

## **Overview of STS Consulting's IV&V Methodology**

STS uses a 5 Step Methodology for IV&V. Our risk-based methodology conforms to Best Practices, relevant international standards, and regulations/guidelines from government agencies. Our Methodology provides a uniform framework in which we train our consultants. This helps us prepare them for IV&V engagements in which we play a leadership role as well as engagements in which we augment IV&V teams using the client's methodology. A high level view of the Methodology is provided in Figure 1 and described below.

The overall objective of STS's IV&V Methodology is to establish documented evidence that the system does what it has been designed to do and will continue to operate correctly in the future. As shown in Figure 1, the output of the methodology includes an IV&V Documentation Package that provides objective evidence that all software requirements have been implemented correctly and completely. This includes evidence that the system produces the intended results and that all functionality is traceable to system requirements.

The Methodology is driven by a Management Process that ensures that each of the 5 Steps in the Methodology is followed correctly, completely, on-schedule, and within budget. When STS manages an IV&V engagement we take full responsibility for seeing that the appropriate documentation is produced in each of the Steps and that this documentation meets agreed upon quality objectives. These quality objectives must be consistent with the company's Quality System. We produce regular Activity/Task reports that document management awareness and controls (including Anomaly reports and resolutions). These reports become part of the IV&V Documentation Package.

### **Step 1: Define IV&V Plan**

The definition of the IV&V Plan begins when the user needs for the system are identified. The user needs are fleshed out in the User Requirements Specification (URS), which defines clearly and precisely what the user wants the system to do and states any constraints (e.g. performance) under which the system must operate. We begin planning of the IV&V as soon as the URS is available and a Project Plan for the system can be developed. The IV&V Plan is a summary document that defines the activities, procedures and responsibilities for accomplishing the objectives of the IV&V. An outline of an STS IV&V Plan (consistent with IEEE Standard for Verification and IV&V1012-1998) is shown as Figure 2. We create the initial IV&V Plan in this Step and update it as necessary during the IV&V process.

Key IV&V Activities:

- Prepare IV&V Plan
- Review URS and Project Plan for completeness and consistency

Key Outputs for IV&V Package:

- IV&V Plan
- URS
- Project Plan
- Documentation resulting from URS and Project Plan Review

## **Step 2: Validate Selection of Supplier**

This Step is focused on IV&V activities associated with the identification and selection of the supplier for the system (which may or not involve a formal RFP process). The process of selecting the supplier involves auditing potential suppliers and assessing their capabilities/qualifications for producing a system that fulfills the User Requirements Specification. STS develops the checklists for the Supplier Audit consistent with Best Practices and client specific procedures.

Key IV&V Activities:

- Audit Suppliers
- Validate Supplier Selection

Key Outputs for IV&V Package:

- RFP
- Supplier Audit Reports (including completed Vendor Assessment Checklist)
- Supplier Quality Certificates
- Documentation justifying Supplier Selection
- Contract

## **Step 3: Validate System Development/Integration**

This Step is focused on IV&V activities associated with the development of the System including customization/integration/configuration activities that may be required. During this step, STS consultants can develop SOPs, prepare and conduct User Training, as well as define IV&V Tests. This Step concludes when the System (including local customization if applicable) has been installed and is ready for the IV&V Tests to be executed.

Key IV&V Activities: (all Reviews include Traceability Analysis, Interface Analysis, Risk Analysis, and concurrent Test Plan and Test Case Generation)

- Review specifications of system functionality (i.e. detailed requirements) produced by the supplier for correctness, consistency, completeness, accuracy, readability, and testability.
- Review Design
- Review Implementation Progress by the supplier including walkthroughs
- Review System Integration/Customization activities
- Review of Tests
- Review of Test Results
- Review of SOPs
- Review of User Training
- Review of IV&V Testing scripts

Key Outputs for IV&V Package:

- Specification Review results including Traceability Analysis and Interface analysis
- Design review results including interface analysis
- Results of reviews of Implementation progress (including results of walkthroughs)
- Results of reviews of System Integration/Customization activities
- Results of test reviews
- Results of test execution
- Risk analysis
- Results of SOP reviews
- Results of User Training Reviews
- User training records
- IV&V Test reviews
- IV&V Test scripts

#### **Step 4: Execute IV&V Tests**

This Step is focused on IV&V activities that take place after development is complete but before operation begins. It is during this step that STS executes the IV&V Tests and produces the IV&V Report. This IV&V Report reviews all deliverables and activities against the IV&V Plan and summarizes evidence that the system is validated.

