

OPEN SOURCE PLATFORM

relysam

Core Reliability Engineering Platform with AI/ML Enhancements

"Design Reliability In. Predict Failures Before They Happen."

VERSION

2.0.0 (June 2026)

LICENSE

GPL v3 + GFDL v1.3

DEVELOPED BY

Oai (Codeberg)

PLATFORM

FreeBSD Optimized

◆ <https://codeberg.org/Oai/relysam/>

The Reliability Crisis & Holistic Model

60–80%

Industrial Accidents Involve Human Error

Yet HRA tools remain proprietary and expensive, leaving this critical analysis capability out of reach

10–1000x

Cost Advantage of Design-Phase Reliability

Addressing reliability early is exponentially more cost-effective than post-deployment fixes

10–20%

of Required Reliability Data Available

Most organizations lack the data foundation needed for accurate reliability predictions

E Equipment Reliability

Design for Reliability (DfR)

FMEA & Fault Tree Analysis

Component Derating

H Human Reliability

THERP & HEART Methods

SPAR-H & CREAM

Performance Shaping Factors

O Organizational Factors

Safety Culture Development

Procedures & Training

Leadership Commitment

True System Reliability requires all three pillars working in concert. relysam is the only open-source platform providing comprehensive tools across all three.

The Data Challenge & DfR Assessment

THE COMPLETE RELIABILITY DATA LIFECYCLE

Design Phase

- Industry Standards
- Reliability Prediction
- FMEA / FTA
- Vendor & Market Data

Testing Phase

- Accelerated Life Tests
- Reliability Growth
- Environmental Stress
- HALT / HASS

Field Phase

- Field Failures
- Warranty Claims
- Root Cause Analysis
- Customer Feedback

relysam Impact

DFR ASSESSMENT: EVALUATING ORGANIZATIONAL MATURITY

1

Reactive

Firefighting, blame culture

2

Awareness

Starting tools, exploration

3

Proactive

DfR integrated, team standard

4

Predictive

AI/ML augmentation

5

Culture

Everyone owns reliability

What is relysam

30+

RELIABILITY ENGINEERING TOOLS

9

COMPLETE HRA METHODS

10

SPECIALIZED AI/ML MODELS

100%

FREE & OPEN SOURCE

relysam delivers a complete reliability engineering ecosystem in a single platform. It covers every stage from design through field operation, providing the tools organizations need to transition from reactive firefighting to proactive reliability culture.

Backed by an enterprise-grade database architecture featuring 126 tables, 30 views, 7 triggers, and 170 indices, relysam provides the robust foundation required for complex reliability analysis. Its maximum offline capability ensures core functionality remains accessible even without internet connectivity.

Core Capabilities

Design for Reliability (DfR)

FMEA & Root Cause Analysis

Statistical Analysis

Fault & Event Tree Analysis

Component Derating

Risk & Trust Assessment

Knowledge Base

Custom AI Training

FMEA, FTA & ETA

AI-ENHANCED

FMEA & Root Cause Analysis

Traditional Failure Mode and Effects Analysis meets AI-powered insights. Risk Priority Number (RPN) scoring automatically prioritizes critical failure modes.

- AI recommendations suggest mitigation strategies
- Systematic "5 Whys" methodology for root cause identification
- Integrated CAPA (Corrective and Preventive Action) workflows

Fault Tree Analysis (FTA)

Comprehensive qualitative and quantitative modeling to identify the root causes of system failures.

- Minimal cut set analysis for identifying critical failure combinations
- Probability assessment grounded in industry standards
- Recursive modeling capabilities for complex system architectures

Event Tree Analysis (ETA)

Models the consequences of initiating events and the success or failure of safety systems.

- Consequence modeling for accident sequences
- Probability assessment based on component reliability data
- Integration with FTA for comprehensive risk assessment

NEW IN V2.0.0

Standards Modernization

Re-engineered physics-of-failure engines ensure predictions reflect current component technologies.

- MIL-HDBK-217F for electronic component reliability
- NSWC-11 for mechanical component reliability
- RBD (Reliability Block Diagram) design logic generation

Complete analytical suite covering both **causes** and **consequences** of system failures.

