STATE OF ALASKA
NORTHERN SUPPORT THROUGH AUTOMATED RESOURCES (NSTAR)

INDEPENDENT VERIFICATION & VALIDATION ASSESSMENT REVIEW JULY 21-23, 1999

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

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EXECUTIVE SUMMARY

As a result of missing the October 1, 1997, deadline for achieving statewide installation and operation of a comprehensive automated child support enforcement system as required under the requirements of the Family Support Act of 1988, Alaska's Northern Support Through Automated Resources (NSTAR) child support enforcement system project became subject to mandatory provisions of 45 CFR 307.15(b)(10). These provisions require an entity independent of the State Title IV-D agency and of the NSTAR project management structure to review all technical and managerial aspects of the project.

An Independent Verification and Validation (IV&V) assessment of the NSTAR project was conducted by the Federal Office of Child Support Enforcement (OCSE) of the Administration for Children and Families (ACF) on July 21-23, 1999. The purpose of the assessment was to determine the extent of IV&V services required on the NSTAR system project. This report presents the findings of our assessment review.

SUMMARY OF FINDINGS AND RECOMMENDATIONS

SCOPE OF REQUIRED IV&V SERVICES

The State must immediately acquire IV&V services for the NSTAR development project. This assessment addressed many areas of system development at a preliminary level. These areas included project management, project personnel, training, process definition, product standards, quality assurance, configuration management, system hardware, system security, system capacity, requirements, requirements management, software design and test. As a result of the assessment review, several areas requiring IV&V services were identified. They include:

- Project Planning and Reporting
- Process Definition and Product Standards
- Requirements and Requirements Management
- Design Documentation
- Configuration Management
- System Software

The IV&V provider who supplies these services shall review and make recommendations on the following areas of the NSTAR development process as described in Section 3 of this report. **IV&V services will be required until as the State of Alaska successfully implements and receives Federal certification of NSTAR for all requirements of the Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (PRWORA).**

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).**

These areas are discussed in detail in the report (see Section 2. *Findings*). Two common threads that surfaced throughout our review and which are addressed in some detail in this report's findings were the small size of the State's project staff and the lack of current documentation. A primary concern noted in the review was that the loss of just one or two key State personnel could have a severe, negative impact on the State project's development capability, management and schedule. As a result, it becomes imperative that all aspects of the system be well documented.

IV&V SERVICES PROVIDER

The State must identify the requirements for, and formulate a Scope of Work for ongoing IV&V services to the State's NSTAR project. The State must begin the acquisition process for these services now to avoid further schedule delays. Therefore, the State should immediately identify potential IV&V resources in-State. If these resources, independent of State's Child Support Enforcement Division (CSED) and its umbrella agency (as specified in Action Transmittal OCSE-AT-98-26), 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.

PRIOR APPROVAL

The Request for Proposal (RFP) and resultant 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 66 percent 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 State of Alaska successfully implements and receives Federal certification of NSTAR for all PRWORA requirements. ACF will periodically reevaluate the IV&V scope of work and frequency requirements of NSTAR 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.

STATE COMMITMENT

Continuing State commitment to the NSTAR project is essential. The State must ensure that the NSTAR project has sufficient resources to implement the IV&V recommendations. In addition, the State should be prepared to support ongoing maintenance of the NSTAR system after Federal certification. An operationally successful system, particularly one of the scope of complexity of a statewide child support system, requires a significant commitment of ongoing maintenance resources.

