

Analysis of State Data Management Capabilities and Plans

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Introduction

The National Association of State Alcohol and Drug Abuse Directors (NASADAD), with support from the Substance Abuse and Mental Health Services Administration (SAMHSA), consulted with member States during May 2001 to gather information on State alcohol and other drug (AOD) agency information systems. NASADAD asked questions about costs, priorities, and plans for information system development. The purpose of the consultation was to help determine whether a model web-based system, developed at the national level, could help States in meeting new requirements for performance reporting and ease transition to new technology.

A total of 47 States responded and are included in this analysis. In some instances, State responses were ambiguous, or were sufficiently unusual that there was a possibility that the respondent misunderstood the question. Future work should be undertaken to clarify State intent.

The analysis below evaluates the evidence of States' ability to finance information systems; the hurdles a State might face in integrating a model system with existing infrastructure, policy and allied systems; State status and plans for shifting to web based systems; State priorities for systems development; the available technical documentation for existing State systems; and the overall interest of States in a model system.

State Funding for Information Systems Operations and Maintenance

States were asked to estimate the annual cost of operating and maintaining their existing information systems. Cost estimates were solicited in six categories: system operations, system software maintenance, user training and help desk, supervision and administration, equipment and software upgrades, and overhead. Most States were able to provide the information requested. Some were able to provide totals only, and eight States were unable to provide any cost data. A number of these non-responders indicated that the information technology budget was controlled by another State agency and was not readily available. Data on billing systems were unavailable, so the numbers include only treatment and prevention management information systems.

States spent an average of \$726,000 annually on substance abuse information systems, adjusted to 2001 dollars¹. Assuming that States that did not provide cost data spend roughly in proportion to population, we estimate the total State expenditures for the operation and maintenance of AOD information systems for 2001 at \$35,359,000, or \$698,000 per State.

A number of States currently have web-based systems in operation and have provided an estimation of their cost experience. The degree of variation in reported costs strongly suggests a wide range in the scope of these systems. This and other issues combine to make the data on the cost of operating web-based systems difficult to analyze. To provide some sense of intrastate comparability the determination was made to express relative costs in per capita terms. The overall average cost is \$.18 per capita, about 50% higher than the typical information system cost nationwide. Since many of the web-based systems are new, this average cost likely includes considerable start-up costs. Only one State, Indiana, has a large web system in operation for

¹ We adjusted reported expenditures or budgets from other years using an implicit price deflator of 3% per annum.

sufficient time to be clearly past start-up costs. Indiana operates its system at \$.104 per capita, about 55% of the average per capita cost nationwide. States with smaller web based systems (total development cost under \$500,000) have widely varying costs per capita. Since we do not know the complexity or quality of these small systems, we cannot judge whether these differences are due to the systems or to factors unique to the implementing States.

Even if Indiana's costs can be replicated elsewhere, there is no assurance that all States that may wish to adopt a model web system could afford to implement it. The range of per capita spending on information systems varies greatly among States, and 39% of the States that could tell us their costs have lower per capita rates of annual expenditure on information system operations than Indiana does. Of the eleven States that indicated positive interest in implementing a model system and reported cost data, seven had annual per capita expenditures that would match Indiana's web based cost experience. There were also a few States that deemed it unlikely that they would adopt the model system for reasons of cost. It should be kept in mind that annual State MIS operating budgets do not constitute a liquid, lump sum source of capitalization for system change. Under many state appropriation mechanisms, only very limited discretion is permitted in reprogramming monies away from the specific purpose for which they were authorized. Funds appropriated for personnel costs, for example, most often could not be utilized for hardware or software without reopening the budget process. In addition, operating expenses include a significant level of fixed costs that must be met on a continuing basis even when a new system is undergoing development and implementation. It seems clear that if a common floor of new information capabilities is to be achieved, the States will require financial assistance.

Most States were able to report their costs, at least as a total. Three fourths could break costs down by category, demonstrating strong understanding of where their costs are incurred. The States that could not provide detailed information about their costs typically commingled information technology expenses with other program areas such as mental health, or contracted out to a managed care organization that does not separately disclose such costs for competitive reasons.