Statistical Analysis & Monte Carlo

Advanced Statistical Tools Deliver Accurate Reliability Predictions from Real-World Data



Weibull Analysis

Models failure distributions and predicts product life with statistical confidence



Monte Carlo Simulation

Runs probabilistic reliability assessments across multiple configurations



Enhanced Life Data Analysis

AI-powered results interpretation transforms raw failure data into actionable insights



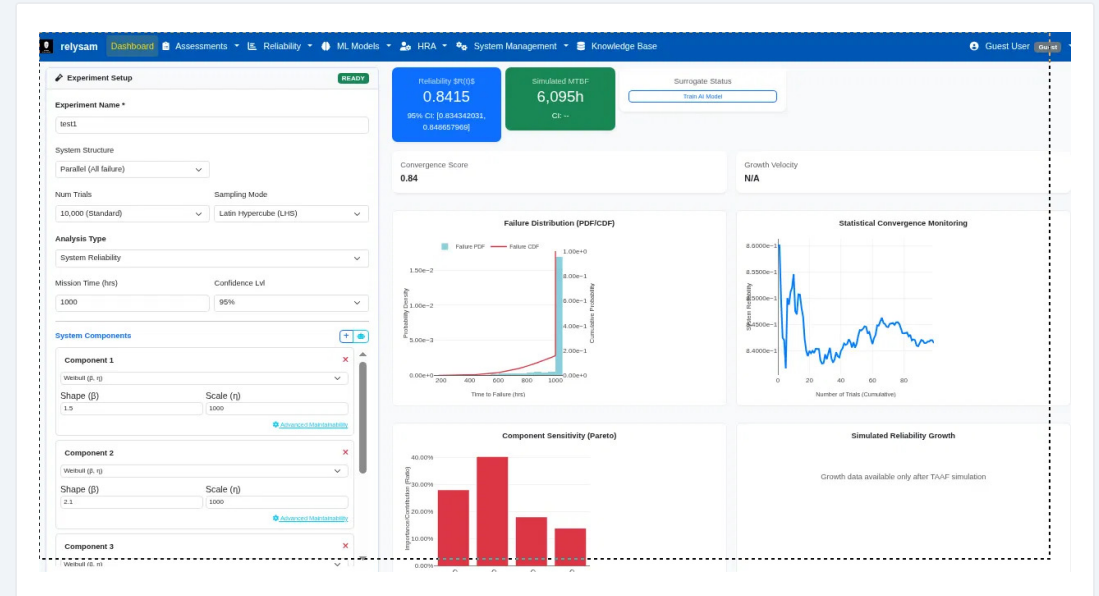
MTBF/MTTR Calculations

Supports maintenance planning and downtime estimation



Distribution Fitting

Handles censored and incomplete data — a common reality in field environments



Monte Carlo Simulation Interface — Probabilistic Reliability Assessment

Component Derating & Standards

relysam modernizes critical industry standards with re-engineered physics-of-failure engines, enabling accurate reliability prediction for both electronic and mechanical components.

MIL-HDBK-217F (Electronics)

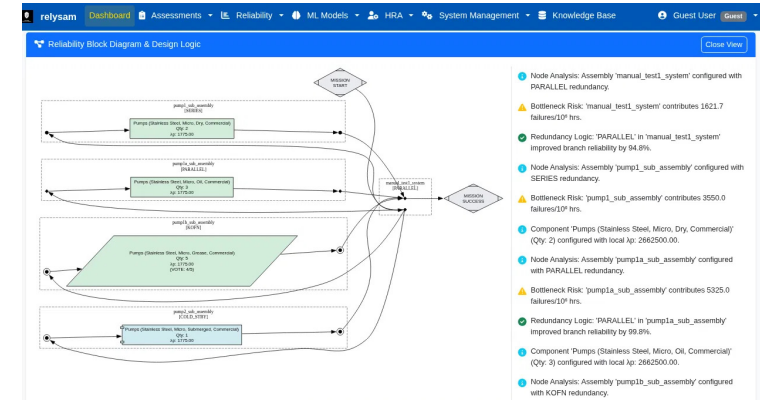
Re-engineered physics-of-failure engine specifically designed for electronic component reliability prediction and stress analysis.

NSWC-11 (Mechanical)

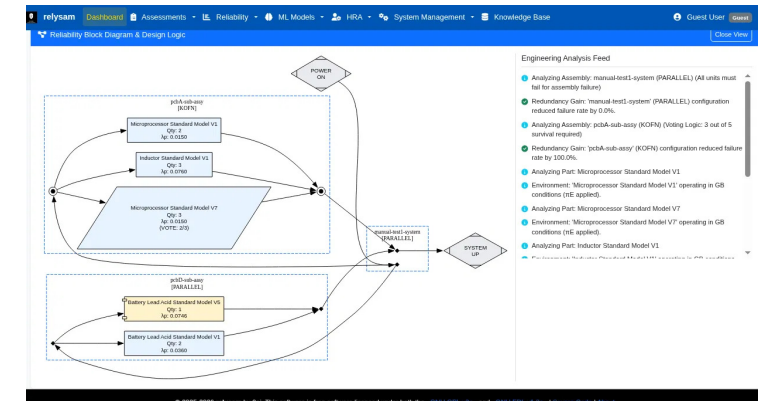
Mechanical component reliability prediction utilizing updated failure rate models that reflect modern mechanical technologies.

