New York Child Support Enforcement System (NY CSES)

Independent Verification & Validation Assessment Review Report

U.S. Department of Health and Human Services
Administration for Children and Families
Office of Child Support Enforcement

Table of Contents

EXECUTIVE SUMMARY

On July 6, 1999, the State of New York submitted for Federal review and approval the results of their extensive CSMS Redesign project feasibility study. This submission, entitled *Child Support System Alternatives and Cost Benefit Analysis,* was divided into two parts: 1.) a Features Matrix and Cost Benefit Analysis, and, 2.) the Alternatives Analysis and Recommendation. As a result of a request by the Administration for Children and Families (ACF), Office of Child Support Enforcement (OCSE), an Independent Verification and Validation (IV&V) Assessment Review was performed of the State of New York's ASSET$ (Automated State Support Enforcement Tracking System) project was performed. The purpose of this assessment review was twofold. First, to review New York's Child Support System Alternatives and Cost Benefit Analysis study, and second, to determine the required scope of IV&V for the ASSET$ project. An on-site review was conducted with the State and its contractor, Renaissance Government Solutions, Inc., August 30-31, 1999, at the State's Offices in Albany, New York. Detailed analysis of the feasibility study and of information gathered during the on-site review was subsequently performed by the Federal review team. This report presents the findings and recommendations of the Federal OCSE's IV&V Assessment Review.

CHILD SUPPORT SYSTEM ALTERNATIVES AND COST BENEFIT ANALYSIS

The State's feasibility study compared four development alternatives or options: 1.) the status quo; 2.) a new system; 3.) a hybrid system; and, 4.) a transfer system. The State of New York's approach was to try and quantify all costs and benefits. Relative, predetermined weights were assigned to various attributes of the costs and benefits of the four options, and the results compared. **The feasibility study concludes that option 3, the hybrid approach, is the most beneficial to the State of New York**. Analysis of the study reveals that this is primarily driven by the following constraints. Option 1 does not provide enough benefit. Options 2 and 4 are contractor managed and therefore incur the cost of Quality Assurance and Project Management for both the State and the contractor. Options 1 and 3 are able to start accruing benefits periodically during development, whereas Options 2 and 4 only begin accruing benefits at the end of the development cycle. Option 4 requires a high degree of system re-engineering.

As a pure mathematical model, it is fairly easy to argue with some of the weighting factors, assumptions that were made, low level estimates of scope or costs, etc. However, most of the weighting factors and assumptions were made prior to the study and these factors were applied evenly across all options. As a management tool the study does a fairly accurate job of portraying the relative pluses and minuses of the various approaches.

Overall, our IV&V Assessment Review's analysis found the State's feasibility study sound, reasonable and measured. It takes a methodical approach to identifying costs and benefits of each considered option. Although we have a few problems with some of the calculations or assumptions made, **the study's conclusions seem to be well thought out and adequately**

supported by the data. We therefore concur with the State's selection of Option 3 as the most cost beneficial, effective and efficient solution to the development of ASSET$.

IV&V ASSESSMENT REVIEW - FINDINGS AND RECOMMENDATIONS

The State must immediately acquire IV&V services for the ASSET$ planning and development project. The IV&V Service Provider who supplies these services shall review and make recommendations on the following areas of the ASSET$ planning and development processes as described in Section 3.2 of this report:

- Project Planning and Reporting
- Project Personnel
- Project Organization
- Quality Assurance
- Requirements Management

IV&V services will be required until such time that New York successfully implements and receives Federal certification of ASSET$ for all requirements of the Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (PRWORA), as delineated in this report. The acquisition of this "IV&V Service Provider," either through a formal procurement of contract resources or Interagency Cooperative Agreement, will need to commence immediately. To assist the State in this regard, this report's recommendations are structured to present specific IV&V tasks that can be included in the Statement of Work of an IV&V Service Provider. **The IV&V Service Provider must supply all plans, reports of findings, and recommendations to ACF Central and Regional Offices at the same time that they are supplied to the State, as specified in 45 CFR 307.15(b)(10)(ii).**

IV&V SERVICE PROVIDER

The State must move to begin the identification of requirements for and formulation of a Scope of Work for ongoing IV&V services to the State's ASSET$ project. It is incumbent on the State to begin the acquisition process for these services now to avoid any schedule delays. Therefore, the State should immediately pursue the identification of potential IV&V resources in-State. If these resources, independent of State's Title IV-D and its umbrella agency, cannot be identified then a contract procurement effort must be initiated. This report has been designed to provide the State with a series of initial recommendations that can be incorporated into a Scope of Work for the project's IV&V Service Provider. To further support the State's IV&V process, OCSE is committed to providing the State with technical assistance in the form of documentation review and recommendations, as needed, to assist the State in the acquisition/ procurement of an IV&V Service Provider**. It must be noted that, contrary to State comments during the IV&V Assessment Review, the procurement of a Quality Assurance (QA) vendor for the ASSET$ project <u>will not</u> also serve the project's need for an IV&V Service Provider. The QA vendor will not possess the sufficient level of independence necessary to meet Federal regulations in this area.**

PRIOR APPROVAL

The Request for Proposals (RFP) and contract (or similar documents if IV&V is performed by another State agency) must be submitted to ACF for prior approval, regardless of the cost or contractual arrangements. The IV&V services contract or agreement with a State agency must include the names and qualifications of key personnel who will actually perform the IV&V services. **For all IV&V activities, the State must submit an Advanced Planning Document Update (APDU) addressing in sufficient detail the IV&V activities and related costs eligible for Federal financial participation (FFP) at the applicable matching rate.**

IV&V DURATION

IV&V must be performed at initial activation of the IV&V Service Provider contract or State agency agreement. Thereafter, the IV&V services must be performed semi-annually until such time that New York successfully implements and receives Federal certification of FACSES for all PRWORA requirements. ACF will periodically reevaluate the IV&V scope of work and frequency requirements of FACSES based upon project progress or when one or more of the IV&V triggers occurs, as described in 45 CFR 307.15(b)(10)(i), such as failure to meet a critical Advanced Planning Document (APD) milestone.

