HBK
HOTTINGER BRÜEL & KJÆR

XFRACAS

A HIGHLY CONFIGURABLE, WEB-BASED, ENTERPRISE-WIDE FRACAS SYSTEM

ReliaSoft

XFRACAS

HBM

Brüel & Kjær

What is XFRACAS?

XFRACAS is an enterprise system for incident / failure reporting and team-based problem resolution.

- Web-based for easy access, collaboration and deployment across multiple sites, suppliers and customers
- Highly configurable to fit your organization's specific processes
- Builds a "knowledge base" of lessons learned that can be shared throughout the organization
- Captures data for reliability, quality, safety, risk management and other analyses
- Flexible, scalable and able to grow with your needs

XFRACAS is a Complete System

Incident Reporting and Failure Analysis

- Report and troubleshoot issues from multiple locations, suppliers, dealers
- Capture findings from failure analysis on returned parts

Team-based Problem Resolution and Root Cause Analysis

- Track any problem resolution method from four to eight steps
- Capture findings from root cause analysis

XFRACAS is a Complete System

Action Tracking and Project Management

- Assign actions, send notifications, track completion
- Manage related problems together and monitor key metrics

Part Tracking for Serialized Systems

- Configuration tracking for serialized systems
- History of incidents and repairs/replacements

Reports, Charts and Dashboards

Data Capture for Reliability Analysis

XFRACAS is Highly Configurable

Extensive configuration options to meet your needs

Each “entity” has its own settings and permissions.

- Turn features on / off and control how they behave
- Rename data fields and even create your own
- Set requirements for data input (choose field type, customize drop-down lists, etc.)

Supports many types of processes

- FRACAS / CAPA
- Safety management
- Risk reduction
- Quality tracking (nonconformance)

Assigning Incidents to Problems

Failure Reporting and Problem Resolution

XFRACAS innovatively bridges the gap between your organization's activities for…

- Incident / failure reporting
- Problem resolution / root-cause analysis

It also…

- Provides all the tools you need to "close the loop" on each reported incident.
- Facilitates more in-depth analysis and team-based problem resolution for broader underlying issues.

In XFRACAS terminology, this involves "incidents" and "problems."

Incidents

An “incident” is a failure, suggestion or other issue found during testing, reported by a customer, etc.

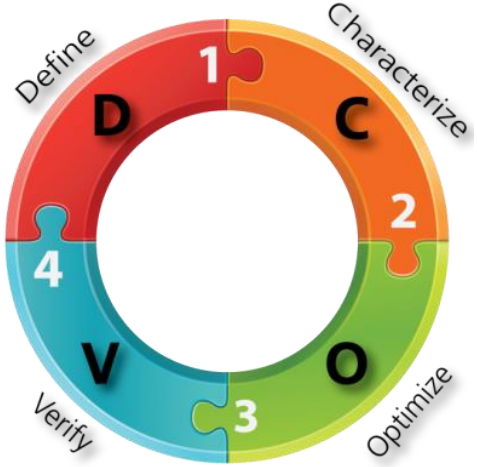
- Each incident deals with a single instance of an issue so you can track how it was addressed.
  - What happened?
  - Which part(s) failed?
  - What actions were taken to get the system up and running again?
- Sometimes multiple incidents are all due to the same underlying issue.

Problems

A “problem” is a larger issue that may require a team-based approach to analyze and resolve.

- Assign multiple incidents to the same problem
- Use any problem resolution methodology, from four to eight steps

4 Step
DCOV Process



5 Step
Six Sigma DMAIC Process

8 Step
8 Disciplines (8D) Process

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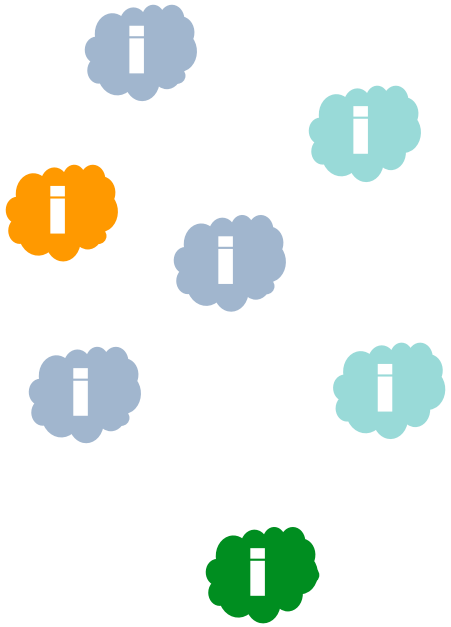
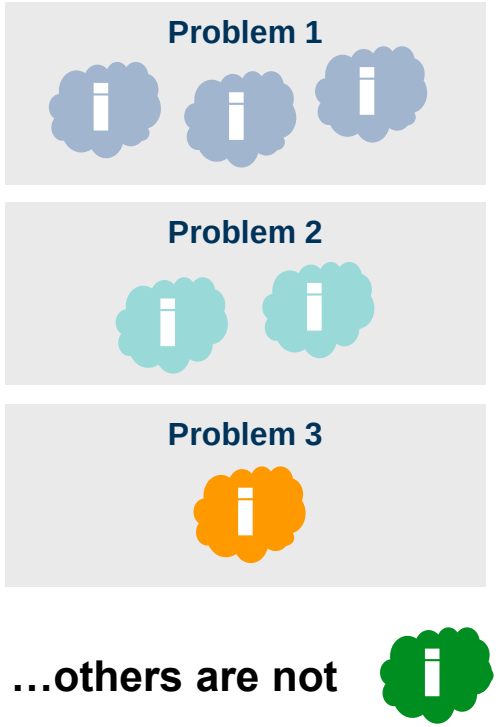
Assigning Incidents to Problems