RBD Design Logic Generation

Automatic Reliability Block Diagram (RBD) design logic generation derived directly from standards data for system-level analysis.



NSWC-11 Mechanical RBD & Logic Generation



MIL-HDBK-217F Electronics RBD & Logic Generation

Human Reliability Analysis

9 complete HRA methods — the most comprehensive open-source HRA platform available.



6 Full Calculators

THERP, HEART, SPAR-H, CREAM, SLIM-MAUD, SHERPA



3 Demo Methods

ATHEANA, JHEDI, MERMOS



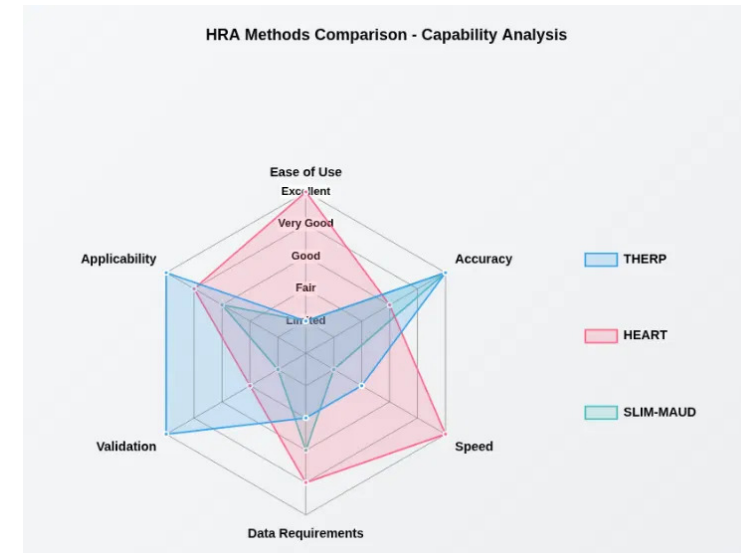
Comprehensive Analysis

Performance Shaping Factors, Error Probability Quantification



Integrated Learning

"Learn More" modals with detailed methodology explanations

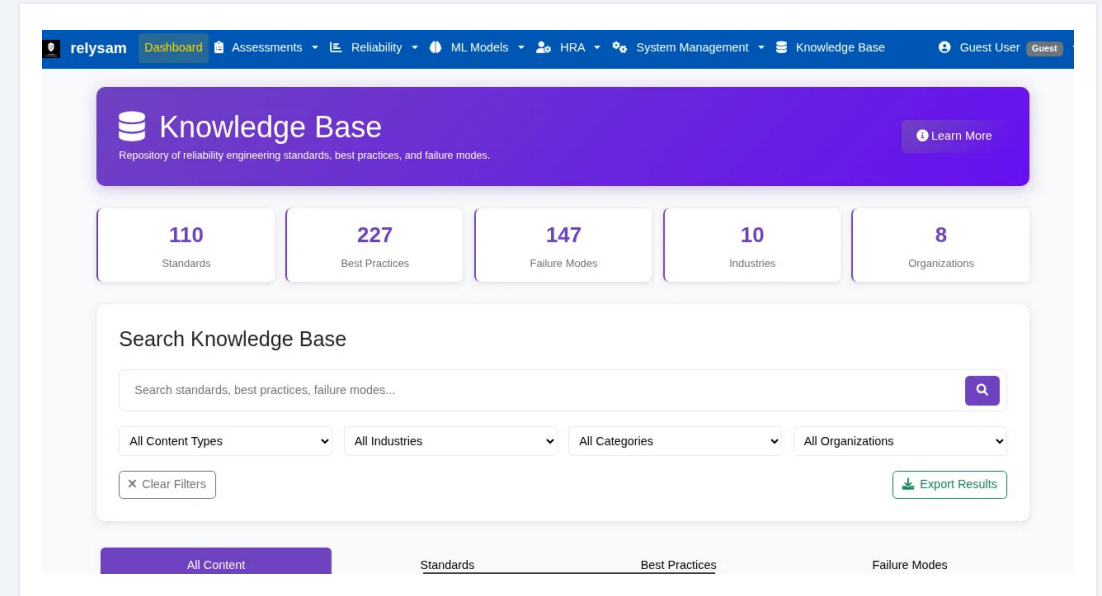


HRA Methodologies Interface — Comprehensive Analysis Tools

Knowledge Base

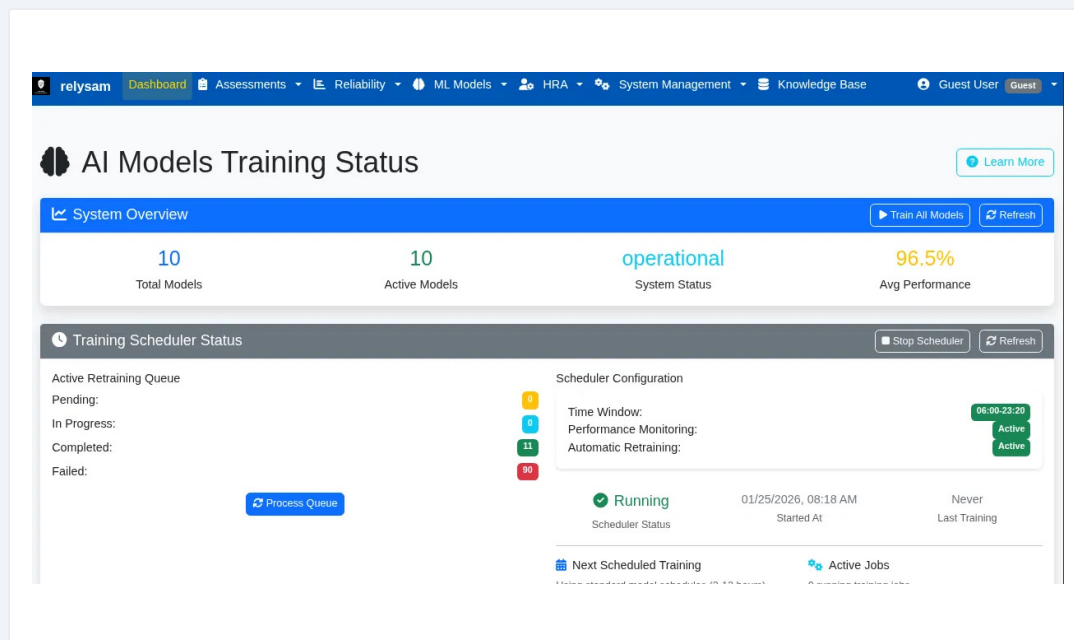
Instant Access to Reliability Standards, Best Practices, and Failure Mode Libraries

- ✓ **Unified Search Interface**
Search across all reliability engineering standards and documentation instantly
- ✓ **Best Practices Repository**
Comprehensive coverage of equipment, human, and organizational reliability best practices
- ✓ **Failure Mode Libraries**
Organized by component type and industry for rapid reference during analysis
- ✓ **Context-Aware Integration**
Relevant knowledge surfaces automatically during assessments, reducing learning curves



Knowledge Base Interface — Unified Search & Reference

AI/ML & Custom Training



AI Model Training Status — Real-time Monitoring & Retraining

10 specialized AI/ML models augment expert engineering judgment. All models support custom data training to adapt to your specific industry, components, and operating conditions.

