#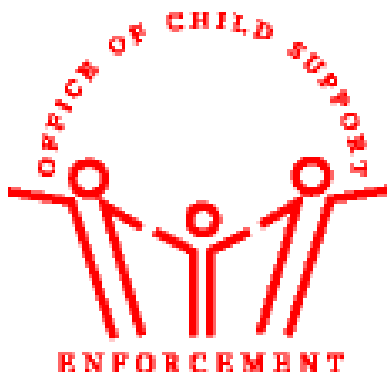 Nevada Operations of Multi-Automated Data Systems (NOMADS) Scope of Required Independent Verification & Validation Assessment Report

January 11, 1999

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

EXECUTIVE SUMMARY

As a result of missing the October 1, 1997 deadline for achieving federal certification for system modification to meet the requirements of the Family Support Act of 1988, the State of Nevada's automated Child Support Enforcement System 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 NOMADS project management structure to review all technical and managerial aspects of the project. An assessment of the scope of Independent Verification and Validation (IV&V) required for the Nevada Operations of Multi-Automated Data Systems (NOMADS), including the availability of the Office of Child Support Enforcement (OCSE) or its contractor to provide the IV&V services, was conducted on November 17-19, 1998. This report presents the findings of that assessment.

Scope of Preliminary Assessment:

This assessment addressed all areas of the system development at a preliminary level. These areas include project management, training, process definition, quality assurance, configuration management, requirements definition and management, system security, and system capacity. Each of these areas of development was further examined, as applicable, in the areas of systems engineering, operating environment, database management, development environment, software architecture, code, and testing. Again, these assessments were performed at a preliminary level due to the time allotted to this assessment.

Summary of Findings:

Deficiencies were found in all areas of system development cited above. Primary problem areas revolved around the issues of project management, reporting, organization and personnel, lack of process documentation, reporting deficiencies, and lack of system performance documentation. The findings are discussed in detail in Section 2.

IV&V Provider Requirements:

A full IV&V review addressing all areas of development of the NOMADS system is required. Because of the extent of the IV&V required, OCSE staff does not have the resources needed to supply the necessary detailed reviews of system plans and development. OCSE will assist to the extent that it has the resources. We will work with the State to determine how to best allocate Federal staff and contractor resources to assist Nevada in their IV&V review. The services of a contractor hired by the State will be required. The full IV&V review must address, but not be limited to the issues summarized below and described in more detail in Section 2 of this report:

1) A study of the effectiveness of the project organization currently in place. This must particularly address the areas of independence of testing and the need for eventual turnover of the NOMADS system to the State for maintenance and operations. It should also focus on methods of accelerating the development and implementation schedules so that the State can implement a certifiable IV-D system as soon as possible. (Reference paragraphs 2.1.1, 2.1.4, 2.1.5, 2.2, and 2.14).

2) A feasibility study and cost/benefits analysis based solely on the IV-D portion of the NOMADS system must be performed. This study should examine the option to implement the IV-D portion of the system separately from the rest of the system. This study should also examine other alternatives as determined by an alternative analysis. (Reference paragraphs 2.1.2, 2.1.3).

3) Determination of recommended means to document system requirements, software design and software development processes. (Reference paragraphs 2.3, 2.4, 2.5, 2.6, 2.7, 2.9, 2.13.1, and 2.13.2).

4) A study of both the development and user hardware to determine if the existing hardware will be capable of supporting the NOMADS system when it is implemented statewide. (Reference paragraphs 2.8, 2.10).

5) A study of the development software to determine if it will adequately support continued system development and if it will be supportable in the future for the maintenance and operations phase of the program. (Reference paragraphs 2.11.1, 2.11.2, and 2.12).

Other Findings:

Two other areas of concern arose from this assessment:

1) The first is an apparent decline in support from county District Attorney offices (Reference paragraph 2.1.1). This lack of support appears to be one of the primary causes of cost overruns and schedule slippage.

2) The second is confusion in the claiming of Federal Financial Participation (FFP) for system development efforts related to NOMADS. (Reference paragraphs 2.1.2, 2.1.3). Further review by a Federal and/or State financial review team is required to clear up these issues.

