the agency as an organization

This Technical Framework provides a general guideline through which the selection or evaluation of software based application solutions for the agency can be addressed. Those application solutions accommodating the framework described, best fit the agency’s goals and objectives.

*Single copies of the following public health surveillance reports are available from
the Arizona Center for Health Statistics*

*

ARIZONA HEALTH STATUS AND VITAL STATISTICS, 1994

*

TEENAGE PREGNANCY, ARIZONA, 1984-1994

*

SUICIDE MORTALITY, ARIZONA, 1984-1994

*

INJURY MORTALITY AMONG CHILDREN AND ADOLESCENTS,
ARIZONA, 1984-1994

*

FIREARM-RELATED FATALITIES, ARIZONA, 1984-1994

*

COMMUNITY VITAL STATISTICS, ARIZONA, 1994

*

CHARACTERISTICS OF NEWBORNS AND MOTHERS GIVING BIRTH BY CENSUS TRACT IN
MARICOPA COUNTY, ARIZONA, 1994

*

CHARACTERISTICS OF NEWBORNS AND MOTHERS GIVING BIRTH BY CENSUS TRACT IN
PIMA COUNTY, ARIZONA, 1994

*

CHARACTERISTICS OF NEWBORNS AND MOTHERS GIVING BIRTH BY CENSUS TRACT IN
SOUTH PHOENIX, ARIZONA, 1994

*

ADVANCE VITAL STATISTICS BY COUNTY OF RESIDENCE,
ARIZONA, 1994

*

UNINTENTIONAL DROWNING DEATHS, ARIZONA, 1983-1993

*

ABORTION SURVEILLANCE REPORT, ARIZONA, 1983-1993

*

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