Operational Architecture

Building Systems That Survive the Audit

We focus on Vocabulary, Lineage, Taxonomy, and the financial nexus where ESG data originates (Accounts Payable). This is where theory becomes operational reality.

Learning Objectives

By the end of this module, you will be able to:

- Translate between **framework vocabulary** and **audit vocabulary** to prevent miscommunication
- Implement **greenwashing firewalls** using EU Taxonomy Technical Screening Criteria
- Build **evidence ladders** that trace AI insights back to source documents
- Design data classification systems that balance transparency with competitive protection
- Create **financial-ESG reconciliation layers** at the Accounts Payable nexus

Pre-Work Assessment

Before You Begin

Complete this self-assessment to identify your starting knowledge baseline.

Knowledge Check Questions

1. **1. Can your data scientists and auditors understand each other's terminology without translation?**

   ☐ Yes, we have a shared lexicon document

   ☐ Partial—some terms aligned, others cause confusion

☐ No—frequent miscommunication about AI concepts

☐ Not sure—haven't observed these interactions

2. **2. When your AI generates an ESG metric, can you trace it back to the specific source document (invoice, receipt, contract)?**

   ☐ Yes, full data lineage with document IDs

   ☐ Partial—can trace to database but not original document

   ☐ No—metrics are aggregated without provenance tracking

   ☐ Not applicable—we don't use AI for metric generation

3. **3. Where does most of your Scope 3 emissions data originate?**

   ☐ Accounts Payable invoices and procurement records

   ☐ Supplier surveys and self-reported data

   ☐ Industry averages and estimation models

   ☐ Multiple sources without clear hierarchy

   ☐ Don't know our primary data source

Note: Keep your responses handy—you'll revisit them at the end of this module.

Episode 2.1 The Lexicon of Trust (Translator Box)

Bridging the gap between Data Scientists and Auditors. We must align the vocabulary to avoid "Translation Risk."

We Say (Framework) Liability Sponge
We Say (Framework) Evidence Ladder
We Say (Framework) Hallucination
Audit Says (Risk Register) Weak Control Environment
Audit Says (Risk Register) Data Lineage / Provenance
Audit Says (Risk Register) Data Integrity Failure

Translation Exercise

Task: Create a glossary mapping your AI team's vocabulary to audit terminology. Identify the 5 terms most likely to cause miscommunication in your organization.

Source: *"VerifyWise AI Lexicon: Human-in-the-loop safeguards."*

Episode 2.2

EU TAXONOMY DNSH

The Taxonomy Engine

80 min

The Premise: CSRD tells you *to report*; the EU Taxonomy tells you *what counts as green*. An AI can generate a perfect CSRD report that fails the Taxonomy's Technical Screening Criteria (TSC). We build the "Double-

Check" logic: ensuring activities flagged as "Sustainable" pass the **Do No Significant Harm (DNSH)** criteria.

The "Greenwashing Firewall" Algorithm

Logic Rule (Illustrative Example): IF (Activity = "Manufacture of Cement") AND (Carbon Intensity > 0.469 tCO2e/t product) THEN (Taxonomy Eligible = FALSE) regardless of marketing claims.

This hard-coded constraint prevents the AI from classifying activities as "green" when they fail technical thresholds.

Legal Ref: *"Regulation (EU) 2020/852 (Taxonomy Regulation)."*

Episode 2.3

DATA LINEAGE

The Provenance Gap

70 min

Tracing data back to the source. If the AI summarized the data, where is the original invoice? We build the **Evidence Ladder**: Raw Data → Aggregated Data → AI Insight → Report.

☕ Case Study: Project Espresso (Chapter 2)

Setup: AI finds gaps in the Vietnamese fertilizer data due to coffee stains.

Failure Mode (The Action): It silently "infills" the data using Regional Averages from Brazil because the variable name "Coffee_Region" was ambiguous.

Result: You report a 20% water reduction that never happened.

Control: Provenance Tagging. Any synthetic data must be explicitly flagged in the JSON schema before visualisation.

Evidence Artifact: The "Infill Audit Log" showing every substitution made during processing.

