ReliaSoft XFRACAS by HBM Prenscia

Highly configurable, web-based, enterprise-wide FRACAS system
What is XFRACAS?

• 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 4 – 8 steps
  - Capture findings from root cause analysis
- 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
- Captures Data for Reliability Analysis
XFRACAS is Highly Configurable

- Extensive options to configure the interface to meet your needs
  - Turn features on or off, control how they behave
  - Rename data fields and even create your own
  - Set requirements for data input
    - choose field type, customize drop-down lists
  - Each “entity” has its own settings and permissions
- Supports many different types of processes
  - FRACAS / CAPA
  - Safety management
  - Risk reduction
  - Quality tracking (non-conformance)
Assigning Incidents to Problems
XFRACAS innovatively bridges the gap between your organization’s activities for:
- Incident / failure reporting
- Problem resolution / root cause analysis

Provides all the tools you need to “close the loop” on each reported incident

Also 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 did you do to get the system up and running again?
  - ...
- Sometimes there are multiple incidents that 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 4 to 8 steps

4 Step
DCOV Process

5 Step
Six Sigma DMAIC Process

8 Step
8 Disciplines (8D) Process

1. Define
2. Measure
3. Analyze
4. Improve
5. Control
6. Establish the Team
7. Contain the Problem
8. Identify, Define, Describe and Verify the Root Cause of the Problem
9. Choose Corrective Actions
10. Implement/Validate the Permanent Corrective Actions
11. Prevent Recurrence
12. Reward the Team
Assigning Incidents to Problems

Incidents are reported and may be addressed as they occur

Some incidents are assigned to problems...

Problem 1

Problem 2

Problem 3

...Others are not

New problems may be identified as new incidents are reported

Problem 1

Problem 2

Problem 3

Problem 4
XFRACAS captures valuable data throughout the process.

Incident (Failure) Reporting
Incidents are reported from a variety of channels.

Dashboard Reports & Metrics
- Reliability
- Quality
- Customer Support Efficiency
- Engineering Change Efficiency
- Warranty Projections
- ...

Data Includes:
- Occurrence Date
- Affected Part(s)
- Time to Failure
- Time to Repair
- Incident Description
- Fault Code(s)
- Repaired Parts
- Replaced Parts
- Incident Resolution
- ...

Problem Resolution Process
- 8D
- DMAIC
- IDOV
- DCOV
- ...

Data Includes:
- Problem Description
- Associated Incidents
- Failure Mode
- Root Cause
- Problem Resolution
- ...

Implement Changes
- Design
- Manufacturing
- Shipping
- Packaging
- ...

Problem Resolved

Problem Resolution Process
- 8D
- DMAIC
- IDOV
- DCOV
- ...

Identify Underlying Problems
Some incidents are assigned to problems that can be tracked and resolved.
- Existing (known) problem
- New problem
- Not assigned to a problem

Test/Inspection Facilities
Distributors or Suppliers
Customer Support
...

Technical/Customer Support Troubleshooting

Incident Addressed
XFRACAS Architecture
Web-based, Scalable and Robust

- XFRACAS is based on the .NET Framework
  - n-tier
  - Scalable
  - Distributable
  - Robust
  - Able to be deployed 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
ReliaSoft desktop applications, XFRACAS and the Synthesis Enterprise Portal (SEP) can all connect with the same data repository on either SQL Server or Oracle.
Server and Client Requirements

- **Server Requirements**
  If you plan to host the database and website on the same server:
  - Windows 2008 R2 or newer
  - .NET 4.6
  - IIS with support for serving ASP.NET
  - SQL Server 2008 or newer OR Oracle 10g or newer (32-bit and 64-bit versions of all, full version only)