The expenditure patterns among States reveal an ability to undertake all facets of system administration. The patterns are typical, and show no unusually high or low amounts that would indicate inefficient or under-funded elements. It may be concluded that most States probably have sufficient personnel to manage a new system, and are organized to operate a system economically and effectively once the learning curve associated with any new technologies are accommodated.

Technology Infrastructure

Most States were able to describe the third party software products they use to deliver web-based services. The choices made by States are somewhat different than earlier, partial reports had led us to believe. Microsoft products are more popular among State AOD web sites than our early

anecdotal reports indicated, and exceed Microsoft's general market share. Virtually all operating systems are Microsoft NT 4 or its successor, Windows 2000, (although some State have heterogeneous architectures, mixing NT and Unix) and web server technology is predominately Microsoft IIS (80%). The only other web server reported by more than one State is Apache (17%). Microsoft's SQL Server (Version 7 or 2000) accounts for 63% of the database engines, with Oracle 8 capturing most of the rest. Many States use multiple database engines, indicating some flexibility. The most popular application languages are Microsoft's development tools (Active Server Pages, Visual Interdev, Visual Basic) (55%) and Java related tools (Java, Java Server Pages, J2EE, Javascript) (30%).

These technology choices have strong bearing on the feasibility of a model system and the choices that must be made for a model system. First, older Microsoft products currently used by States do not meet the technical criteria for a widely transferable model system. They do not always meet an open architecture standard, which reduces their interoperability with other vendors' products. SQL Server (prior to the recently released SQL Server 2000) and Access database engines do not meet ANSI SQL standards. The development tools (except the soon-to-be-released ASP+ and .NET) lack true object-relational architecture, which inhibits the modularity of the system. These characteristics will make it difficult to build a model system that can operate on both Microsoft and non-Microsoft platforms.

On the other hand, the wide prevalence of Microsoft products in State AOD web sites means that a model system designed specifically for Microsoft platforms could succeed in being useful to enough sites to justify the development cost. Of the States that indicated interest in implementing the model system and could identify their current web products, over 80% could implement a Microsoft based solution. Further, it is unlikely that a non-Microsoft solution would attract enough adopting States to justify the expense.

A surprising number of States are already making forays into web-enabled systems. There are five substantial web-based treatment systems² in operation and eight more planned or underway. Twenty-five additional States have or are planning small-scale web applications for collecting treatment data. On the prevention side, there are two substantial web based systems in operation and five more planned or under construction. A total of 24 States have made or will make investments in small-scale web-based prevention systems. Regarding billing systems, we identified two major systems already built and two more being planned. Twelve States have or are planning smaller scale billing systems.

Average development costs for completed and projected projects are given below:

	Treatment	Prevention	Billing
Completed	\$515,000	\$156,000	\$500,000
Planned	\$678,000	\$158,000	\$1,150,000

² We assumed a treatment system with an estimated development cost of \$500,000 or more was "large." For prevention and billing systems, we set the cutoff at \$100,000 for a large system. Since most of the developments with unknown costs were by smaller States, we arbitrarily classified all developments with unknown costs as "small."

The data for planned billing systems are distorted by one very large HIPAA project by the State of California, and are not a reasonable basis for projection to other States. Otherwise, the data appear to be reliable measures.

States are indicating increased average cost of projects for treatment data collection. Narrative comments do not indicate any desire to build treatment systems of larger scope than the existing systems, although States are aware that both HIPAA and PPG's may introduce expanded requirements. Those requirements, at least in part, may be reflected in treatment system budget forecasts. Prevention system forecasts agree with the experience of completed States. However, current prevention systems have apparently disappointed policy makers (MDS was mentioned in particular), and the funds budgeted for more sophisticated prevention systems may be insufficient.

We assumed that the completed system costs were the most reliable for forecasting. Based on State priorities for development, we forecast that 40 new State treatment systems would be needed over the next four years, as well as 33 prevention systems and 15 billing systems. The estimated aggregate cost of this development would be \$33 million in 2001 dollars.