Incidents are reported and may be addressed as they occur

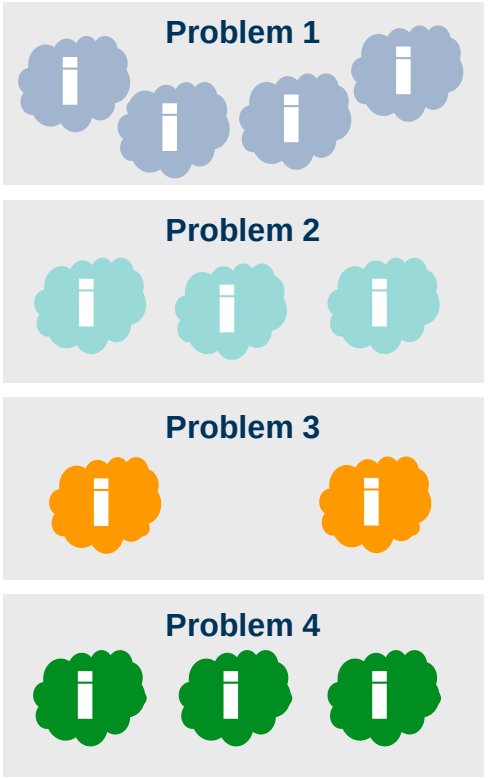


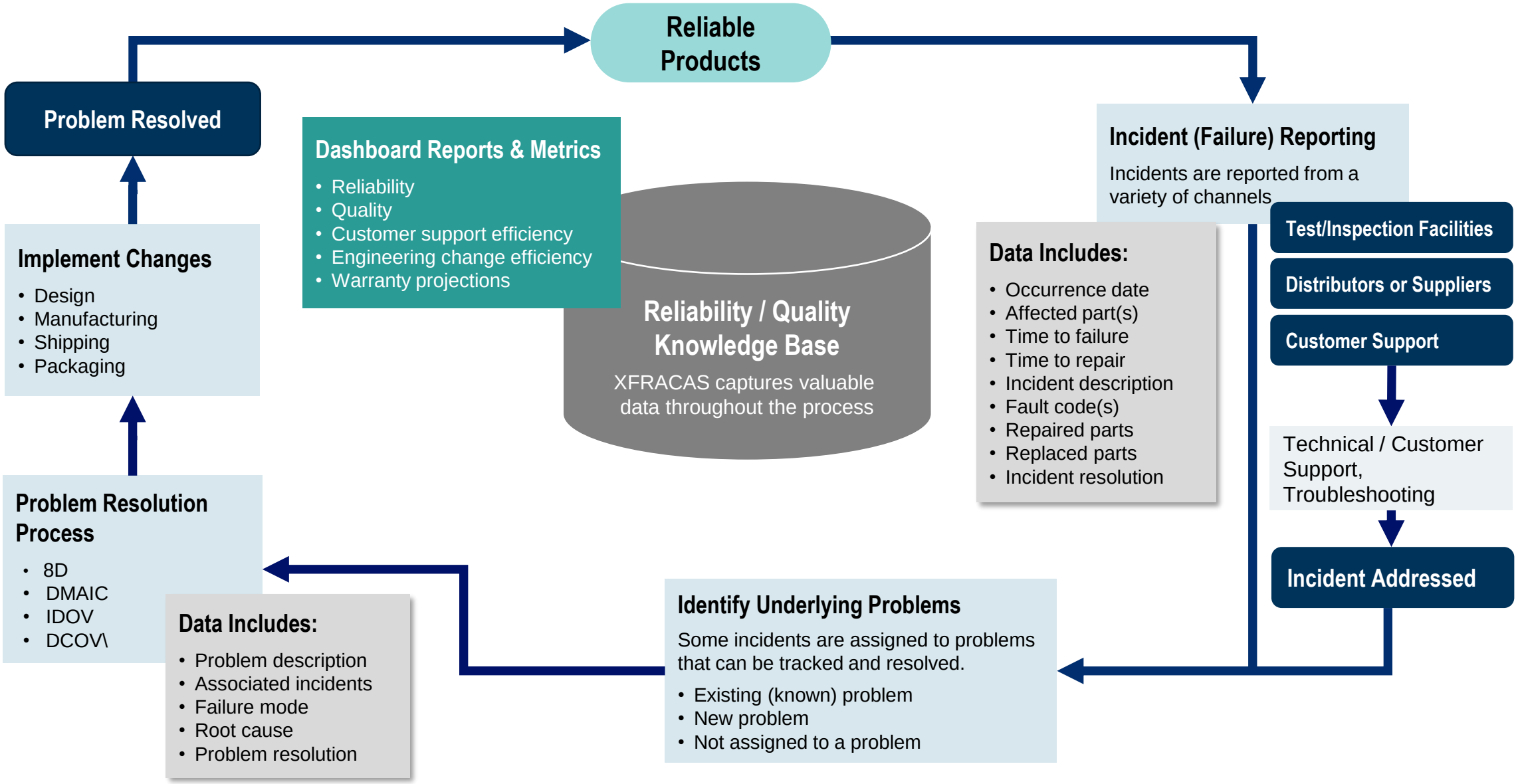
Some are assigned to problems…



…others are not

New problems may be identified as new incidents are reported





XFRACAS Architecture

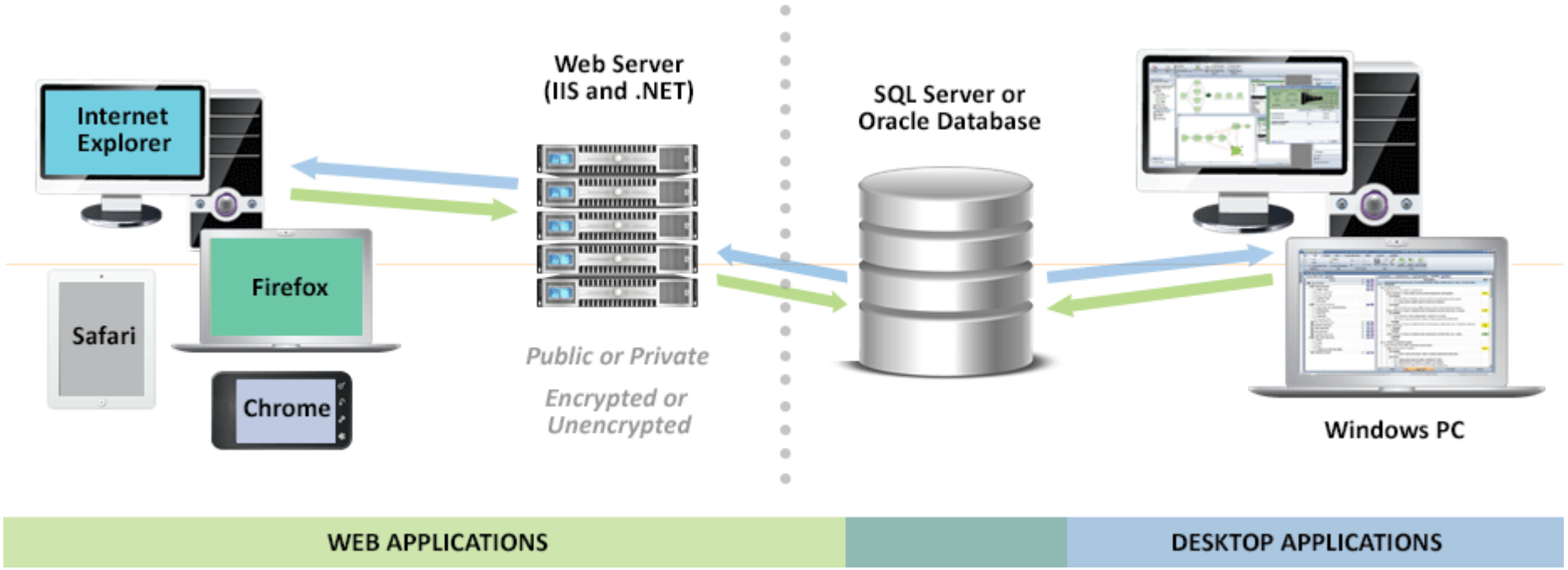
Web-based. Scalable. Robust.

XFRACAS is based on the .NET Framework

- n-tier
- Scalable
- Distributable
- Robust
- Deployable across multiple servers or on a single box
- Windows Authentication or Single Sign-On (SSO)
- Public or private
- Encrypted or unencrypted
- Access from web browser — no client installation

Architecture

ReliaSoft desktop applications, XFRACAS and the SEP web portal can all connect to the same database on either SQL Server or Oracle.



Server Requirements

If you plan to host the database and website on the same server, you will need the following: *

- Windows Server
- .NET
- IIS with support for serving ASP.NET
- SQL Server or Oracle

** For minimum versions, please consult the latest implementation guide*

Client Requirements

Users can access the website with any browser that supports the following doctype:

```
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
```

This includes most common browsers (such as Chrome, Safari and Firefox) that are available for Windows, Mac and tablet operating systems.