INDEPENDENT VERIFICATION AND VALIDATION (IV&V) ASSESSMENT REVIEW REPORT FOR THE NEW YORK CSES PROJECT

1. INTRODUCTION

The State of New York submitted for Federal review their extensive CSMS Redesign project feasibility study entitled *Child Support System Alternatives and Cost Benefit Analysis.* The two parts of the document are: 1.) a Features Matrix and Cost Benefit Analysis, and, 2.) the Alternatives Analysis and Recommendation. A result of this submission, in accordance with Federal regulations at 45 CFR Part 307.15(b)(10)(i), the need of an Independent Verification and Validation (IV&V) review of the feasibility study, including analysis of the study's methodology and of its findings and recommendations, was triggered. In order to provide technical assistance to the State, the Federal Office of Child Support Enforcement (OCSE) performed the IV&V Assessment Review of the State of New York's ASSET$ (Automated State Support Enforcement Tracking System) feasibility study and overall planning project. The purpose of OCSE's IV&V Assessment Review was twofold. First, to review New York's Child Support System Alternatives and Cost Benefit Analysis study, and second, to determine the required scope of IV&V for the ASSET$ project. This report presents the findings and recommendations of the Federal OCSE's IV&V Assessment Review.

1.1 BACKGROUND

The State of New York currently operates a Federally certified, comprehensive and statewide installed automated child support enforcement system called CSMS (Child Support Management System). The CSMS, a legacy system whose operation dates from the early 1980's, is described by State staff as being Y2K-compliant. With changes in technology and the need to consolidate hardware and software platforms to reduce operational expenses and streamline ongoing systems maintenance, the State of New York initiated a new systems development planning project in the fall of 1997. Initially, the planning effort was to focus on modifying only certain functional capabilities of the legacy CSMS, such as improved document generation, and enhanced financial and case data history retrieval and archival capabilities. However, the project, over the course of the following 12 months grew in scope to include consideration of a complete redesign of the existing CSMS legacy system. This "CSMS Redesign" planning effort progressed slowly until the fall of 1998 when, at Federal direction, the State created and the Federal OCSE approved for release, a Request for Proposal (RFP) to conduct a Feasibility Study for the CSMS Redesign. The successful offeror to the State's

solicitation was Renaissance Government Solutions, Inc., (RGS). RGS began work on the feasibility study in January 1999.

Recently, on July 6, 1999, the State of New York submitted for Federal review and approval the results of their extensive CSMS Redesign project feasibility study. This submission, entitled *Child Support System Alternatives and Cost Benefit Analysis,* is divided into two parts: 1.) the Features Matrix and Cost Benefit Analysis, and 2) the Alternatives Analysis and Recommendation.

The Federal OCSE performed the IV&V Assessment Review of the State of New York's ASSET$ feasibility study and overall project and planning effort. An on-site review was conducted with the State and its contractor, Renaissance Government Solutions, Inc., August 30-31, 1999, at the State's Offices in Albany, New York. Detailed analysis of the feasibility study and of information gathered during the on-site review was subsequently performed by the Federal review team.

1.2 METHODOLOGY

The purpose of the IV&V Assessment Review was twofold. First, to review New York's Child Support System Alternatives and Cost Benefit Analysis study and second to determine the required scope of IV&V for the State's ASSET$ project. On-site interviews with the State and the CBA contractor (Renaissance) were held on August 30-31, 1999, at the State's systems development Offices in Albany, New York. The Federal assessment team consisted of:

Joe Bodmer -	ACF/OCSE/DCSIS
Greg Jordan -	ACF/OCSE/DCSIS
Brian Mitchell -	ACF/Region 2
Dave Tabler -	Marconi Systems Technologies
Rick Emery -	Marconi Systems Technologies
Tim McIntosh -	Marconi Systems Technologies

The New York Office of Temporary and Disability Assistance staff represented the State – in particular, project management personnel from the proposed Automated State Support Enforcement Tracking System (ASSET$) project. Representatives from Renaissance Government Solutions, who had prepared New York's Child Support System Alternatives and Cost Benefit Analysis study, were also present.

After the on-site interviews, the assessment team spent several weeks analyzing ancillary documentation and drafting this report. In addition, some sensitivity analysis was performed on the low level Excel spreadsheets used to develop the cost benefit estimates. In particular, the New York study was compared to the recommendations in the ACF document, Feasibility, Alternatives, and Cost/Benefit Analysis Guide.

2. FINDINGS

The following sections detail the findings of the feasibility study, the cost benefit analysis, and the Verification and Validation Plan.

2.1 FEASIBILITY STUDY AND COST BENEFIT ANALYSIS ISSUES

During review of the alternatives and cost benefit analysis study, the following issues arose.

2.1.1 METHODOLOGY ISSUES

Overview

The State of New York worked with Renaissance to develop the methodology used in the alternatives and cost benefit analysis study. In brief, Renaissance produced very detailed schedules and cost estimates and traded them off against very detailed estimates of benefits. Benefits were primarily defined as cost savings and compliance with the project goals and requirements. The approach involved an analysis of four system development alternatives:

- **Alternative 1:** Enhance the Current Legacy System
- **Alternative 2:** Develop New System with Open System Architecture
- **Alternative 3:** Combination of New and Legacy System Architecture
- **Alternative 4:** Transfer an Existing Certifiable System

The analysis assessed the characteristics of each alternative in comparison to a pre-defined set of criteria. These criteria were categorized as follows:

- **Category One – Compliance,** which included criteria designed to assess each alternative's ability to meet performance goals, as well as functional and technical requirements and level of risk.
- **Category Two – Economic Value,** which included criteria by which the economic viability of each alternative could be assessed.

Each alternative was evaluated, and then awarded a score for each criterion in accordance with a pre-established weight structure. After scores were awarded to each alternative, Renaissance conducted a comparative analysis of the results. [1]

[1] NY Child Support System Alternatives and Cost Benefit Analysis, page 1-8.

The approach taken by the State of New York in their alternatives and cost benefit analysis study was basically sound. However, several issues could easily have been handled another way and are open to debate. The following sections discuss these issues.

Weighting Factors

Some concern exists over the assignment of weighting factors. From a mathematical point of view, it would be very easy to manipulate the results simply by manipulating the weighting factors. Investigation of this issue revealed that the weights were jointly derived by the State of New York and Renaissance primarily based on the priorities assigned by the State in the RFP for the study. This was a good answer. It shows that consideration had been given to the value of certain benefits prior to the analysis. We believe that it is well within the State's prerogatives and even responsibilities to decide the relative worth of costs and benefits for its particular requirements. The only issue here is one of repeatability. If someone else or another state were to perform a similar analysis, they could easily derive different conclusions based on the relative weights.

