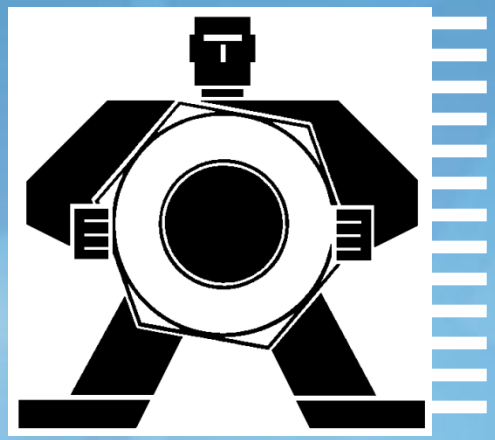
RCM *Extension* for MAXIMO



helps drive safety, reliability and productivity improvements for all industries.

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Presented by
Lance Morris** and **John Reeve

July 29, 2011

IBM Business Partner

Presenters

Lance Morris
Principal and cofounder of Cohesive Work Management Practice Lead and Solution Architect

John Reeve
Practice Leader Advanced Maintenance and Scheduling Processes

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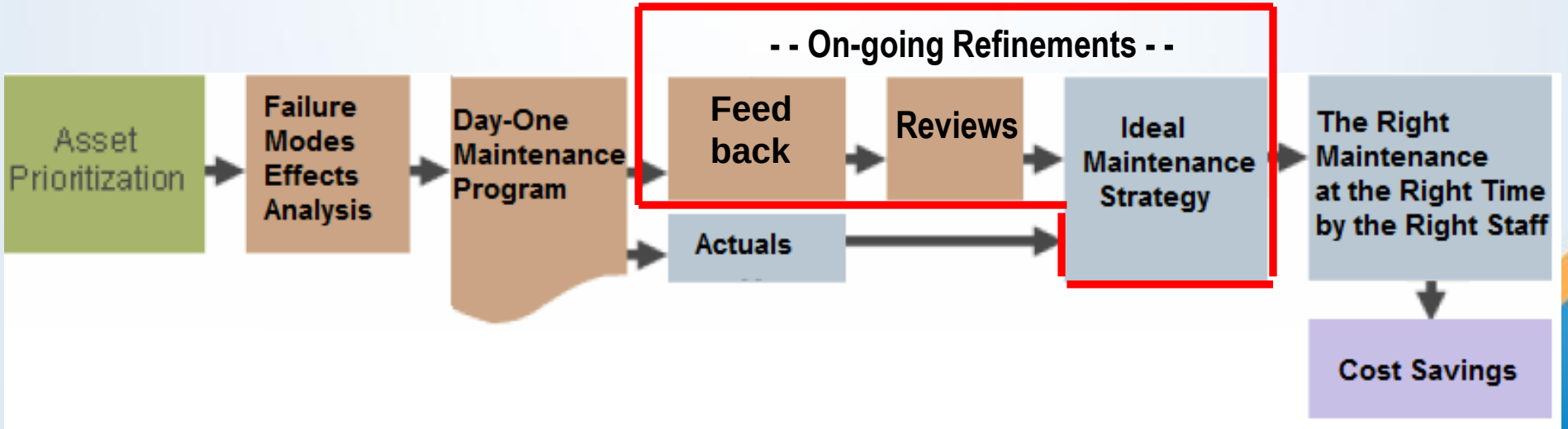
Webinar Objectives

Demonstrate how to use Maximo to:

1) Identify what equipment is important and why?
2) Identify how it fails and the resulting consequences?
3) Identify what will be done to prevent or mitigate the risk
4) Illustrate how to capture and automatically disposition feedback on the effectiveness of those actions.



Reliability Centered Maintenance

- What is it? ..... Asset performance optimization
- Do I need it? .....Supports continuous improvement
- Once I have it in place, is that it?

The first step toward reliability centered maintenance is to capture, categorize and review asset information. But, how do you focus scarce resources on those items that would cause the most disruption if they were to fail to achieve highest ROI?