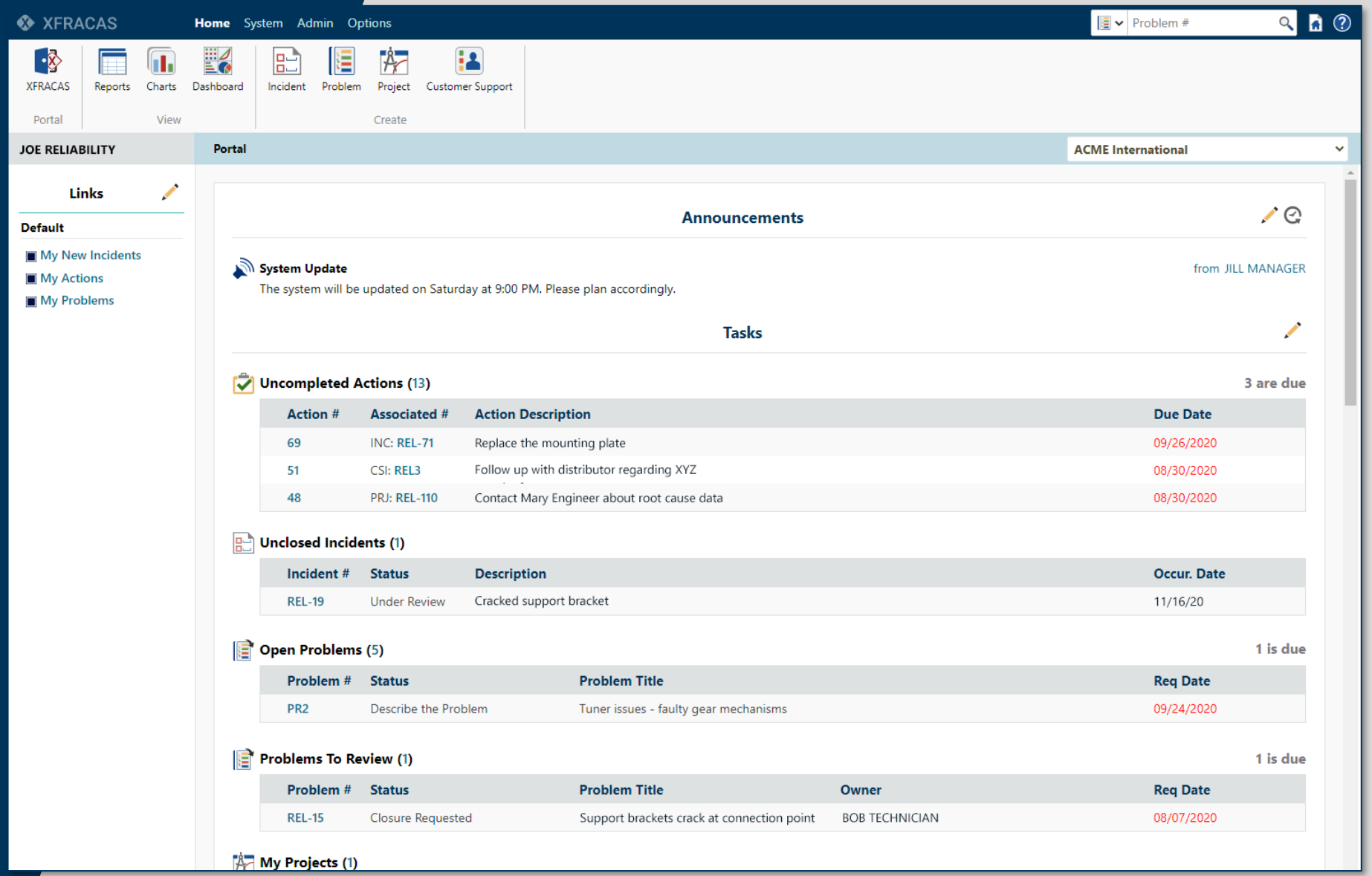
Personalized Portal

Personalized Portal

- Customizable, at-a-glance view of all the issues you need to work on, such as:
  - Actions you need to complete
  - Incidents, problems or projects you need to work on
  - Problem steps you need to review and sign off
- Global or local announcements and links
- Links to saved custom reports
- Option to run a report automatically when you visit this page

Portal Page

Can be customized to fit your needs



Incidents and Failure Analysis

XFRACAS Incidents

Captures data to understand, categorize and address each incident — such as:

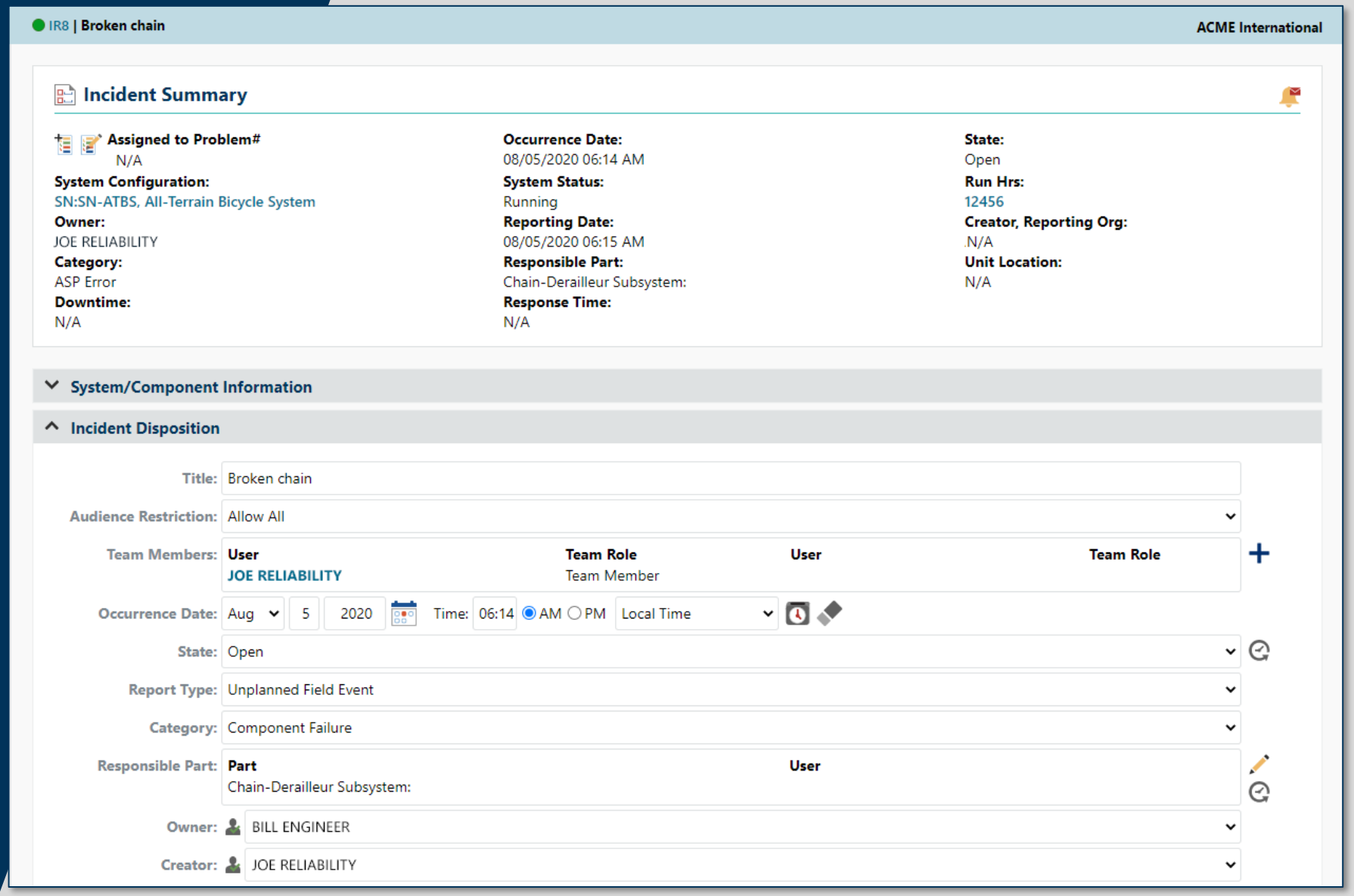
- Description of the incident
- Date and time of occurrence
- Responsible part, fault code, failure mode
- Actions taken to address the incident
- Type of failure (chargeable / not chargeable) for reliability analysis

For a serialized system, you can also capture:

- Complete history of incidents and repaired/replaced parts
- Time/usage (run hours, cycles) when each incident occurred, for reliability data analysis