INDEPENDENT VERIFICATION AND VALIDATION (IV&V) ASSESSMENT REVIEW REPORT FOR THE ALASKA NSTAR PROJECT

1. INTRODUCTION

The State of Alaska missed the October 1, 1997, Federal certification deadline for operating a statewide, comprehensive automated system meeting for the requirements of the Family Support Act of 1988. As a result of missing this deadline, the NSTAR system development project became subject to the mandatory provisions of 45 CFR 307.15(b)(10). These provisions require that an entity independent of the State's IV-D agency and automation project review and report on all technical and managerial aspects of the project. Consequently, the Administration for Children and Families (ACF), Office of Child Support Enforcement (OCSE) conducted an Independent Verification and Validation (IV&V) Assessment Review of the State of Alaska's Northern Support Through Automated Resources (NSTAR) child support enforcement system project. As part of this IV&V Assessment Review, and prior to conducting an on-site review, ACF reviewed the project's current software documentation, as well as current and future management planning for the project in order to make recommendations on the extent of the IV&V services that the State will be required to obtain. Subsequent to the on-site review, additional analysis was performed of the State's documentation and information gathered during the on-site review. This report presents the results of this Office's IV&V Assessment Review of the NSTAR project.

1.1 BACKGROUND

As a result of ACF's request for an IV&V Assessment Review, a site visit to help determine the required scope of IV&V for the NSTAR project was held July 21-23, 1999, at the NSTAR development office in Anchorage, Alaska. ACF provided a list of questions and documentation requests to NSTAR management before the site visit.

IV&V review team members interviewed State project staff and collected data for its IV&V assessment at the Alaska Department of Revenue Child Support Enforcement Division (CSED) offices in Anchorage, Alaska. ACF's IV&V Assessment Review team consisted of the following Central Office staff:

Mike Fitzgerald	ACF/OCSE
John Cheng	ACF/OCSE
Tom Mahony	Marconi Systems Technologies (consultant)

They were assisted by the following Alaska CSED personnel:

John Mallonee	CSED Assistant Director
Susan Goodman	CSED Data Processing Manager
Judy Webb	CSED LAN Manager and Database Coordinator
Steve Rees	CSED Quality Control
Hank Wiedle	CSED Training

1.2 METHODOLOGY

Prior to the site visit, ACF supplied CSED with an extensive questionnaire on systems engineering topics. The site visit consisted primarily of follow-up questions to CSED personnel based on the State's responses to the questionnaire. As a result of subsequent interviews, sample documents (see *Table 1. NSTAR Documents Reviewed*) for analysis were requested by ACF and provided by the State.

ACF analyzed all available documentation, including the questionnaire and CSED responses to follow-up questions. The following table contains documents collected by ACF:

Table 1. NSTAR DOCUMENTS REVIEWED

Document	Originator	Date
Annual Advance Planning Document Update	CSED	June 9, 1999
Application Developer's Toolkit	AMS	1995
Batch Run Report	CSED	June 1999
Capital Projects Plan	CSED	July 13, 1999
Change Order Documentation - Final Draft	AMS	May 15, 1995
CSED Acceptance Test Plan - Draft	CSED	May 9, 1996
ELMO Detailed Design Document	Interwest	June 28, 1999
Disaster Recovery Manual	Alaska Information Technology Group	June 26, 1998
ELMO Status Report	Interwest	December 28, 1998
Enforcement Desk Manual - Change Memorandum	CSED	July 20, 1999
Hardware Report	Alaska Information Technology Group	July 14, 1999
Information Technology Group - Guide to Services	Alaska Information Technology Group	August 1997
ITG - Technical Services - Software Support	Alaska Information Technology Group	August 1997
JM11-1 Welfare Excess Test Script	CSED	

Document	Originator	Date
LAN Diagram - Firewall Needs Assessment - Draft	Department of Revenue	
Logon ID Request Form	Alaska Division of Information Services	March 31. 1998
Memo - Case Confidentiality	CSED	September 8, 1997
Monthly Report - Katrina Wheeler	CSED	May 31, 1999
Monthly Report - Kris Hutchin	CSED	May 31, 1999
NSTAR Functional Design Document	AMS	August 21, 1995
NSTAR Operations Manual	CSED	June 1, 1999
Open ITS List	CSED	May 21, 1999
Organization Chart	DOR/CSED	January 4, 1999
Personnel Policies - Use of State Office Technology Resources	State of Alaska	October 10, 1996
Programming with NET/CORE Foundation Software	Data Base Management, Inc. (AMS)	
Security Manual	CSED	January, 1995
Service Request Forms		October 9, 1998
Service Request Forms	CSED	October 1998
Space Projection Report	Alaska Information Technology Group	July 22, 1999
Staff Resumes	CSED	
Status Report	AMS	March 13, 1996
Status Report	AMS	February 20, 1997
Status Report	AMS	July 2, 1999
Status Report	G. L. Mills Consulting	March 27, 1999
Status Report	William Shumate Consulting	June 15, 1999
Status Report and Deliverable Sign-off	Diversified Systems, Inc.	June 1, 1998
Strategic Systems Direction Report	Deloitte & Touche	October 22, 1993
Training Policy (Draft)	CSED	July 16, 1999
Update on Alaska Certification	CSED	July 22, 1999