- Simply stated, the RCM Extension supports:
  - ✓ Doing the right activities
  - ✓ To the right assets
  - ✓ At the right time

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Questions to Consider

Concerns:

- How do you know you are performing the **right PMs**? and at the right **frequency**?
- What if the maintenance personnel have knowledge regarding asset performance but it is **not being properly captured**?
- What if the data being captured is all **textual** format?
- What if you are **missing foundation** data, e.g. locations, assets, failure/problem codes?
- What if your assets are not ranked in terms of **criticality**?

EAM System

Questions to Consider (part 2)

- Some have said, “For years and years, we have had a lot of good data. But it was **in the heads** of our most senior staff, and, many of them plan to retire soon.”
- For some organizations, the Maximo system has verbose descriptions stored inside the work order. This text might contain problem assessments, suggestions to prevent future problems, and even design changes. **Unfortunately**, there is **no way to quickly slice-and-dice** this data categorically.
- It is a **common misunderstanding** by maintenance organization that by typing text-only descriptive for problem/cause/remedy that this data alone provides adequate medium for failure analysis.

Defining What is Important and Why

Key Information to Capture:

- It is important that we capture “actionable data” in addition to descriptive.
- We should understand the design function of the Operating Location (what is it supposed to do)?
- How critical is the Operating Location to the process?
- How does it fail and what are the consequences of each failure?
- And what other considerations might affect the performance of the equipment?

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How to Mitigate Failure Risk

Maximo Considerations:

- Most failure risks can be mitigated by Preventive or Predictive Maintenance as scheduled by Maximo

  - - but what confidence level do you have in your PM/PdM program?

- What is the *basis* for the strategy and frequency?
- Which risks are the PM intended to address?
- How does the PM specifically address the failure mode? Where is this stored in Maximo?

Establish Maintenance Strategies

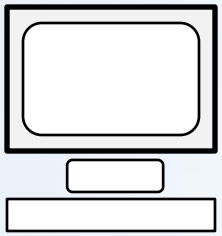
- Determine **asset/system priority** (store in Maximo)
- Determine **operating context** for the asset being analyzed (cooling water system is to maintain water from 40°F to 45°F).
- Define the asset's **functions** (maintain water temperature and contain water in the tank).
- Assess possible failures (water too hot, or, too cold).
- Identify possible **failure modes** or root causes (heat exchanger fouled, valve closed, pump bearing fatigued).
- Determine the most probable **failure effects** for each failure mode (inefficient heat exchanger results in higher utility cost, extra cooling tower sections in operation, eventual inability to deliver quality parts).
- Then propose an **appropriate maintenance task** for each failure mode.

FMEA

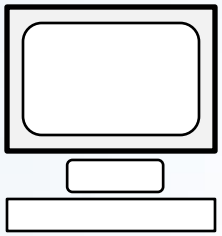
*This is all possible, but you have the power within Maximo with some education, to **immediately enhance your failure analysis** process and **asset performance**.*

Cohesive RCM Extension

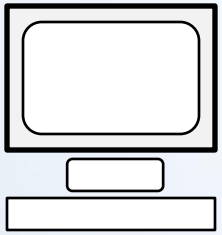
There are no new screens, but **alterations** to existing Maximo screens have been made, such as adding new tabs.



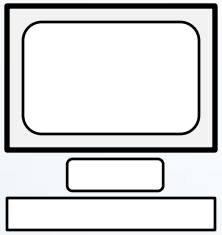
Locations, RCM FMEA



Locations, RCM Streamline

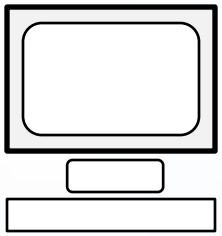


Work Order main, RCM tab, CM work type

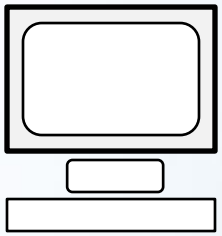


Work Order main, RCM tab, PM work type

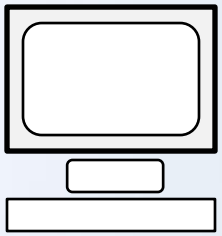
Standard Tools used:
Application Designer, Database Configuration, Domains, Escalations, Notifications, Workflow