- **Client Requirements**
  Users can access the website with any browser that supports the following doctype:

  ```html
  <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
  "http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
  
  This includes Internet Explorer, Chrome, Firefox or Safari residing on a Windows operating system, a Mac operating system or even a tablet (such as iOS, Android, etc.)
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 have a report run automatically when you visit this page
Portal Page

(YOU CAN CUSTOMIZE TO FIT YOUR NEEDS)

<table>
<thead>
<tr>
<th>USER NAME</th>
<th>Portal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reports</td>
<td></td>
</tr>
<tr>
<td>• Incidents Created by Me</td>
<td></td>
</tr>
<tr>
<td>• Incidents Submitted for Testing</td>
<td></td>
</tr>
<tr>
<td>External Links</td>
<td></td>
</tr>
<tr>
<td>• Company Home Page</td>
<td></td>
</tr>
</tbody>
</table>

### Announcements

**System Update**

The system will be updated on Saturday at 9:00. Please plan accordingly.

**Tasks**

**Uncompleted Actions (1)**

<table>
<thead>
<tr>
<th>Action #</th>
<th>Associated #</th>
<th>Action Description</th>
<th>Due Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>INC:E1-21</td>
<td>Replace the mounting plate.</td>
<td>07/26/2013</td>
</tr>
</tbody>
</table>

**Unclosed Incidents (10)**

<table>
<thead>
<tr>
<th>Incident #</th>
<th>Status</th>
<th>Description</th>
<th>Occur. Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1-17</td>
<td>Open</td>
<td>Fused Plug</td>
<td>07/18/2013</td>
</tr>
<tr>
<td>E1-18</td>
<td>Under Review</td>
<td>Cracked Case</td>
<td>07/18/2013</td>
</tr>
<tr>
<td>E1-16</td>
<td>Under Review</td>
<td>Cracked Support Bracket</td>
<td>07/18/2013</td>
</tr>
</tbody>
</table>

**Open Problems (0)**

You have no Problems due.

**Problems To Review (1)**

<table>
<thead>
<tr>
<th>Problem #</th>
<th>Status</th>
<th>Problem Title</th>
<th>Problem Owner</th>
<th>Req Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1-4</td>
<td>03A</td>
<td>Support brackets crack at connection point</td>
<td>CATHY USER</td>
<td>09/30/2013</td>
</tr>
</tbody>
</table>

**My Projects (1)**

<table>
<thead>
<tr>
<th>Project #</th>
<th>Title</th>
<th>Req Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1-1</td>
<td>System A Issues</td>
<td>05/24/2014</td>
</tr>
</tbody>
</table>
Incidents and Failure Analysis
XFRACAS Incidents

• Captures data to understand, categorize and address each incident, such as:
  • Description of the incident
  • Date/time of occurrence
  • Responsible part, fault code, failure mode
  • How the incident was addressed
  • Is this a “chargeable failure” for reliability analysis?

• For a serialized system, you can also capture:
  • Complete history of incidents and repaired/replaced parts for that system
  • Time/usage (run hours, cycles) when each incident occurred — for reliability data analysis
Incident Page

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Failure Analysis for Replaced Parts

- When applicable, 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
  - ...

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 4 – 8 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

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E1-4 | Support brackets crack at connection point

Owner: USER, CATHY
Priority: High
First Occurrence: N/A

Creator: NAME, USER
Process Status: DO: Choose and Verify Permanent Corrective Actions
Last Occurrence: N/A

Created Date: 01/14/2010
Requested Closure Date: 09/30/2013
Expected Closure Date: N/A

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: Change design of support bracket connection point.

Corrective Actions:

<table>
<thead>
<tr>
<th>Action Number</th>
<th>Short Description</th>
<th>Due Date</th>
<th>Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>Send new brackets to existing custo...</td>
<td>07/30/2013</td>
<td>USER, ANN</td>
</tr>
</tbody>
</table>

Completed By: USER, BILL
Completed Date: 07/22/2013 11:30 AM

FRB Approved By:
Reviewer Name: NAME, USER
Category: DS Approver
Sign-off Date: Sign off: Yes

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 the 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:
  • What is the target completion date?
  • How many issues are open/closed?
  • How long has each issue been in the system?
