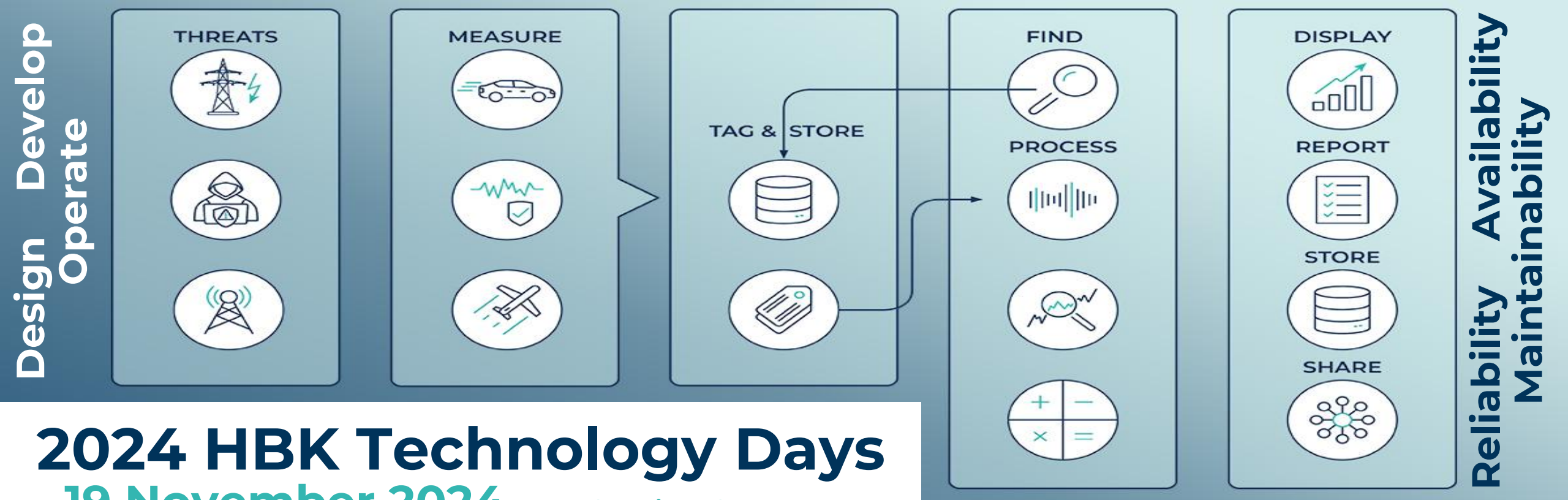
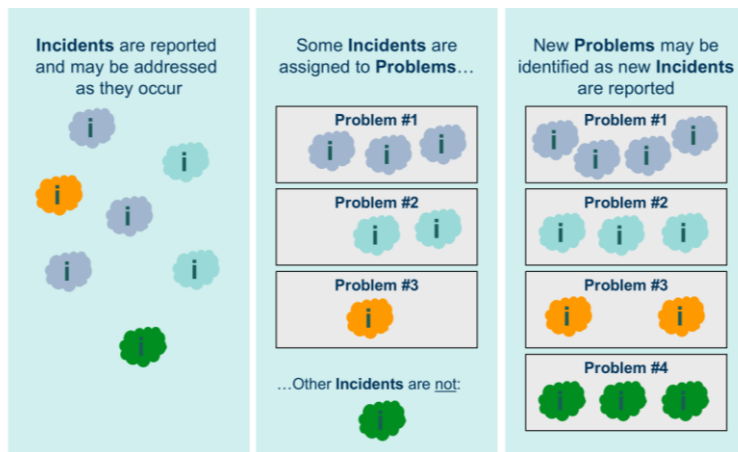




2024 HBK Technology Days

19 November 2024

Assigning Incidents to Problems



i - incident

Session 6:

The ...abilities – Reliability, Availability, Maintainability (RAM) for Dependability

- Failure Reporting, Analysis, and Corrective Action System (FRACAS) knowledge base for incident and failure reporting, failure modelling and root cause analysis

Mariusz Dabrowski,
Senior Application Engineer – Reliability, HBK

Failure Reporting, Analysis, and Corrective Action System (FRACAS) knowledge base for incident and failure reporting, failure modelling and root cause analysis

Abstract

- Failure Reporting, Analysis, and Corrective Action System (FRACAS) is essential for enhancing reliability, availability, maintainability (RAM), and dependability (RAMD) of systems. FRACAS provides a structured, closed-loop process to identify, analyse, and correct failures throughout a system's lifecycle.
 - Reliability: FRACAS helps to identify failure patterns and root causes, enabling corrective actions to improve system reliability.
 - Availability: By addressing failures promptly, FRACAS ensures systems are operational when needed, thus enhancing availability.
 - Maintainability: FRACAS supports maintainability by providing data on failure modes and repair actions, which can be used to streamline maintenance processes.
 - Dependability: Overall system dependability is improved as FRACAS ensures that failures are systematically addressed and prevented from recurring.
- Key activities in FRACAS include capturing failure data, prioritizing issues, performing root cause analysis, implementing corrective actions, and tracking the effectiveness of these actions over time. This iterative process promotes continuous improvement and supports decision-making in design, development, production, and operational phases.