Incident Page

Can be customized to fit your needs



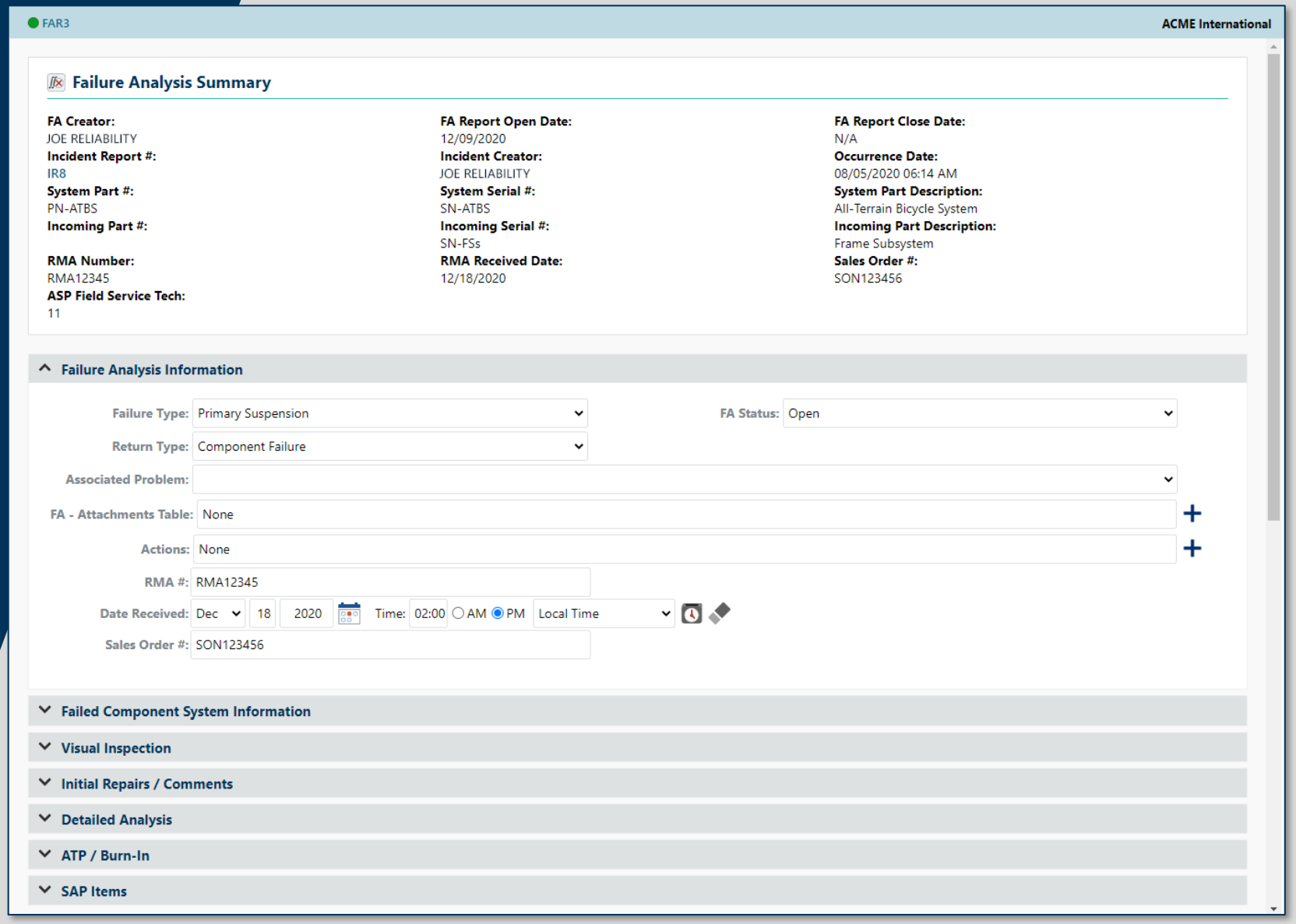
Failure Analysis for Replaced Parts

When applicable, you can capture more detailed findings for parts that were removed / replaced and returned for failure analysis, such as:

- RMA #, sales order #, work order #
- Visual inspection
- Fault history
- Initial repairs
- Detailed analysis
- ATP/burn-in test results

Failure Analysis Page

Can be customized to fit your needs



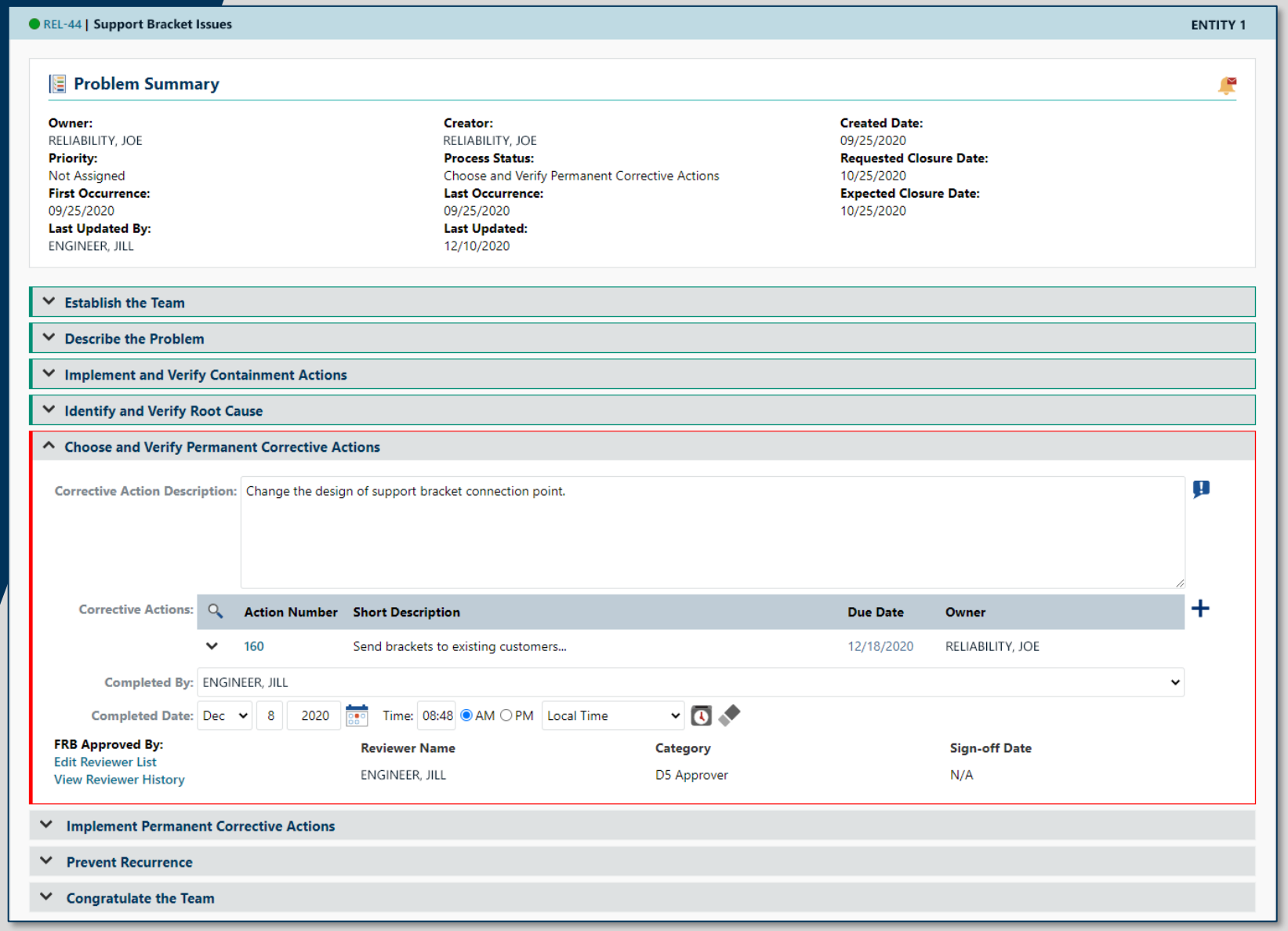
Problem Resolution and Root Cause Analysis

XFRACAS Problems

- Describes the problem and links to all related incident reports
- Tracks the team's efforts for root cause analysis and problem resolution
- Can be configured for any method, from four to eight steps:
  - 8 Disciplines (8D)
  - Six Sigma DMAIC
  - DCOV
- Tracks the completion of assigned actions
- Tracks review and sign-off by failure review board (FRB)