  • Which issues are still open?
  • What is the status?
  • Who is responsible?
  • …
### Project Page

**E1-1 | System A Issues**

**Owner:** ANN USER  
**Priority:** High  
**Target Completion Date:** 09/30/2013 10:30 AM  
**Revised Completion Date:** N/A  
**Project Start Date:** 07/15/2013 09:30 AM  
**Actual Completion Date:** N/A

#### Associated Problems

<table>
<thead>
<tr>
<th>Problem</th>
<th>Problem Description</th>
<th>Owner</th>
<th>Status</th>
<th># of IRs</th>
<th>Last Occurrence</th>
<th>Cpt. Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1-3</td>
<td>Cracks develop in external casing, allowing dust to enter the unit.</td>
<td>USER, BILL</td>
<td>Describe the Problem</td>
<td>1</td>
<td>07/18/2013</td>
<td>N/A</td>
</tr>
<tr>
<td>E1-4</td>
<td>Support brackets crack at connection point</td>
<td>USER, CATHY</td>
<td>Develop Containment</td>
<td>1</td>
<td>07/18/2013</td>
<td>N/A</td>
</tr>
<tr>
<td>E1-7</td>
<td>Plugs overheat and fuse to mounting plate.</td>
<td>USER, ANN</td>
<td>Describe the Problem</td>
<td>2</td>
<td>07/18/2013</td>
<td>N/A</td>
</tr>
</tbody>
</table>

#### Associated Incident Reports

- **Open Incidents:** 4  
- **Closed Incidents:** 0

#### Associated FA Reports

<table>
<thead>
<tr>
<th>Problem</th>
<th>FA Number</th>
<th>Created Date</th>
<th>Closed Date</th>
<th>RMA</th>
<th>Root Cause</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1-7</td>
<td>E1-3</td>
<td>07/18/2013</td>
<td>N/A</td>
<td>N/A</td>
<td>Overheating</td>
</tr>
</tbody>
</table>

**Associated Files:** None
Reports, Charts and Dashboards
**XFRACAS Reports**

- Wide variety of tabular reports
  - Use built-in “standard” reports
  - Save and re-use your own custom templates
    - Columns displayed, filter criteria, sort order
  - Run your own custom SQL statements
- Results displayed in 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, which can be used as a web-based data source for other tools (e.g., “Get External Data > From Web” in Excel)
Reports Page

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Results based on the following qualifier(s):
Entity = Acme Enterprises

Report Generated: 07/22/2015 11:08 AM

<table>
<thead>
<tr>
<th>Incident Number</th>
<th>Occurrence Date</th>
<th>Category</th>
<th>Creator</th>
<th>Incident Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td>REL-18</td>
<td>04/30/2013 11:32 AM</td>
<td>Component Failure</td>
<td>BRIAN BULB</td>
<td>MIKE MANAGER</td>
</tr>
</tbody>
</table>

- Responsible Part: C1: Chandelier
  - Incident Status: Closed
  - Incident Status: Open

- Responsible Part: CCF: Chandelier Composite Frame
- Responsible Part: CLED: Chandelier LED
- Responsible Part: FL1: Fluorescent Bulb
- Responsible Part: WR1: Wiring

Create Filter
XFRACAS Charts, Dashboards and XSLT

- Pareto or trend charts for any set of results
  - Bar charts, pie charts, area charts, step charts, scatter charts, 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

YOU CAN CUSTOMIZE 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++/RBI
  - Import from Excel or XML
- If you want 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
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

YOU CAN CUSTOMIZE TO FIT YOUR NEEDS
Reliability Data Analysis and FMEAs
Reliability Data Analysis

- The incident reporting process in XFRACAS can result in clean, usable data for reliability analysis in ReliaSoft desktop applications.
- Use the Data Warehouse in Weibull++, ALTA or RGA 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.
Weibull++/ALTA – Life Data Analysis

- Extract failure and suspension times/usage 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 SDW calculates suspensions based on reported hours/usage
RGA – Repairable, Fleet or Growth

- Fielded Systems
  - Repairable Systems Analysis
    - Power Law
  - Fleet Analysis
    - Crow-AMSAA (NHPP)
- Reliability Growth Analysis
  - Multiple Systems – Concurrent Operating Times
    - Crow-AMSAA (NHPP) or Duane
XFRACAS and XFMEA

- Synchronize generic system templates (“bill 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
  • Links to incidents where you are the owner
  • Links to reports and charts you have selected to “watch” in XFRACAS
  • 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 SDW dashboards based on any saved XFRACAS report