



canso

civil air navigation services organisation

**Validation and Verification (V&V)
in Safety and Acquisition:
An International Perspective**

October 20, 2011

Overview

- International Collaboration
- ANSP T&E Concepts and Considerations
- V&V and Safety Management
- Independent Safety Assessment trends and test community collaborative opportunities
- V&V Culture

Civil Air Navigation Services Organisation (CANSO) Overview

- An international trade organization that represents the interests of ANSPs
 - Full Members: 65 ANSPs, representing 85% of world Air Traffic
 - Associate Members: 70 industry partners
- Key CANSO strategies:
 - Be the clear voice of ANSPs
 - Lead the improvement of ANS performance
 - Optimize the effectiveness of the organization
- CANSO structure:
 - Global Programs: Safety, Operations, Policy
 - Regional Programs: Asia-Pacific, Middle East, Europe, Caribbean & Latin America, Africa
- Key partners:
 - ICAO (International Civil Aviation Organization)
 - IATA (International Air Transport Association)
 - ACI (Airports Council International)
 - FSF (Flight Safety Foundation)
 - IFATCA (International Federation of ATC Associations)
 - IFALPA (International Federation of Airline Pilots Associations)

Executive Committee



Paul Riemens: Chairman;
Chief Executive Officer, LVNL
Netherlands



Massimo Garbini: Chair, EC3;
Director General, ENAV S.p.A.
Italy



Capt. Mohammad Amin Al-Mustafa
Chairman, MEC3;
Chief Commissioner CARC
Jordan



Carey Fagan:
Members at Large;
Executive Director of
International Affairs, FAA



Yap Ong Heng:
Member at Large;
Director General, CAAS
Singapore



Greg Russell: Vice Chairman;
Chairman APC3;
CEO, Airservices Australia



Micilia Albertus-Verboom:
Chair, LAC3; Director General, NAATC
Netherland Antilles



Juan Ignacio Lema Devesa:
Member at Large;
President and Director General, Aena
Spain



Neil Planzer:
Associate Member Representative;
VP ATM, Boeing ATM

ATO T&E Process

- **Validation:** The right system is built.
 - Documented developmental and operational requirements are correct, clear, and unambiguous.
- **Verification:** The system is built right.
- Similar to International concepts
- This process is performed by various FAA organizations to verify that requirements have been met and the system is ready for operational use.

ANSP T&E Concepts and Considerations

- Many international ANSPs are not government organizations or are not wholly government organizations.
- Most software, hardware, and factory-acceptance testing is contracted out.
- Most systems integration and acceptance testing is conducted by the ANSP with technical support from suppliers.
- NextGen is not just an FAA or European (SESAR) initiative. Many others are facing the same T&E, V&V, safety management, and implementation challenges that we are.

ANSP Aspects Considered

➤ Degree of testing required:

- Impact assessment
- Backing evidence
- Amount of OT/integration tests
- Specific testing of safety features
- Entrance and exit criteria

➤ Integrity of testing:

- Coverage
- Test completeness
- Limitations
- Traceability
- Documentation
- Metrics
- Test environment
- Configuration

ANSP T&E Concept (UK NATS)

- Lifecycle activities are guided by:
 - IEEE Standard 829, Software Test Documentation
 - IEEE Standard 1012, Software V&V
 - ISO/IEC System Engineering Standard 15288 for Lifecycle Stages
 - ISO/IEC System Engineering Standard 12207 for Software Lifecycle Processes
- These are heavily supplemented by the Human Factors Team and human performance considerations, which drive simulations, limited operational services, and validation exercises for large capability changes.

V&V and Safety Management

“We can’t leave the baby here; there’s a tiger in the bathroom!”



- **Mission:** Keep the baby safe in the suite.
- **Solution:** Leave the baby in the closet.
- **Result of validation:** Original solution is not the right one. The Tiger will still eat the baby

CANSO SMS SRM

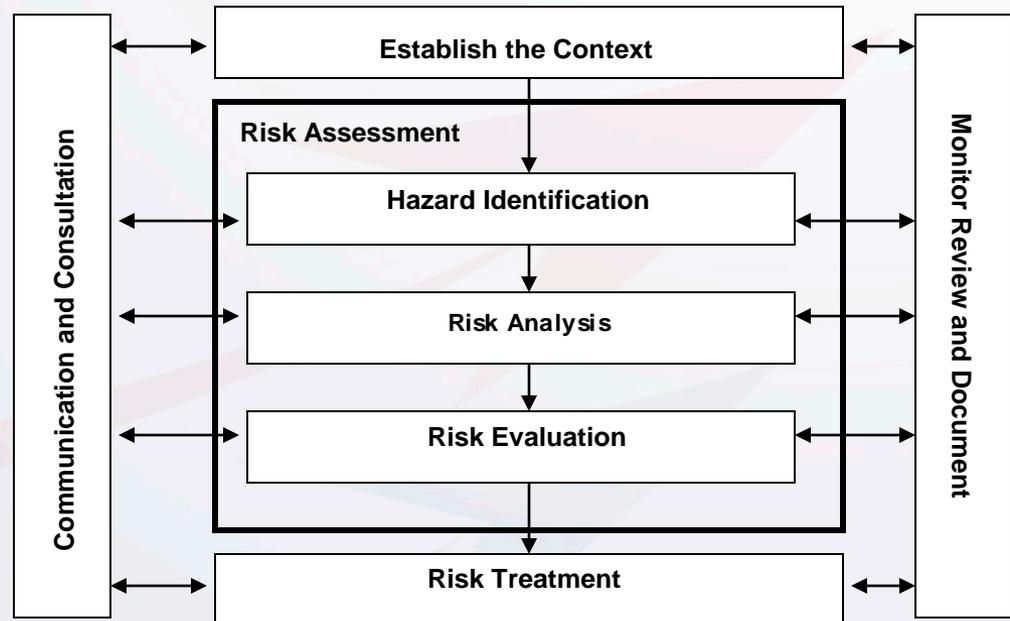
➤ Formal, documented process for identifying, assessing, classifying, and controlling all safety risks, including potential future risks (V&V)

➤ Risk treatment:

➤ Identify options and select one treatment plan.