2.1.2 SYSTEM CONSTRAINTS AND ASSUMPTIONS ISSUES

In a study of this magnitude, it is both necessary and reasonable to restrict the solutions on the problem space; that is, rule out some options before the study begins. In addition, for the options that remain, assumptions must be made about exactly how the options will be engineered and managed. The New York study includes a section labeled *Constraints and Assumptions*; however, several of the issues we discuss in the following paragraphs are either not listed as assumptions or are hidden as minor items in a table.

Management Model

An assumption is made that options 1 and 3 will be managed by the State and that the contractor will manage options 2 and 4. This is not necessarily an unreasonable assumption. However, analysis of the root causes of the superior rating of option 3 revealed that one of the reasons it scored better was that by the State managing the project, they avoided certain costs associated with dual functions in the contractor and State personnel (i.e., project management and configuration management). Although options 1 and 3 may have a slightly better fit being state managed, any option could be State managed or contractor managed. The choice of a management model will have its own set of costs and benefits. By predefining this constraint, the results are not a clean comparison of the proposed approaches, but a combination of the approach and the chosen management model.

Reuse Percentage

Intuition would have predicted option 4 scoring better than it did. Root cause analysis revealed that the primary reason this option did not score higher was the assumption that minimal reuse would be gained by transferring an existing system. The assumption estimates that about 80% of the system would need to be re-engineered to meet the State of New York's requirements. This assumption is based on State, Federal and contractor experience in transferring other systems. For the purposes of the study and this paper, we will consider that a fact, and the issue of what could be done to improve that percentage is outside the scope of this analysis.

Nondeterministic Costs

Because of the system's size and complexity, several major alternatives were selected based on the detailed requirements outlined in the RFP. Renaissance, based on their experience and industry best practices, developed detailed cost estimates and derived benefits for the proposed fictitious system(s). All assumptions supporting each approach were outlined in detail. This approach, given their task and schedule, is not unreasonable. However, the reviewer should be aware that the resulting outcomes represent a probability of outcomes within a range rather than an absolute. The outcomes can and will vary depending on the actual implementation of the selected alternative and its cost components.

For example, in the area of hardware/software costs for alternative 3, a plan has been laid out to accomplish document management and imaging. If an imaging vendor were to propose the same system based on specific hardware and software, his costs would differ by some factor. He might propose different software and hardware, and configure them differently. This effect applies to not only the hardware and software costs but also to staffing and training.

In the real world, the ability to define and/or quantify the probability of the range of outcomes is practically impossible due to cost, time, and manpower considerations. Therefore, you define your most probable alternatives based on stated requirements, experience, and industry best practices and develop the associated cost/benefits. Renaissance has developed and executed, in a consistent manner, a sound methodology to define the costs/benefits of the four alternatives. Key constraints and assumptions that established baselines or impact the given alternatives are defined in detail. Although the probability of the range of outcomes of associated cost/benefits can vary greatly, based on Renaissance's approach and assumptions, the proposed outcome would not be significantly impacted.

Option 1 Cost and Benefits

The Federal guidelines call for one of the options to be the status quo. However, it is realistic to assume that some maintenance will take place to the status quo. For the purpose of the analysis, it is desirable to have a stable baseline. The New York study engineered option 1 to include all improvements not requiring new hardware or Commercial Off-the-Shelf (COTS) software. This approach makes it more difficult to see the relative advantages of some improvements.

Improved Collections Calculations

The New York study's calculation of improved benefits contains two factors. One is calculated based on the experience of other states as improvements or links to other databases are introduced. The other is based on New York's historical data of improving collections via existing programs and improvement plans. It is this second factor with which we have some concerns. This factor was put in as an X% improvement over time. In reality, this improvement will not be linear but rather be some sort of exponential equation. That is, there must be a maximum number of cases that can be collected, and, it is reasonable to assume, that this number is less than 100%. In addition, improvement efforts will not approach this limit evenly but as some sort of diminishing returns over time. The historical data from the State of New York does not contain enough data points to accurately represent this phenomenon. Even if we believe the linear equation or are willing to accept it as a reasonable simulation for the purposes of the trade-off, we believe the improvements introduced in factor one will have a diminishing effect on the improvements in factor two. That is, since there are only *n* number of possible cases that can be solved, the more you solve using one set of improvements, the fewer available cases to solve using another set of improvements.

2.1.3 ANALYSIS ISSUES

Number of Releases Inherent in Alternative 3

Alternative 3 is scheduled to be completed over 29 months. During this period, 20 different releases are scheduled in an overlapping manner. This represents approximately 1 release every month and a half. The releases span both the old (11 releases) and new (9 releases) systems. Each feature and enhancement was reviewed and categorized to determine which feature could be included in which release. Criteria used to group the features included ease of programming, system efficiencies, dependencies on other features and events, and whether the time box of like functionality was a factor. Experience dictates that this is an extremely aggressive approach, both from a managerial and implementation standpoint. As the number of releases goes up, so does the amount of integration, coordination, and managerial control required. The risk(s) associated with the multi-release approach do not appear to be addressed in the Risk Mitigation Plan.

Areas of significant impact are configuration management (CM), quality assurance (QA), and training.

CM activities directly affected by each release include:

- Defining system baselines
- Tracking changes
- Versioning of products/knowing what is current
- Authorizing and coordinating changes
- Approving changes
- Authorizing product releases

QA audit opportunities directly affected by each release include:

- Requirements
- Design
- Test plans
- Source code
- Testing, test results at all levels
- User documentation
- Handling and coordinating rework

Training activities impacted by each release include:

- Training preparation
- Developing training materials
- Developing classes
- Holding classes
- Coordinating travel

Historically speaking, though the number of failures in new development and transitional development efforts for automated Child Support Systems have been significantly smaller, as a percentage, in comparison to industry norms, they do occur[2]. Some child

[2] Based on a comparison of total number of failed State child support system projects divided by total of all State child support projects since 1984 (15.3 percent result) versus national industry average of 31.1 percent failure (Reference: Charting the Seas of Information Technology, pp. 3. The Standish Group International, Inc. 1994.)

support system development projects were abandoned due to cost and schedule overruns; others had major functional deficiencies; some had both. Most failures have been directly attributed to inadequate management planning and/or control. This suggests that it would be prudent not to incur any additional risks in areas where the system development process has been traditionally weak. Renaissance has significant experience in the area of developing Child Support Systems as evidenced by their cost benefit analysis. They appear to have a good understanding of the functionality of the eight major systems involved, right down to almost the code level. If there are no problems developing the system, it may be possible to define, design, implement, test, train the user community, and deliver 20 system releases in 29 months. However, based on historical evidence, it would be advantageous to limit the number of releases to six or less. The effect of reducing the number of releases from 20 to say 5, given that benefits are accrued evenly over the development cycle, will only decrease cost savings 10 to 15%.