Nevada NOMADS Project
Scope of Required IV&V Assessment Report

January 11, 1999

1. Introduction

As a result of missing the October 1, 1997 deadline for achieving federal certification for system modification to meet the requirements of the Family Support Act of 1988, the State of Nevada automated Child Support Enforcement Systems 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 NOMADS project management structure to review all technical and managerial aspects of the project. The Administration for Children and Families (ACF), Division of Child Support Information Systems (DCSIS) requested an assessment of the current documentation of the system, as well as historical data on the project, so it could make recommendations on the extent of the IV&V services that the State will be required to obtain. This report provides the results of this assessment.

1.1 BACKGROUND

As a result of ACF's request, an assessment to determine the required scope of IV&V for NOMADS was held on November 17-19, 1998 at the NOMADS development office in Carson City, Nevada. The Federal assessment team consisted of:

Mike Rifkin -   ACF/OCSE/DCSIS
Dave Tabler -   ACF/OCSE/DCSIS
Pat Colonnese -   ACF/Region IX

Personnel from the Nevada State Welfare Division (NSWD), the Department of Information Technology (DoIT), International Business Machines (IBM) and Maximus represented the State.

1.2 METHODOLOGY

The assessment consisted primarily of State presentations focusing on the primary areas of system development, followed by a question and answer period for each presentation. Some time was spent on the final day examining the documentation process for change control by tracking a single Work Item through the documentation/code/test/training processes.

2. Findings

2.1 PROJECT MANAGEMENT

2.1.1 Project Initiation

Issues:

- The State has assigned overall project management responsibility to IBM. This should be the responsibility of State personnel. An organization has been established with an IBM project manager, an NSWD Administrator, and a DoIT Director forming an executive management team. However all team managers under that executive management team report directly to the IBM project manager, who has the authority to make project decisions.

- It appears to be that support from local DA offices for the NOMADS project has diminished. DA's are requiring the State to make enhancements not needed for certification as a condition of allowing statewide rollout. One example is requiring local form flexibility. As reported, DA's are also asking about alternative configurations for their counties.

Recommendations:

- Project management must be transitioned to State personnel as soon as possible. The State project manager must be solely responsible for monitoring the cost and schedule of the project. The organization must be closely scrutinized for effectiveness during the full IV&V review recommended in this report.

- The issue surrounding the apparent lack of DA support must be worked out at the State level as soon as possible. This is one of the primary issues causing cost overruns and schedule slippage. The State must move to complete the definition and documentation of NOMADS software requirements and design. All significant changes to that completed design must be limited to only those items required to pass federal certification. Once certification is attained, further enhancements, such as those being requested by the DA offices, may be scheduled.

2.1.2 Project Planning and Reporting

Issues:

- The State indicated the IV-D portion of the system has completed initial development, however this was not verified by this assessment. The State is delaying implementation until the entire integrated NOMADS system is completed. The State must use the IV&V to consider the option of bringing up the IV-D portion of the system independent of the rest of the system to allow them to accelerate certification.

- The financial FFP accounting reports do not reconcile with total claims submitted. Based on claims submitted, it appears that the State has overdrawn approved NOMADS funds. However, the State believes there are sufficient approved funds remaining. As an explanation, project fiscal personnel stated that there is a possibility that non-NOMADS data processing costs have been claimed as NOMADS costs and that they are investigating this issue.

- The State has not supplied requested cost adjustments for disallowed time periods of IBM contract amendments 7 & 8. ACF disallowed FFP because the State failed to submit both amendments for approval prior to their execution in accordance with 45 CFR 95.611.

- The Computer Business Systems Incorporated (CBSI) contract for data center hardware may have needed prior approval. CBSI was originally a subcontractor to IBM. Upon IBM's termination of this subcontract, DoIT contracted CBSI under a DoIT master services agreement contract.

Recommendations:

- The IV&V effort recommended by this report must include a study on the feasibility of implementing the IV-D portion of the system independent from the rest of the system.

- State and/or ACF fiscal personnel should perform a review of FFP accounting reports as soon as possible.

- Further discussion is required between ACF and State personnel to determine the requirements for prior approval of the CBSI contract.

