INDEPENDENT VERIFICATION AND VALIDATION

OBJECTIVES

- To Define Independent Verification & Validation (IV&V) and it's Benefits
- *To Understand the Federal Requirements for IV&V*
- To Provide the Federal Perspective on IV&V
- To Describe the IV&V Process
- To Provide Sample Findings and Documentation

IV&V DEFINITION AND BENEFITS

Verification/Validation - Take 1 (IEEE STD 1012-1998)

- **Verification:** Confirmation by examination and provisions of objective evidence that specified requirements have been fulfilled

- **Validation:** Confirmation by examination and provisions of objective evidence that the particular requirements for a specific intended use are fulfilled

Verification/Validation - Take 2 (Simplified)

- **Verification:** Ensuring the product is built right
  - *Review activities/results for each development step*
- **Validation:** Ensuring the right product is built
  - *Inspect final products for compliance and functionality*

Potential Barriers to IV&V

- Lack of resources
- Schedule constraints
- Lack of access to project
- Evolving products
- Reporting – "too much" vs. "too little"

IV&V – Requirements for Success

IV&V is only as good as:

- The skills/experience of the IV&V provider and state buy-in of the IV&V process
- Willingness of the state staff and vendors to cooperate with the IV&V provider
- Ability and willingness by the IV&V provider and the state project office to evaluate a project objectively & completely
- Willingness of the IV&V provider to report the true status of the project, regardless of the negative reporting on the State or Contractors
- Willingness to accept "bad news" and make tough decisions

Benefits of IV&V

- Identifies high-risk areas early
- Provides State management and the Federal government an objective analysis to deal with system development issues and to make informed decisions
- Provides management with improved and objective visibility into the progress and quality of the development effort
- Reduces errors in delivered products and increases probability of project success

FEDERAL REQUIREMENTS FOR IV&V

Federal IV&V Requirements

- **Independent Verification and Validation** (IV&V) provides an independent appraisal of a system's development project

- **Independent** - The IV&V Provider and associated contract must reside outside the State's Title IV-D Agency and it's Umbrella Agency

Federal Variations to "Traditional" IV&V

- Identifies areas of deficiencies and risk and recommends solutions, but does not actively participate in remedial activities

- Focus is on both management processes and work products

- Reports are submitted to OCSE at the same time they are provided to State management

V&V Versus IV&V?

- **<u>DEVELOPER V&V:</u>** Ensure Completeness and Accuracy of Requirements and Design – Part of the development effort (Development Contract)

- **<u>INDEPENDENT V&V:</u>** Performed by an Independent Contractor in direct support of the state and federal stakeholders to provide an independent evaluation of project activities

Federal IV&V Regulations

- Federal Regulation **45 CFR 307.15(b)(10)** requires an entity independent of the State Title IV-D Agency and of the CSES Project Management Structure to review all technical and managerial aspects of the project

IV&V "Triggers"

- Lack of a federally certified statewide system
- Project at risk of failing to meet regulatory and statutory deadlines
- Project at risk of failing to meet a critical milestone
- Submission of APD for system redesign
- Development under a waiver pursuant to 452(d)(3) of Social Security Act
- OCSE determination of risk of project failure, serious delay or cost overrun
- State's procurement policies put the project at risk
- Fail to adequately involve state program offices in development and implementation of system project.

What Does IV&V Cost?

- Based on state costs from previous and on-going development projects, the average costs for IV&V services are:
  - Periodic IV&V Reviews:
    - $120,000 to $220,000 per assessment
    - Note: for some states the initial assessment was higher to include the costs to develop an IV&V Management Plan and Communication Plan.
  - Full-Time IV&V Services:
    - $900K to $1.8 million per year
    - Typically contracted for an initial 1-2 year period with additional option years built into the contract.