Master PM



PM main, RCM tab



PM main, Work Orders tab

***No customization** to Maximo is required which means this solution is **easily upgradable**.*

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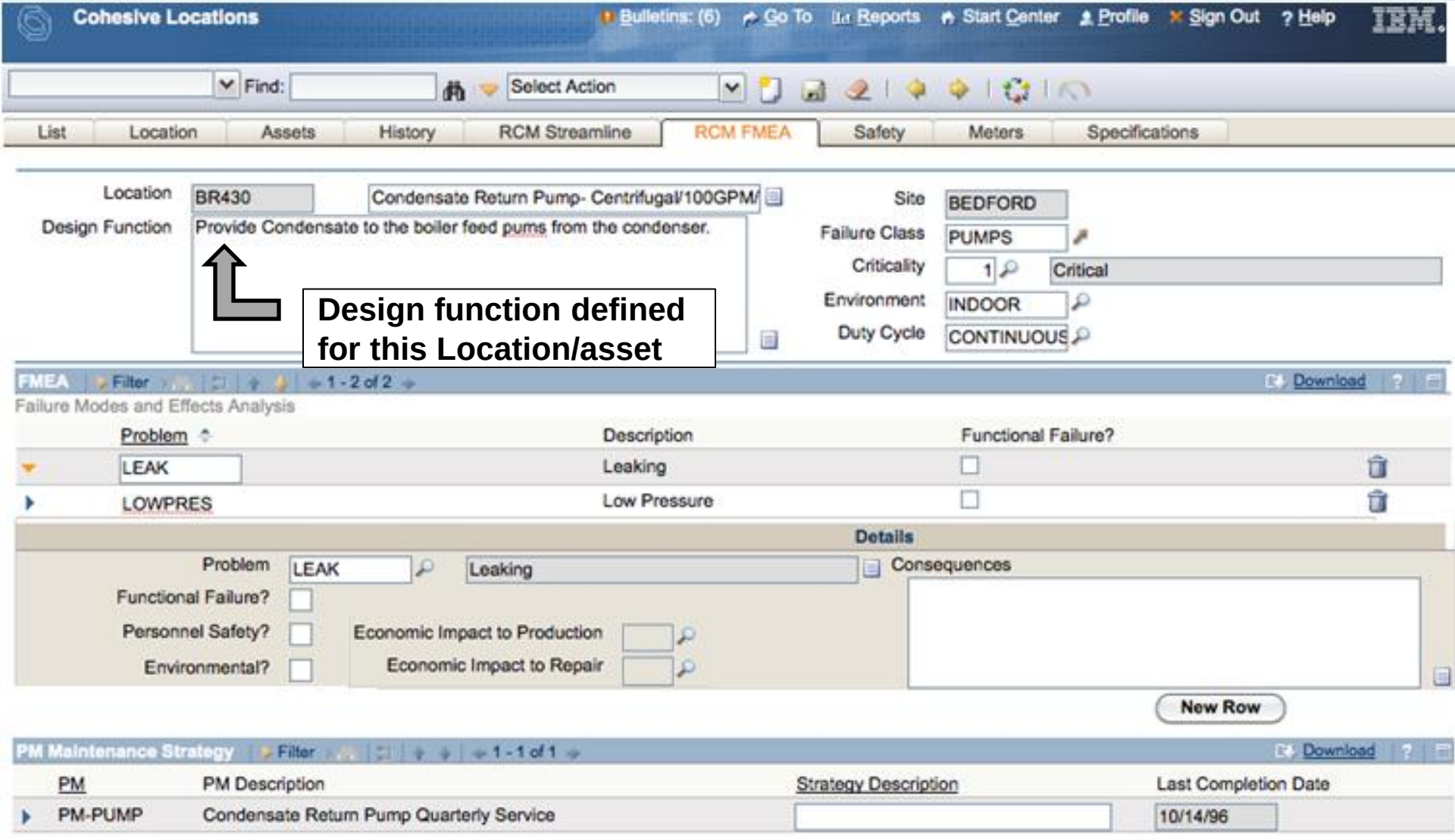
- - Locations, RCM tab - -



