Modernizing Failure Classification

Implementing a Data-Driven FRACAS Framework in IBM Maximo

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The Goal of This Implementation

Moving Beyond ‘Data Bankruptcy’

Many Maximo installations suffer from data bankruptcy — millions of rows of historical work orders that provide zero engineering value because the failure records are incomplete or circular.

FRACAS (Failure Reporting, Analysis, and Corrective Action System)

Standardize Reporting: Eliminate custom synonyms across teams.

Protect Tool Time: Minimize lookup clicking for technicians.

Isolate Failure Physics: Track actual failure mechanisms, not just descriptive symptoms.

Automate Analytics: Build clean paths directly into dashboards.

PART ONE

Understanding the Legacy Model

Why traditional asset-specific hierarchies fail in modern operations

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The Legacy “Waterfall” Structure

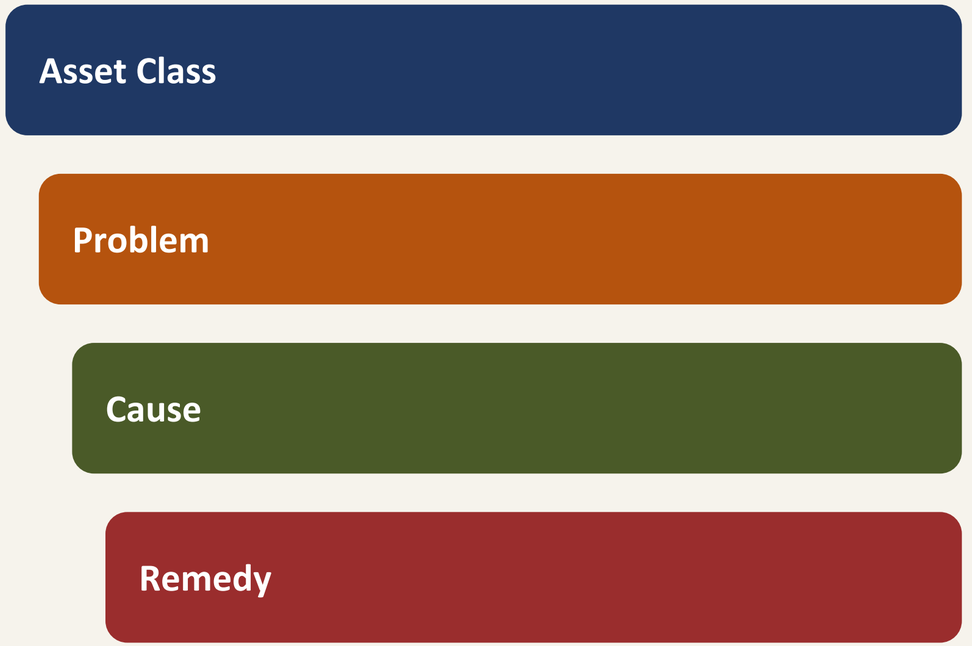
The traditional Maximo architecture relies on highly specific, vertical, asset-by-asset failure trees configured in a rigid layout.

Asset Class: Specific equipment type (e.g. Centrifugal Pump, VFD).

Problem: Specific symptoms hardcoded directly to that asset class.

Cause: Specific triggers mapped strictly to that unique problem.

Remedy: Direct physical repair actions mapped strictly to that cause.



The Gaps in Legacy Thinking

Code Proliferation

Every asset requires its own custom codes. Over time synonyms run rampant — ‘Scratched’, ‘Scored’, ‘Gouged’ — created across different asset classes, diluting macro-level analysis.

The Multi-Discipline Blind Spot

Assets are locked to a default class. If a mechanical pump suffers an electrical motor winding short, the technician is trapped in a mechanical lookup tree with no access to electrical codes.

Technician Fatigue

Technicians are forced to select Problem, Cause and Remedy at the moment of work completion, resulting in arbitrary selection just to clear the screen.