FEDERAL PERSPECTIVE ON IV&V

IV&V vs. Quality Assurance

- Under PRWORA, OCSE requires States to provide evidence of adequate QA
- QA is an on-going process, while IV&V typically provides a "snapshot" of the project at a point in time
- QA Provider -- Works directly under the direction of the State's project staff
- IV&V Provider -- Is not directly associated with or managed by the project staff

IV&V Performance Criteria

Criteria for an IV&V Service Provider are:

- Independence from Title IV- D Agency and it's Umbrella Agency
- Capability and capacity to handle management, organization and performance assessment and analysis,

and possibly:

- Capability to accommodate highly technical analyses in areas such as: Capacity Analysis, Software Metrics and Performance, etc.

IV&V Technical Skills

IV&V Consultants need various skills to carry out the review of project performance. These include, but are not limited, to the following:

- Software metrics definition, assessment, and reporting
- Knowledge of Industry Standards (PMBOK, IEEE, CMMI, etc)
- Software estimating models/methods
- Development strategies/methodologies
- Risk assessment, mitigation, tracking, and reporting methods
- Requirements validation methods (testing, simulations, analysis)
- Software design tools/methodologies
- Software languages and coding techniques
- Test planning, test conduct, test measurement, and test reporting
- Tools/environments that support software development
- Computer platforms and system peripherals
- Database structures
- Networking architectures and capabilities

THE IV&V PROCESS

IV&V Process - Part 1
OCSE

- For States meeting one of the IV&V triggers, OCSE conducts a "Scope of IV&V Assessment Review"
- OCSE selects the appropriate activities to investigate in a particular project
- Review includes a one-week on-site review, including interviews with key staff and collection of project documentation and artifacts
- Output of the review is a report identifying specific IV&V requirements for the State
- Report is written to aid the State in developing the Statement of Work for their IV&V RFP

OCSE's Part in the On-Going IV&V Review Process

- IV&V Service Provider will start with the initial findings from OCSE's "Scope of IV&V Assessment Review"

- IV&V Providers take direction from and provide project monitoring on behalf of OCSE

- OCSE allows nothing but a "mistake-of-fact" to change a finding or recommendation issued in any draft or final IV&V report

- Every finding in an IV&V report contains an "ACF Priority" statement – essentially a clarification of how concerned (or not) OCSE is about an issue

IV&V Assessment Activities
Project Management

- **Project Initiation**

- **Business Process Re-engineering**

- **Project Planning and Reporting**

- **Project Estimating and Scheduling**

- **Project Personnel**

- **Project Organization**

- **Subcontractors and External Staff**
  - Subcontractor commitment
  - State oversight
  - Acceptance and turnover

IV&V Assessment Activities
Project-Wide Processes

- **Training and Documentation**
  - User Training and Documentation
  - Developer Training and Documentation
- **Process Definition and Standards**
- **Quality Assurance**
- **Risk Management**
- **Configuration Management**
- **Requirements Management**
- **System Security**
- **System Capacity**

IV&V Assessment Activities
Environments, Processes and Products

- **Systems Engineering**
  - Requirements Analysis
  - Interface Requirements
  - Requirements Allocation and Specification
  - Reverse Engineering
- **Operating Environment**
  - System Hardware
  - System Software
- **Data Management**
  - Database Software
  - Data Conversion
  - Database Design

IV&V Assessment Activities
Environments, Processes and Products

(Continued)

- **Development Environment**
  - Hardware
  - Software

- **Software Architecture**
  - High-Level Design
  - Detailed Design
  - Job Control

- **System Implementation**
  - Big Bang
  - Phased Functionality
  - Phased by Region

- **Code and Test**
  - Code
  - Unit Test
  - Integration Test
  - System/Acceptance Test
  - Pilot Test

- **Transition to State**

IV&V Process - Part 2
The State

- The RFP and IV&V Contract must be submitted to OCSE for prior approval

- No waiver of prior approval, even if under the Federal thresholds

- If another State agency is used as the IV&V Provider, a copy of the Interagency Agreement or Memorandum of Understanding is provided to OCSE for prior approval

- Federal Funding for IV&V Services is available at the 66% FFP Rate

- Ensure all State Project team members, Executives, and Key Stakeholders agree and proactively support IV&V requests for interviews and documentation

IV&V Process - Part 3
The IV&V Provider

- Works with the State to develop an IV&V Management Plan that identifies the scope, depth, schedules, and resource requirements of the IV&V effort

