

# XFRACAS

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

**ReliaSoft**  **XFRACAS**

# 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

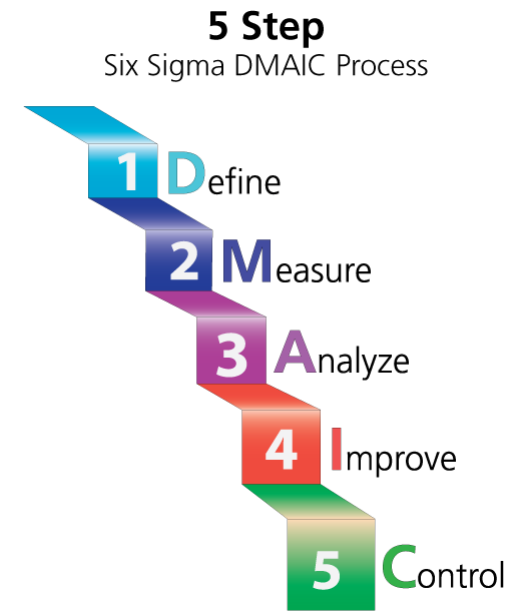
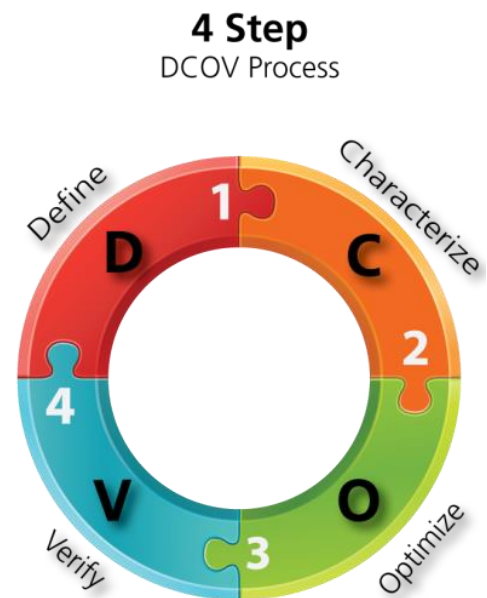
An “incident” is a failure, suggestion or other issue found during testing, reported by a customer, etc.

- ▲ 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

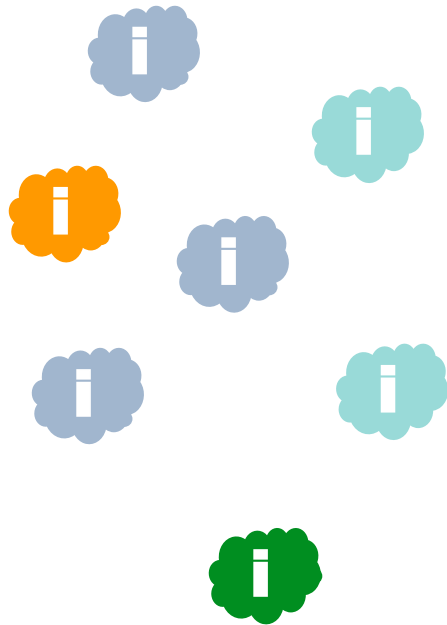
A “problem” is a larger issue that may require a team-based approach to analyze and resolve.

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

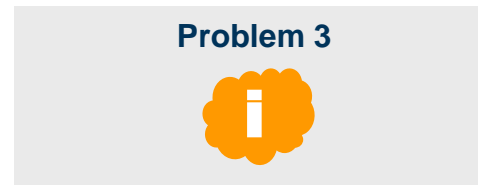
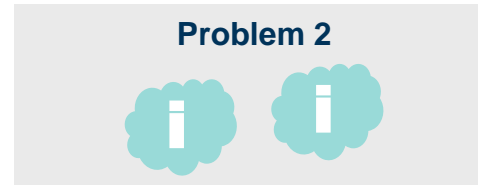