Problem Page

Can be customized to fit your needs

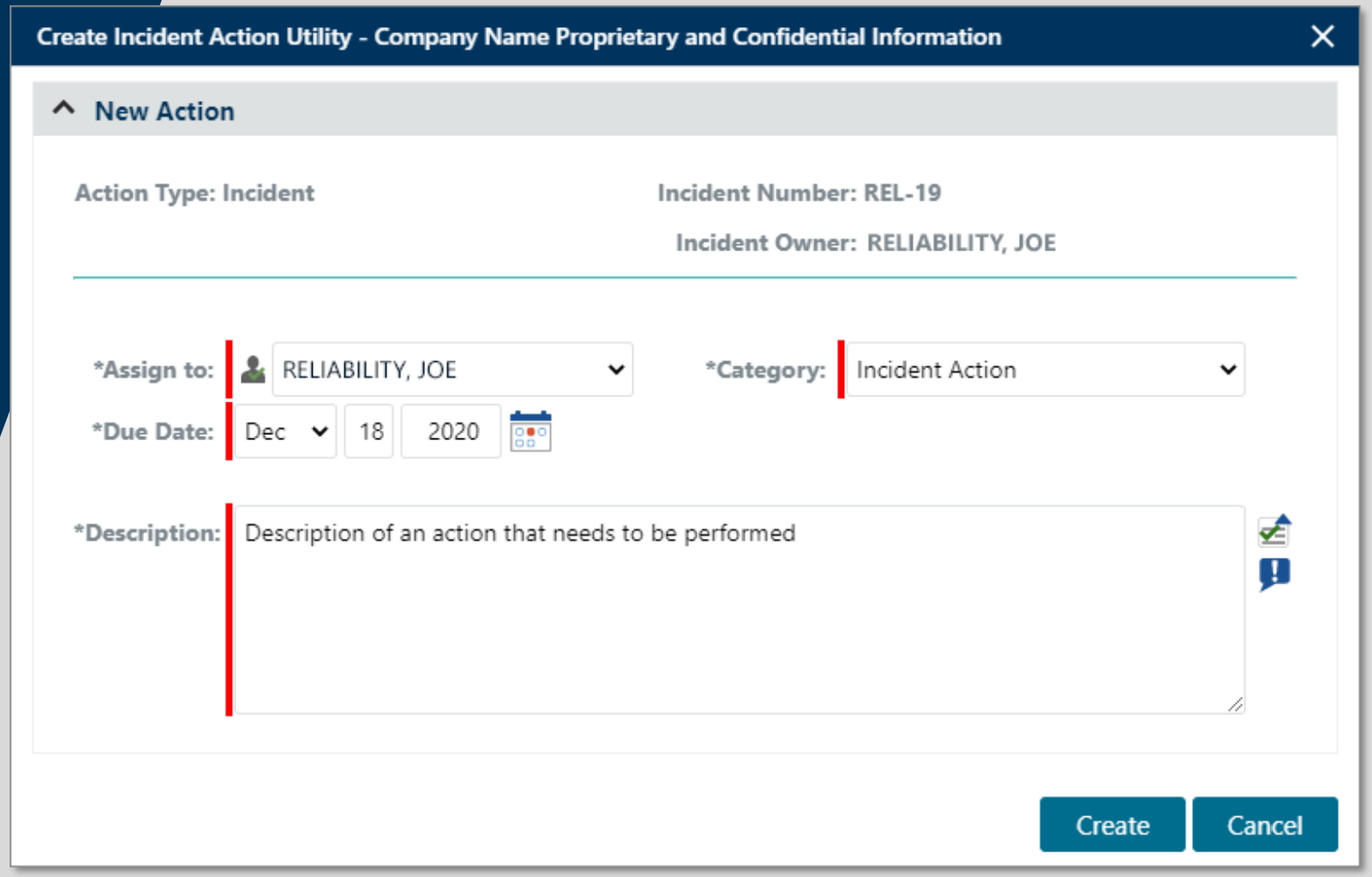


Action Tracking and Project Management

XFRACAS Actions

Throughout XFRACAS, you can assign actions to users and track their completion.

- Option for automated e-mail notifications
- Option to assign other users or groups
  to receive notifications
- Multiple ways to track progress — reports, charts, dashboards



XFRACAS Projects

Group multiple problems together and track statistics such as:

- Target completion date
- Number of open/closed issues
- Length of time each issue been in the system
- Open issues
- Issue status
- Responsible person

Project Page

Can be customized to fit your needs

REL-110 | ACME Widgets — ENTITY 1

Project Summary

Owner: RELIABILITY, JOE
Priority: High
Project Start Date: 07/28/2020 02:37 AM
Target Completion Date: 07/28/2020 02:37 AM
Revised Completion Date: 08/21/2020 02:12 PM
Actual Completion Date: N/A
Last Updated By: RELIABILITY, JOE
Last Updated: 09/11/2020 03:25 PM

Project Information

Associated Data

Associated Problems

Create New Problem | Assign/Remove Problems

Problem	Problem Description	Owner	Status	# of IRs	Last Occurrence	Cpt. Date
REL-29	Support bracket design issues	ENGINEER, JANE	Describe the Problem	0	N/A	N/A
REL-28	Plug issues	ENGINEER, JANE	Describe the Problem	55	09/08/2020	N/A
REL-27	Support bracket manufacturing issues	TECHNICIAN, BOB	Implement and Verify Containment Actions	1	09/04/2020	N/A

Associated Incident Reports

Hide/Display Associated Incidents

Incident #	Description	Owner	Occur Date	Status	Closed Date
REL-67	Cracks develop in external casing	RELIABILITY, JOE	09/17/2020	Closed	09/24/2020
REL-50	Support brackets crack at connection	TECHNICIAN, BOB	08/28/2020	Closed	09/11/2020
REL-49	Plugs overheat and fuse to plate	ENGINEER, MARY	08/27/2020	Closed	09/11/2020

Associated FA Reports

None

Associated Files:

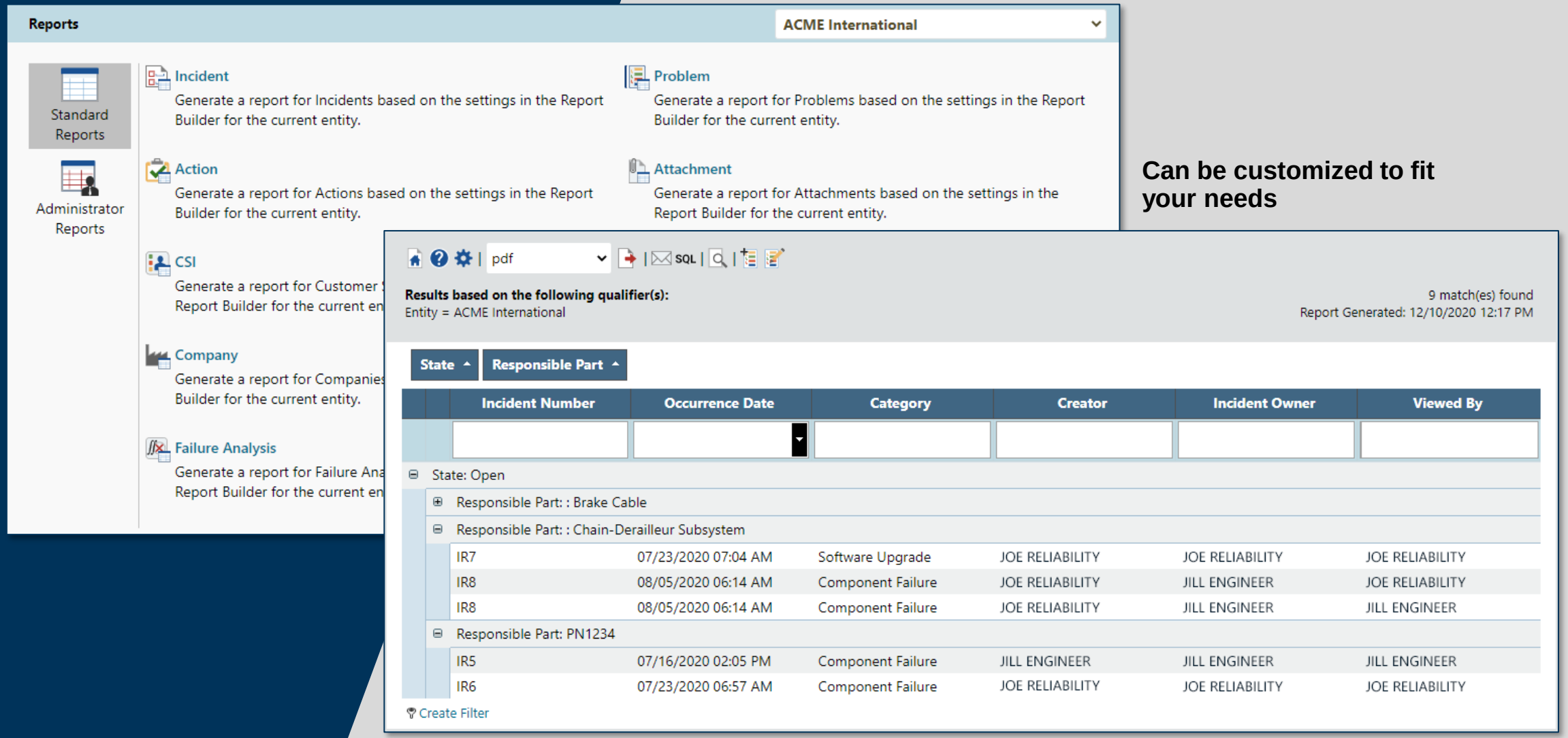
Att. Type	Date	File	Description
Text	09/11/2020 03:25 PM	Notes	Summary of suppliers specifications

