



OneSAF Users Conference

The OneSAF Development V&V Process

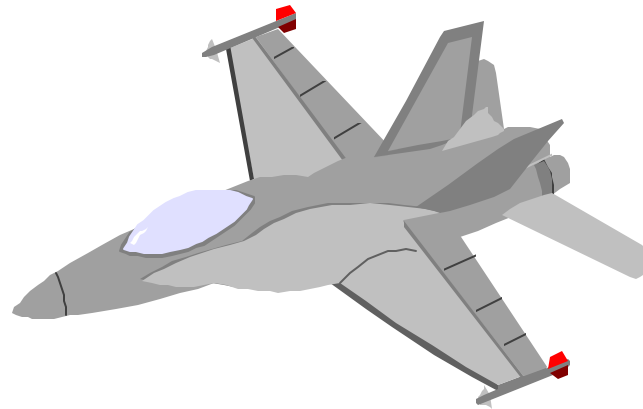
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Introduction

Is this a valid model of a jet aircraft?



Validation

Your response should be “*Valid for what?*”

- For OneSAF? No
- For a briefing graphic? Yes



The point is...

VALIDITY IS ALWAYS RELATIVE to the purpose for which a model used.

And...

The purpose will dictate how much faithfulness to reality is required in its function (fly, shoot, etc) and its form (shape and dimensions)

So What's Valid for OneSAF Development Purposes?

- The TPO validates via designated domain representatives
- Domain SME representatives review, critique, and validate program proposed concept specifications for the TPO
- The purpose: General, state of the art capabilities and foreseeable applications but no specific application

Therefore, development validation does not extend beyond the OneSAF development!

Once Valid, Not Always Valid?

How to tell a person who understands models and V&V....

- Doesn't understand: "OneSAF has been V&V'ed"
- Does understand: "OneSAF has been V&V'ed [for the Joint Forces Exercise \(etc.\)](#)."

The operative word is "for" followed by the [application title](#)!

You mean...

- A model supplied and supported by AMSAA is not always valid? **No!!!!**
- If SMEs say it's valid, isn't that official and valid? **No!!!!**

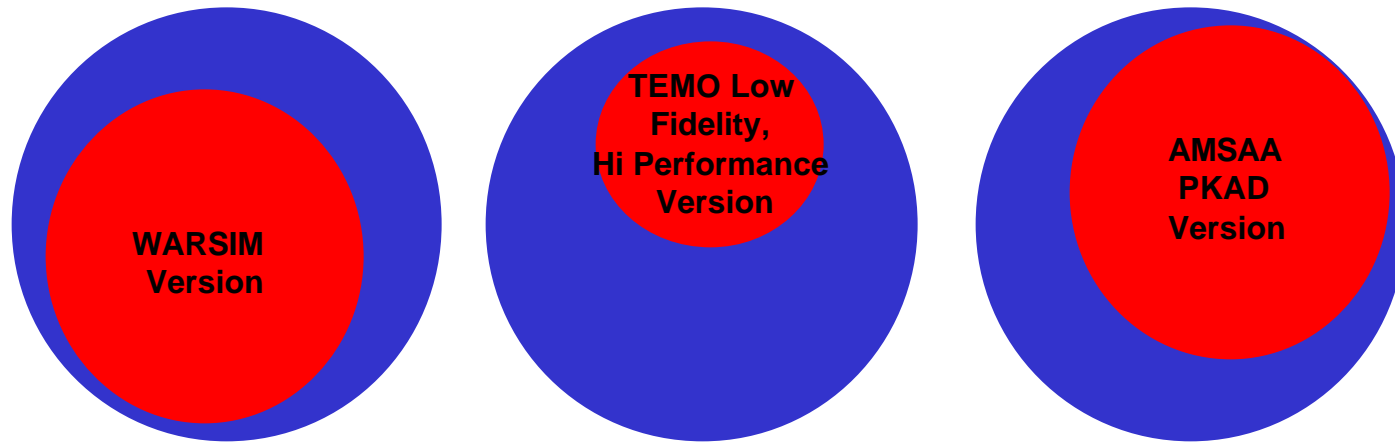
Why? Because...

- Because no model is a perfect reflection of reality
- There are different models for the same phenomenon (e.g., flight model)
- A model previously used may not be the right one for the next application.
- Therefore, for the purposes of the newest application, all models (and their interaction with other models) must be assumed invalid until assessed "valid" (a decision of adequacy) by the application sponsor

The OneSAF Development Will Have Multiple Valid Models

At FOC, there will be multiple valid models of the same phenomenon.

Can any one be used for any application?