ACCEPTANCE CRITERIA

- Every AI-generated metric must link back to a specific Document ID (Invoice #).
- "Synthetic/Infilled" data must be flagged in the metadata column.
- Confidence scores must be stored alongside the value (e.g., "500kg [0.42]").

Episode 2.4

STRATEGY

Public Eligibility & Data Classification

60 min

What data is safe to publish? Managing the risk of exposing sensitive supply chain maps to competitors via "Transparency" reports. The tension between "Openness" and "Trade Secrets."

DATA CLASSIFICATION MATRIX

Public:

Aggregated Regional Impact, Policy Statements.

Internal:

Supplier Names, Specific Audit Scores.

Restricted (Secret):

Exact GPS of strategic mines (Rare Earths), Pricing formulas.

The Redaction Game

Activity: Review a sample "Transparency Report." Identify the 3 data points that inadvertently reveal your proprietary supplier pricing structure to a competitor using AI scraping.

Episode 2.5 2-WAY MATCHING SCOPE 3 FINANCE

The Accounts Payable Nexus

90 min

The Premise: ESG data does not originate in sustainability dashboards; it originates in **Accounts Payable**. The invoice is the atomic unit of Scope 3. We bridge the gap between the CFO's "2-Way Matching" (PO vs. Invoice) and the CSO's "Impact Matching" (Invoice vs. Emission Factor).

☕ Case Study: Project Espresso (Chapter 2.5)

Setup: AP sees "50kg Urea @ $20." ESG sees "46% N-content × 5.15 kg CO2e/kg."

Failure Mode (The Discrepancy): A 2-Way Match between AP and ESG revealed a $0.02 variance in currency conversion (VND→USD).

Result: This triggered a re-extraction, revealing the receipt indicated *organic fertilizer* (lower emission factor), saving 12% on Scope 3.

Control: Financial-ESG Reconciliation Layer.

Evidence Artifact: The Reconciliation Delta Report.

INTEGRATION ARCHITECTURE

The Reconciliation Requirement: Financial data and ESG data must match at the invoice level.

- AP system and ESG platform share common invoice IDs
- Currency conversion applied consistently across both systems
- Variance threshold triggers re-extraction (e.g., >2% discrepancy)

Required Reading: *"Transforming financial operations: Integrating SAP OpenText VIM, AI-Powered OCR, and RPA"* (Charabuddi).

Module Summary

Key Takeaways

Conceptual Framework

- • Shared lexicons prevent "translation risk" between technical and audit teams
- • EU Taxonomy requires hard-coded validation, not just reporting compliance
- • Data provenance must trace AI insights back to source documents
- • Accounts Payable is the true nexus of ESG data, not dashboards

Practical Tools Acquired

- • Framework-to-audit vocabulary translator
- • Greenwashing firewall algorithms with DNSH criteria
- • Evidence ladder architecture (Raw → Aggregate → Insight → Report)
- • Financial-ESG reconciliation protocols at invoice level

Post-Module Assessment

Revisit your pre-work assessment. Has your understanding shifted?

Reflection Questions

1. **1. Based on Episode 2.1, identify the most dangerous vocabulary mismatch in your organization.**

   Example: "Hallucination" (AI team) vs "Data Integrity Failure" (Audit)

   ```
   The term, why it's
   dangerous, proposed
   ```

2. **2. Does your organization have a financial-ESG reconciliation layer (Episode 2.5)?**

   If yes, what's the variance threshold? If no, where would you implement it?

   ```
   Current state and
   implementation
   plan...
   ```

3. **3. If you implemented ONE architectural control from this module, which would have the highest ROI?**

   Options: Lexicon translator, Taxonomy firewall, Evidence ladder, Data classification, AP reconciliation

   Your priority control and

Next Module

Level 3: The Lucas Cycle

Systems That Raise—exploring how automation designed to elevate safety can accidentally lower the floor. We examine oversight drift, training bias, and the moment when helpful systems become controlling ones.

- • The Jedi Council Problem (oversight drift)
- • Training the trainers (bias amplification)
- • Protocol droids and rule-following failure modes
- • The droid uprising (when automation refuses)

Begin Level 3