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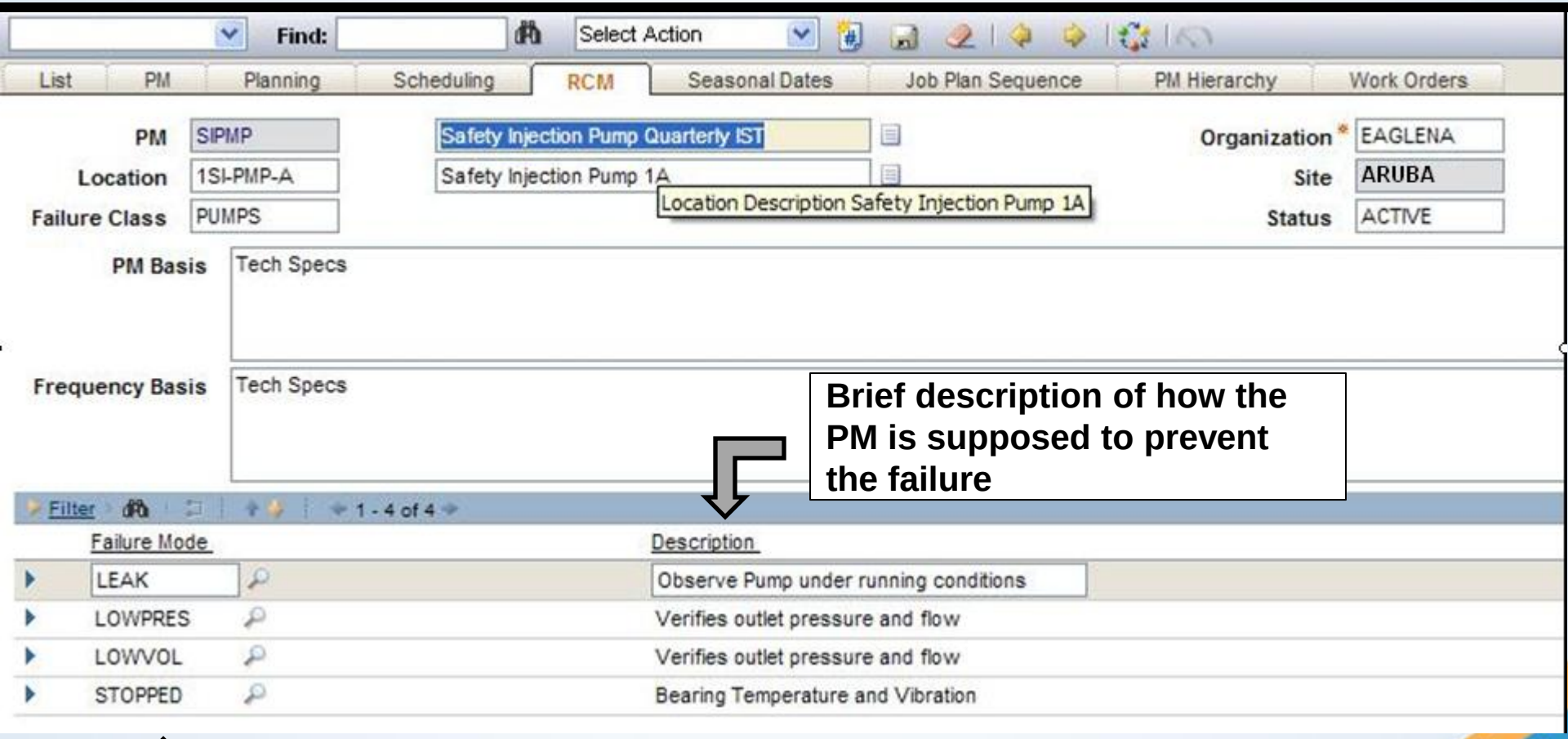
- - PM RCM tab - -