- The above **models** of **reality** (say, a flight model) could all eventually reside in OneSAF to support different applications.
- Each would be valid for one application and possibly invalid for another application.
- OneSAF is a perfect case in point that validation
 - Is ephemeral: Has a shelf-life of only the current application
 - Must be assessed for EVERY application

The Necessity for V&V Documentation

- OneSAF V&V documentation will provide users with critical life cycle evidence for application validation for accreditation

Without it, OneSAF is a black box of unknown capabilities!

- Useful evidence describes the implemented models, the standards to which they were tested, their performance, and their limitations
- Traditional Army “V&V” repositories are replete with KA information, source documentation from which KE was performed.
- KA information is uninteresting for V&V purposes because it does not reflect what was implemented!
- V&V documentation must explain exactly what has been implemented in OneSAF
- Look forward to the OneSAF PM’s V&V product containing what was implemented and tested to assist the user in application accreditation decisions

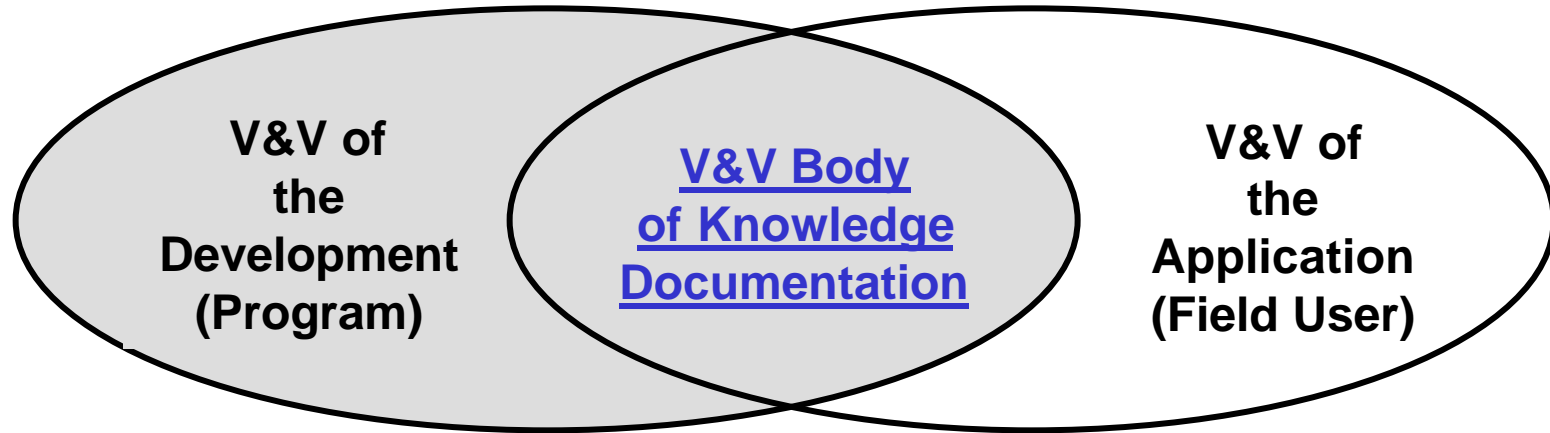
What's Verification

- Making sure what was validated was built right
- Verification is the testing of two major areas
 - The “pieces,” the models working as designed
 - The system, the models working together logically and harmoniously
- Sadly, poor development practices fail to validate before implementation, depending on review of executing software to simultaneously approve (validate and verify) the implementation
- Repetition of poor practices has caused many people to numbed into concluding that V&V is
 - Testing
 - Done at the end

Impacting credibility and resources for rework

- The OneSAF PM's V&V process has parted with that paradigm

OneSAF Support for User Accreditation



V&V of the development assures ORD requirements are met.

V&V of the application assures application requirements are met.

- The program can only be concerned with V&V of the development.
 - The program's customer is the TPO.
 - The TPO **ACCEPTS** the development
- Future users are the only ones who can do a V&V of OneSAF for an application.
 - Application V&V is always a field user responsibility and decision.
 - Development V&V supports Application V&V through the V&V Body of Evidence.
 - The user decision of OneSAF sufficiency for a given application is **ACCREDITATION**.