2.1.3 Project Estimating and Scheduling

Issues:

- There has been little or no anticipation in the planning and estimation phase of the program to account for the likelihood that when the system goes in to a test or pilot phase, there will be changes required due to problems or enhancement requests. As a result, whenever a change is required, it impacts the schedule and cost of the overall project. The State should have collected enough historical data by now to anticipate and plan for the amount of change required for future test and pilot phases. There should also be up-front planning to ensure flexibility in NOMADS to accommodate inevitable Federal and State regulation changes that will impact the NOMADS program.

- There is no definite system completion date in the project plan. The State and IBM indicated that the earliest date for Phase II implementation statewide would be October 2000. This depends on the current schedule being met (which is highly unlikely, based on project history). Note that Phase II includes only FSA 88 requirements. It appears that the State has little chance of implementing PRWORA system requirements by October 2000, since these are not yet identified in the project plan.

- IBM is on a time and materials contract. Amendment 8 runs through June 30, 1999, although State staff indicated that the contract hours would be used by May. The cost for IBM alone averages $5-7 million annually for total NOMADS development. At the current pace, at least 2 more years of development will be needed. Cost overruns will also extend to State staff and State data center use.

- State staff indicated there would never be a break-even point for NOMADS. Based on current projected costs and benefits, costs will always exceed benefits. This must be considered during the IV&V review.

- It is unclear if an analysis has been conducted to examine areas of NOMADS where Family Support Act certification requirements are either superseded by, or conflict with, PRWORA automation requirements. This analysis could potentially prevent duplication of effort.

- There is no planning or scheduling for how to more effectively and efficiently train staff on NOMADS functionality.

Recommendations:

- Future scheduling and cost analysis must account for the probability that each test phase and each pilot program phase will lead to requirements for changes to the program. Although the State is now carefully scrutinizing proposed changes and enhancements to implement only the essential changes, the reported reluctance by the counties to accept the system without certain enhancements needs to be considered in the planning process for the future. A means for acquiring county buy-in for these changes must be developed to aid in avoiding future problems with county acceptance. In addition, there is now enough historical data available to estimate future change requirements.

- A feasibility study and cost/benefit analysis based solely on the IV-D portion of the NOMADS system must be performed. This study should include the option to implement the IV-D portion of the system separately from the rest of the system. This study should also include other alternatives as determined by an alternative analysis.

- An analysis must be performed to examine areas where Family Support Act certification requirements are either superseded by, or conflict with, PRWORA automation requirements. The results of this analysis must be used to revise, where appropriate, the functional requirements for NOMADS.

2.1.4 Project Personnel

Issue:

- The State indicated a difficulty exists in obtaining and keeping personnel with the appropriate background and experience levels for this project. The heavy turnover rate is detrimental to the project as a whole and detrimental to plans for eventual turnover of the program from IBM to the State. The State project manager has resigned. State and vendor management have many disagreements. In addition, skill transition training to State and other contractor personnel has not occurred to allow for future turnover of the system to the State. A personnel initiative program is in the planning stages to attract and keep personnel, however it is unknown when any of this program will be approved and funded by the legislature.

Recommendation:

- An examination of the project organization to determine its impact on personnel performance must be included as part of the full IV&V study proposed by this report. In addition, the recommendation to return project management to State personnel defined in section 2.1.1 above also applies to this issue.

2.1.5 Project Organization

Issue:

- The organizational structure utilized for this project was developed to encourage cross training and cooperation among the various state and contractor groups. However, it also makes the lines of reporting unclear and forces competition for very limited resources. Also, there is no separation of functions, particularly in the area of software testing. The test manager indicated that the personnel performing testing at all levels were the same personnel who performed design and code. As a result there is no independent testing performed on the software.

Recommendation:

- A close examination of the effectiveness of the project organization to determine its impact on personnel performance must be included as part of the full IV&V study proposed by this report. This examination should particularly focus on the need for an independent test function within the organization.

2.2 TRAINING

Issue:

- State staff are expected to take over maintenance and operations of NOMADS once development is completed. There is a requirement for IBM to perform skill transition training to State and other contractor personnel to allow for future turnover of the system to the State. However, this training has not been initiated and no formal plan exists to perform this skill transition training. According to the DoIT director, this skill transition is occurring only partially through on-the-job training at this point. If IBM left NOMADS tomorrow, State staff could not assume responsibility.

