V.A.I.Y.L. Framework Field Guide

The V.A.I.Y.L. Framework
Version 1

Layer 1 - The Framework

The V.A.I.Y.L. Framework emerged from practical reflection on operational experience within the National Airspace System. It is not intended as a formal safety model, but as a lightweight method for examining variations noticed by operators during normal work.

Identity Line

The Variation – Analysis – Insight – Yield – Learn (V.A.I.Y.L.) Framework is a structured way to examine variations in operator experience.

Purpose

The V.A.I.Y.L. Framework is a structured way to examine variations in operator experience. In complex operational systems, operators frequently notice differences between observed and expected behavior during normal operations, referred to here as *variations*. These variations can act as weak signals of gaps or misalignments within the system, but they are often left unexamined.

The framework provides a structure for capturing these experiences and examining them in order to develop insight about the system. It may also be used asynchronously, allowing the operator or reviewer space to reflect on the experience, learn from it, and revisit the observation at a later time if necessary.

The purpose of the framework is not to prescribe corrective actions or replace formal reporting systems, but to provide a lightweight method for developing understanding from operator experience.

Overview

The framework is divided into three sections: Source, Method, and Scope, which together describe where the experience originates, how it is examined, and how the resulting understanding may apply.

The Source refers to the experience perceived by the operator.

The Method contains two components: the Seed Log, a brief log of the observation, and the V.A.I.Y.L. Sequence, a structured guide for developing understanding. Analysis initiates an Examination, which exists outside of the framework. Examination may include notes, operational processes, operational reviews, or formal investigations, which may provide feedback to the Analysis component.

The Scope describes how the understanding developed through the V.A.I.Y.L. Sequence may apply broadly at the system level or reflect conditions specific to a facility.
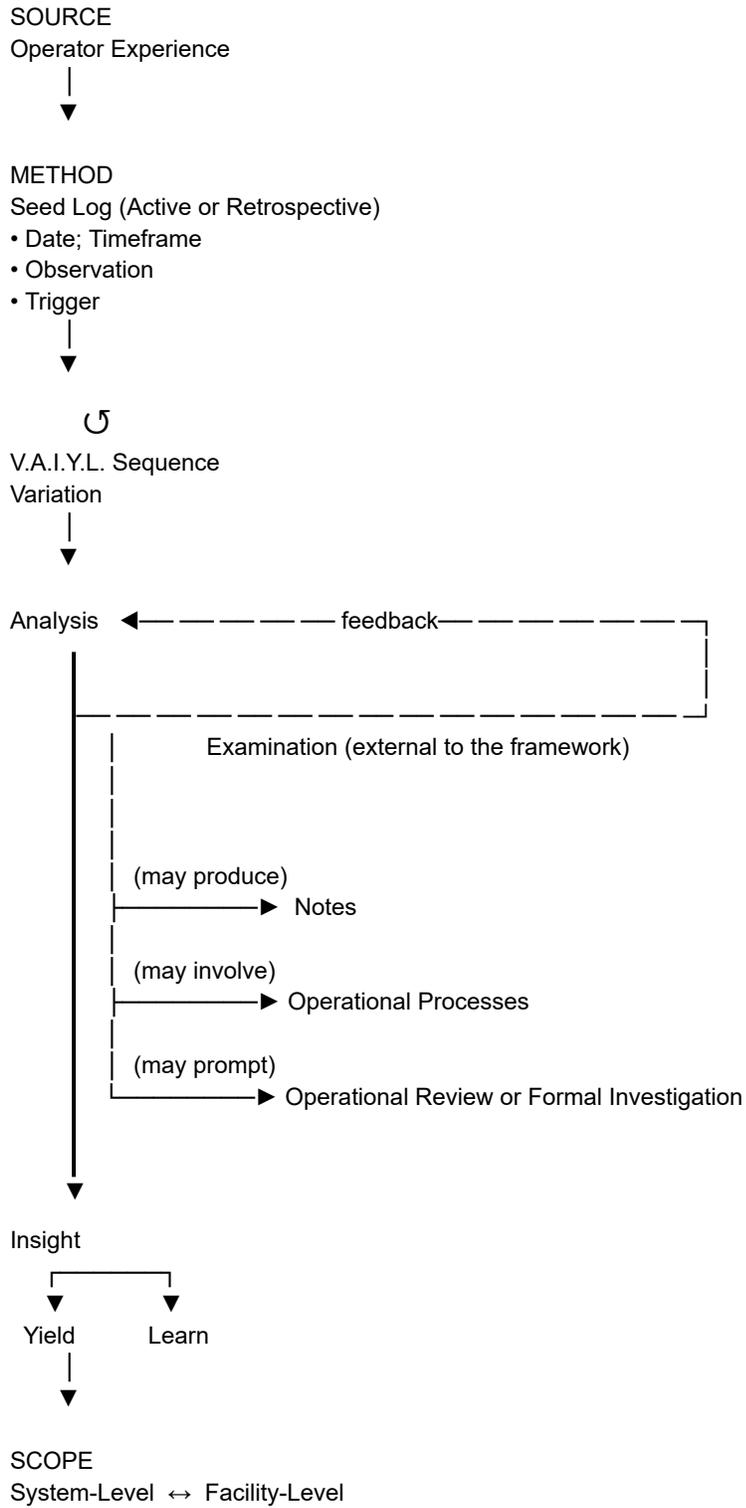
Diagram:

SOURCE
Operator Experience
    |
    ▼

METHOD
Seed Log (Active or Retrospective)
• Date; Timeframe
• Observation
• Trigger
    |
    ▼

    ↺
V.A.I.Y.L. Sequence
Variation
   |
   ▼

Analysis ◀— — — — — feedback— — — — — ┐
  | |
  | └ — — — — — — — — — — — — — — — — ┘
  | | Examination (external to the framework)
  | |
  | |
  | |
  | | (may produce)
  | ├——————▶ Notes
  | |
  | | (may involve)
  | ├——————▶ Operational Processes
  | |
  | | (may prompt)
  | └——————▶ Operational Review or Formal Investigation
  |
  ▼

Insight
  ┌——————┐
  ▼   ▼
Yield   Learn
 |
 ▼

SCOPE
System-Level ↔ Facility-Level

Figure 1. Structure of the V.A.I.Y.L. Framework

Elements

Operator Experience

Operator Experience is the source of the observation. The experience is a situation perceived by the operator during normal operations, training, discussions, or study.

Seed Log

The Seed Log captures the experience in simple written form. The observation may be recent, an Active Seed, or from past experience, a Retrospective Seed. The Seed Log is composed of three subcomponents:

Date; Timeframe – Date records when the Seed Log entered the framework. For Active Seeds, a blank timeframe implies the experience occurred on the recorded date. For Retrospective Seeds, the timeframe should be estimated when possible; if it cannot be reasonably determined, N/A is recommended for clarity.

Observation – A summary of the operator's experience.

Trigger – The reason the experience stood out to the operator.

Variation

Variation is the difference between observed behavior and a reference point in operational understanding. The reference point may include procedures, common practices, operator expectations, or comparable systems.

Analysis

Analysis is the operator's or reviewer's Examination of the variation to develop insight about the experience. The Examination may produce Notes or involve Operational Processes, such as voluntary safety reporting programs. In some cases, an Examination may prompt an Operational Review or Formal Investigation.

Insight

Insight is the understanding developed through Analysis; the operator's or reviewer's interpretation of what the experience may reveal about the system.

Yield and Learn

This understanding is then categorized as either Yield or Learn.

Yield represents what the experience may reveal about the operational system.

Learn represents what the operator or reviewer personally understood through the process.

This distinction prevents personal insights from being mistaken for, or combined with, system-level conclusions.

Scope

Scope describes how the understanding may apply broadly at the system level or reflect conditions specific to an individual facility.

Using the Framework

The V.A.I.Y.L. Framework is designed to be flexible in practice. Observations may be recorded at the time they occur or introduced later from past experience. Once captured in a Seed Log, the V.A.I.Y.L. Sequence may be applied immediately or revisited at a later time.

During Analysis, the operator or reviewer examines the variation in order to develop Insight about the experience. This Analysis initiates an Examination outside of the framework. The Examination may remain informal and produce notes while reviewing procedures or discussing the experience with colleagues, or it may involve operational processes and/or operational reviews or formal investigations. Information produced through Examination feeds directly back into Analysis in order to refine the resulting Insight. The framework does not require that every observation lead to operational processes, operational reviews, or formal investigations.

Because the framework is asynchronous, the Sequence may be rerun when new information, experience, or understanding becomes available. In this way, the framework allows observations to develop over time while maintaining a simple structure for examining operator experience.