The OneSAF V&V Process

The Value of the OneSAF PM's Development V&V Process

- The value of the OneSAF V&V plan during development is it provides a structured logical process for timely user input which
 - Minimizes contractor misinterpretation
 - Minimizes rework
 - Provides the greatest opportunity for the contractors to meet user expectations

Simply stated, the best chance to get it right the first time and save resources from rework for more functionality development

- The value of the OneSAF V&V plan post FOC is it provides users with accurate descriptive documents of the implemented models and the testing methodologies used to verify performance which
 - Save time and money when making an accreditation V&V of OneSAF for an application
 - A reference source
 - For making intelligent model choices when composing an instance of OneSAF for an application
 - For understanding why model results occurs as a function of the limitations of the various models (ex. high fidelity and medium fidelity models of the same phenomenon will give different results)

V&V Approach Within the OneSAF Development Context

Planning Validation Phase

(Iterate Until Complete)

Developer Implementation Verification Phase

(Iterate Until Complete)

User Verification & Acceptance Phase

(Iterate Until Complete)

Development Processes
(TPO, Domains, PM & Developers)

- Decompose ORD
- Integrate guidance (White Papers, etc)
- Develop or reuse concepts and solutions
- Develop verification tests

Implement, integrate specifications (code)

None

Verification Processes
(TPO, Domains, PM & Developers)

- Verify Concepts
- Verify Solutions
- Verify Tests that satisfy ORD requirements

- Verify code pieces perform to spec
- Verify pieces work together properly
- Using acceptance test designs
- In process reviews
- Observe contractor tests
- Review contractor test results

1. TPO Verification Testing Based on validated test designs
2. TPO Composition Instance Verification Testing Based on ESS and use-cases

Validation Decisions
(TPO)

- Validate Concepts
- Validate Solutions
- Validate Verification tests for ORD satisfaction and meet user needs

None

None

Acceptance Decisions
(TPO)

None

None

Accept if tests achieve or exceed validated test design criteria

Accreditation Decisions
(Field User)

Supported only by OneSAF BOK

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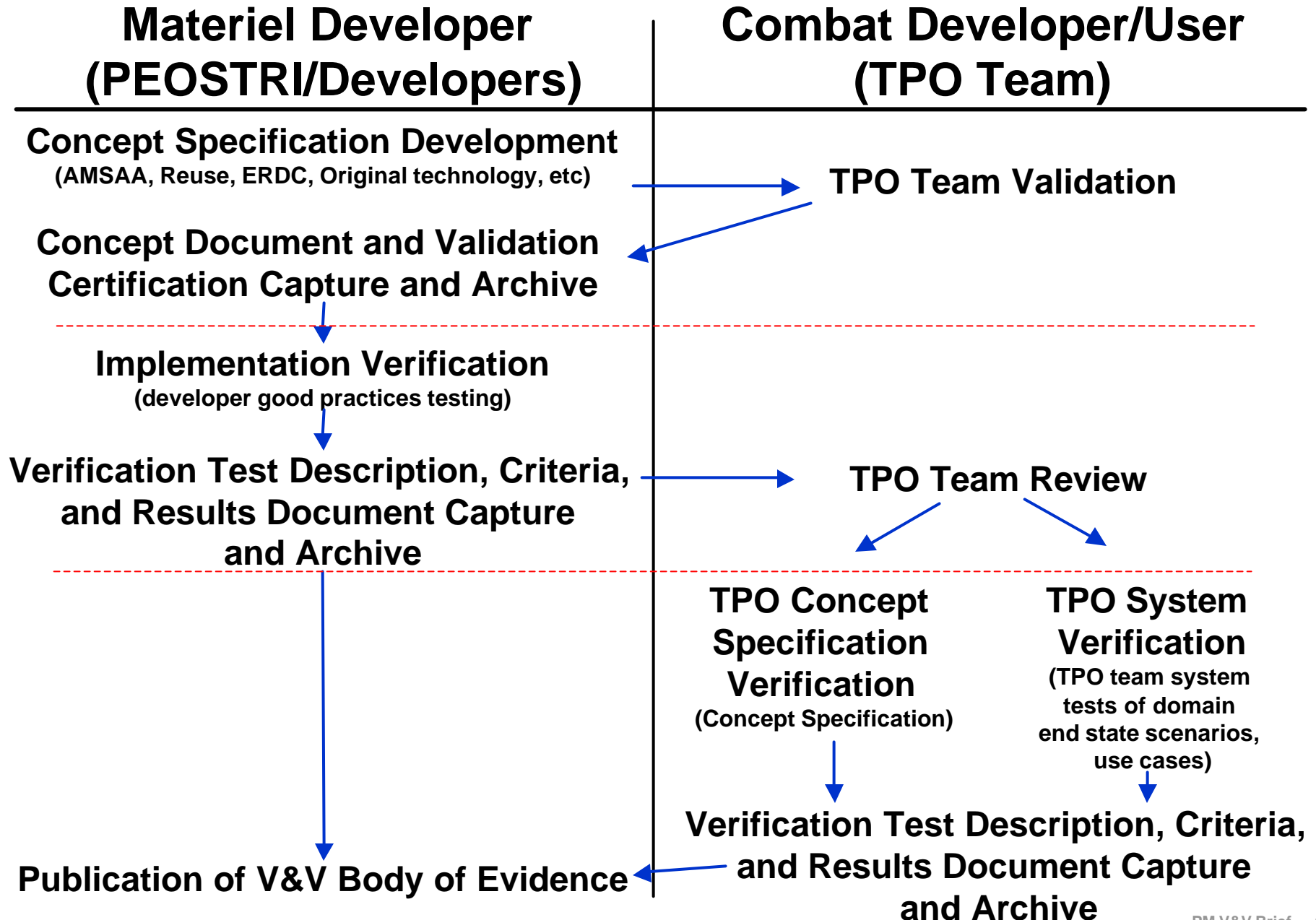
Documentation Product for V&V BOE