Cost Avoidance

In some cases, the cost savings of a given benefit are calculated by multiplying the number of hours the benefit would save against a given employee's hourly rate. Although this method gives a relative approximation of the worth of a given benefit, from an accounting point of view, care must be taken to remember that these are full-time State employees and that real cost savings are only derived if these employees are able to process *n* number of other cases or some other activity that generates income.

Contractor Versus State Managed

As stated earlier, we have some concern over the inequity of options 1 and 3 being state managed and options 2 and 4 being contractor managed. This is not the only issue in this area. If we believe the assumptions made, no one would ever pick a contractor managed system, since it apparently incurs a greater cost and no benefits. Two of the missing benefits of using a contractor are hard to quantify. First, most legitimate contenders will have some previous experience in the applications domain. Therefore, they should bring a certain percentage of reuse or improved productivity over a staff starting from scratch in a given technology area. Second, the primary motivation of the contractor is to fulfill the contract. The motivation of the State is to make all of the interested parties happy. Historically, this increases the likelihood of requirements' creep, rework, and other manifestations of straying from the plan.

The New York study does contain a section on risk. This risk is primarily quantified from the user's perspective of “Will the system do what I want?” It seems that at a bare minimum, some thought should be given to the risk of “Can we build the system on time and within budget?” Research at Carnegie Mellon's Software Engineering Institute has shown that a one level increase in the software maturity level can translate into a 15-21%

increase in productivity.[3] Barry Boehms Software Engineering Economics show similar cost drivers based on the developer's familiarity with the technologies.

2.1.4 MISCELLANEOUS ISSUES

We detected several minor errors during our analysis as outlined below. In our validation effort, we were only able to spot check many of the detailed calculations. The size of New York's study made it impractical to validate all low level details.

- Volume 2, page 5-5, says staff time will be calculated using 167 hours a month, but the spread sheet seems to use 160 hours a month. We do not believe this affects the outcome of the study.

- Math error - The Business Compliance Consideration score for Alternative 1 should be 137 points vice 151 (reference page 1 of Appendix H-2). Alternative 1 received a raw score of 151 out of 220 points possible. Using the algorithm described in paragraph 3 on page 2-8 of deliverable 2, 151/220 * 200 = 137 should be the final score. The summary table on page 1-10 of deliverable 2 shows a final score of 151. The final score was computed correctly for the other three alternatives. This does not affect the outcome of the study.

- In some of the detailed spreadsheets, when figuring out the cost of a given month, the equation is the monthly cost * the number of months/the number of months (in particular, nonrecurring costs column AB). This seems to be a useless term in the equation. In addition, some of these fields have the number of months hard-coded in the equation rather than picking it up out of the appropriate field, making analysis even harder.

[3] The effect of Software Process Maturity on Software Development Effort, Bradford K. Clark, August 1997.

2.1.5 COMPARISON TO FEDERAL FEASIBILITY, ALTERNATIVES, AND COST/BENEFIT ANALYSIS GUIDE

The Administration for Children and Families provided a Feasibility, Alternatives, and Cost/Benefit Analysis Guide. This guide states that "ACF will use the guide as a measure against which to evaluate the State's efforts for comprehensiveness of evaluation and to consider the merits of the State's proposed solution."[4] The following discussion addresses each question specifically called out in that guide.

- Has the State thoroughly described the status quo?

  Yes: Section 3 of the study describes the current environment.

- Have a broad range of alternatives, varying technologically and by source, been considered? Have the options of modifying the existing system and transferring another state's system been evaluated?

  Yes: The study considered the following four options:

  - ✓ **Alternative One: Enhance the Current Legacy System**
    This alternative is to determine if the current system with the existing architecture (legacy mainframe system) can be enhanced to add the functionality outlined in the Features Matrix without hardware or software add-ons.
  - ✓ **Alternative Two: Develop New System with Open System Architecture**
    This alternative is to develop and implement a new child support system using new, open system technologies. The new system will include all predetermined features and functions included in the Features Matrix and will be federally compliant.
  - ✓ **Alternative Three: Combination of New and Legacy System Architecture**
    This alternative specifies a new child support system with a logical and cost effective migration from the current technical architecture to an open system architecture using a "conceptual transfer" as a basis for design development and implementation.
  - ✓ **Alternative Four: Transfer an Existing Certifiable System**
    This alternative is to develop and implement a new system using a federally certifiable transfer system as the primary basis for development. The transfer alternative is a code level transfer from a state or jurisdiction of comparable size and operational structure.[5]

[4] ACF Feasibility, Alternatives and Cost/Benefit Analysis Guide, page 1-5.
[5] NY Child Support System Alternatives and Cost Benefit Analysis, page 2-6.

- Did the State apply cost/benefit analysis to at least two -- but preferably three -- viable alternatives? Is the status quo one of the alternatives?

  Partially: The study provided cost/benefit analysis for all of the alternatives. However, as stated earlier, option 1 is not really the status quo, but the status quo plus some subset of changes.

- Were the status quo and all alternatives evaluated on a system's life basis?

  Yes: The study calculated costs and benefits through 2007. This is far enough in the future to capture the benefits from most planned improvements. If this date were moved farther into the future, it would change the ratio of gains between the various options, but should not change the relative ranking of the various options.

- Was present value analysis used? Was a 7 percent discount factor used?

  Yes: All calculations were done using present value with no inflation.

- Is the State's presentation of costs and benefits thorough, detailed, and well documented throughout the system's life? Do the cost and benefit projections appear reasonable?