Failure Reporting, Analysis, and Corrective Action System (FRACAS) knowledge base for incident and failure reporting, failure modelling and root cause analysis

- ▲ About the presenter, Mariusz Dabrowski, Senior Application Engineer – Reliability, HBK
 - Mariusz is an application engineer supporting ReliaSoft reliability software for HBK with 17-years of professional experience in reliability engineering, with previous experience at Warsaw Institute of Aviation and General Electric in aviation and energy industries. Certified Six Sigma Black Belt focused on continuous improvement. Training instructor in reliability engineering. Specializes in reliability of nonrepairable systems and RAM analysis (Reliability, Availability, Maintainability). Project manager, currently implementing the FRACAS systems (Failure Reporting, Analysis and Corrective Action System).

FRACAS Knowledge Base for Incident and Failure Reporting, Failure Modeling and RCA

Mariusz Dabrowski
Hottinger Bruel & Kjaer Poland Sp. z o.o.





About the Presenter

Mariusz Dabrowski is an application engineer supporting ReliaSoft reliability software for HBK with 17-years of professional experience in reliability engineering, with previous experience in aviation and energy industries. Certified Six Sigma Black Belt focused on continuous improvement. Training instructor in reliability engineering. Specializes in reliability of nonrepairable systems and RAM analysis (Reliability, Availability, Maintainability). Project leader, currently implementing the FRACAS systems (Failure Reporting, Analysis and Corrective Action System).

FRACAS Knowledge Base for Incident and Failure Reporting, Failure Modeling and RCA

Agenda

1. What is FRACAS?
2. Incidents and Problems
3. Process Steps
4. Benefits
5. Summary



What is FRACAS?

Failure – we want to prevent / optimize recurrence of failures (Incidents)

Reporting – log Incidents in a database and summarize

Analysis – join Incidents into larger Problems, perform RCA and Problem Resolution Process

Corrective Action – plan, execute and verify short-term and long-term corrective actions

System – a structured way to achieve the above

- ▲ System for managing, monitoring, controlling and understanding **incidents** and associated **root causes**
- ▲ Basic Reliability tool
- ▲ Helps with data gathering
- ▲ Builds a "knowledge base" of lessons learned that can be shared throughout the organization



Incidents

- An “**Incident**” is a failure, maintenance event, 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?
 - What were the symptoms?
 - Which part(s) failed?
 - What did you do to get the system up and running again? (short-term fix)
 - ...
- Sometimes there are multiple **Incidents** that are all due to the same underlying issue

Failure

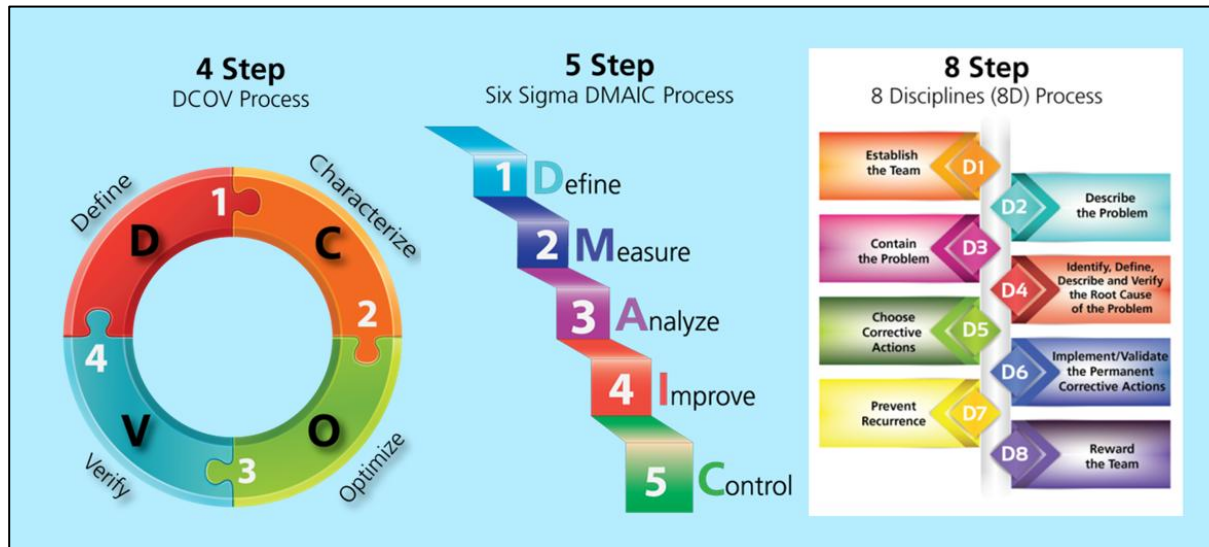


The screenshot shows a software interface for managing incidents. The title bar indicates 'INC-26 | Rig failed' and 'JFT MODEL DATABASE'. The main content is divided into several sections:

- Incident Summary:** Contains key information in three columns:
 - Assigned to Problem#:** N/A
 - System Configuration:** SHARD 123, ENGINE SUBSYSTEM TYPE 2
 - Owner:** PIENIAK, LUKASZ
 - Category:** Component Failure
 - Response Time:** N/A
 - Occurrence Date:** 02/23/2018
 - System Status:** Running
 - Reporting Date:** 02/23/2018
 - Responsible Part:** Piston: Piston
 - State:** Open
 - Run Hrs:** 10000
 - Creator, Reporting Org:** BARTEK SWATEK, N/A
 - Downtime:** N/A
- System/Component Information:** A collapsed section.
- Incident Disposition:** Expanded section showing:
 - Title of Incident:** Rig failed
 - Incident Date:** Feb 23 2018
 - State:** Open
 - Report Type:** Corrective Maintenance
 - Category:** Component Failure
 - Responsible a la Part:** Part: Piston: Piston
 - User:** SWATEK, BARTEK
 - Owner:** PIENIAK, LUKASZ
 - Creator:** SWATEK, BARTEK
 - Actions:** A table with columns: Action Number, Short Description, Due Date, Owner.
 - Row 1: 8, Please have a look at the piston, 04/28/2018, MORAGIANNIS, KONSTANTINOS
 - Description:** Rig failed ...
- Incident Repair Information:** A collapsed section.

Problems

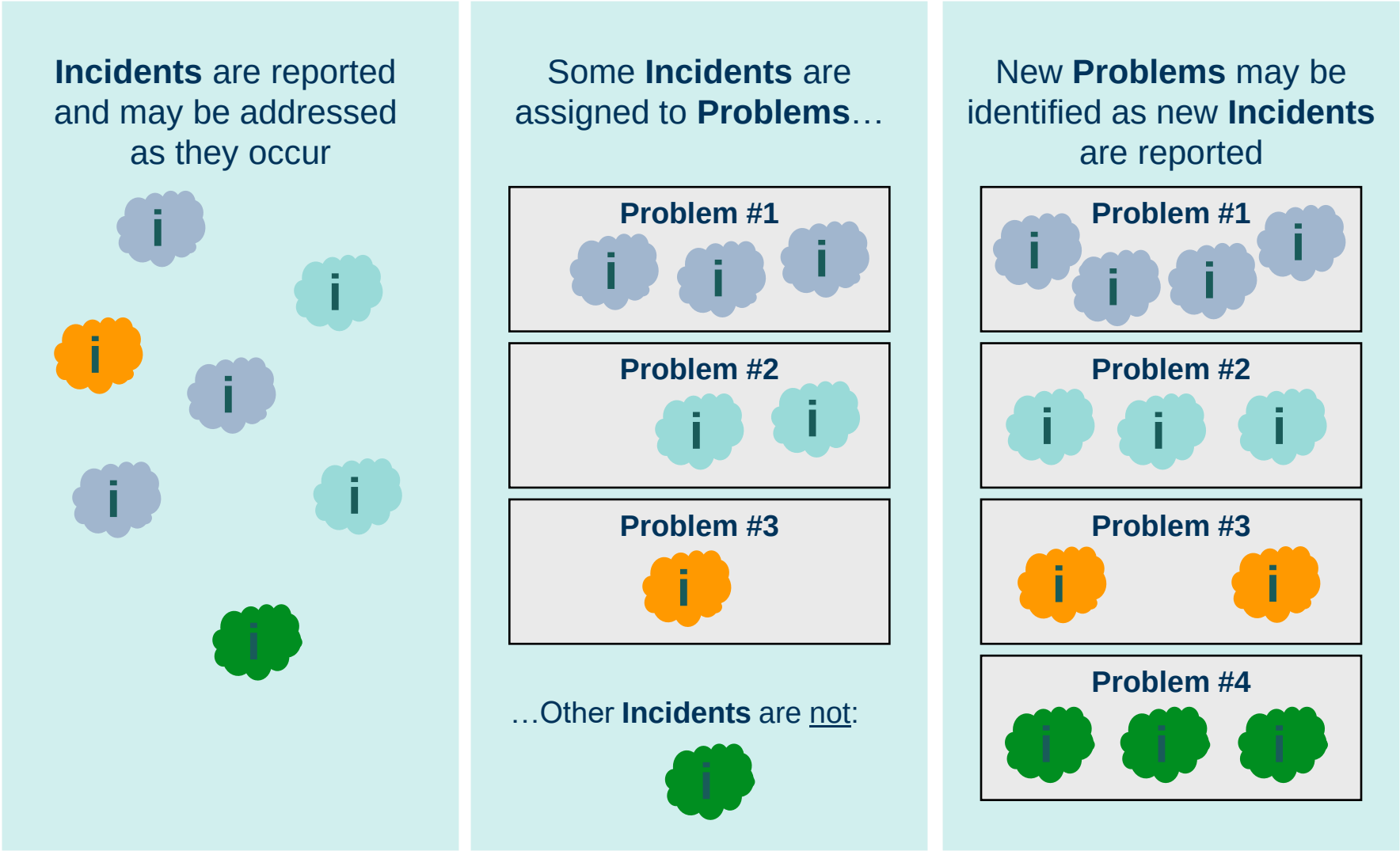
- ▲ A “**Problem**” is a larger issue that may require a team-based approach to analyze and resolve
 - Assign multiple **Incidents** to the same **Problem**,
 - Use any **Problem Resolution Process** from 4 to 8 steps:



The screenshot shows a software interface for problem resolution, titled "REL-58 | Bracket Issues" and "ACME International". It displays a "Problem Summary" section with fields for Owner, Priority, First Occurrence, Last Updated By, Creator, Process Status, Last Occurrence, Last Updated, Created Date, Requested Closure Date, and Expected Closure Date. Below this, there are sections for "Establish the Team", "Describe the Problem", "Implement and Verify Containment Actions", and "Identify and Verify Root Cause". The "Choose and Verify Permanent Corrective Actions" section is expanded, showing a table of corrective actions with columns for Action Number, Short Description, Due Date, and Owner. The table lists one action: 202, Send new brackets to existing custo..., Due Date 01/20/2021, and Owner TECHNICIAN, BOB. The interface also includes a "Completed By" field (TECHNICIAN, BOB), a "Completed Date" field (Aug 17, 2020), a "Time" field (03:23 AM PM), a "Local Time" field, and a "Sign-off Date" field.

- ▲ FRACAS addresses both individual **Incidents** and the underlying **Problems**

Assigning Incidents to Problems

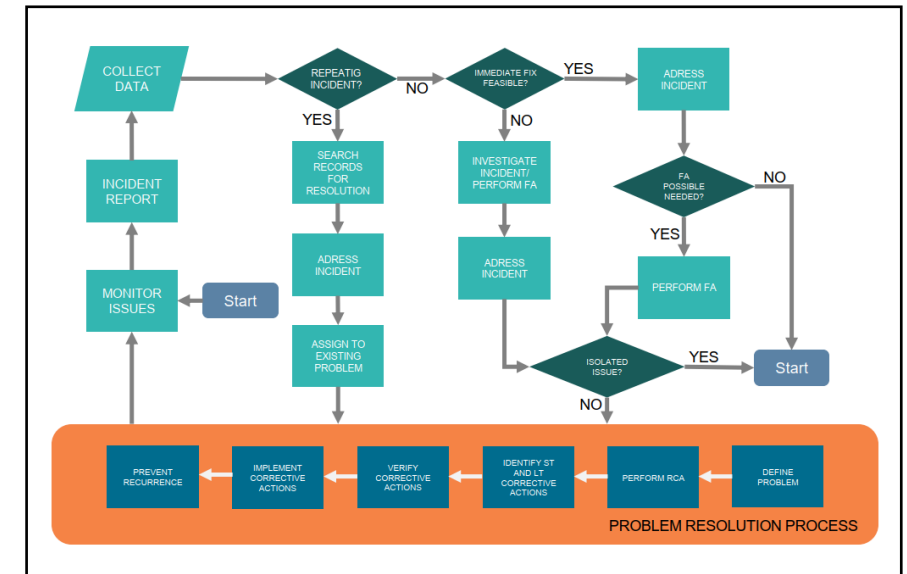


 - incident

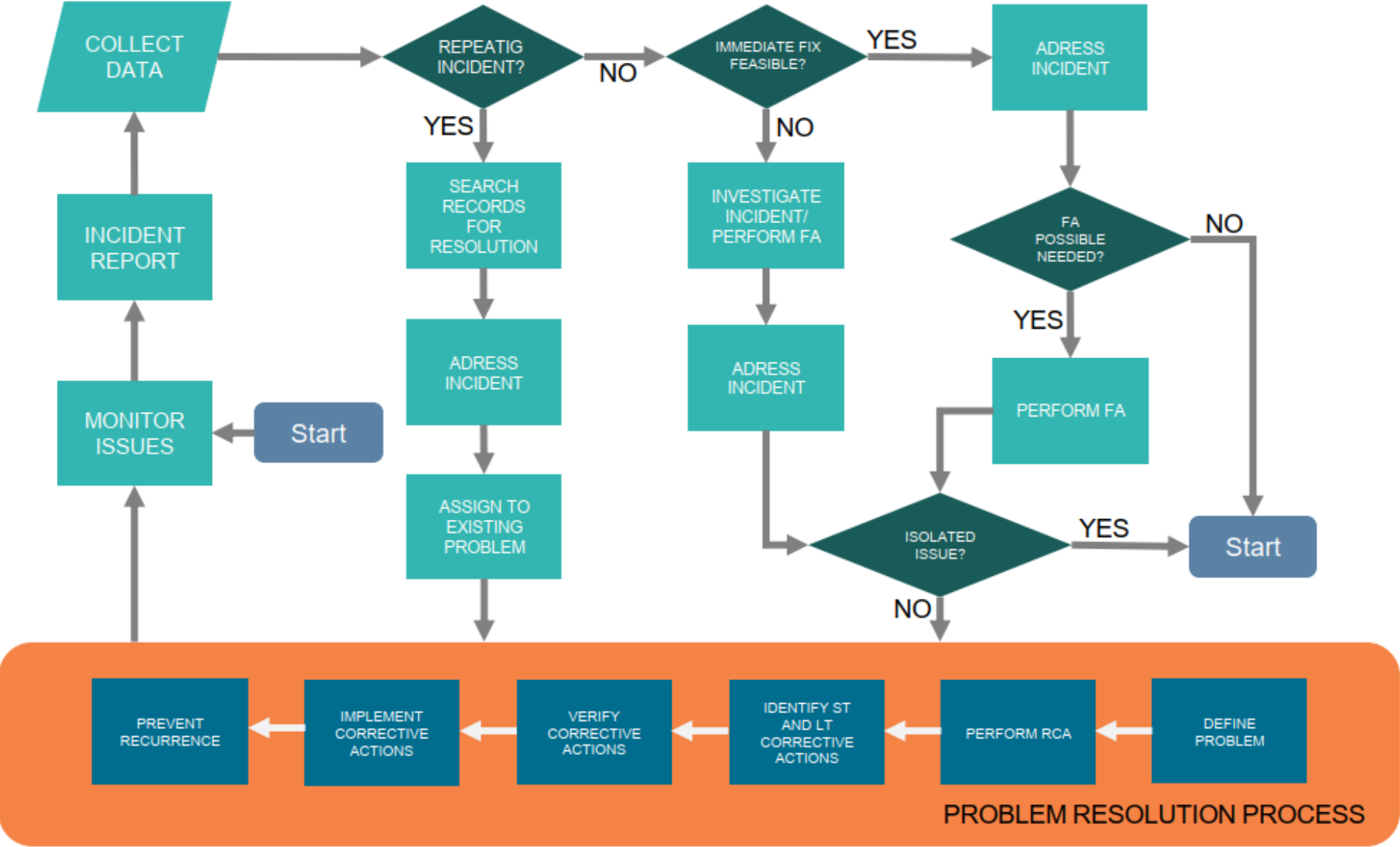
Basic Steps of FRACAS

▲ The basic steps of FRACAS include:

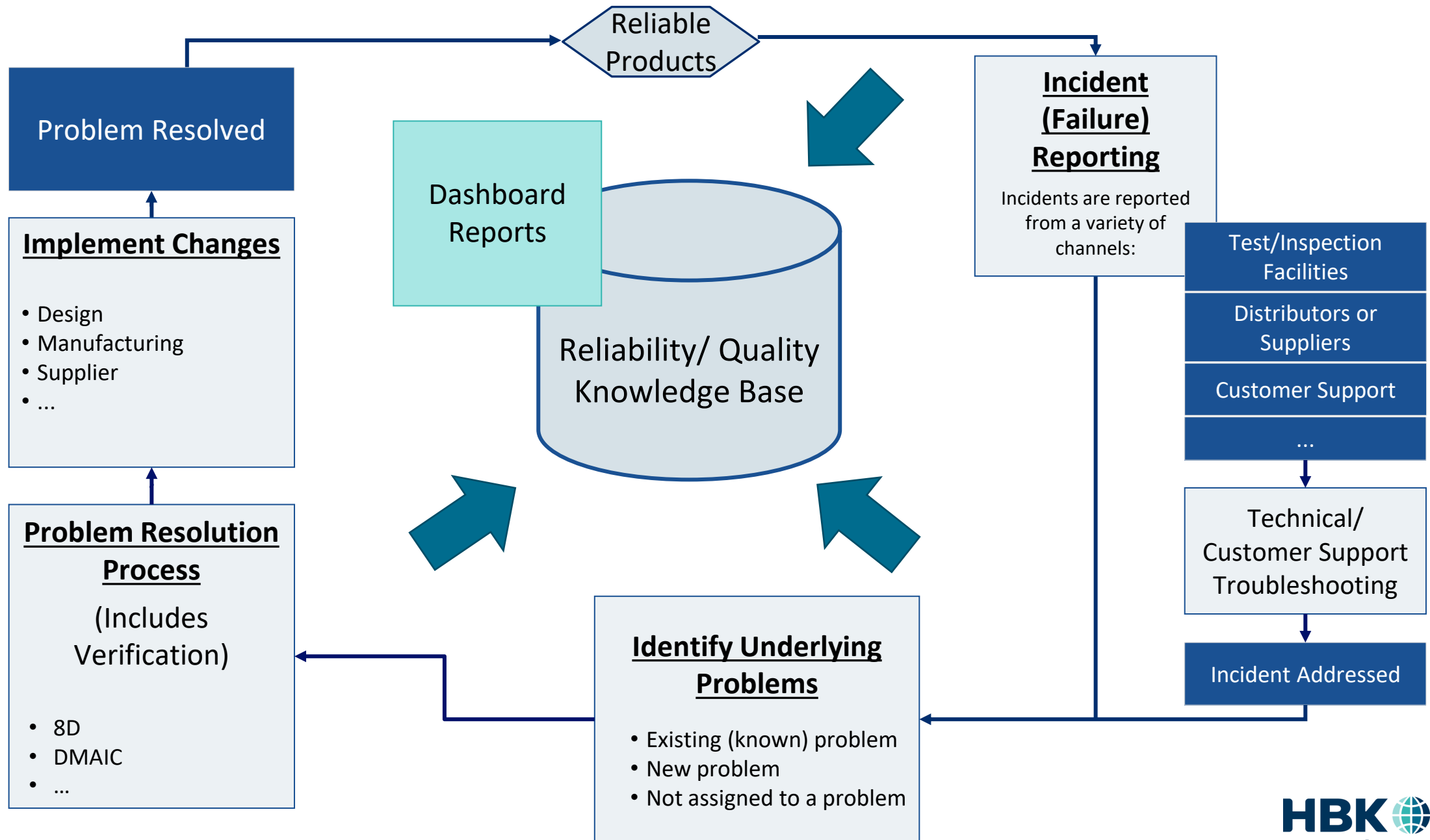
- RECORDING of an incident (issue)
- Assigning responsible individual(s)
- Creating appropriate action items to address the incident
- Performing incident (failure) ANALYSIS
- Determining if a bigger problem exists
- Identifying appropriate CORRECTIVE actions
- VERIFYING that the corrective actions are effective
- IMPLEMENTING corrective actions
- PREVENTING recurrence of incidents



Closed Loop FRACAS Process



FRACAS Conceptual Overview



Industries That Can Benefit from FRACAS

- ▲ FRACAS can be effectively applied to any type of industry
- ▲ The major industries where FRACAS is used are:
 - Aerospace
 - Medical
 - Electronics
 - Airlines
 - Chemical & Process
 - Oil & Gas
 - Energy
 - Infrastructure/Facilities Management
 - Utilities
 - Transportation
 - Heavy Equipment
 - IT
 - Defense
 - Telecommunications
 - Railways
 - Automotive
 - Manufacturing
 - Capital Equipment
 - OEM
 - Appliances
 - Etc....

Benefits of FRACAS to Different Entities in the Organization

Benefits to the Engineering Department

- ▲ Manage incidents reported throughout the development cycle and field operation
- ▲ Consistent data to perform reliability, failure root cause and quality analysis
- ▲ Provide a formal process for problem resolution

Benefits of FRACAS to Different Entities in the Organization (cont'd)

Benefits to the Manufacturing / Production Departments

- ▲ Facilitates reporting and resolution of downing events and interruptions to production
- ▲ Eliminates the reliance on inefficient, non-integrated ways of reporting problems
- ▲ Replaces primitive “status boards,” paper reports and walkie-talkies with a sophisticated system
- ▲ Compiles a log of problems caused by suppliers' equipment
- ▲ Provides a formal process for problem resolution
- ▲ Supports Reliability Centered Maintenance activities



Benefits of FRACAS to Different Entities in the Organization (cont'd)