2. FINDINGS

The findings in this report are based on the discussions held with State staff during July 21-23, 1999, and upon the system documentation review. This report intentionally does not assess past performance except where applicable to current project status. The focus of this report is on what needs to be accomplished by the State to ensure future project success.

2.1 PROJECT PLANNING AND REPORTING

The review team found that the project has no consistent format for program plans or project reports. The Capital Projects Plan is text-based. This plan displays total planned dollar expenditures and dollars expended for each task, as well as a start and end date for each task. It does not indicate who is assigned to specific tasks or what percentage of task work is complete. In addition, it does not consistently identify critical milestones or lifecycle phases. The Preliminary Development Schedule for the Electronic Modification Project (ELMO) uses a Gantt chart format for task dates and costs-in-hours. Though this schedule further identifies life-cycle phases and some milestones, it does not present a budget or personnel assignments.

Reports from contractors vary in format and content. Personnel assigned to tasks are not always identified, nor are task's milestones and progress toward milestones always identified.

2.2 PROCESS DEFINITION AND PRODUCT STANDARDS

Most NSTAR development is done by American Management Systems (AMS), but some is also done by State personnel and by contract staff hired off a master vendor list (bodyshop contract). Various contractors on the project have used different products, formats, and standards in their development. No clearly defined and comprehensive standards apply to all aspects system development activities. Though some Alaska Information Technology Group data standards, and some AMS standards have generally been followed, they do not cover all aspects of system development.

There should be little or no redundancy between documents. However, the ELMO Detailed Design Document, for example, contains a Project 1099 Interface Layout. This interface layout should more appropriately be uniquely defined in a separate document, not redefined in every design document that uses the interface. Such redundant design documentation increases the opportunities for and thus instances of inconsistent documentation maintenance.

There should be a set of defined processes, products, formats and standards for every phase of NSTAR development, not different contractors producing different documents in different formats. All contracted software development and project support staff should be contractually obligated to adhere to prescribed NSTAR standards and processes in their design and

development of NSTAR products. Such adherence to standards would increase software design and development accuracy, improve system maintainability, better define the various contractor responsibilities, and enhance contractor performance measurement.

2.3 REQUIREMENTS AND REQUIREMENTS MANAGEMENT

The current NSTAR system has no separate requirements document and no requirements traceability capability. Software requirements should be a language-independent specification of the functionality of a software product, as well as of any constraints the product must satisfy. It allows people not familiar with the implementation of the system to understand the intent of the system at a detailed level.

Software design is developed based on the software requirements. It may take many design elements, both batch and on-line, to satisfy one requirement and conversely, one design element may satisfy many simple requirements. Requirements traceability information should detail what design elements satisfy what requirement and what code element satisfies what design element. It is then possible to develop tests that exercise all the code associated with a particular requirement and to determine accurately the impact on design, code and test of a change in a requirement.

It is very difficult for a person not intimately familiar with the NSTAR system to tell what requirements the system satisfies, what requirement a design or code element satisfies, where a requirement is implemented, what test(s) are needed to verify a requirement, and what impact changing a requirement may have. This significantly increases the difficulty of modifying the system successfully including causing unnecessary code and design work. Accurate testing of the system is also made more difficult and can result in unnecessary testing. It also increases the vulnerability of the project to the loss of key personnel.