  Partially: The State's presentation of costs and benefits is extremely detailed. They did an excellent job of trying to consider all of the costs and benefits throughout the system's life. In modeling anything, it is necessary to approximate the behavior of the real world to gain an understanding of the behavior of the model. The simpler these approximations, the easier it is to understand the behavior of the model, but the less likely the model will behave like the real world. As explained in several of the previous discussions of issues, we believe that there is a delta between the cost and benefit projections presented in the study and the costs and benefits that will be encountered during the real development and implementation.

- Were net benefits or costs, benefit/cost ratios, and breakeven points calculated for the status quo and all alternatives?

  Yes: These calculations were all done. However, once again, option 1 is not really just the status quo and all of the above calculations were not used in the cost/benefit trade-off.

- Is the selected alternative reasonable?

  Yes: We do have some concerns over the cost and benefit predictions; however, it appears that most of these issues apply evenly across all options and that the relative rank of a given option will not be significantly impacted. The driving forces that cause option 3 to outperform are:

- ✓ Option 1 can not deliver enough new functionality.
- ✓ Options 2 and 4 have extra management overhead because they are contractor managed.
- ✓ Option 4 has 80% rework.
- ✓ Option 3 gains benefits sooner via incremental releases.

- Has the State set forth a clear set of projected benefits and costs against which actual costs and benefits can be measured?

  Yes: The State made a good faith effort to define the costs and benefits associated with each option as defined; however, one could argue about the relative merits of some of the above issues.

Again we would like to reiterate that although there are some issues, the New York study is very detailed and attempts to account for all of the cost drivers and relative benefits from the various approaches. The study adequately answers seven of the nine questions called out in ACF's Feasibility, Alternatives, and Cost/Benefit Analysis Guide and mostly answers the other two. Depending on how you grade the mostly compliant answers, this yields a compliance percentage of around 90%.

Analysis of the study shows that Option 3 scores highest primarily based on the fact that by fielding changes incrementally, benefits accrue earlier. If we make the additional assumptions that the benefits of Option 3 are reduced by 15%, (due to not as many releases) and that the cost of Option 2 and 4 are decreased by 30% (due to the mature software organization of the contractor), Option 3 will still score the highest due to the incremental accrual of benefits.

2.2 INDEPENDENT VERIFICATION AND VALIDATION (IV&V) ASSESSMENT

The findings in this section are based on the discussions held with State staff during the on-site portion of the review. Recommendations to mitigate these findings are provided in section 3.2 of this report.

2.2.1 PROJECT PLANNING AND REPORTING

The planning phase of the ASSET$ project will include development of an IAPD for the system implementation phase. This IAPD must address the following findings, which are discussed in more detail in the "IV&V Planning Review" sections of this report (Sections 2.1 and 3.1):

- Based upon the ACF Cost/Benefits Guide, one of the options for the Cost/Benefit Analysis needs to be the status quo, defined as the existing system with no modifications. The feasibility study modified the status quo option (Option 1) to include all improvements not requiring new hardware or Commercial Off-the-Shelf (COTS) software. As a result, the true baseline specified in the ACF Guide is not provided.

- The number of releases planned for the selected option is excessive. Twenty different, overlapping releases in a 29 month period will cause significant managerial and implementation headaches and increase the risk factor for successful completion of the project.

- The mathematical model for accumulation of benefits over time using State data for existing programs and improvement plans assumes a constant, linear improvement. In reality, this improvement will not be linear but will rather have an exponential characteristic.

2.2.2 PROJECT PERSONNEL

Current staff appears to have a strong background in and knowledge of the project. State staff agreed that additional staff, through procurement of contractor staff, would be required of the ASSET$ project once the development effort starts. The State currently plans to utilize Master Vendor Contracts (a/k/a body shops) to fill this need.

Of additional importance is that although vendor staff will be brought onboard to help manage the project, the State must clearly demonstrate that day-to-day direction of the project rests squarely with State personnel.

2.2.3 PROJECT ORGANIZATION

The State has not finalized their project organization for the ASSET$ project. We are concerned about the lines of authority between the CSMS and ASSET$ projects. This concern extends into the area of project staffing. For example, how will the State ensure ASSET$ project personnel will remain dedicated to the ASSET$ project and not be pulled to help with CSMS related tasks? If priorities change at the Human Services Application Service Center (HSASC) for the CSMS project, and ASSET$ staff do not belong to the ASSET$ project, there is a danger that ASSET$ staff could be pulled to work other projects to the detriment of the ASSET$ project schedule. These concerns appear to apply to the application of contract personnel from the "mini-bid" master contracts between the CSMS and ASSET$ projects, as well as to State computer systems personnel dedicated to the CSMS and ASSET$ projects versus other HSASC automation projects.

2.2.4 QUALITY ASSURANCE

There is currently no dedicated Quality Assurance (QA) support staff in the State. The feasibility study provides for the addition of QA staff for the ASSET$ project. The State agrees that QA will be necessary for the project. We concur with this decision and recommend the State begin procurement of their QA provider immediately so they can aid the State during the planning phase for the ASSET$ project. However, we strongly disagree with statements in the feasibility study that the QA provider is also responsible for providing IV&V services to the State. The IV&V provider must be independent of all other State and Contractor staff, including QA staff.

2.2.5 REQUIREMENTS MANAGEMENT

Again, coordination between the CSMS and ASSET$ projects is a primary concern in this area. While the State appears to have a well mapped set of requirements for the ASSET$ system, changes to the CSMS system have not yet been finalized and may not be identified and documented in time for ASSET$ development. The State's QA staff recommended by this report will be instrumental in developing and monitoring the processes for requirements management.

Another concern in the area of Requirements Management is the possibility of "requirements creep", where new requirements and modifications to existing requirements are constantly added on with little or no attention to the impact on performance and schedule. On a project of this size and complexity, it is imperative to define and document the system requirements early in the development phase and to get agreement and approval from all shareholders in the project on the system's initial, foundation requirements. In addition, a stringent Configuration Management process

must be put in place to limit changes to the system requirements to those items that are required to meet State and Federal performance requirements. Finally, a process needs to be put in place to trace system requirements through the various phases of the system development, from requirements definition to design, to code, to test, and to training. QA staff should be an essential factor in setting up and monitoring these processes.

3. RECOMMENDATIONS

This section presents the recommendations of the Federal assessment team after reviewing the State of New York's Child Support Management System (CSMS) redesign feasibility study.