Benefits to the Procurement Department

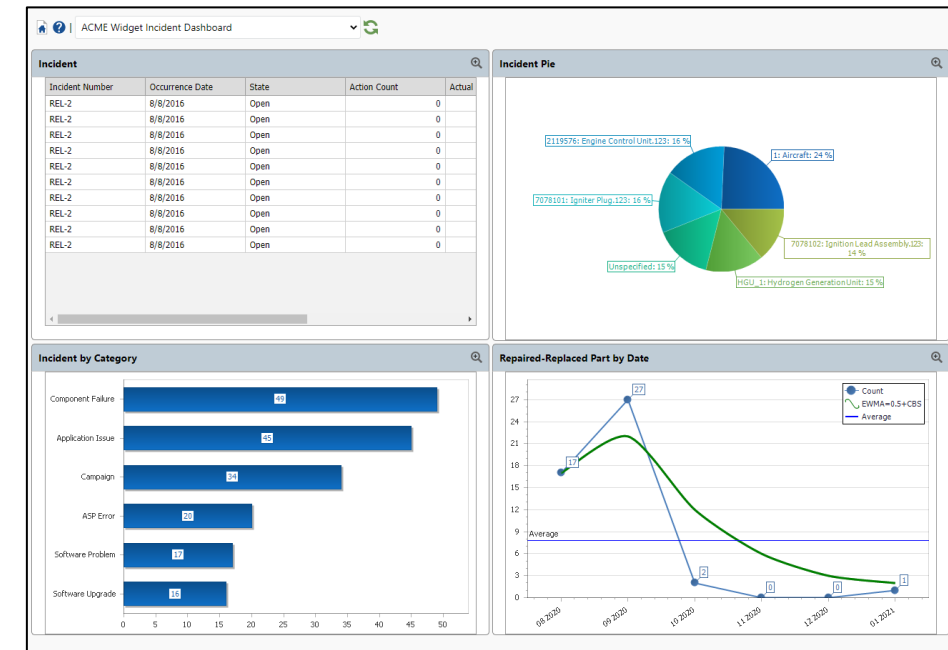
- ▲ Establishes clear and direct channels between production and design engineers with purchasing
- ▲ Encompasses all the feedback/issues that the procurement department needs to know to closely monitor suppliers
- ▲ Enables dynamic and data-driven analysis to evaluate/award (or suspend) suppliers based on actual performance
- ▲ Supplier selection can be elevated to promote a paradigm through total cost of ownership – not just the lowest bidder



Benefits of FRACAS to Different Entities in the Organization (cont'd)

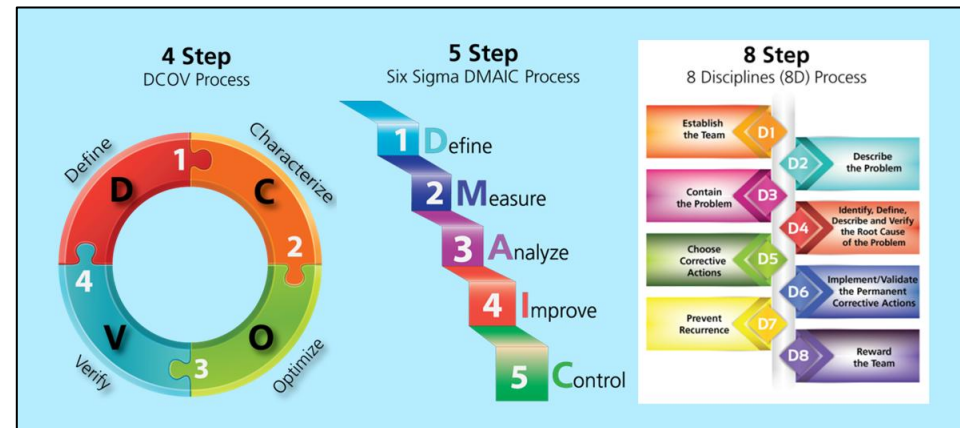
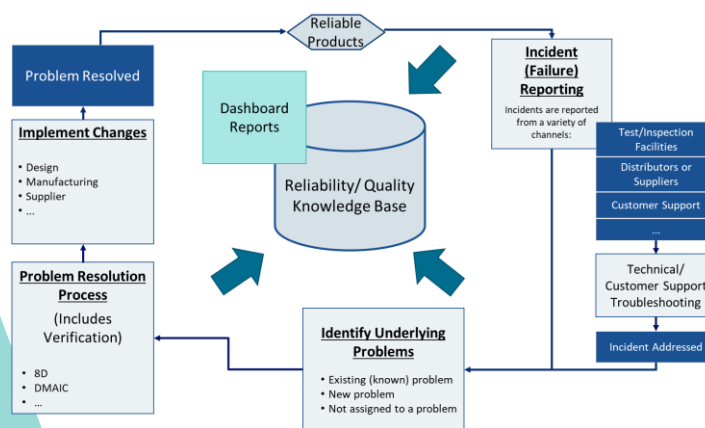
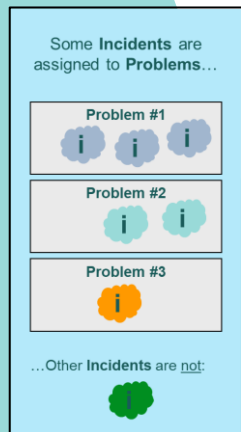
Benefits to Finance / Corporate Management