Recommendation:

- The training group is currently dedicated to user training. This group should be augmented to allow development of a training plan for system developers. This plan should focus on the skill transition training to be provided by IBM to State and other contractor personnel. Completion of this training should be scheduled to coincide with turnover of the system to the State for maintenance and operations.

2.3 PROCESS DEFINITION AND PRODUCT STANDARDS

Issue:

- While the State was able to provide a verbal description of many of their processes, in most cases these processes are not documented. Examples where documentation is required include the Training Plan, Software Development Plan, Test Plan, Security, Quality Assurance (QA), and Configuration Management.

Recommendation:

- The State's QA effort must address process definition. All processes must be defined and documented.

2.4 QUALITY ASSURANCE

Issue:

- There is no formal Quality Assurance plan. The State has hired Maximus to assist with project management and APDUs. In addition, DoIT provides one technical staff member assigned for oversight. Although these people can monitor processes, they do not have time to assess quality. It is also not clear if the current QA staff is sufficient to assess a project of this cost/scope/risk.

Recommendation:

- The State's QA effort must address development of a Quality Assurance plan to include process definition activities.

2.5 CONFIGURATION MANAGEMENT

Issues:

- While a viable configuration management process appears to be in place, there is no formal configuration management plan to provide a written description of this process.

- Configuration management for the system utilizes a form called a "Work Item". This form includes an indicator, "Impact to Training". While this indicator appears to be utilized as designed to note training impact and to ensure the change is reported to training personnel, this process is not tracked to completion. Once the training material has been updated in response to a Work Item change, the Work Item form is not updated to reflect the training update as completed. While the training group maintains their own separate record showing completion of the Work Item, this must be incorporated back into the actual Work Item.

Recommendations:

- The State's QA effort must address process definition.

- User training and System Developer training requirements must be fully integrated into the Work Item management process to ensure all training materials are kept up to date as changes are made to the system.

2.6 REQUIREMENTS MANAGEMENT

Issue:

- There is no requirements document for the NOMADS system. Changes to the system are documented in Work Items. These are tracked to completion. However the changes documented in these Work Items only exist separately and do not appear in an overall system document. Any changes affecting the user end of the program at the design level are updated in the detailed design document, but this level of detail is not sufficient to document all changes. See the section on Detailed Design for more description.

Recommendation:

- The full IV&V review recommended by this report must address the requirements documentation process for the NOMADS system.

- The State must put in place a mechanism to document current requirements and track all changes and their impact on overall project objectives, schedule and cost. This mechanism must include a means to obtain and document stakeholder buy-in to all changes which impact project objectives, cost, or schedule.

2.7 SYSTEM SECURITY

Issue:

- While an informal process for maintaining system security exists, there is no formal system security plan.

Recommendation:

- The State's QA effort must address process definition, including the process for system security.

2.8 SYSTEM CAPACITY

Issue:

- The last capacity study was performed over a year ago. The data from this study was provided to the ACF assessment team in terms of millions of instructions per second (MIPS). This alone is not necessarily reflective of the actual software performance in terms of core usage and application run times. Significant changes have occurred since the study was completed. The State plans to replace the current mainframe in the near future. No IV&V has been performed or is planned to assess this new system environment.

Recommendation:

- An up-to-date capacity study must be performed which considers application size and speed requirements, CPU capacity, and bandwidth data. This study must reflect the system's ability to support both on-line and batch processing requirements of the NOMADS system once it is implemented statewide. The IV&V review proposed by this report must include an analysis of this data along with a study of any plans the State has to replace the current mainframe.

2.9 REQUIREMENTS ANALYSIS

Issues:

- There is no up-to-date software requirements document for the system. This is an essential element of the software development process. By maintaining this document through the change control process, it provides a historical record of what changes were made, why they were made, and who approved them. It is also unclear how the State is able to review and approve changes to the system requirements when no initial requirements document exists. The software requirements documentation should be the first step prior to developing the software design documentation. It should also be the guiding document for the development of test cases and test plans and procedures at the system level of testing. A complete, up-to-date software requirements document is essential before the State can support maintenance and operations for NOMADS

- Additional changes continue to be made beyond the original project scope. Meanwhile, Nevada's Title IV-D program penalties for missing Family Support Act of 1988 systems deadline continue to accrue. In addition, NOMADS is missing PRWORA program requirements (i.e. Distribution) where Nevada is still subject to the State Plan disapproval process. Priority does not seem to be given to finishing automation for Child Support and thus mitigating these penalties.