State decisions to invest in information technology follow the same pattern as per capita expenditures for operating costs. The States least able to support data systems currently are also those least likely to plan new development. These States are apparently most in need of a model system to help them make up for their inability to raise enough State funds to independently finance new development.

Priorities

States were asked to rank from 1 (highest) to 11 (lowest) those elements of a State model data system that were most important. Those system elements that received the highest priority across the board would be those modules of a model system that are most crucial and would probably be finished first, technology issues aside. The eleven modules are:

- Treatment Admission
- Treatment Discharge
- Treatment Outcomes
- Treatment Events
- Case Management
- Invoicing
- Prevention Activity
- Prevention Recipients
- Prevention Outcomes
- Prevention Planning
- Contract Performance

Respondents used a variety of scoring conventions that produced non-comparable results. Some ranked from 1 to 11 as asked, while others gave equal ranking to multiple elements. Some used the entire range of numbers, and others used a subset. We therefore converted all scoring to Z-

scores to provide some comparability. The Z-scores could be summed to obtain an overall and group-by-group ranking.

Responses were consistent in naming the top two priorities: Treatment Admission was number one on everyone’s list (except those that already had a web based system they judged adequate), and Treatment Discharge was number 2. After that, however, opinions diverged. The following table compares rankings of all States to States that classified themselves as interested in adopting a model system (“very likely” or “more likely than not”) and to those who are taking a wait and see attitude (“toss-up”). The model system is most important to these possible adopters, and the system modules should be scheduled to meet their needs first.

	All Respondents (45)	Likely to Adopt (18)	On the Fence (17)
Admission	1	1	1
Discharge	2	2	2
Treatment Outcome	3	3	4
Treatment Event	4	5	3
Case Management	11	10	9
Invoicing	8	11	7
Prevention Activity	5	4	5
Prevention Recipient	9	9	10
Prevention Outcome	7	7	6
Prevention Planning	10	8	11
Contract Performance	6	6	8

Technical Documentation

States were asked whether they had two key pieces of technical documentation about their current systems: a data dictionary and a logical data model.

States indicated data dictionaries were widespread (37 of 46 respondents) and usually available. These dictionaries are important for the design of a model system, since any disparity between States regarding definition of a data item must be resolved before a model system can be built. Any early step in analyzing the functional requirements and performance requirements for the model system should include a careful review of these documents.

States reported logical data models less often than data dictionaries (20 of 46, or 44%). Data models reflect a relational database design, so we would not expect them for systems that use the older hierarchical database design. The presence of data models is a good proxy for the currency of database technology.

Reviewing data models will be another important early analysis task for the builders of the model system. Unfortunately, not all of these data models can be easily obtained. Some of them are proprietary. Some are coded in tools that do not export well. Additional work on this issue is needed.

Integration with Other State Systems and Standards

We asked States whether their treatment, prevention and billing systems were integrated with other program areas. There is a surprising amount of such integration. Nineteen treatment systems, four prevention systems and eight billing systems were combined with mental health. Six treatment systems, two prevention systems and four billing systems were shared with developmental disabilities. Other program areas shared systems with AOD agencies at relatively small rates.

These cross-program integrations make a model system more difficult to design. If the model system does not collect mental health data, 40% of the States might find the system not appropriate. If the model system attempts to incorporate mental health services, the time and cost of design and construction would increase significantly. These increases and delays are due to designers needing to account for the functional requirements of different State AOD programs, and consider different State mental health systems as well. We have no information regarding how varied mental health systems are among States: if they vary greatly, mental health integration might not be feasible at all. On the other hand, if States would accept a model system that meets the national CMHS model and no more, it would reduce the cost and delay stemming from mental health integration.

Seventeen States among our 47 respondents indicated their State integrates databases of different programs. These integrated databases help States understand, manage and plan for multiple enrollments of clients across different program areas. In the simplest model, each program specific data system sends an extract of its data to a consolidated database that sorts the data and identifies duplicates. In more complex systems, program specific data systems access a consolidated database for the data common to all systems. A model system can be easily modified to extract the data required for a State's consolidated central database, but modifying it to access a foreign database directly would be considerably more costly. We do not have data on which States use the simpler model and which have the more complex design, but anecdotal evidence points overwhelmingly to the former.