Legacy Real-World Examples

Example A: The Circular Trap

A process pump experiences master shaft seal leakage. The technician navigates the legacy lookup menu:

- **Problem:** Leakage
- **Cause:** Damaged Seal
- **Remedy:** Replace Seal

The Flaw: This data is completely circular. It describes the physical task completed but omits the engineering mechanism (chemical corrosion vs. misalignment) needed to prevent recurrence.

Example B: Synonyms & Noise

Three technicians document surface wear on three different assets using ungoverned legacy fields:

- **Tech 1:** Pump Impeller → Cavitated
- **Tech 2:** Conveyor Chute → Pitted
- **Tech 3:** Gearbox Shaft → Scored

The Flaw: Reliability analytics cannot parse these as shared surface-wear mechanisms. They appear as three completely isolated, non-trending failures.

PART TWO

The Modernized FRACAS Framework

Flat, renumbered, and optimized for engineering analytics

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The Flat, Zoned Architecture

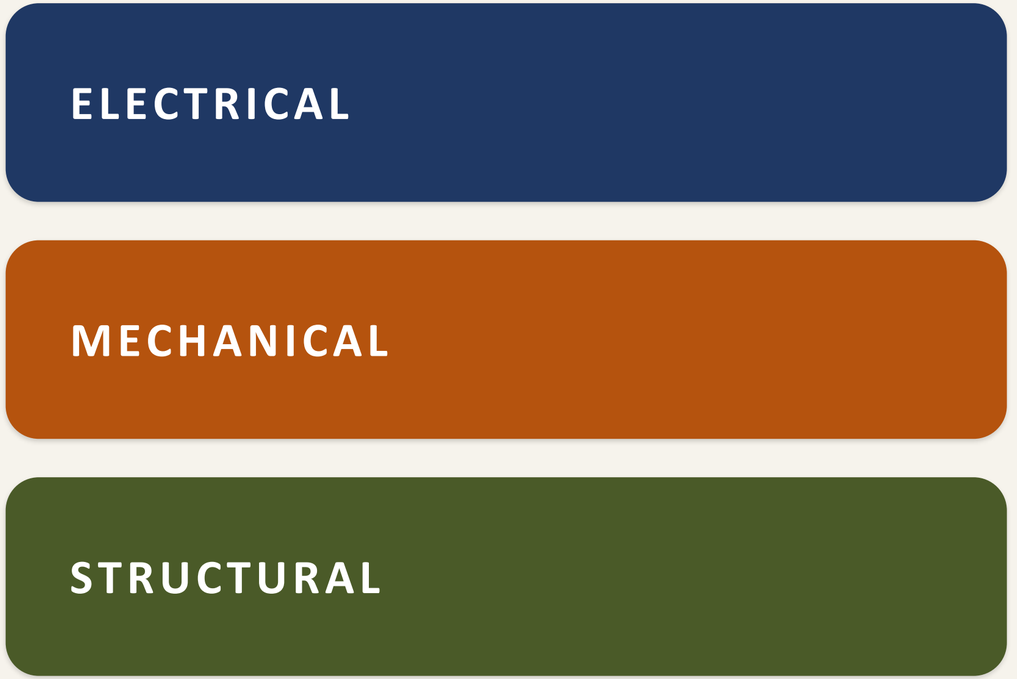
Our new implementation replaces thousands of individual asset-level trees with **three discipline-based failure classes** mapped to a standardized, master index.

Electrical Class: Automation loops, power delivery, instrumentation.

Mechanical Class: Kinetic assemblies, rotating equipment and piping.

Structural Class: Static infrastructure, framing, cathodic grids.

Lookups are renumbered into chronological zones, placing high-volume triage events at the top so technicians find them in seconds.



The Parallel Workflow Split

Reporting vs. Action

We decouple tactical reporting from engineering analysis. Technicians are never asked to define strategic remedies in the field.

The Technician — Field Tier

Documents immediate field realities (P-codes and C-codes) during active work order processing. Fast, frictionless data capture at the point of work.

Reliability Engineering Tier

Extracts the strings post work completion in a separate process to assign strategic Lifecycle Remedies (R-Codes).

The Discipline Override Rule

Dynamic Interface Swapping

To eliminate the multi-discipline blind spot, the new framework gives technicians final authority over failure class boundaries at the point of entry.