Document solution specifications and their test designs, agreements, conflict resolutions, decisions, etc.

Document development specifications and test plan results

Document test plans and results, limitations, ability to satisfy acceptability criteria MOE

OneSAF V&V Process Flow and Responsibilities



Synthesis of the OneSAF V&V Process

| V&V Step | V&V Artifact |
|--|--|
| 1. Develop the concept specification | Concept document |
| 2. Have the TPO or his representative validate the concept specification | TPO Certification statement and name attached to the concept document |
| 3. Implement the validated concept specification | Test description, criteria, and result |
| 4. Verify (prove) that the validated concept specification was implemented properly | Test description, criteria, and result (can use the developers if within specification) |
| 5. Document and capture the verification process and result | TPO Certification statement and name attached to test description, criteria, and result |

OneSAF V&V Evidence Category Areas

| |
|---------------------------------|
| Environmental Models |
| Primitive Behaviors Models |
| Orderable Behaviors models |
| Physical Models |
| Environmental Models Data |
| Physical Model Data |
| Primitive Behaviors Models Data |
| Orderable Behaviors Model Data |
| Unit Models |
| Entity Models |

What other categories would you need for assessing OneSAF's ability to support your applications?

OneSAF V&V In Action Example

Orderable Behaviors: Bounding Overwatch

| V&V Step | V&V Activities | V&V Artifact |
|---|--|---|
| 1. Develop the concept specification | KA and modelers design an implementable concept of "bounding overwatch" | Concept document |
| 2. Have the TPO or his representative validate the concept specification | The TPO representative for validating behaviors (NSC) reviews the concept and iteratively works with the program until it is "good enough," at which time it VALIDATES the concept as "ready for modeling" | TPO Certification statement and name attached to the concept document |
| 3. Implement the validated concept specification | The PM's modeling team implements the concept exactly to specification and performs internal testing against the concept specification | Test description, criteria, and result |
| 4. Verify (prove) that the validated concept specification was implemented properly | The TPO representative for validating behaviors (NSC) now VERIFIES the implementation against the specification which it approved. | Test description, criteria, and result (can use the developers if within specification) |
| 5. Document and capture the verification process and result | When the implementation is determined to meet the validated specifications, the implementation is verified as ACCEPTABLE to the TPO | TPO Certification statement and name attached to test description, criteria, and result |
| | | |

Purpose of the OneSAF V&V Body of Evidence

Pre FOC

- **PEOSTRI traceability and management of the development process**
 - The right things were identified for implementation
 - Evidence they were validated by the TPO (certification)
 - Evidence the developers built them right (verification tests)
- **TPO management of the acceptance process**
 - Proof that we met the ORD
 - Proof that PEOSTRI built everything right
 - Leverage developer tests for TPO tests
 - Capture TPO verification proof to the users that the OneSAF system meets their needs (ESS, use case, etc)

Post FOC

- **Concept specifications: the users know exactly how each model works, critical for intelligent user**
 - Decision-making for V&V assessment of OneSAF capability to support a specific use
 - Compositions
 - OneSAF behaviors
 - Model selections for OneSAF system instances
- **Verification tests and results: intelligent user model decision-making**
 - Performance capabilities and limitations
 - Limitations of original development testing
 - Benchmarks for new code development and post system composition testing

Verification Tools

- **The OneSAF development has or is in process of developing several tools that**
 - **Will assist it in its development verification processes**
 - **After FOC, will assist users in their application verification processes**
- **Physical models: automated testing**
- **Primitive Behaviors: automated testing**
- **Orderable behaviors: Output for manual checking against specifications and as intended**

What are your questions?