- Provides a “dashboard” of custom reports reflecting the “real-time” state of the organization: incidents and problems can be presented in a concise fashion to identify key risks, costs and opportunities for improvement. Improves visibility into issues occurring in production, development and in the field
- Provides metrics and status reports that clearly communicate to all stakeholders.
- Enforces a clearly defined and communicated workflow enabling management to hold all parties fully accountable for the problems they are associated with.
- Helps forecast returns, failures/replacements and maintenance costs
- Allows for quick reaction to serious issues or frequently recurring incidents
- Helps comply with regulations, standards and customer requirements
- Facilitates overall cost reduction



Summary

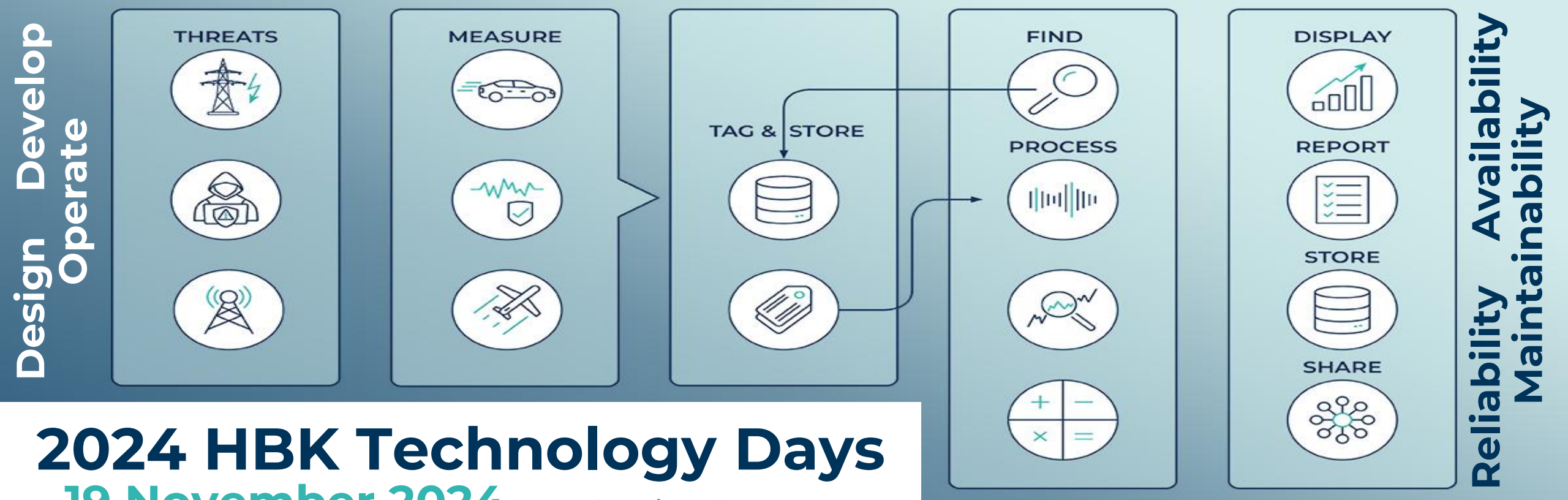
- ▲ FRACAS is a structured, closed-loop process
- ▲ Main goal is to report, analyse, and correct failures
- ▲ Failures are systematically addressed and recurrence minimized
- ▲ Foundation for data-driven decisions
- ▲ Enhancing RAMD – by improving reliability, optimizing maintenance and more



Thank You

Q&A

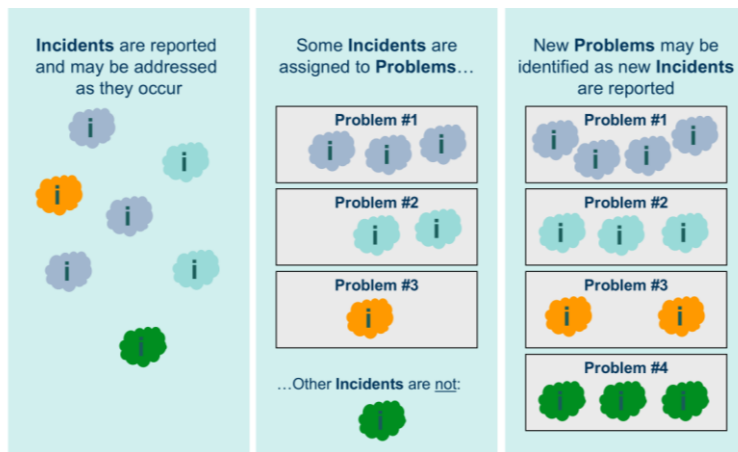




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