Layer 2 - Applications and Considerations

The following examples illustrate how the V.A.I.Y.L. Framework may be applied to different types of operator experiences. These examples demonstrate how observations of varying scope—from small operational moments to complex events—can be examined through the framework to develop understanding. They also illustrate that the framework may be applied immediately or revisited later as additional information or knowledge becomes available.

Examples

Example 1: Crossing Runway Separation Interpretation (U.S. Air Traffic Control)

Seed Log (Retrospective Seed – SL-002)

Date; Timeframe: 03/10/2026; 03/22/2025

Observation: Two Certified Professional Controllers (CPCs) held different interpretations of the crossing runway separation standard for aircraft operating under instrument flight rules (IFR) in instrument meteorological conditions (IMC), specifically between an arrival and a departure.

Trigger: A supervisor filed a Mandatory Occurrence Report (MOR) alleging a separation error during crossing runway operations involving the two IFR aircraft.

V.A.I.Y.L. Sequence

Variation

One CPC interpreted that crossing runway separation standards could only be applied when the field was in visual meteorological conditions (VMC) or when tower-applied visual separation had been coordinated in accordance with facility SOPs. A second CPC (the operator) interpreted that this restriction did not exist.

Analysis

After reviewing the facility SOPs and FAA Order JO 7110.65, the directive that defines U.S. air traffic control procedures and separation standards, the operator examined the variation and

concluded that crossing runway separation standards did not include weather restrictions or tower-applied visual separation requirements.

Examination (external to the framework)

Notes: The operator reviewed the relevant sections of the facility SOPs and JO 7110.65 concerning crossing runway separation standards.

Operational Process: An Air Traffic Safety Action Program (ATSAP) report was submitted supporting the operator's interpretation.

Operational Review: The incident initiated a System Service Review (SSR), which confirmed that crossing runway separation standards do not contain weather restrictions or tower-applied visual separation requirements. The facility later received a formal briefing on the matter.

Insight

The misinterpretation extended facility-wide and was partially due to how crossing runway separation standards for IFR aircraft operating in IMC were taught at the facility.

Yield

The facility training department updated its procedures to correct the interpretation of crossing runway separation standards.

Learn

The operator learned that procedural and operational drift can extend to the point where it becomes formalized within a training environment.

Scope

The misinterpretation appeared to be contained at the facility level. However, the operator also observed that JO 7110.65 does not contain specific procedures addressing IMC separation standards between two IFR aircraft during crossing runway operations, while such procedures do exist for same-runway operations, specifically between arrivals and departures. This absence may allow similar misinterpretations to occur at a broader system level.

Example 2: STARS Adaptation Precipitation Depictions (U.S. Air Traffic Control)

Seed Log (Active Seed – SL-001)

Date; Timeframe: 03/07/2026

Observation: Three Certified Professional Controllers (CPCs), including the operator, were unsure about the precipitation intensity levels depicted on the radar scope.

Trigger: The operator recalled that several months had passed since the new Standard Terminal Automation Replacement System (STARS) adaptation (a unique configuration of the radar scope) had been implemented. Despite this, none of the CPCs present could immediately distinguish which depiction represented moderate precipitation and which represented heavy precipitation and had to consult a posted reference near the radar scope.

Note: The original Seed Log was recorded in a physical notebook. The entry presented here is a reconstructed Seed Log created during preparation of this example.

V.A.I.Y.L. Sequence

Variation

CPCs are expected to quickly distinguish between the six precipitation intensity levels displayed on the radar scope with little effort. In this case, the operators needed to consult the posted reference near the radar scope to determine which depiction represented moderate and heavy precipitation.

Analysis

The operator noted that under the previous STARS adaptation, heavy precipitation had been depicted as a solid yellow-orange color without texture. Under the new adaptation, the same presentation now represents moderate precipitation.

Examination (external to the framework)

Notes: N/A

Operational Process: N/A

Operational Review: N/A

Insight

The new STARS adaptation effectively changed how precipitation intensities are visually interpreted by CPCs at the facility. Although operators had likely been briefed on the change, the yellow-orange color may still be subconsciously associated with heavy precipitation.

Yield

Three CPCs clarified their understanding of the precipitation depictions introduced by the new STARS adaptation.

Learn

The operator became more aware of the potential confusion the new STARS adaptation may have introduced at the facility.

Scope

Uncertain. If the STARS adaptation is unique to the facility, the confusion between precipitation intensities may be limited to the facility. If similar adaptations were implemented elsewhere, the issue may exist at a broader system level.