3.1 FEASIBILITY STUDY AND COST BENEFIT ANALYSIS

3.1.1 METHODOLOGY ISSUES

Although the State chose different weights and cost factors than we would have, we find nothing wrong in what they did. Our only recommendation in this area is to better explain the rationale for their choices. This would allow better verification of whether their methodology really met their intentions. In particular, why did they calculate four cost factors and only use two?

3.1.2 SYSTEM CONSTRAINTS AND ASSUMPTIONS ISSUES

The difference between an assumption and a low level estimate is debatable. However, some of the assumptions that strongly drove the low level estimate such as the 80% rework in option 4 should have been listed in the *Assumptions* section of the study.

Management Model

We believe it would be beneficial to separate the management model from the development choice. This would better show the real differences in the approach.

Reuse Percentage

As stated earlier, we are willing to take the 80% rework estimate for transferring an existing system as a fact. However, because it has such a devastating impact on option 4, it should be listed as an assumption.

Nondeterministic Costs

To do a better job in this area, costs need to be listed with a probability or costs should be listed as a maximum and a minimum. In either case, a model can then show the uncertainty window as well as a medium guess. This uncertainty window may very well come into play when the windows overlap between options.

Option 1 Cost and Benefits

One of the options needs to be the status quo. As stated in the ACF guide "Each Cost/Benefit Analysis must begin with the determination of the operational costs of the installed system – the status quo" alternative. This critical step sets the stage for comparing alternatives against baseline costs."[6] We recommend that option 1 be reworked with no changes and/or option 1 be split into option 1 and 1A to show both approaches.

Improved Collections Calculations

This is almost a no-win situation. If we leave the linear equation as is, it makes the answers mathematically incorrect. If we put in a more complicated algorithm, it makes it harder to understand and opens up debate about the validity of a given algorithm. However, due to the importance of reaching the federally mandated 80% compliance levels, we believe the equation should be re-thought to more accurately reflect the damping effect and the less than 100% limit.

3.1.3 ANALYSIS ISSUES

Number of Releases Inherent in Alternative 3

Of all the issues, this is our strongest complaint. We believe that a software development plan with 20 releases in 29 months is doomed to failure. Grouping your changes into baseline releases is one of the cornerstones of Configuration Management. If we say each release takes approximately 6 months to develop, that implies that there are always four or more releases in development simultaneously. This is a project management and configuration management nightmare. Having more than one release in progress simultaneously presents coordination and scheduling problems. We recommend that options 1 and 3 be re-worked with a manageable number of releases.

Cost Avoidance

The cost savings from hours saved need to be recalculated as a function of extra income generated rather than salaries saved.

Contractor Versus State Managed

The study needs to be upgraded to better reflect the benefit of using a contractor. The study should reflect varying costs based on the selected management model. Although it is recognized that the project is not defined well enough to use the actual COCOMO[7]

[6] ACF Feasibility, Alternatives and Cost/Benefit Analysis Guide, page 3-1.
[7] "Constructive Cost Model (COCOMO)" Software Engineering Economics, Barry Boehm, 1981.

model, some effort should be given to looking at the COCOMO cost drivers and estimating their effect on the various options.

3.1.4 MISCELLANEOUS ISSUES

All of the miscellaneous issues identified were minor. They should be fixed but have little bearing on the study's outcome if they are not.

If the State of New York chooses to provide their own management as proposed in option 3, a prime requirement will be a strong Software Program Manager with well-defined resources and charter. In addition, liberal use of Quality Assurance and Configuration Management is recommended to ensure the project remains on track.

3.2 INDEPENDENT VERIFICATION AND VALIDATION (IV&V) ASSESSMENT

The IV&V assessment team provided the following recommendations to the State's CSES project management team during the course of the two-day onsite visit to the project site. Also provided in this section are requirements for the State's IV&V provider for their use in the creation and finalization of a comprehensive Statement of Work.

3.2.1 INDEPENDENT VERIFICATION AND VALIDATION (IV&V)

Based upon our discussions with State staff during this initial IV&V review, the State must acquire Independent Verification and Validation services in accordance with 45 CFR 307.15(b)(10). These services can be obtained from a contractor via a Request for Proposal (RFP) or from an independent State agency. If a contractor is used, the RFP and contract must be submitted to ACF for prior approval, regardless of the cost or thresholds. The contract must include the names, experience, and skills of key personnel who will actually perform the IV&V analyses. If IV&V is performed by another State agency, similar, equivalent documentation must be submitted, usually taking the form of a detailed Interagency Cooperative Agreement. The State must then submit an Advance Planning Document Update (APDU) describing in sufficient detail, the prescribed IV&V activities, work products, and costs eligible for Federal financial participation.

This IV&V activity should describe two levels of IV&V services. The first level will consist of periodic reviews as specified below to monitor the overall status and management of the project's development effort. Many aspects of this level of IV&V services are described in this report, and will be further defined by the State's own IV&V Service Provider.

The second level of IV&V services are full technical reviews of various facets of the system's software and hardware operation and performance, and documentation

maintenance, as needed. Each of these levels of IV&V services is discussed in detail below. **In each case, the IV&V Service Provider must supply all plans and reports of findings and recommendations to OCSE Central and Regional Offices at the same time that they are supplied to the State, including draft documents submitted for comment and review.**

3.2.2 PERIODIC IV&V REVIEWS

Periodic IV&V reviews will be required to ensure the project is on schedule and that requirements are being met for Federal certification. The first of these reviews will be required near the end of the State's initial planning phase. This first review will focus primarily on the State's Implementation Advance Planning Document (IAPD). This review will also examine the project's organization as well as Request for Proposals for vendor support for the Development Phase of the project. A second IV&V review will be needed at the completion of the Requirements Definition Phase of the project. The primary objectives for this second review will be to review the processes for requirements definition and project management, to ensure shareholder buy-in to the project and to the system requirements, and to examine the documentation of system requirements. Subsequent reviews will be periodic every 6-8 months. The frequency and task level of these reviews will be reported in the IV&V Management Plan. These periodic reviews will require the IV&V Service Provider to assess system development in areas including, but not limited to, the following:

- Analyze project management and organization, evaluate project progress, resources, budget, schedules, work flow, reporting and contractor oversight.
- Review and analyze project management planning documents.
- Review and analyze project software development documents.
- Review and analyze processes to ensure they are being documented, carried out, and analyzed for improvement.
- Monitor the performance of the QA contractor by reviewing its reports and performing spot checks of system documentation.
- Assess and recommend improvement, as needed, to assure continuous stakeholder buy-in, support and commitment, and that open pathways of communication exist among all stakeholders.
- Assess and recommend improvement, as needed, to assure lines of communication between vendor staff and State management are in place and engaged.
- Assess and recommend improvement, as needed, to assure appropriate user and developer training is planned and carried out.