# Assigning Incidents to Problems

Incidents are reported and may be addressed as they occur

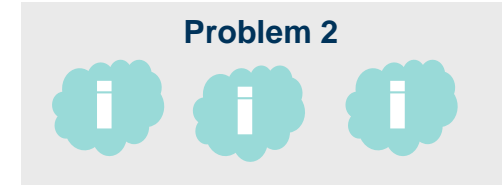
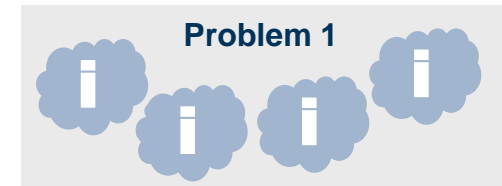


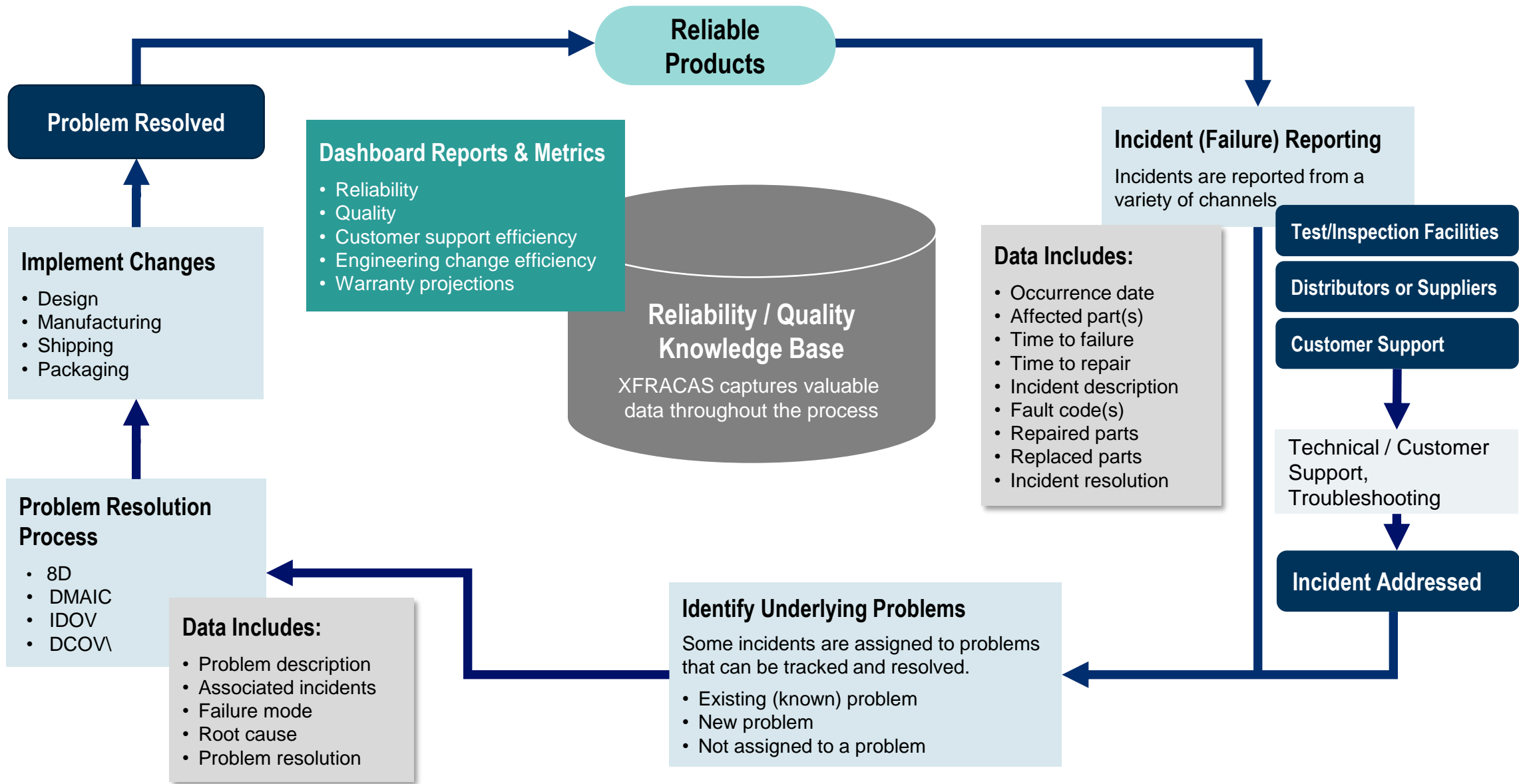
Some are assigned to problems...