Twenty-four States indicated they have State standards that must be met for new data systems. These standards are designed to direct non-technical personnel away from poor decisions, ensure interoperability and reduce maintenance costs. Our experience is that State standards typically conform to commonly accepted "good practices," and pose little additional cost to an otherwise well designed model system.

In some cases, however, State standards also restrict State agencies from deploying certain advanced technologies, because State technical staff do not have the requisite skills and knowledge to support and maintain systems built with these technologies. The model system may be faced with some difficult design decisions, weighing the lower cost and increased performance of these advanced tools and techniques against the possibility that the number of adopting States might be significantly reduced if they were employed.

Degree of Interest in Model Web System Adoption

We asked States how likely it is that they would adopt a model system. Their responses were as follows:

- Very Likely: 19%
- More Likely than Not: 19%
- Toss-Up: 31%
- Not Likely: 14%
- Very Doubtful: 17%

It should not be inferred that “Toss-up” States are uninterested in moving to web based systems. Rather, these States will require more definitive information prior to making a decision or commitment on a specific course of action. For the most part, States electing a neutral position were of medium size. Of necessity, such States must approach such a major decision cautiously and in consultation with a number of parties. Areas in which this group of States desires more concrete information included cost, ease of customization, ease of data migration from legacy systems, privacy and confidentiality, the challenges of implementation, interface with existing provider systems, ownership (perhaps related to customization issues), HIPAA compliance, and performance speed.

States expressing that they were unlikely to adopt a model system (Not Likely or Very Doubtful) fell into three categories:

- States that had made substantial investments already in web technology, and have no need for a model system;
- Large States with complex management structures, that doubt whether a system built for the business needs a typical States would meet their business needs; and
- States with very low per capita investments in information technology, which expressed despair of ever having enough capital to implement even a model system.

Generally, these conclusions seem reasonable and are unlikely to change over time, except for the States that felt they could not afford to adopt a model web system. These States might change their plans if financial assistance were available. We note that a few of the States in the first two groups, while having no interest in adopting a model system for themselves, still expressed strong support for the idea as a cost-effective means of helping other States modernize their technology.

The first two categories (“Very Likely” and “More Likely than Not”), and to somewhat of a lesser extent the neutral States, are the core of the probable adopters of a model system. The “Very Likely” and “More Likely than Not” States expressed only a few concerns, all of which were mentioned above.

The number of States that adopt a model system will depend on the functionality of the system, its installation and operating costs, alternative competing systems from the private sector, and future budgets (including any supplemental federal funding for system implementation). Until these issues are settled, it is difficult to forecast how many States would adopt a model web system. Making fairly conservative assumptions regarding each of these factors, an adoption level of 40% to 70% is feasible. Using the lowest end of that range (20 States), the total avoided

cost of state-by-state system development would be about \$16 million. A model state system can be built for \$2 to \$4 million, providing a return on investment of over 400%.

Conclusion

Evidence from this consultation with our members points to the very probable success of a model system. There is a possible technology architecture that would be widely accepted. There is good agreement among States on the modules and their priority. There are reasonable indications of the cost effectiveness of such an approach.

Two significant challenges emerged from our consultations. First, a strategy is needed which results in necessary financial assistance to the States. Regardless of whether a model system is available or not, States will have to create an ability to report PPG performance measures, meet HIPAA requirements and address other pressing data issues such as those associated with submission for waivers for eligible PPG conditions. Since additional funds must be found anyway, significant additional benefits can be realized if States have the option of leveraging the added money into acquiring newer technology.

Second, the widespread integration of substance abuse and mental health systems must be addressed. Sponsors must face the prospect that a model system will either be considerably more complex, costly and delayed with a mental health component, or appeal to about three-fifths as many States without it. A two-stage development may be indicated, the first stage addressing States with free-standing substance abuse systems and the second addressing combined mental health and substance abuse States.