Reports, Charts and Dashboards

XFRACAS Reports

- Wide variety of standard, built-in tabular reports, plus the ability to
  - Save and re-use your own custom templates (columns displayed, filter criteria, sort order)
  - Run your own custom SQL statements
- Results displayed in a web browser
  - Filter and sort within the results
  - Export to *.xlsx, *.rtf, *.csv, *.pdf
  - Easy to link, “watch” and share with other users
- Option to output as XML for use as a web-based data source for other tools (e.g., **Get External Data > From Web** option in Excel, Power BI)

Reports Page

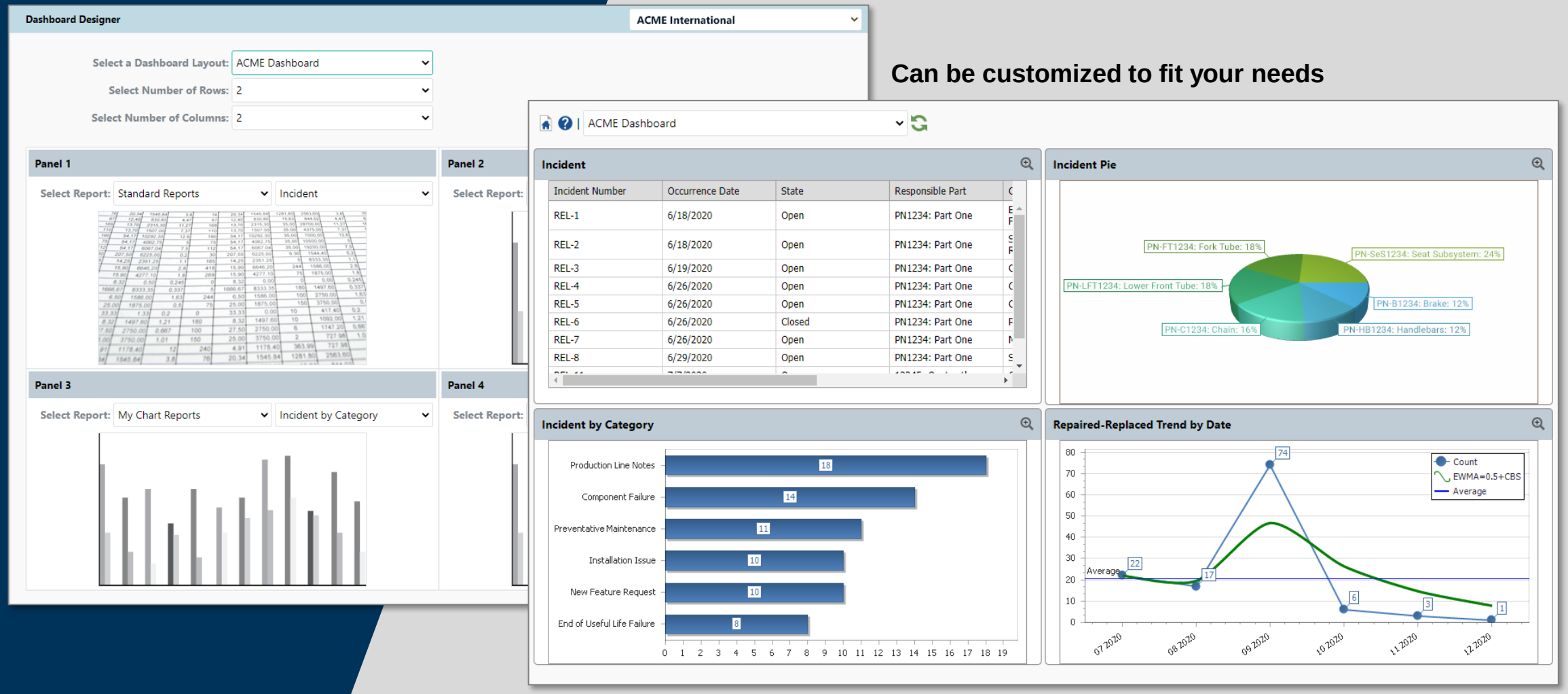


Can be customized to fit your needs

XFRACAS Charts, Dashboards and XSLT

- Pareto or trend charts are available for any set of results.
  - Bar, pie, area, step, scatter and line charts
  - Highly customizable
  - Full drill-down capability
- Dashboards display multiple charts and/or tabular results together in a single display.
  - Create your own custom layouts
  - Easy to share with other users
- For completely customized output, you can create your own XSLT style sheet for any set of results (Extensible Stylesheet Language Transformations).

Dashboard Page



Can be customized to fit your needs

Part Tracking for Serialized Systems

Templates and Serialized Systems

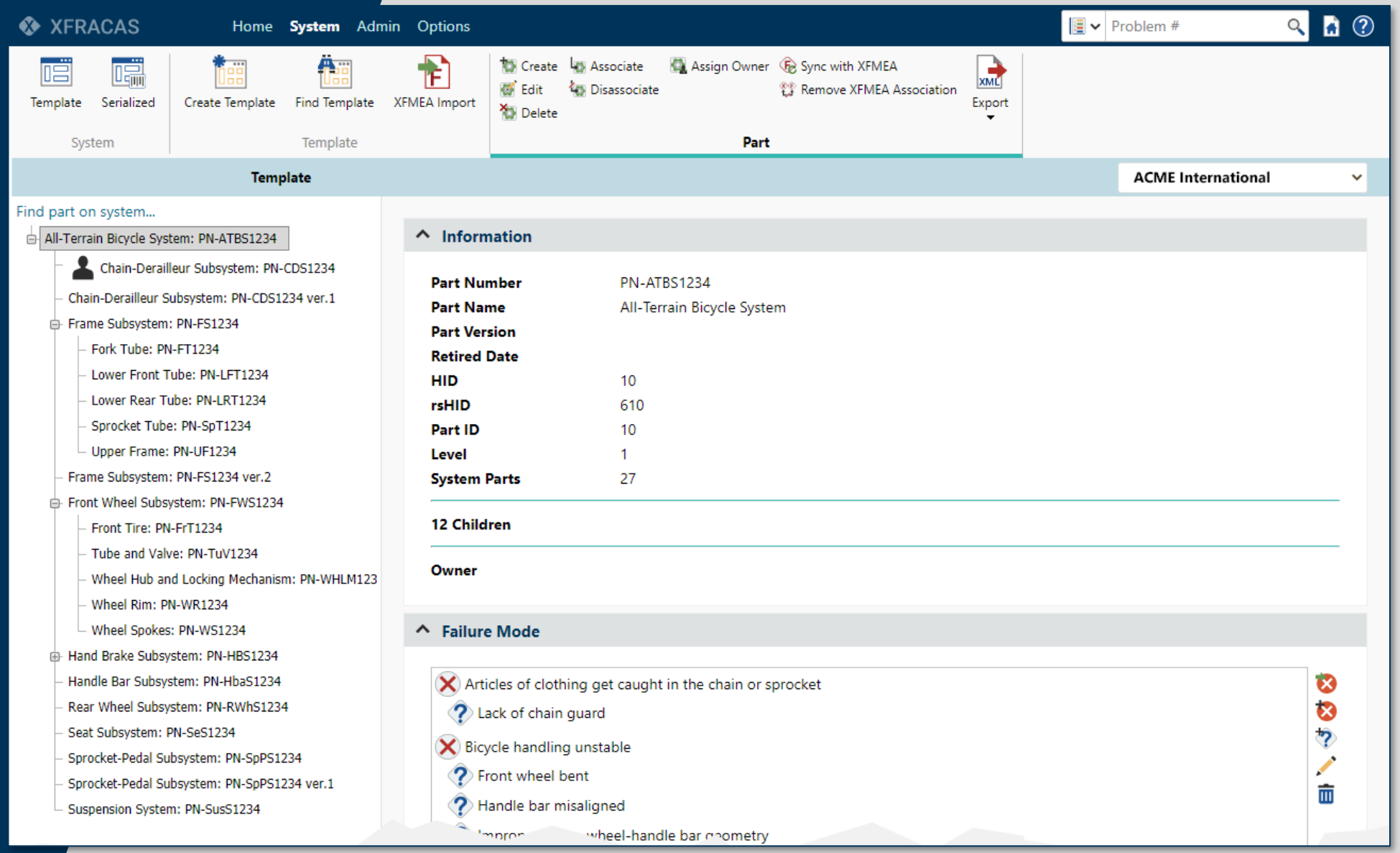
A “template” is a hierarchical configuration used to track issues by generic part / version or process / task (e.g., bill of materials).