Brief description of how the PM is supposed to prevent the failure

Problem codes from Failure Code hierarchy

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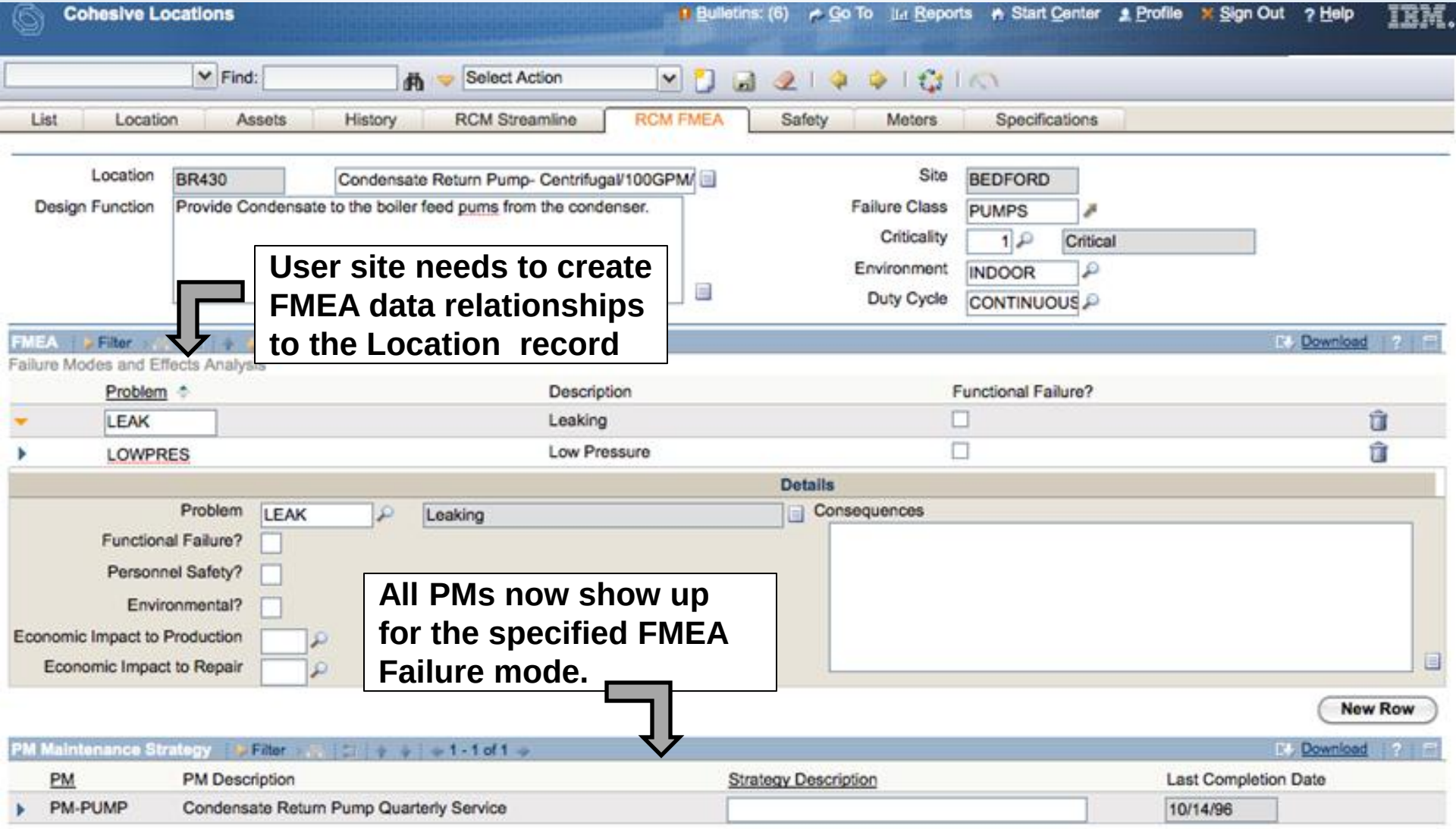
- - Locations RCM tab - -



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A Streamlined Approach

Design Considerations:

Failure Modes Effects Analysis

- Not all customers will want to do a detailed **FMEA** on each critical or important Location

Function	Failure mode	Effects	S (severity rating)	Cause(s)	O (occurrence rating)	Current controls	D (detection rating)	CRIT (critical characteristic	RPN (risk priority number)	Recommended actions	Responsibility and target completion date	Action taken
Fill tub	High level sensor never trips	Liquid spills on customer floor	8	level sensor failed level sensor disconnected	2	Fill timeout based on time to fill to low level sensor	5	N	80	Perform cost analysis of adding additional sensor halfway between low and high level sensors	Jane Doe 10-Oct-2010	

Determine all failure modes based on the functional requirements and their effects. Examples of failure modes are: Electrical short-circuiting, corrosion or deformation.