Example 3: Memory Aid Design and Secondary Risk (U.S. Air Traffic Control)

Seed Log (Retrospective Seed – SL-003)

Date; Timeframe: 03/11/2026; Winter 2026

Observation: A memory aid introduced to the tower environment appeared to reduce the time and focus operators devoted to scanning the airport surface and surrounding airspace. The tool was intended to assist controllers in remembering when aircraft were crossing active runways. Some operators occasionally stopped using the memory aid during periods of higher traffic volume.

Trigger: While reading about human factors and safety management systems in aviation, the operator encountered the concept that tools designed to mitigate operational risk may also introduce secondary risks.

V.A.I.Y.L. Sequence

Variation

The operator noticed that both themselves and other controllers did not always maintain the expected or optimal visual scan out the tower windows when using the memory aid.

Analysis

According to facility management, the memory aid had been introduced as a corrective action following a quality review of an operational incident. The operator understood that the tool was intended to reduce the likelihood of errors associated with aircraft crossing active runways.

Note: The operator first noticed the potential effect of the memory aid approximately two years earlier when the tool was introduced. During the winter of 2026, after reading about risk mitigation tools and secondary risk in safety management and human factors literature, the operator discussed the concept with a trainee and reconsidered how it might apply to the facility's crossing runway memory aid.

Examination (external to the framework)

Notes: N/A

Operational Process: N/A

Operational Review: N/A

Insight

The operator inferred that the memory aid may have been designed primarily to satisfy a corrective action requirement following the earlier incident, with limited consideration given to how the tool might affect operator attention. Because the memory aid is positioned low on the tower control panel below the windows, its use may reduce the time controllers visually scan the operational environment. Additionally, the facility's SOPs require the memory aid to be used but do not specify a standardized method for its use.

Yield

The memory aid may introduce a form of secondary risk within tower operations by drawing operator attention away from direct observation of the operational environment.

Learn

The operator recognized the need to balance the use of procedural tools with maintaining situational awareness of the operational environment. Increased familiarity with safety management and human factors concepts, including secondary risk, provided a clearer framework for understanding how safety tools may influence operator behavior.

Scope

This specific memory aid is unique to the facility. However, because crossing runway configurations are common across air traffic control facilities, similar memory aids elsewhere could introduce comparable effects on operator attention and visual scanning.

Additional examples may be documented separately as V.A.I.Y.L. Records as new observations arise.

Considerations

The following considerations clarify the intended use and limitations of the V.A.I.Y.L. Framework.

- **The framework encourages observation but does not require action.** Some observations may simply clarify understanding without leading to operational changes or formal processes.

- **Observations do not need to involve errors or incidents.** Variations may arise from normal operations and still provide useful insights into the system.

- **Incomplete information does not invalidate an observation.** Observations may initially contain limited information and may be refined later as additional knowledge becomes available.

- **The framework is asynchronous.** Observations may be recorded at the time they occur or introduced later from past experience. The V.A.I.Y.L. Sequence may be applied immediately or revisited at a later time.

- **The V.A.I.Y.L. Sequence may be rerun.** As additional knowledge, experience, or information becomes available, the Sequence may be applied again to refine Insight, Yield, or Learn.

- **Variation may originate from operator expectations.** Differences between observed behavior and operator understanding may serve as valid reference points for identifying variations.

- **Yield and Learn serve different purposes.** Yield reflects what the experience may reveal about the operational system, while Learn reflects what the individual operator or reviewer understood from the experience.

- **Examination exists outside the framework.** Operational processes, operational reviews, or formal investigations may occur independently of the framework but may provide feedback to the Analysis component.

- **All observations involve some level of Examination during Analysis, though the depth of that Examination may vary.** In many cases, the Examination remains informal and consists only of reflection, memory recall, notes, or discussion with colleagues.

- **The framework does not replace formal reporting systems.** Systems such as voluntary safety reporting programs or operational investigations operate independently and may intersect with the framework during Examination.

- **There is no prescribed method for recording observations.** The Seed Log numbering format used in the examples (e.g., SL-001) is only one possible method of organization and is provided for illustration.

- **The examples presented originate from live air traffic control operations.** However, the framework is designed to be domain-neutral and may be applied to other operational system

The V.A.I.Y.L. Framework is intended to support structured reflection on operator experience and encourage the continued development of operational understanding over time.