2.4 DESIGN DOCUMENTATION

Alaska's NSTAR system design is not presented in a consistent format or at a consistent level of detail. The review team found that the design documents are sometimes the only source of system requirement information. Design changes have not been incorporated into a master design document consistently. There is no clear distinction between general (high-level) design and detailed design. The NSTAR Functional Design Document, for example, contains a description of a subsystem and its screens, but does not define the programs within the subsystem. The ELMO Detailed Design Document, on the other hand, contains both a description of the subsystem and pseudo-code for the component programs.

2.5 CONFIGURATION MANAGEMENT

NSTAR **code** is under good configuration control. The project uses separate regions for development and test. Migration between regions is done on approval by the Data Processing Manager with e-mail confirmation. Computer Associates' (CA) Librarian tool is used for version control. Software errors are recorded, prioritized (including an "aesthetic" category), and tracked to resolution via Service Request Forms.

Control of documentation, however, appears less organized. Design documents do not have version numbers and they are not updated rigorously. Design changes are not always integrated into a master version. Letting the documentation become out-of-date or difficult to reconstruct increases the difficulty of maintaining the system and increases the vulnerability of the project to the loss of key personnel.

2.6 SYSTEM SOFTWARE

CORE is a proprietary AMS product used by NSTAR to access the ADABAS database. It is written in assembly language and is not maintained by CSED. CSED is dependent on AMS for product support. Although CSED holds a license to the current version of CORE, this is a high maintenance risk, as AMS may not continue to support the product or support may become prohibitively expensive. Further complicating the issue of the use of CORE is that new versions of ADABAS may not be compatible with CORE.

3. RECOMMENDATIONS

The following recommendations are presented herein based upon the on-site review by the IV&V Assessment Review team on July 21-23, 1999, as well as preliminary and subsequent analyses of the State's NSTAR project documentation.

3.1 INDEPENDENT VERIFICATION AND VALIDATION (IV&V)

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 an 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.**[1]

This IV&V activity should describe the level of IV&V services to be provided, consisting of an initial review at contract (or State agency agreement) activation and semi-annual reviews to monitor the overall status and management of the project's development effort. Many aspects of this level of IV&V services are briefly described below, and will be further defined by the State and its 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 (including draft documents submitted for comment), as specified in 45 CFR 307.15(b)(10)(ii).**

An IV&V management plan must be developed as described in section 3.2 *IV&V Management Plan.* The recommendations in Section 3.3 *Project Planning and Reporting* through Section 3.7 *Configuration Management*, require an initial review followed by periodic reviews. These reviews are summarized in the *Initial and Semi-Annual IV&V Reviews* paragraphs below. The recommendation in Section 3.8 *System Software*, requires an initial analysis with subsequent IV&V recommendations to be based on the results of the analysis.

INITIAL AND SEMI-ANNUAL IV&V REVIEWS

An initial (at contract or State agency agreement activation) and semi-annual IV&V reviews shall be required to ensure the project is on schedule and requirements are being met for Federal certification. The frequency and task level of these reviews will be defined in the IV&V

[1] IV&V services are eligible for reimbursement at the regular (66 percent) rate of Federal financial participation.

Management Plan. The initial and semi-annual reviews will require the IV&V Service Provider to assess system development in areas including, but not limited to, the following:

a) Analyze project management and organization, evaluate project progress, resources, budget, schedules, work flow and reporting.

b) Review and analyze project management planning documents.

c) Review and analyze project software development documents.

d) Review and analyze processes to ensure they are being documented, carried out, and analyzed for improvement.

e) Assess the project's CM function/organization by reviewing its reports and making recommendations regarding appropriate processes and tools to manage system changes.

f) Perform a detailed review of the system documentation (Requirements, Design, Training, Test, Management Plans, etc.) for accuracy and completeness.

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

h) Develop performance metrics, which allow tracking of project completion against milestones set by the State. Monitor the performance of the QA function/organization by reviewing its reports and performing spot checks of system documentation.

i) Assess the project's risk management plan and make recommendations regarding organization, processes, policies, and overall effectiveness of the plan to identify, analyze, and mitigate potential project risks.

j) 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.

k) Report on the State's efforts to address the findings and recommendations from this IV&V Assessment Review Report.