- But how do we capture meaningful data at an equipment type level as a starting point?

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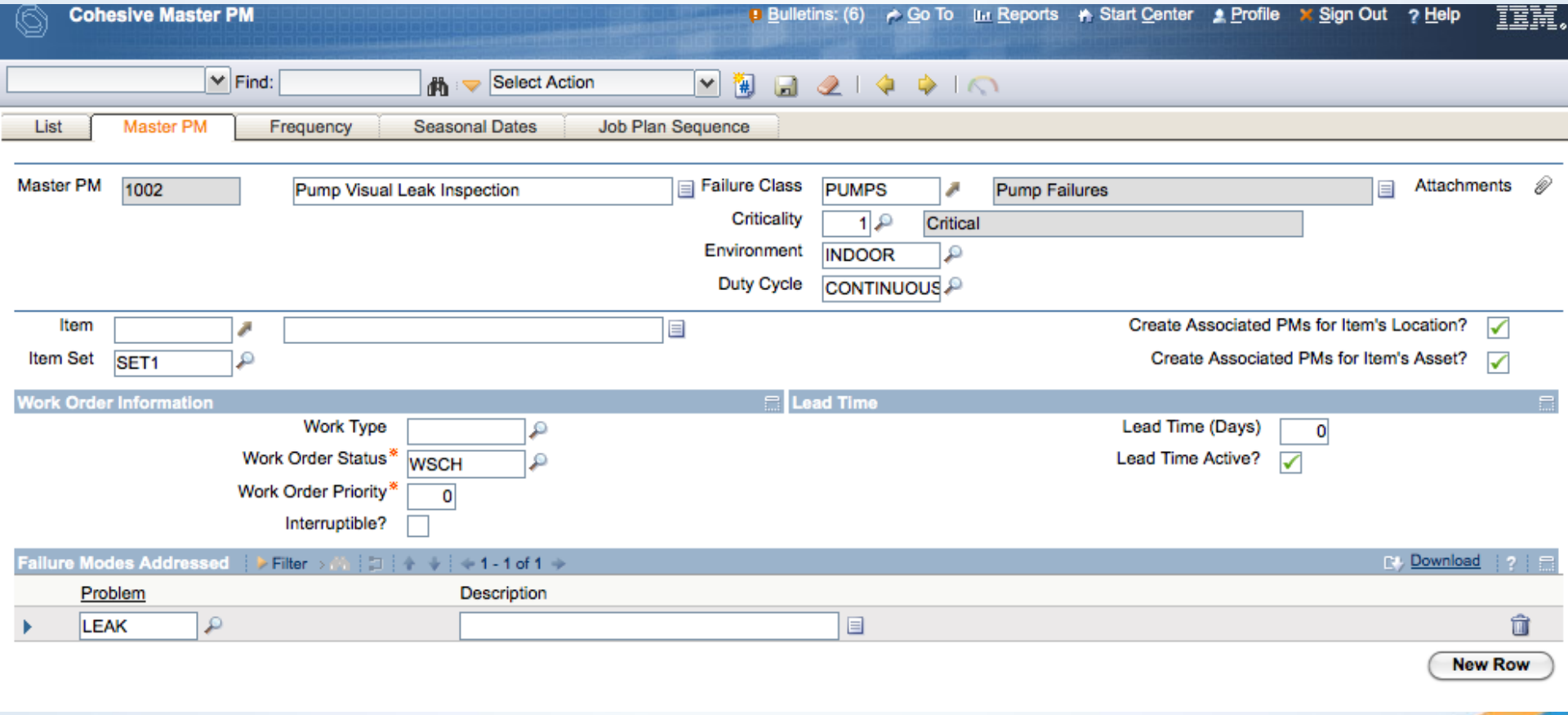
- - RCM version of Master PM's - -