...others are not

New problems may be identified as new incidents are reported





# XFRACAS Architecture

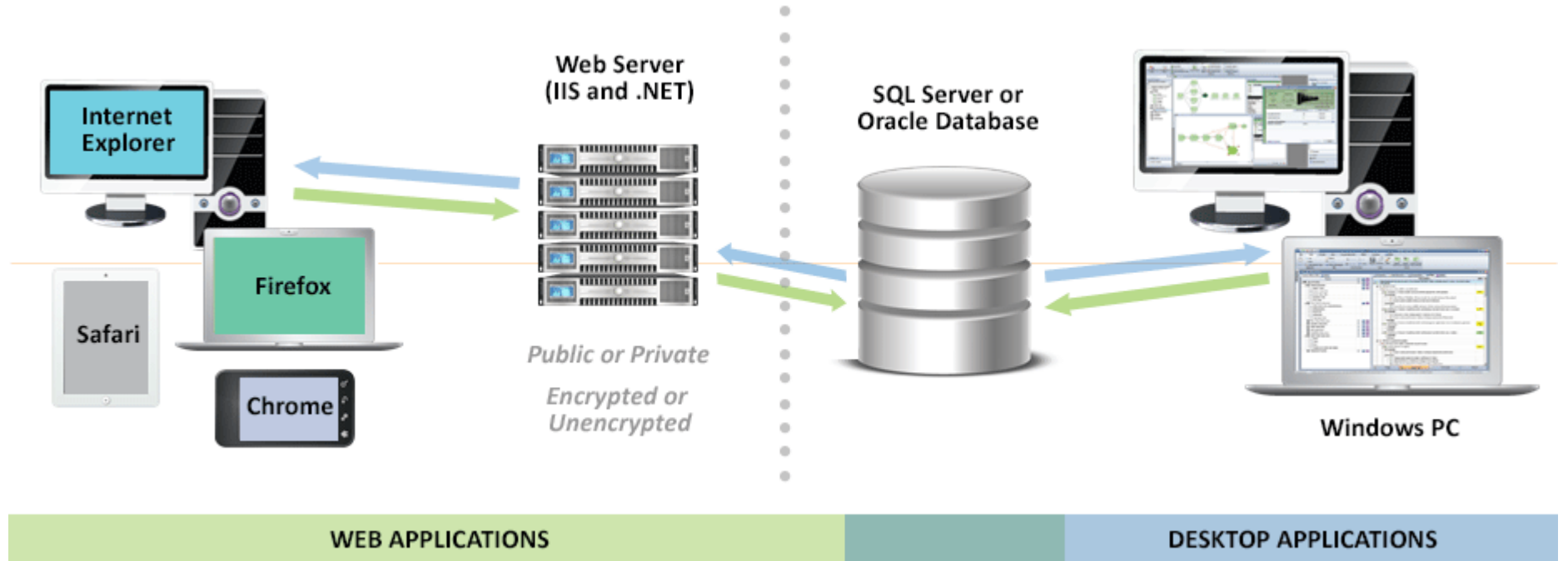
# Web-based. Scalable. Robust.