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

The initial and semi-annual IV&V reviews of system development in the following areas are <u>not currently required</u> for the NSTAR project. However, the State is advised to select an IV&V Service Provider with the appropriate technical skills and resources available to support such reviews should they become necessary as a result of significant findings during the semi-annual IV&V reviews.

a) 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.

b) Assess and recommend improvement, as needed, to assure lines of communication between project staff and State management are in place and engaged.

c) Assess and recommend improvement, as needed, to assure appropriate user and developer training is planned and carried out.

d) Assess and recommend improvement, as needed, to assure maintenance of a data center, including data center input to the project regarding operational and maintenance performance of the application.

e) Review and analyze system capacity studies.

f) Review system hardware and software configuration and report on any compatibility and obsolescence issues.

FULL TECHNICAL IV&V REVIEWS

Full technical (software and hardware) IV&V reviews are not currently required for the NSTAR project. However, the State is again advised to select an IV&V Service Provider with the appropriate technical skills and resources available to support such reviews should they become necessary as a result of significant findings during the semi-annual 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 it 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:

a) Perform a detailed review of the software architecture for feasibility, consistency, and adherence to industry standards.

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

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

3.2 IV&V MANAGEMENT PLAN

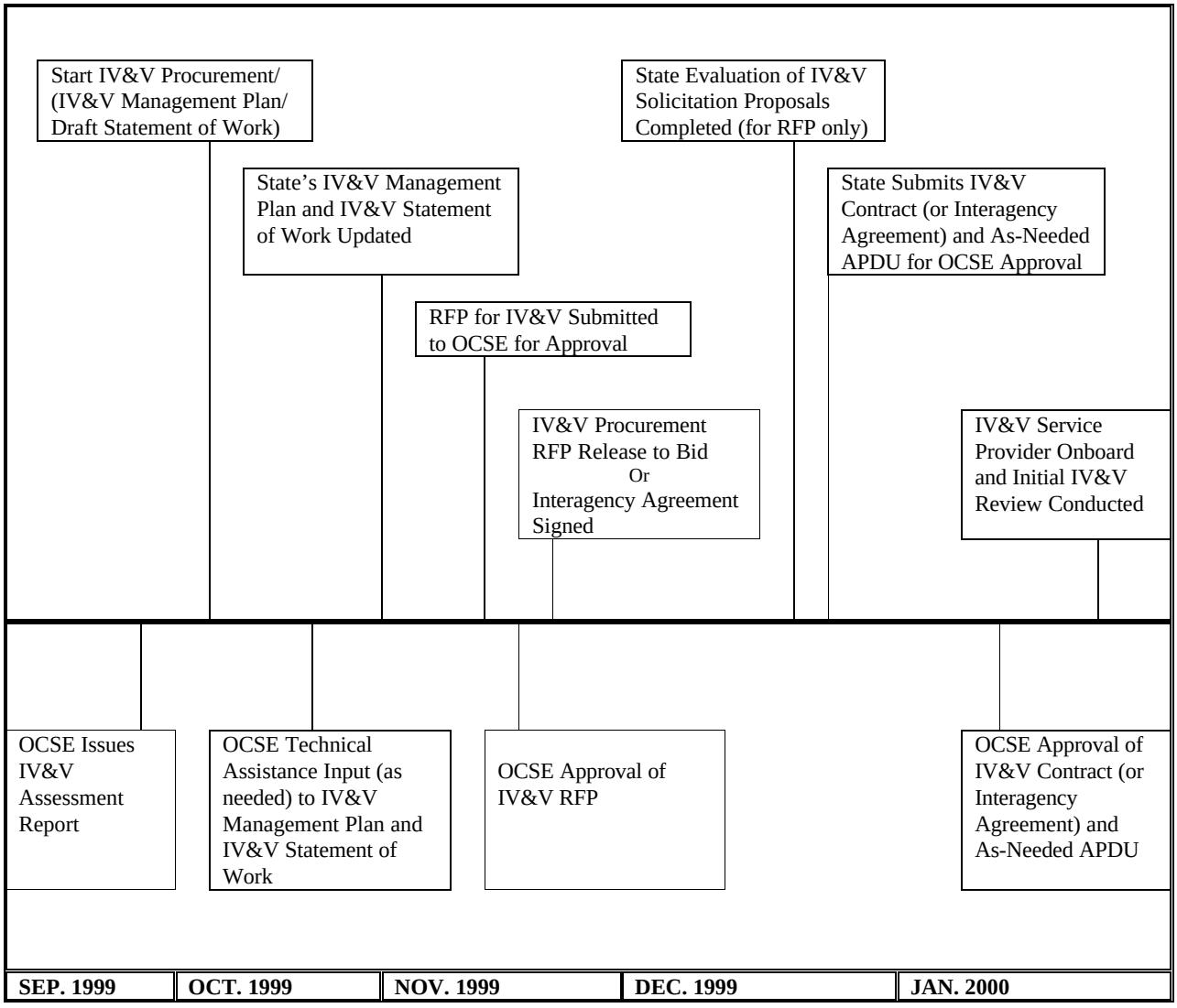
Many of the recommendations contained in this report are presented to the State in the form of general requirements for the State to incorporate into what this report refers to as an "IV&V Management Plan".[2] These recommendations are intended to assist the State in creating and refining an acquisition/procurement document's Scope of Work for the eventual solicitation of an IV&V Service Provider. 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 Cooperative 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 technical assistance in the form of documentation review and recommendations, as needed, to assist the State in the development of its Interagency Cooperative Agreement or Statement of Work for the acquisition of the IV&V Service Provider.