- Build via the website
- Import from ReliaSoft XFMEA/RCM++
- Import from Excel or XML

To track specific systems identified by serial number, you can also define a “serialized” configuration for each individual unit.

- Complete history of incidents, repairs and replacements for each system
- Yields more accurate time/usage data for reliability analysis

Template


XFRACAS
Home
System
Admin
Options
Problem #
Template
Serialized
Create Template
Find Template
XFMEA Import
Create
Edit
Delete
Associate
Disassociate
Assign Owner
Sync with XFMEA
Remove XFMEA Association
Export
System
Template
Part
Template
ACME International
Find part on system...
All-Terrain Bicycle System: PN-ATBS1234
Chain-Derailleur Subsystem: PN-CDS1234
Chain-Derailleur Subsystem: PN-CDS1234 ver.1
Frame Subsystem: PN-FS1234
Fork Tube: PN-FT1234
Lower Front Tube: PN-LFT1234
Lower Rear Tube: PN-LRT1234
Sprocket Tube: PN-SpT1234
Upper Frame: PN-UF1234
Frame Subsystem: PN-FS1234 ver.2
Front Wheel Subsystem: PN-FWS1234
Front Tire: PN-FrT1234
Tube and Valve: PN-TuV1234
Wheel Hub and Locking Mechanism: PN-WHLM123
Wheel Rim: PN-WR1234
Wheel Spokes: PN-WS1234
Hand Brake Subsystem: PN-HBS1234
Handle Bar Subsystem: PN-HbaS1234
Rear Wheel Subsystem: PN-RWhS1234
Seat Subsystem: PN-SeS1234
Sprocket-Pedal Subsystem: PN-SpPS1234
Sprocket-Pedal Subsystem: PN-SpPS1234 ver.1
Suspension System: PN-SusS1234
Information
Part Number PN-ATBS1234
Part Name All-Terrain Bicycle System
Part Version
Retired Date
HID 10
rsHID 610
Part ID 10
Level 1
System Parts 27
12 Children
Owner
Failure Mode
Articles of clothing get caught in the chain or sprocket
Lack of chain guard
Bicycle handling unstable
Front wheel bent
Handle bar misaligned

Customer Support for Serialized Systems

If you are tracking specific systems based on serial number/TAG, XFRACAS can capture details such as:

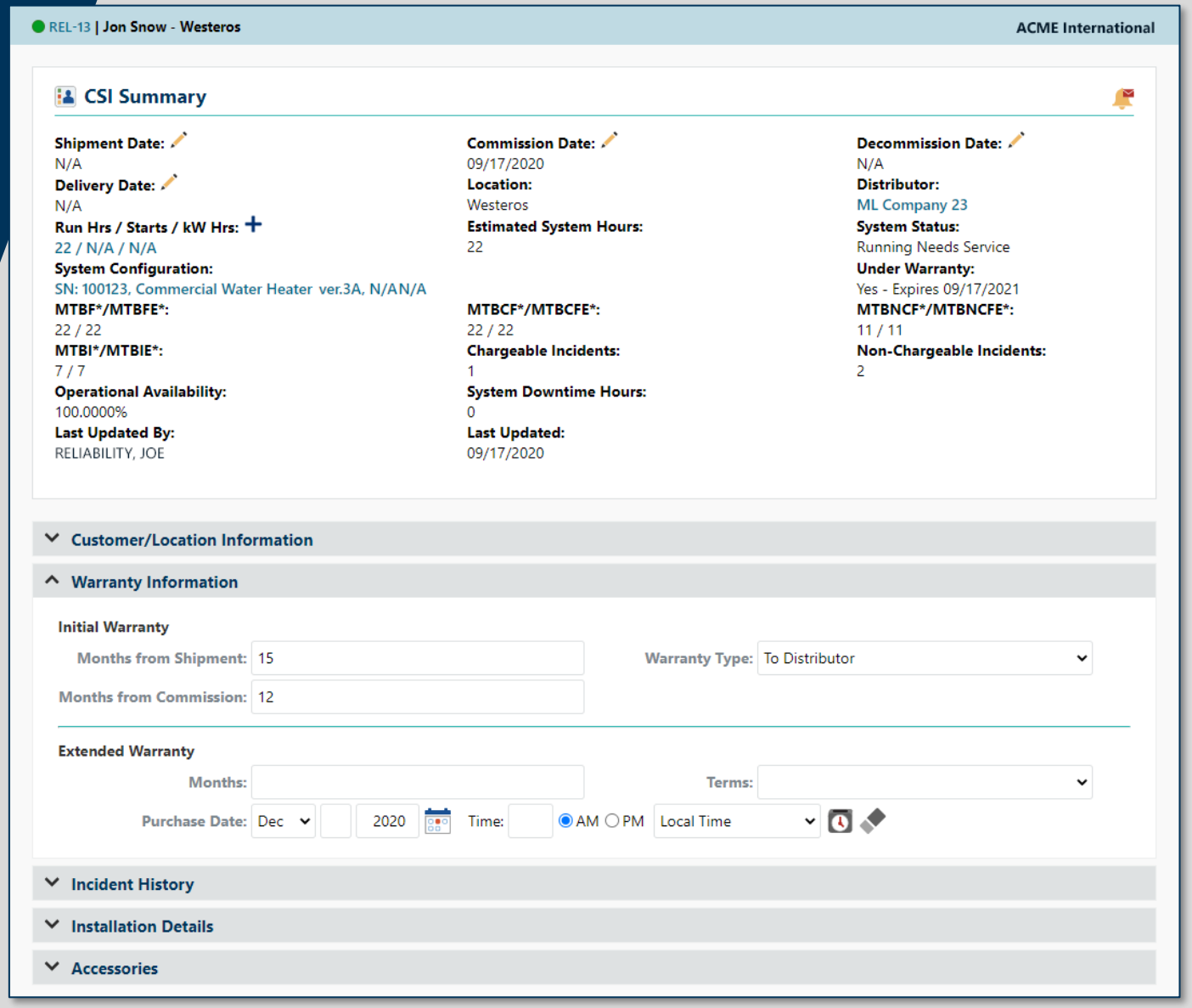
- Customer contact info
- Installation (commissioning) details
- Terms of warranty agreement
- Current status of the system (running, waiting for part)

Tracks a full history of:

- All reported incidents
- All reported time/usage metrics (hours, cycles)
- Exact system configuration as it changes over time

Customer Support Page

Can be customized to fit your needs



Reliability Data Analysis and FMEAs

Reliability Data Analysis

- The incident reporting process in XFRACAS can produce clean, usable data for reliability analysis in ReliaSoft desktop applications

- Use the Data Warehouse in Weibull++ to extract data and transfer to an analysis folio

- If XFRACAS data entry is based on fully serialized systems, you can extract complete time-to-failure and suspension data by system, subsystem and component