1. A motor-driven pump assembly defaults to the MECHANICAL class.
2. The technician inspects the asset and discovers the terminal block has shorted.
3. The technician overrides the class drop-down to ELECTRICAL.
4. Maximo instantly wipes out mechanical selections and serves a clean, relevant electrical problem look-up matrix.

The Complete FRACAS Master Index Reference

*Failure Mode = **Failed Part / Sub-Component** + Problem + Cause*

Master Problem Codes (P01 – P17)

- **P01** False Trip / Nuisance Alarm / No Fault Found
- **P02** Binding / Stuck / Jammed
- **P03** Imbalance / Vibration
- **P04** Overheated / Burned / Blown
- **P05** Stoppage
- **P06** Cracked / Broken / Sheared
- **P07** Damaged / Bent / Dented
- **P08** Worn / Deteriorated / Surface Damage
- **P09** Structural Distortion / Sagging / Deflection
- **P10** Leaks Internally / Externally
- **P11** Dirty / Oily / Littered
- **P12** Shorted / Grounded / Continuity Fault
- **P13** Open Circuit / Continuity Loss
- **P14** Communication / Signal / Software Fault
- **P15** Loose / Poor Connection
- **P16** Out of Adjustment / Calibration
- **P17** Low Flow

Master Cause Codes (C01 – C11)

- **C01** Operator Error
- **C02** Improperly Installed
- **C03** Improper Adjustment / Align / Tension
- **C04** Vandalism
- **C05** Power Failure / Surge
- **C06** Obstructed
- **C07** Cooling / Lubrication Failure
- **C08** Age / Corrosion / Erosion / Wear
- **C09** Environment (Chemical, Dust, Temperature)
- **C10** Improper Material
- **C11** Unknown

Master Remedy Codes (R01 – R09)

- **R01** Asset Condition Management (ACM)
- **R02** Defect Elimination (DE)
- **R03** Operator Driven Reliability (ODR)
- **R04** Planning and Scheduling
- **R05** PM Optimization
- **R06** Reliability Centered Maintenance (RCM)
- **R07** Root Cause Analysis (RCA)
- **R08** Spares Management (MRO)
- **R09** Training / Resources / Procedures

Modernized Real-World Examples

Example A: Eliminating the Circular Trap

The same leaking pump assembly is recorded under the new model:

Technician Logs: Seal + P10 (Leaks Internally / Externally) + C09 (Chemical / Dust / Temperature)

Reliability Analysis: Reviews notes confirming a fluid-compatibility failure.

Strategic Remedy: R02 (Defect Elimination)

Result: Maximo captures an actual engineering mechanism, triggering a material upgrade project rather than a routine replacement cycle.

Side-by-Side Architectural Comparison

Metric / Capability	Traditional Legacy Model	Modernized FRACAS Model
Backend Code Footprint	Thousands of asset-specific codes	One flat master index filtered across 3 classes
Field Selection Interface	Scrambled alphanumeric listings	Zoned, chronological lookups (Triage at top)
Data Ownership Loop	Technician performs 100% of inputs	Technician reports facts; Reliability assigns strategy
Cross-Discipline Accuracy	Trapped inside a single-discipline tree	Class override resolves cross-discipline faults
Analytical Outputs	Circular, descriptive, non-trending	Engineering-grade, trend-ready dashboards

Go-Live Implementation Roadmap

Deployment Milestones

01 **Database Injection**

Load mappings into Maximo Failure Codes.
Update assets with the default failure class.
Configure a user-defined field to capture failed part / sub-component data.

02 **Configure Reliability Reporting**

Create a reliability Maximo Start Center and a reliability Power BI dashboard.
Update the Maximo and Mobile Failure Reporting tabs.
Make failure reporting mandatory on CM Work Orders in Maximo and Mobile.

03 **Technician Handoff**

Train technicians on Failure Classes including “Problem” and “Cause” entry rules.

04 **Establish Review Loop**

Route completed work orders to the weekly reliability Start Center and Power BI dashboard.

Questions & Discussion

Locking down the failure class structure for Maximo production import.

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