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

The screenshot displays the XFRACAS Portal Page. At the top, there is a navigation bar with the XFRACAS logo and menu items: Home, System, Admin, and Options. A search bar on the right contains the text "Problem #". Below the navigation bar is a secondary menu with icons for Reports, Charts, Dashboard, Incident, Problem, Project, and Customer Support. The main content area is divided into sections: "Announcements" with a "System Update" message from JILL MANAGER; "Tasks" with a section for "Uncompleted Actions (13)" containing a table of actions with columns for Action #, Associated #, Action Description, and Due Date; "Unclosed Incidents (1)" with a table of incidents with columns for Incident #, Status, Description, and Occur. Date; "Open Problems (5)" with a table of problems with columns for Problem #, Status, Problem Title, and Req Date; "Problems To Review (1)" with a table of problems with columns for Problem #, Status, Problem Title, Owner, and Req Date; and "My Projects (1)".

**Uncompleted Actions (13)** 3 are due

Action #	Associated #	Action Description	Due Date
69	INC: REL-71	Replace the mounting plate	09/26/2020
51	CSI: REL3	Follow up with distributor regarding XYZ	08/30/2020
48	PRJ: REL-110	Contact Mary Engineer about root cause data	08/30/2020

**Unclosed Incidents (1)**

Incident #	Status	Description	Occur. Date
REL-19	Under Review	Cracked support bracket	11/16/20

**Open Problems (5)** 1 is due

Problem #	Status	Problem Title	Req Date
PR2	Describe the Problem	Tuner issues - faulty gear mechanisms	09/24/2020

**Problems To Review (1)** 1 is due

Problem #	Status	Problem Title	Owner	Req Date
REL-15	Closure Requested	Support brackets crack at connection point	BOB TECHNICIAN	08/07/2020

**My Projects (1)**

# 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

IR8 | Broken chain ACME International

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### Incident Summary 🔔

<b>Assigned to Problem#</b> N/A	<b>Occurrence Date:</b> 08/05/2020 06:14 AM	<b>State:</b> Open
<b>System Configuration:</b> SN:SN-ATBS, All-Terrain Bicycle System	<b>System Status:</b> Running	<b>Run Hrs:</b> 12456
<b>Owner:</b> JOE RELIABILITY	<b>Reporting Date:</b> 08/05/2020 06:15 AM	<b>Creator, Reporting Org:</b> N/A
<b>Category:</b> ASP Error	<b>Responsible Part:</b> Chain-Derailleur Subsystem:	<b>Unit Location:</b> N/A
<b>Downtime:</b> N/A	<b>Response Time:</b> N/A	

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System/Component Information

Incident Disposition

Title:	Broken chain		
Audience Restriction:	Allow All		
Team Members:	<b>User</b> JOE RELIABILITY	<b>Team Role</b> Team Member	<b>User</b> <b>Team Role</b>
Occurrence Date:	Aug 5 2020	Time: 06:14 AM	Local Time
State:	Open		
Report Type:	Unplanned Field Event		
Category:	Component Failure		
Responsible Part:	<b>Part</b> Chain-Derailleur Subsystem:	<b>User</b>	
Owner:	BILL ENGINEER		
Creator:	JOE RELIABILITY		

# 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

FAR3 ACME International

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### Failure Analysis Summary

<b>FA Creator:</b> JOE RELIABILITY	<b>FA Report Open Date:</b> 12/09/2020	<b>FA Report Close Date:</b> N/A
<b>Incident Report #:</b> IR8	<b>Incident Creator:</b> JOE RELIABILITY	<b>Occurrence Date:</b> 08/05/2020 06:14 AM
<b>System Part #:</b> PN-ATBS	<b>System Serial #:</b> SN-ATBS	<b>System Part Description:</b> All-Terrain Bicycle System
<b>Incoming Part #:</b>	<b>Incoming Serial #:</b> SN-FSs	<b>Incoming Part Description:</b> Frame Subsystem
<b>RMA Number:</b> RMA12345	<b>RMA Received Date:</b> 12/18/2020	<b>Sales Order #:</b> SON123456
<b>ASP Field Service Tech:</b> 11		