• Web UI Interface

• CLI Tools

• REST API

SPECIALIZED AI MODELS

Reliability Predictor

Predicts component reliability scores

Failure Mode Classifier

Classifies failure modes automatically

Risk Assessment Model

Assesses risk levels with insights

Recommendation Engine

Generates improvement recommendations

Anomaly Detector

Detects anomalies in operational data

Enhanced Failure Predictor

Predicts failure probabilities

Maintenance Trend Analyzer

Analyzes maintenance patterns

Priority Model

Prioritizes maintenance tasks

Audience & Competitive Advantages

L Learners & Students

Guided workflows, progressive complexity, and a safe practice environment without expensive licenses.

E Reliability Engineers

30+ tools in one platform, cross-train on multiple methodologies, AI-enhanced analysis capabilities.

M Technical Management

Evaluate reliability strategies, review AI-powered insights, and build a reliability-aware culture cost-effectively.

CAPABILITY	RELYSAM	COMMERCIAL TOOLS
License & Cost	✓ GPL v3 (Free)	✗ Expensive Proprietary
Reliability Tools	✓ 30+ Comprehensive	~ Limited Sets
HRA Methods	✓ 9 Complete Methods	~ 2-4 Methods
AI/ML Integration	✓ 10 Models + Custom Training	~ Manual / Limited
Source Access	✓ 100% Open Source	✗ Closed Source
Offline Operation	✓ Maximum Capability	~ Cloud-Required

Start Building Reliability Today

Professional reliability engineering should be accessible to everyone.

<https://codeberg.org/Oai/rellysam/>

Visit the repository to download, install, and explore the platform.



Star on Codeberg



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"Design Reliability In. Predict Failures Before They Happen."