Table 2. Estimated Critical Milestone Schedule in NSTAR IV&V Procurement presents an estimated timeline representing an appropriate order for the major milestones in the NSTAR IV&V procurement phase, from the issuance of this report through to the IV&V Service Provider being brought onboard, to completion of the IV&V Management Plan. The State should use this estimated timeline as guidance in the development of its initial IV&V Management Plan that will be part of the State's required As-Needed APDU and subsequent updates. A more accurate procurement schedule developed by the State for inclusion in its forthcoming As-Needed APDU and IV&V Management Plan should reflect and be consistent with the State's procurement processes and timeframes. If the use of an expedited procurement process is an option for the State, then this should be seriously considered for this effort. The IV&V Management Plan should be reviewed and updated once the IV&V Service Provider is selected and onboard. This revised and finalized IV&V Management Plan should be one of the first IV&V Service Provider deliverables and should reflect any schedule changes consistent with the IV&V Service Provider's detailed Technical Proposal to the State's IV&V solicitation document.

If the NSTAR project does not meet the State-provided, OCSE-reviewed/approved milestones the project might then be subject to additional IV&V monitoring. ACF will also periodically reevaluate the IV&V scope of work and frequency requirements of NSTAR 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.

[2] 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 NSTAR project's critical development and implementation phase milestones and deliverables. In addition, it serves as vital documentation to the State's required update to its As-Needed Advance Planning Document Update.

Table 2. Estimated Critical Milestone Schedule in NSTAR IV&V Procurement



3.3 PROJECT PLANNING AND REPORTING

The State should develop a uniform format for planning and reporting cost and status of development tasks for both State personnel and contractors. Internal project plans and reports should be consistent in format and provide project management, at a minimum, the information required for Advanced Planning Document Updates (APDUs). For APDUs, OCSE requires a project schedule that describes each task with respective significant subtask(s), with a start date, an end date, lifecycle phases, critical milestones, and display of progress toward these milestones. The schedule should be broken out by quarter and be closely tied to the project budget (see

OCSE-AT-99-03 Addendum to State Systems Advanced Planning Document Guide for Child Support Enforcement Systems - March 1999).