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#### ^ Failure Analysis Information

Failure Type: Primary Suspension	FA Status: Open
Return Type: Component Failure	
Associated Problem:	
FA - Attachments Table: None	+
Actions: None	+
RMA #: RMA12345	
Date Received: Dec 18 2020	Time: 02:00 PM Local Time
Sales Order #: SON123456	

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- Failed Component System Information
- Visual Inspection
- Initial Repairs / Comments
- Detailed Analysis
- ATP / Burn-In
- SAP Items

# 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

REL-44 | Support Bracket Issues ENTITY 1

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### Problem Summary 🔔

<b>Owner:</b> RELIABILITY, JOE	<b>Creator:</b> RELIABILITY, JOE	<b>Created Date:</b> 09/25/2020
<b>Priority:</b> Not Assigned	<b>Process Status:</b> Choose and Verify Permanent Corrective Actions	<b>Requested Closure Date:</b> 10/25/2020
<b>First Occurrence:</b> 09/25/2020	<b>Last Occurrence:</b> 09/25/2020	<b>Expected Closure Date:</b> 10/25/2020
<b>Last Updated By:</b> ENGINEER, JILL	<b>Last Updated:</b> 12/10/2020	

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▼ Establish the Team

▼ Describe the Problem

▼ Implement and Verify Containment Actions

▼ Identify and Verify Root Cause

▲ Choose and Verify Permanent Corrective Actions

Corrective Action Description:  💬

Corrective Actions:

🔍	Action Number	Short Description	Due Date	Owner	+
▼	160	Send brackets to existing customers...	12/18/2020	RELIABILITY, JOE	

Completed By:

Completed Date: Dec 8 2020  AM  PM  🕒 ⚙️

**FRB Approved By:**  
[Edit Reviewer List](#)  
[View Reviewer History](#)

Reviewer Name	Category	Sign-off Date
ENGINEER, JILL	D5 Approver	N/A

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▼ Implement Permanent Corrective Actions

▼ Prevent Recurrence

▼ Congratulate the Team

# 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


Create Incident Action Utility - Company Name Proprietary and Confidential Information



^ New Action

Action Type: Incident Incident Number: REL-19  
Incident Owner: RELIABILITY, JOE

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\*Assign to:  RELIABILITY, JOE \*Category: Incident Action

\*Due Date: Dec 18 2020 

\*Description: Description of an action that needs to be performed  

Create Cancel

# 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

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### Project Summary 🔔

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

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▼ 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

**Reports** ACME International

**Standard Reports**

**Administrator Reports**

**Incident**  
Generate a report for Incidents based on the settings in the Report Builder for the current entity.

**Action**  
Generate a report for Actions based on the settings in the Report Builder for the current entity.

**CSI**  
Generate a report for Customer Support Incidents based on the settings in the Report Builder for the current entity.

**Company**  
Generate a report for Companies based on the settings in the Report Builder for the current entity.

**Failure Analysis**  
Generate a report for Failure Analysis based on the settings in the Report Builder for the current entity.

**Problem**  
Generate a report for Problems based on the settings in the Report Builder for the current entity.

**Attachment**  
Generate a report for Attachments based on the settings in the Report Builder for the current entity.

**Can be customized to fit your needs**

pdf | SQL | Search | Print | Refresh

**Results based on the following qualifier(s):**  
Entity = ACME International 9 match(es) found  
Report Generated: 12/10/2020 12:17 PM