Recommendations:

- The full IV&V review must address the development and maintenance of requirements, documentation for the NOMADS system.

- Approval of future changes to the systems must be limited only to Work Items that are required to meet Federal certification requirements. Implementation of changes not required to meet certification requirements must be deferred until after the system is certified.

2.10 SYSTEM HARDWARE

Issue:

- The current end user equipment configuration was installed in 1995. To date, this equipment has been used for training. It is nearing the end of its life cycle. The State claims that hardware, network, and software versions have been kept up-to-date so they will support NOMADS.

Recommendation:

- The full IV&V review recommended by this report must ensure the current hardware and operating environment will support the system once implemented statewide.

2.11 DATABASE MANAGEMENT

2.11.1 Data Conversion

Issue:

- Case clean-up of financial information has not started in most counties. If NOMADS were to be completed tomorrow, it would still take 12 months for the State to enter all cases to the database. The State wants to enter full data only on currently paying cases, and add financial information for non-paying cases gradually. This would not meet certification requirements, nor would it be sufficient for a conditional certification.

Recommendation:

- Any plan other than full conversion must be submitted to ACF for review and approval.

2.11.2 Database Design

Issue:

- The database is shared by Child Support (both IV-D and non IV-D cases), and the Family Assistance programs, including TANF, Food Stamps, and Medicaid. As stated in paragraph 2.1.2 above, the State must explore the option of bringing up the IV-D portion of the system independent of the rest of the system to allow them to escalate certification. As part of the issue, the State needs to consider what modifications, if any, would be required to enter and maintain all client data in the IV-D system alone.

Recommendation:

- The IV&V effort recommended by this report must determine the scope and feasibility of any modifications that are required to address this issue.

2.12 DEVELOPMENT SOFTWARE

Issue:

- The programming language used is CSP (Cross System Product), which is an antiquated language which is no longer supported by IBM. Development personnel typically require training to use this language. Some of the code has been converted to COBOL, primarily for the screen displays. There is a method available to convert CSP code to another IBM supported language (VisualAge Generator), but the feasibility and cost benefit of making this change would have to be studied prior to taking this step. IBM public relations (Internet web page) claims hundreds of current VisualAge Generator customers have migrated from CSP with relative ease.

Recommendation:

- The full IV&V review recommended by this report must examine the feasibility and cost/benefit of converting software to a more up-to-date programming language.

2.13 SOFTWARE ARCHITECTURE

2.13.1 High-Level Software Design

Issue:

- There is no high-level design document. Like the requirements documentation, this is an essential element of the software development process. Again, it provides a baseline for where the software design began. By maintaining this document through the change control process, it also provides a historical record of what changes were made, why they were made, and who approved them. A complete high-level design document is essential before the State can support maintenance and operations for NOMADS

Recommendation:

- The full IV&V review recommended by this report must examine the design documentation process for the NOMADS system.

2.13.2 Detailed Design

Issue:

- The detailed design document is maintained only for user-end items (screen displays, keyboard entries, etc.). This document was initiated for the rest of the program but has not been maintained and is therefore outdated. As a result, the only way to track changes to a particular portion of code is by looking through all of the individual change records from the various Work Items. A complete detailed design document is essential before the State can support maintenance and operations for NOMADS.

Recommendation:

- The full IV&V review recommended by this report must examine the design documentation process for the NOMADS system and include recommendations as part of an overall process definition.

2.14 TESTING

Issue:

- There is no independent test group in the NOMAD project's organization. The team manager for testing indicated the same people who do design and code typically also perform testing for a given segment of code. There needs to be some phase of testing, typically at the integration or system level, which is performed independently from the design and code.

Recommendation:

- The State must immediately implement a means to ensure testing at the integration level and above is performed independently of the design and coding processes. The current project organization does not allow for this. An examination of the organization to determine its impact on personnel performance should be included as part of the full IV&V study proposed by this report.