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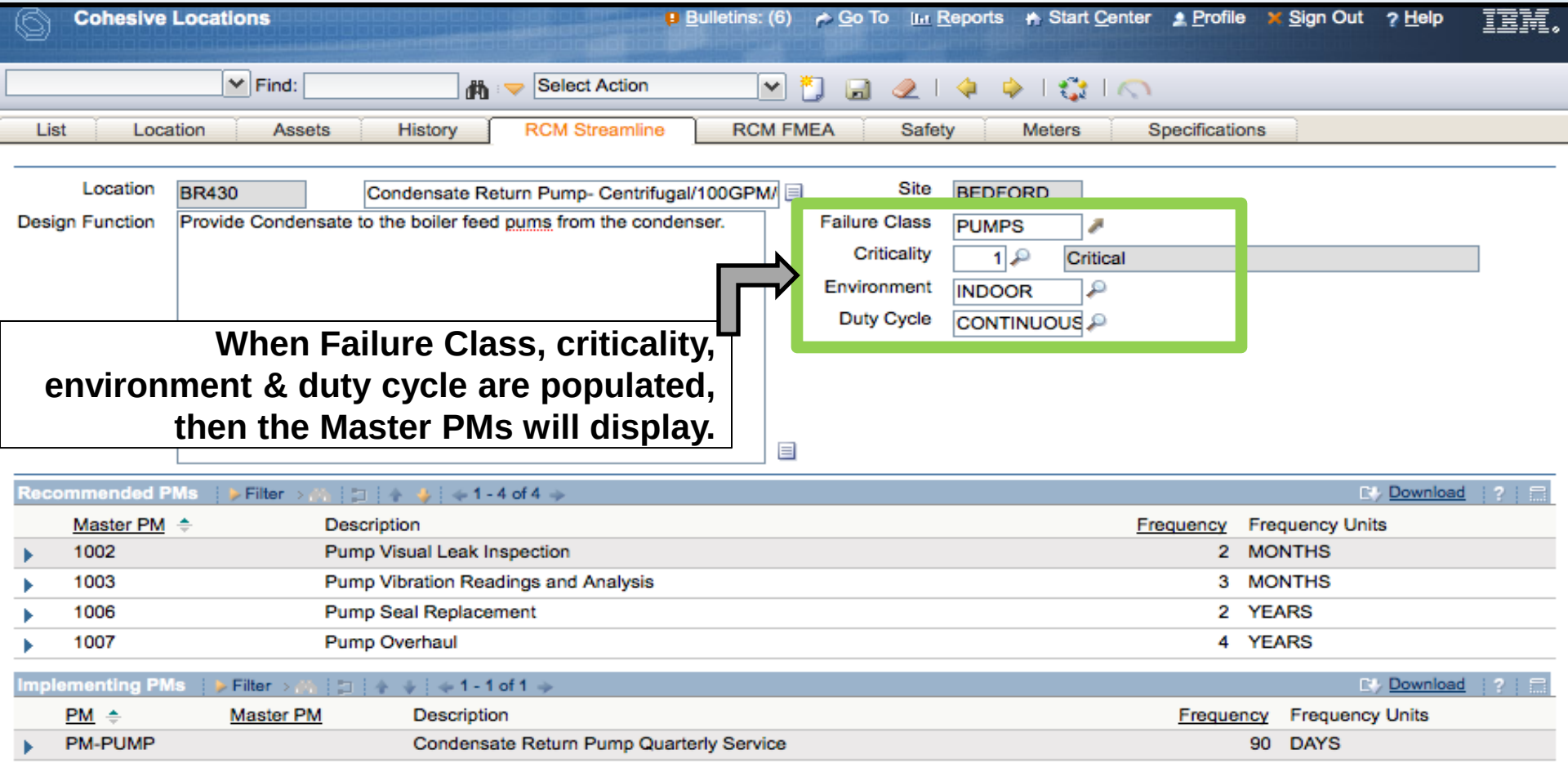
Cohesive RCM Extension

- - Locations Streamlined RCM tab - -



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Capture data to monitor and optimize the process

- Work order feedback: the goal is to capture the thoughts and wisdom of the maintenance personnel, plus create actionable data for review and analysis.
- It is also important for the people providing feedback to have buy-in to this process and see that their comments are actually being read – and processed.
- This work feedback process supports continuous improvement.