**State** ^ **Responsible Part** ^

Incident Number	Occurrence Date	Category	Creator	Incident Owner	Viewed By
State: Open					
Responsible Part: : Brake Cable					
Responsible Part: : Chain-Derailleur Subsystem					
IR7	07/23/2020 07:04 AM	Software Upgrade	JOE RELIABILITY	JOE RELIABILITY	JOE RELIABILITY
IR8	08/05/2020 06:14 AM	Component Failure	JOE RELIABILITY	JILL ENGINEER	JOE RELIABILITY
IR8	08/05/2020 06:14 AM	Component Failure	JOE RELIABILITY	JILL ENGINEER	JILL ENGINEER
Responsible Part: PN1234					
IR5	07/16/2020 02:05 PM	Component Failure	JILL ENGINEER	JILL ENGINEER	JILL ENGINEER
IR6	07/23/2020 06:57 AM	Component Failure	JOE RELIABILITY	JOE RELIABILITY	JOE RELIABILITY

Create Filter

# 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).



# 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

The screenshot displays the XFRACAS software interface. At the top, there is a navigation bar with 'Home', 'System', 'Admin', and 'Options' menus. A search bar on the right contains 'Problem #'. Below the navigation bar is a toolbar with icons for 'Template', 'Serialized', 'Create Template', 'Find Template', 'XFMEA Import', 'Part', and 'Export'. The 'Part' section is active, showing a dropdown menu with 'ACME International' selected. The main area is divided into two panes. The left pane, titled 'Find part on system...', shows a tree view of a bicycle system hierarchy. The right pane, titled 'Information', displays details for the selected part: 'All-Terrain Bicycle System: PN-ATBS1234'. Below the information pane is a 'Failure Mode' section with a list of failure modes.

**System** | **Template** | **Part**

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**

<b>Part Number</b>	PN-ATBS1234
<b>Part Name</b>	All-Terrain Bicycle System
<b>Part Version</b>	
<b>Retired Date</b>	
<b>HID</b>	10
<b>rsHID</b>	610
<b>Part ID</b>	10
<b>Level</b>	1
<b>System Parts</b>	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
- Improper wheel-handle bar geometry

# 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

REL-13 | Jon Snow - Westeros ACME International

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### CSI Summary 🔔

<b>Shipment Date:</b> ✎ N/A	<b>Commission Date:</b> ✎ 09/17/2020	<b>Decommission Date:</b> ✎ N/A
<b>Delivery Date:</b> ✎ N/A	<b>Location:</b> Westeros	<b>Distributor:</b> ML Company 23
<b>Run Hrs / Starts / kW Hrs:</b> + 22 / N/A / N/A	<b>Estimated System Hours:</b> 22	<b>System Status:</b> Running Needs Service
<b>System Configuration:</b> SN: 100123, Commercial Water Heater ver.3A, N/AN/A	<b>MTBCF*/MTBCE*:</b> 22 / 22	<b>Under Warranty:</b> Yes - Expires 09/17/2021
<b>MTBF*/MTBFE*:</b> 22 / 22	<b>Chargeable Incidents:</b> 1	<b>MTBNCF*/MTBNCFE*:</b> 11 / 11
<b>MTBI*/MTBIE*:</b> 7 / 7	<b>System Downtime Hours:</b> 0	<b>Non-Chargeable Incidents:</b> 2
<b>Operational Availability:</b> 100.0000%	<b>Last Updated:</b> 09/17/2020	
<b>Last Updated By:</b> RELIABILITY, JOE		

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▼ Customer/Location Information

^ Warranty Information

**Initial Warranty**

Months from Shipment:       Warranty Type:

Months from Commission:

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**Extended Warranty**

Months:       Terms:

Purchase Date:   2020  Time:   AM  PM

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▼ Incident History

▼ Installation Details

▼ Accessories

# 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.

	Number in State	State F or S	State End Time (hr)	Subset ID 1
1	2	F	10	
2	104	S	10	
3	2	F	20	
4	98	S	20	
5	9	F	30	
6	88	S	30	
7	10	F	40	
8	76	S	40	
9	16	F	50	
10	52	S	50	
11	20	F	60	
12	72	S	60	
13	31	F	70	
14	38	S	70	
15	37	F	80	
16	36	S	80	
17	34	F	90	
18	35	S	90	