- Assess and recommend improvement, as needed, to assure establishment and maintenance of a data center, including data center input to the project regarding operational and maintenance performance of the application.
- Develop/update a risk management plan and conduct periodic risk analyses to identify, analyze, and mitigate risks.
- Review and analyze system capacity studies.
- Review system hardware and software configuration and report on any compatibility and obsolescence issues.
- Assess and recommend improvement, as needed, to assure software testing is being performed adequately through review of test plans or other documentation and through direct observation of testing where appropriate, including participation in and coordination of peer reviews.
- Develop performance metrics, which allow tracking of project completion against milestones set by the State.
- Report on the State's efforts to address the findings and recommendations from this IV&V Assessment Review Report, as well as the forthcoming IV&V Planning Review.

Some of the above tasks may already be assigned to the State's QA provider. In that case, the IV&V provider would be responsible for ensuring these tasks are being performed through the review of QA products and reports.

3.2.3 FULL TECHNICAL IV&V REVIEWS

In addition to the periodic reviews discussed in the previous section, the State should consider employing full technical (software and hardware) IV&V reviews. These reviews could be prompted by major milestones in the project's development cycle such as program version turnover or completion of a test phase. A full technical review may also become necessary as a result of significant findings during the periodic IV&V reviews, such as a need to assess application performance or system capacity issues. These reviews may also be initiated by the State to give them assurance that the project's code base, documentation, etc., is in good shape and to identify and address any problems before they become unmanageable. Full technical IV&V reviews may include, but not be limited to the following areas of review for remediation and elimination of deficiencies:

- Perform a detailed review of the system documentation (Requirements, Design, Training, Test, Management Plans, etc.) for accuracy and completeness.
- Perform a detailed review of the software architecture for feasibility, consistency, and adherence to industry standards.

- Inventory and review the application software for completeness and adherence to programming standards for the project.

- Review the traceability of system requirements to design, code, test, and training.

Analyze application, network, hardware and software operating platform performance characteristics relative to expected/anticipated/contractually guaranteed results and industry standards/expectations.

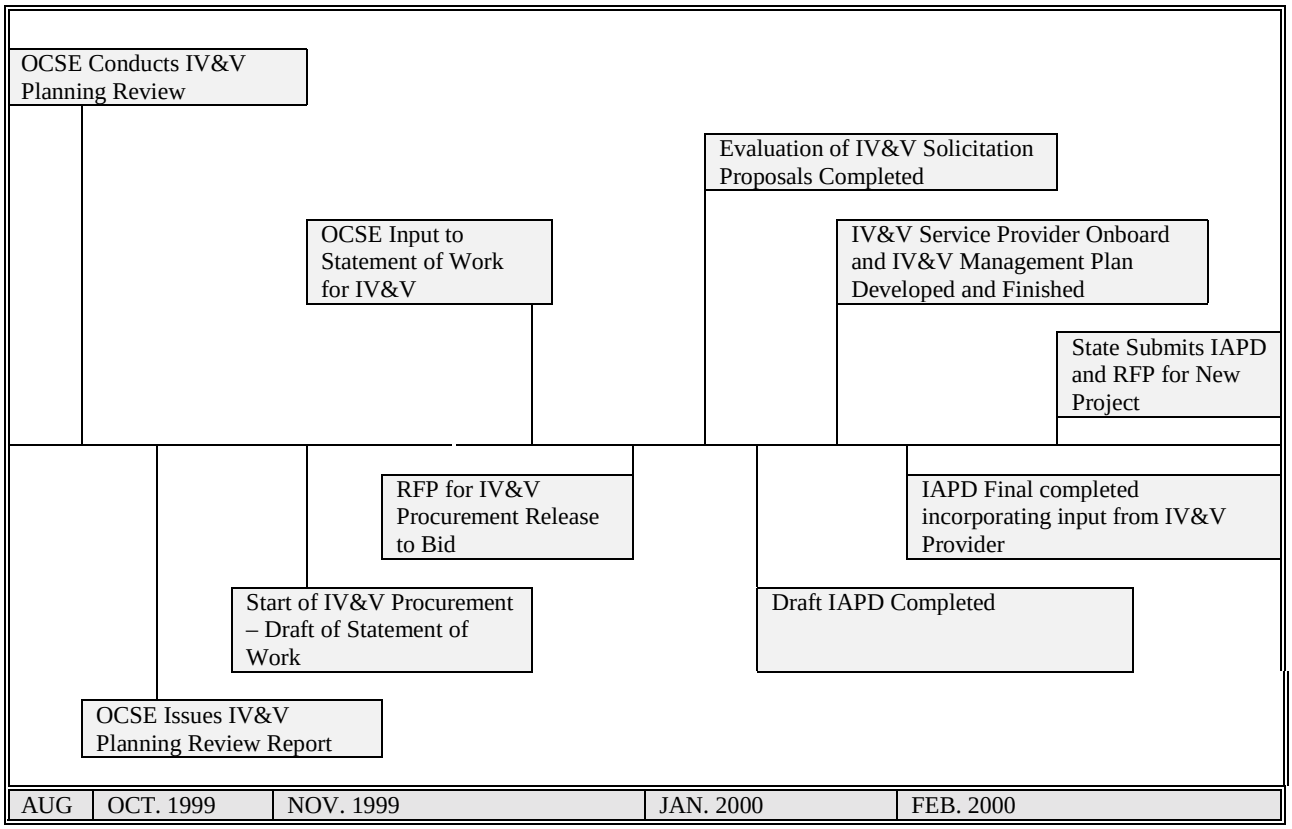
3.2.4 IV&V MANAGEMENT PLAN

Many of the recommendations contained in this report are presented to the State in the form of general requirements for the State to incorporate into what this review refers to as an "IV&V Management Plan[8]." The plan should be one of the first deliverables created by the State in collaboration with its IV&V Service Provider. The recommendations in this report are intended to assist the State in the creation, and refinement of an acquisition/procurement document's Scope of Work for the eventual solicitation of an IV&V Service Provider. The IV&V Management Plan will then be refined and finalized based upon the IV&V Service Provider's detailed Technical Proposal to the State's IV&V solicitation (e.g., Scope of Work in a Request for Proposal) document. If the IV&V Service Provider is to be a State agency, the IV&V Management Plan, incorporating these recommendations, will be jointly constructed as part of an interagency agreement defining the roles and responsibilities between the Title IV-D agency and the State agency serving as the IV&V Service Provider. OCSE is committed to providing ongoing technical assistance to the State relative to the creation and finalization of a comprehensive Statement of Work for the acquisition of a IV&V Service Provider, as well as in consultation and coordination with the State on all aspects of project management and organization.