Key IV&V Activities:

- Execute IV&V tests (includes capturing and analyzing results)
- Prepare IV&V report

Key Outputs for IV&V Package:

- IV&V testing results
- IV&V Report

### **Step 5: Maintain IV&V Status**

This Step begins when the System is placed into operation. STS performs periodic evaluations of ongoing operations. We ensure that documentation is accumulated that demonstrates that ongoing operations are proceeding as intended and that appropriate maintenance, change control, and security procedures are being followed. This Step continues until the system is replaced or retired.

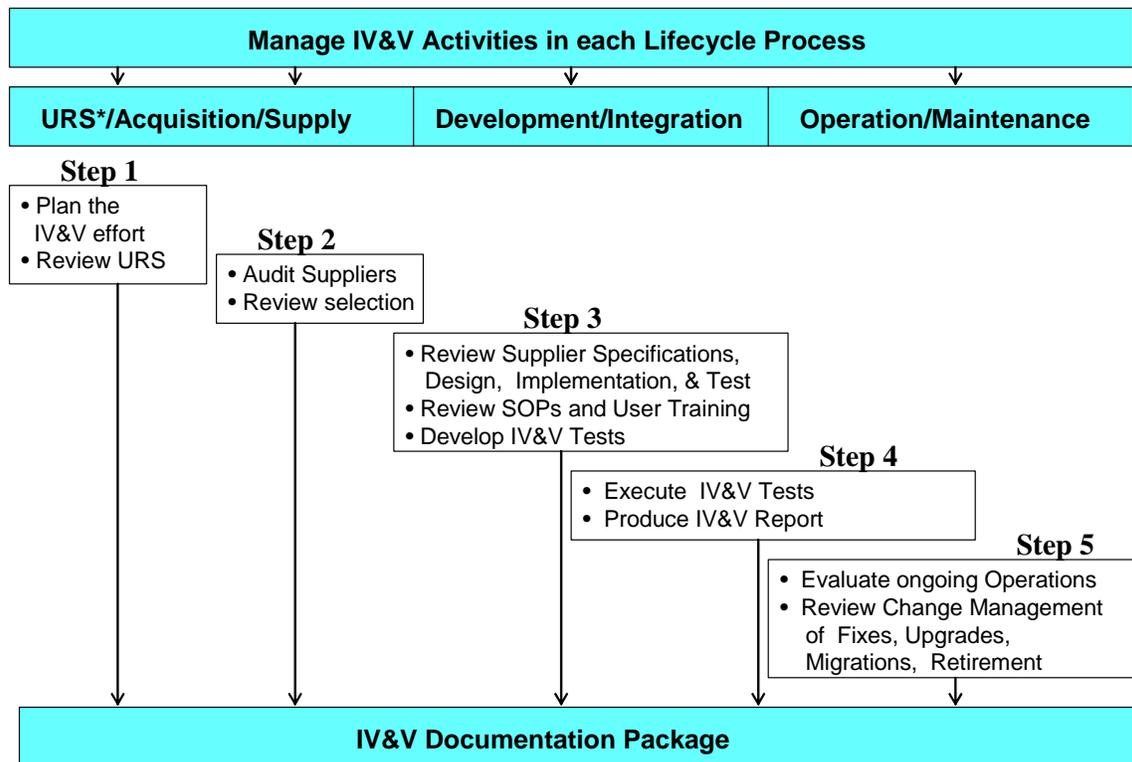
Key IV&V Activities:

- Evaluate ongoing Operations
- Validate Change Management of Fixes, Upgrades, Migrations, Retirements

Key Outputs for IV&V Package:

- Operations evaluation reports
- Risk Analysis
- IV&V Plan Revisions
- Change Management Procedures
- Proposed Change Assessments
- Anomaly Evaluation
- Migration Assessments
- Retirement Assessments

**Figure 1: High Level View of STS IV&V Methodology**



\* URS stands for User Requirements Specification

**Figure 2: Outline of STS IV&V Plan**

1. Purpose
2. Referenced documents
3. Definitions
4. IV&V Overview
  - 4.1. Organization
  - 4.2. Master schedule
  - 4.3. System Integrity Level Scheme
  - 4.4. Resources summary
  - 4.5. Responsibilities
  - 4.6. Tools, techniques and methodologies
5. Life cycle process validation
  - 5.1. Management of validation
  - 5.2. Acquisition/Supply
  - 5.3. Development/Integration
    - 5.3.1. Specification (detailed requirements)
    - 5.3.2. Design
    - 5.3.3. Implementation
    - 5.3.4. Test
  - 5.4. Operation/Maintenance
6. IV&V Reporting requirements
7. IV&V administration procedures

- 7.1. Anomaly reporting and resolution
- 7.2. Task iteration policy
- 7.3. Deviation policy
- 7.4. Control procedures
- 7.5. Standards, practices and conventions
- 8. IV&Vdocumentation requirements