- All Work Plans and Reports generated must be submitted to OCSE at the same time they are submitted to the State

- IV&V provider is not permitted to bid on any subsequent contract issued by the Title IV-D agency, nor any contract issued by the umbrella agency if that contract interfaces with the child support system development project in any way

IV&V Provider Requirements

- Develop an IV&V Management Plan

- Review and make recommendations on Project Organization, Management, Resources, and Methodologies

- Review and make recommendations on the technical aspects of the CSES

- Assess Stakeholder and User Involvement and Buy-in

IV&V Provider Requirements

(Continued)

- Analyze past project performance to develop "lessons learned"

- Provide Assessment of the State's Risk Management Process

- Provide Capacity Planning, as required

- Develop performance measures to track project completion

- Address issues from OCSE's "Scope of IV&V Assessment" Review

Sample IV&V Findings and Documentation

Common IV&V Findings

- Lack of adequate communication
  - Involvement of stakeholders in the definition of system requirements and business practices
  - Lack of communications within the project between different operating groups
  - No Communication Plan
- Deficiencies in the Project Management Plan
  - Inadequate or incomplete staffing
  - Lack of resource assignments
  - Incomplete scheduling
    - Lack of detail
    - Lack of dependencies
    - Not resource loaded and balanced
    - Missing activities or tracked separately from master project schedule

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Common IV&V Findings (continued)

- Deficiencies in Requirements Management
  - Requirements traceability is insufficient
  - Lack of an adequate RTM tool
  - Inadequate use of Subject Matter Experts (SME's) at the county level in requirements definition
- Inadequate Risk Management
  - Risks defined at high (non-detailed) level
  - Lack of prioritization
  - Insufficient mitigation planning
- Insufficient process definition; or the project is not following defined processes, particularly:
  - Configuration Management
  - Training
  - Lack of Metrics
  - Quality Assurance
  - Document Management

Sample Finding

- **2.19 Quality Assurance Function Transfer from the Project**
- FINDING:
  - During the review, the state reported that the QA contract is being transitioned from the [project] office to the [state IT shop]. Moving control of the QA function to an organization outside of the program creates added risk for the project budget and schedule. While project staff indicate they plan to embed QA activities into their day-to-day activities, there is no QA plan in place showing how this will be accomplished. There is also no plan in place to show how QA vendor resources will be utilized and how these resources will be shared between the various state IT projects.

- OCSE PRIORITY – URGENT
  - Degree of Project Impact – High
  - Probability of Impact – High
  - Time Criticality – Short Term

Sample Finding (continued)

- <u>STATUS</u>
  - New Finding
  - (Note: if this were not a new finding, this section would indicate whether progress was observed by the IV&V team since the last review, and provide a description of that progress.)

- <u>RECOMMENDATION</u>
  - Update the [project] QA plan to address the upcoming changes to QA processes. This should also include references to the [state IT shop] QA plan as required. The project must ensure adequate resources (state and vendor) are available to sufficiently implement these QA activities. Copies of the [project] QA plan update, the [state IT shop] QA plan, and the resource management plan showing QA activities should be provided as they become available.

How is each IV&V report generated?

- Example: IV&V Reviews On Florida's CAMS Project
  - Activities Conducted During IV&V Reviews
  - Draft Report submitted to OCSE
  - After OCSE comment period, "Draft Final" report submitted to State for comment.
  - State has opportunity to provide clarification to findings
  - This may result in a change in the finding (matters of fact only) as decided by the IV&V Provider
  - State comments are included (appended) to Final Report

Resources

- OCSE IV&V Assessment Overview
  - http://www.acf.hhs.gov/programs/css/resource/overview-ocse-ivv-assessment
- IV&V Assessment Detailed View
  - http://www.acf.hhs.gov/programs/css/resource/ivv-options
- IV&V Statement of Work Template
  - http://www.acf.hhs.gov/programs/css/resource/ivv-statement-of-work-template
- IV&V Status of State Systems
  - http://www.acf.hhs.gov/programs/css/resource/ivv-status

QUESTIONS