QCP

Life Data Folio: Batch Auto Run Data\All Sets

**t(R=0.85) 397.706474 hr**

Reliable Life      hr      No Bounds      Captions On

Units      Bounds      Options

Calculate

Probability

- Reliability
- Prob. of Failure
- Cond. Reliability
- Cond. Prob. of Failure
- Reliable Life**
- BX% Life
- Mean Life
- Mean Remaining Life

Life

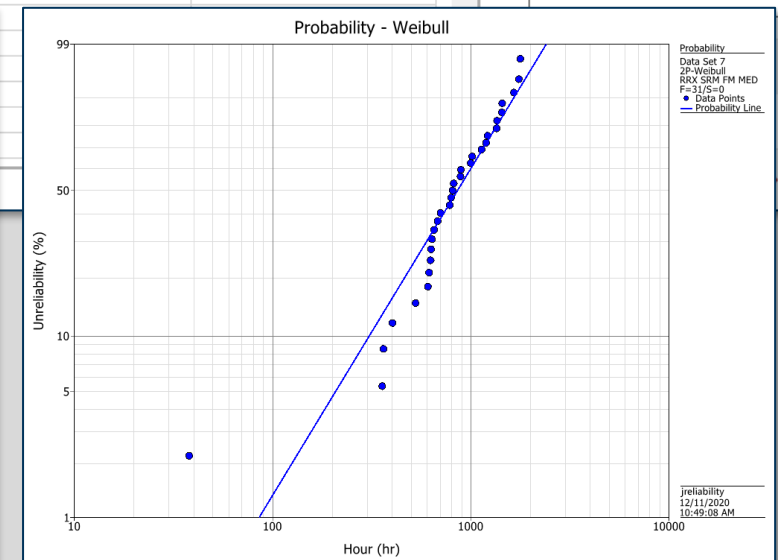
Rate

- Failure Rate

Input

Required Reliability

Calculate      Report      Close



# Repairable, Fleet or Growth Analysis

## FIELDDED SYSTEMS

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

## RELIABILITY GROWTH ANALYSIS

Multiple systems – concurrent operating times (NHPP or Duane)

The screenshot displays the ReliaSoft Weibull++ software interface for a project titled "Repairable Systems - Infant Mortality". The main window shows a spreadsheet with the following data:

Time to Event (hr)	Comments
0	Start
10000	End
320.3	
485.6	
1625.6	
1706.1	

On the right, the "Growth Data" panel shows the model is "Power Law" and "Fielded Repairable". The "Results" section displays the following parameters and tests:

Parameter	Value
Beta	0.871184
Lambda (hr)	0.006332
Statistical Tests	
Significance Level	0.1
DVM	Passed
DBH	Passed
Termination Time (hr)	10000.000000
Systems	3/3

The "Individual System Results" section shows:

System	Beta	Lambda (hr)
System 1	1.055179	0.001384

A "QCP" (Quality Control Plan) dialog box is open, showing the calculation of CNOF (t=3000) = 6.773034. The dialog includes input fields for "Time (hr)" (3000) and "Calculate" buttons for various metrics like "Number of Failures", "Mission Time (hr)", and "Expected Fleet Failures".

Two charts are overlaid on the spreadsheet:

- Cumulative Number of Failures vs Hour (hr):** A scatter plot with a blue trend line showing the cumulative number of failures over time. The x-axis ranges from 0 to 11000 hours, and the y-axis ranges from 0 to 20 failures.
- System Operation:** A plot showing the operation of three systems (System 1, System 2, System 3) and a "Superposition" line. The x-axis is "Hour (hr)" from 0 to 12000, and the y-axis represents the number of systems operating.

# 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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