3.4 PROCESS DEFINITION AND PROJECT STANDARDS

An IV&V provider should assist the State in the development of a Software Development Plan and other documentation specifying the discrete software design and development processes, products and standards for NSTAR development. A process definition for each development process (requirements analysis, design, code, test, etc.) should be developed which should answer at least the following questions:

- What are the entrance criteria for this process ?
  (products and people that need to be ready or decisions that need to be made)
- What methods are used and what activities take place in this process?
  (JAD sessions, informal design meetings, functional decomposition, object-oriented analysis, normalization, ER modeling, prototyping, batch runs, data analysis, etc.)
- What are the products of this process?
  (requirements, general design, detailed design, code, test plans, test results, etc.)
- What are the product standards ?
  (documents describing required content and format)
- How are different versions of the products identified and maintained ?
  (configuration identification and change control)
- How are errors found and tracked during this process?
  (errors should be recorded and prioritized, corrective action scheduled, assigned, and tracked to completion)
- How is the quality of products assured ?
  (reviews, inspections, sign-offs, process monitoring etc.)
- How are the products of this process related to the system requirements ?
  (Design, data, code, test, and training should directly traceable to requirements)
- What software is used ?
  (OS, CASE tools, databases, compilers, tracking software, test tools, planning software, CBT etc.)
- What hardware is used ?
  (CPU, networks, storage, etc.)
- How are the participants in this process trained ?
  (Training class, CBT, manuals, informal personal training, etc.)
- What is reported to management during this process ?
  (Hours, tasks, dates, errors, software metrics, etc.)
- What steps are taken to improve this process ?
  (Quality management methods, analysis of productivity and quality data)

- What are the exit criteria for this process ?
  (The products and/or activities that need to be completed before the next process can begin. Reviews, sign-offs, acceptance testing etc.)

The IV&V Service Provider must verify initially that all processes are defined. Subsequent activities must ensure that the IV&V provider monitor process fidelity by verifying periodically (every six months) that the project's documentation and development processes are being implemented as defined.

3.5 REQUIREMENTS AND REQUIREMENTS MANAGEMENT

In conjunction with the recommendations in Section 3.4, the IV&V Service Provider should assist the State in identifying or defining (as necessary) a standard and format for NSTAR software requirements as well as a methodology for requirements traceability. The IV&V Service Provider must then verify periodically (every six months) that areas of new development have software requirements documents that are complete and accurate, follow approved standards and formats, and have an appropriate level of configuration control.

3.6 DESIGN DOCUMENTATION

In conjunction with the recommendations in Section 3.4, the IV&V Service Provider should assist the State in defining a standard and format for NSTAR design documents. The IV&V Service Provider must then verify periodically (every six months) that areas of new development have software design documents that are complete and accurate, follow approved standards and formats, are traceable to requirements, and have an appropriate level of configuration control.

3.7 CONFIGURATION MANAGEMENT

In conjunction with the recommendations in 3.4, the IV&V Service Provider should assist the State in developing a Configuration Management (CM) plan for the NSTAR project through operations and maintenance. The plan must define the products that should be under CM control, the tools and/or methods to be used for keeping code and documentation up-to-date, and the tools and/or methods to be used to tracking errors. The IV&V Service Provider must then verify periodically (every six months) that the plan is being implemented.

3.8 SYSTEM SOFTWARE

An IV&V Service Provider with experience in similar middleware technology should analyze the projected costs and benefits of the CORE product to the NSTAR project. The provider should determine the projected cost, stability and viability of CORE by evaluating the size of the existing install base of CORE and AMS's long-range maintenance plans for the product. This cost and risk should be weighed against the benefits that CORE delivers to the NSTAR project. Recommendations for the following various alternatives need to be considered and weighed:

- Continued use and upgrade of CORE,
- Replacing CORE with a similar product
- Developing NSTAR proprietary code that emulates the functionality of CORE
- Removing the CORE middleware entirely, with NSTAR directly referencing the database.

This Office may make further IV&V recommendations for the State's IV&V Service Provider or to the State's NSTAR development project based on the results of this analysis.