➤ Implement and verify the mitigation.

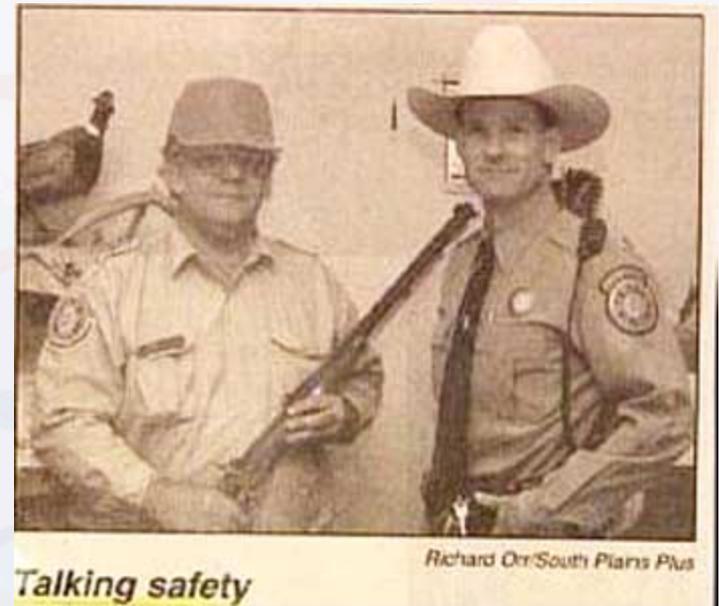
➤ Monitor and validate the effectiveness of the mitigation.



Sample Risk Management Process Model (Modified from ISO 31000)

V&V and Safety Management

- While the concepts are the same as T&E, their application is a bit different.
- SMS V&V focuses on ensuring controls are implemented to mitigate the assessed risk are correct and effective.
- Challenges:
 - What performance metrics can be used for V&V controls?
 - Are all of the controls effective?
 - What do we do if the answer is no?
 - We often apply short-term mitigations, such as training, but how much is too much?



Independent Safety Assessment Trends and Test Community Collaborative Opportunities

- Independent Safety Assessment issues that impact the In-Service Decision often aren't new.
 - The severity of a hazard is usually accurate
 - What changes is the frequency of occurrence
- Training is almost always an item in ISA Executive Summaries
- Collaboration Opportunities:
 - Bring risk analysis and V&V of controls and mitigations to T&E discussions
 - Align micro and macro system views
 - Is the System Ready for the NAS?
 - Is the NAS Ready for the System?

Positive Culture Components

- Some positive culture components are the same for both safety and V&V:
 - **Reporting**
 - Willing and able to report (i.e., a “no blame” culture)
 - “Don’t shoot the messenger.”
 - **Informed**
 - Knowledgeable of what is actually going on
 - Value good data more than data that make us look good
 - **Learning**
 - Willing to adapt and implement necessary reforms
- These positive components are key to ensuring the enduring integrity of V&V.

Back-up Slides

ATO SRM Process

- All proposed changes to the NAS must undergo SRM.
 - Equipment, systems, procedures, operations
- SRM Evaluation
 - Performed early in the planning or change proposal process
 - Ensures that safety-related changes are documented and resolved
 - Emphasizes objective evidence to:
 - Validate that requirements are correct and mitigated
 - Verify that the requirements are implemented and working as designed and intended

Safety Standing Committee Workgroup Structure

Further enhance safety management and culture amongst members

SMS Capability

Lead: Mark DeNicololo (FAA-ATO)

Goals

By 2013 a significant number of the SSC members (as at June 2010) have achieved the "implementing" level as measured by the SMS maturity metric

Activities and outcomes:

Raising SMS capability and sharing of data
Safety Information Exchange Programme
Safety Culture
SMS Implementation (Mentoring, workshops & training)

Positively affect safety performance in ANSP operations

Safety of Operations

Leads: Max Bice, Airservices Australia
Graham Wadson, UK-NATS

Goal:

By 2013 we will have worked together with our operations colleague and industry partners to achieve a demonstrable safety improvement in runway safety as measured using the common safety metrics

Activities and outcomes:

Runway Excursion/Incursion Risk Reduction
Sharing of data

Provide global leadership through the shaping of future safety development

Future Safety Development

Leads: Huan Nguyen, FAA-ATO
Claire Marrison, Airservices Australia
Roger Dillon, UK-NATS

Goal:

By 2013 we will have engaged a multi disciplinary team and our industry partners to address the safety aspects of future technologies, automation and global integration concepts

Activities and outcomes

SMS of the Future
Version 2 of the CANSO SMS Standard of Excellence and Implementation Guide
Global Safety Case
Human Factors

Safety Performance Measurement

Leads: Hans-Jürgen Morscheck, DFS
Doug Chapman, Navcanada

Goal:

By 2013 All SSC members (as at June 2010) are using the common safety metrics and are sharing data to aid safety improvement

Activities and outcomes:-

Runway Incursion metric, IFR/IFR metric, SMS maturity metric, Develop Global Safety Report to provide Data sharing & Benchmarking