Table 2. presents an estimated timeline representing an appropriate order for the major milestones in the planning phase, from the issuance of this report through to the final submission for Federal review and approval of an Implementation Advance Planning Document (and if needed, a Request for Proposal for the Implementation of ASSET$.).

[8] The need for an IV&V Management Plan, beyond its use as a basis for a Scope of Work for an IV&V Service Provider (whether contract or State agency) is as a detailed plan of action for periodic independent reviews of the ASSET$ project's critical development and implementation phase procurements, milestones and deliverables. In addition, it serves as vital documentation to the State's forthcoming Implementation Advance Planning Document Update and Corrective Compliance Plan.

Table 2. Estimated Critical Milestones Schedule in CSES Project Planning Phase



3.2.5 PROJECT INITIATION

The State must now finalize their decision based upon the analyses contained in the ASSET$ feasibility study and get underway with the planning phase of the project. This is essential not only to get the planning phase of the project completed in a timely manner, but also to allow time for staffing the project prior to the initiation of the development phase.

3.2.6 PROJECT PLANNING AND REPORTING

The IAPD must address the findings in section 2.2.2 as follows:

- Option 1 (the Status Quo) must be reworked with no changes to the existing legacy system. If the State wishes to keep the option of the existing system with all improvements not requiring new hardware or COTS software, they may include this as a separate option.

- The State needs to reduce the selected option's releases to a manageable number, probably no more than 5 or 6, and in doing so reduce risk and improve manageability. This will also require a reworking of the end calculations of the option.

- Due to the heavy weighting given to the importance of reaching the federally mandated 80% compliance levels in the feasibility study, we believe the equations for these calculations should be re-thought to more accurately reflect the real, non-linear effect of these equations.

In addition, the IAPD must identify and address how the State plans to track critical milestones for the project. Milestones are typically set for the beginning and/or end of project modules, significant tasks or deliverables, and are relative to the size, complexity and cost of the effort. Traditional milestones tend to be based on project life cycle methodology and at a minimum address requirements analysis, procurement, design, acceptance testing, pilot testing, and implementation. Critical milestones are defined as those milestones, which if not met, would jeopardize the State's ability to meet program requirements within statutory timeframes.

3.2.7 PROJECT PERSONNEL

We encourage the State to make every effort to limit the Master Vendor Contracts to a single vendor, if possible. If not possible, we recommend keeping the number of different vendors to a minimum. Based upon experiences in other States, the fewer the number of vendors in a "body shop project", the more manageable the project. This approach will limit the amount of coordination the State's Project Director will need among the various contractors. It will also help achieve accountability among State and contractor staff as well as reduce the likelihood of "passing the buck" on assigned tasks or passing on responsibility when things go wrong. A clearly defined set of responsibilities and a clearly defined reporting path will be essential to keeping a project of this size on schedule and on budget.

While it is important for the State to demonstrate that the overall management of the project is the direct responsibility of State personnel, we recommend the State consider

augmenting their State management staff with a Technical Program Manager who would report directly to the State's Project Director. This does not reduce the role of the State's Project Director. A project of this size and complexity warrants the hiring of a technical manager, particularly to oversee the management of multiple body shop staff, if a single vendor is not possible. In addition, use of the project's Quality Assurance vendor in an additional role of providing ongoing, day-to-day project monitoring, management reporting, and cost and activities tracking, including the use of standardized project management software tools would be well-advised.

The IV&V provider must ensure sufficient staffing with the appropriate level of job skills exists for the ASSET$ development effort.

3.2.8 PROJECT ORGANIZATION

During the planning phase for the ASSET$ project, the State must consider methods to ensure a smooth line of authority and cooperation between the CSMS and ASSET$ projects. These lines of authority must be clearly defined in the State's IAPD. The State must also take measures to ensure staff hired to work on ASSET$ development remain fully dedicated to that effort. Quality Assurance may help to some degree by monitoring proper use of system resources (in this case, personnel). We also feel other measures should be considered by the State during the planning phase of the ASSET$ project. Measures such as an Interagency Agreement between CSMS and ASSET$, bringing the two projects together under the same management structure, or other measures as determined by the State should be considered. Any decisions made should be specified in the State's IAPD.

The IV&V Service Provider must assess for assurance that the lines of authority between the CSMS and ASSET$ projects are clearly defined and that communications between these two projects is effective. The IV&V provider must also assess that staffing resources are being properly utilized.

3.2.9 QUALITY ASSURANCE

The State should begin the procurement process for the Quality Assurance (QA) vendor immediately so the QA personnel can provide support during the planning phase for the ASSET$ project. This QA support during the planning phase would include support in writing the IAPD, writing of RFP's for development staff, developing the processes and associated process documents for management of the project, determining the requirements for lines of authority between CSMS and ASSET$ project management, and developing the Configuration Management Plan for the project. The State's IAPD must provide a description of the project's organization which shows planning for a QA organization which reports to the State's Project Manager. The IAPD must also specify

that the QA provider will be independent from the IV&V provider. Finally, in accordance with our recommendations regarding use of the QA vendor to support project management tracking and reporting, the QA vendor, if brought aboard the project timely, should be tasked with considerable documentation tracking, compilation and reporting tasks directly supportive of the IAPD process.

3.2.10 REQUIREMENTS MANAGEMENT

The coordination of system requirements between the CSMS and ASSET$ projects must be considered by the State during the initial planning phase for the ASSET$ project. Results of this coordination planning must be included in the State's IAPD for the ASSET$ project.

During the periodic reviews, the State's IV&V provider should monitor requirements management for the ASSET$ project and coordination of requirements between the ASSET$ and CSMS projects. The IV&V provider must also monitor that processes for Change Management and Requirements Traceability are in place and are being utilized by the project.