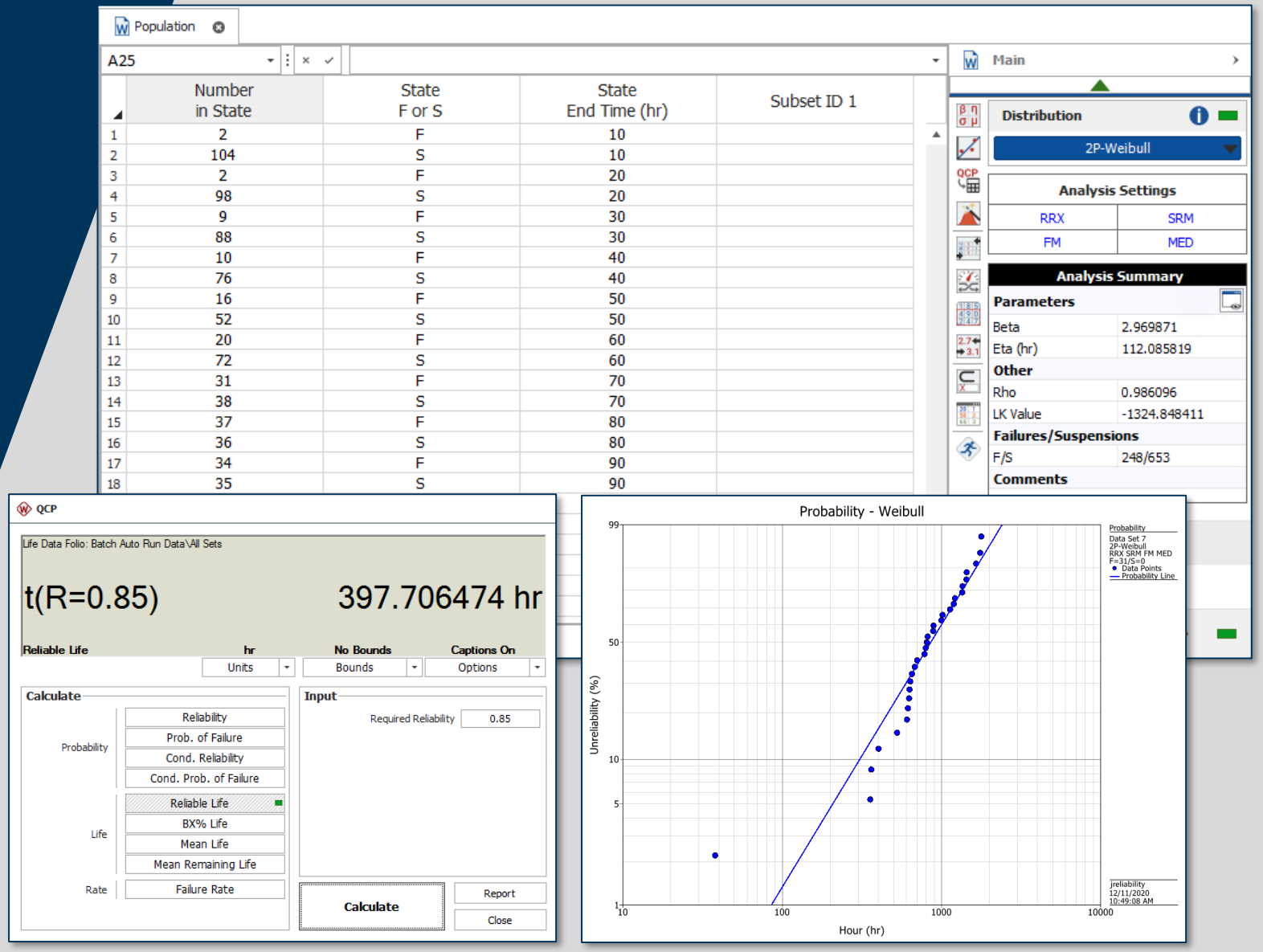
Life Data Analysis

Extract failure and suspension time / usage data for a specific part number or group of part numbers.

Use Weibull++ to fit a distribution for:

- Time to failure.
- Time to repair (if captured for incidents).

For serialized systems, you can track your at-risk population of all parts and components → the Data Warehouse calculates suspensions based on reported hours/usage.



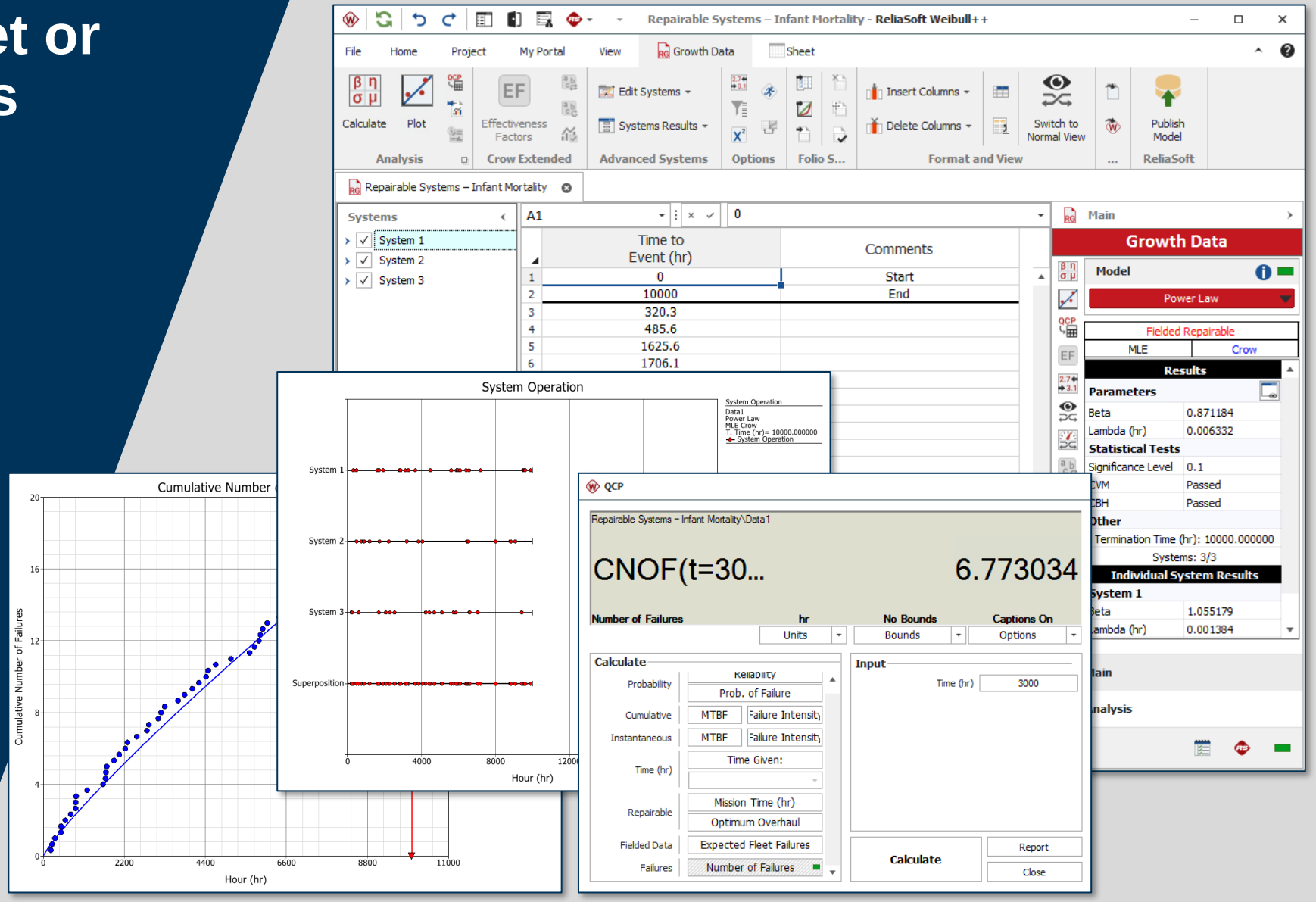
Repairable, Fleet or Growth Analysis

FIELDED SYSTEMS

- Repairable systems analysis (Power Law)
- Fleet analysis (Crow-AMSAA (NHPP))

RELIABILITY GROWTH ANALYSIS

Multiple systems – concurrent operating times (NHPP or Duane)



XFRACAS and XFMEA

- Synchronize generic system templates (“bills of materials”)
- Use an existing FMEA to identify the **failure mode » root cause** for an incident, problem or failure analysis in XFRACAS
- Use incidents reported in XFRACAS to identify new failure modes that need to be assessed in an FMEA
- Use the number of reports in XFRACAS for a particular **failure mode » root cause** as input to calculate risk priority metrics in an FMEA (RPN, SxO)

XFRACAS and SEP

- The SEP web portal provides web-based access to key analysis and project management details from ReliaSoft desktop applications such as Weibull++, XFMEA and BlockSim.
- For users who also have XFRACAS, SEP links to:
  - Both the XFRACAS actions and ReliaSoft desktop actions that are relevant to you.
  - Incidents that you “own.”
  - Reports and charts you are “watching” in XFRACAS.

  It also displays FMEAs for systems and parts you are tracking in XFRACAS
- For users who don’t have direct access to desktop applications or XFRACAS, SEP can display custom data warehouse dashboards based on any saved XFRACAS report.

Thank You

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XFRACAS