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- Work order feedback can be applied to corrective or preventive maintenance.
- Trades feedback examples:
  - PM: validation of correct **overall strategy**
  - PM: validation of correct **frequency**
  - CM/PM: asset (loc) condition **trending**
  - CM/PM: design issue concern/**suggestion**
  - CM/PM: **safety**/environmental issue
  - CM: **maintainabilit**y issue
  - CM: need new failure/problem **code value**
  - CM: need new **asset number**
  - CM: **tips** for reducing future **breakdowns**
- Trades feedback can also refer to planning accuracy
  - CM/PM: validation of correct **estimates**
  - CM/PM: validation of **task steps** for this strategy

Note: typical work order updates only include actual labor (and sometimes materials).

Routing of Feedback – Multiple Directions

Completed Work Order with Feedback

Chief Planner

Maintenance Manager

Engineering Manager

Operations Manager

Reliability Team

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Process is equally as important as the software

- Once comments are captured, then routing of information begins.
- Each plant/facility can setup routing unique to their organization e.g. escalations/notifications.
- Reliability team maintains list & assigns actions.

Create a Reliability Team and Punchlist of actions

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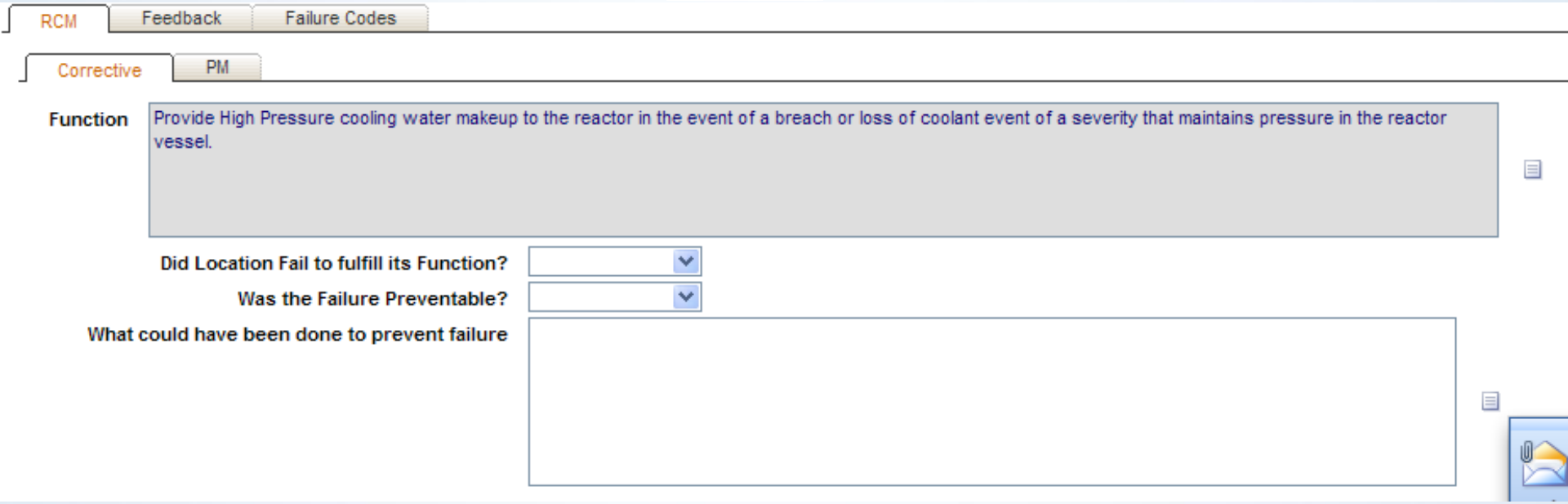
- - WO RCM tab for CM - -

CM



The best strategy for maintenance is to keep analyzing results and make periodic adjustments in light of the experience gained.

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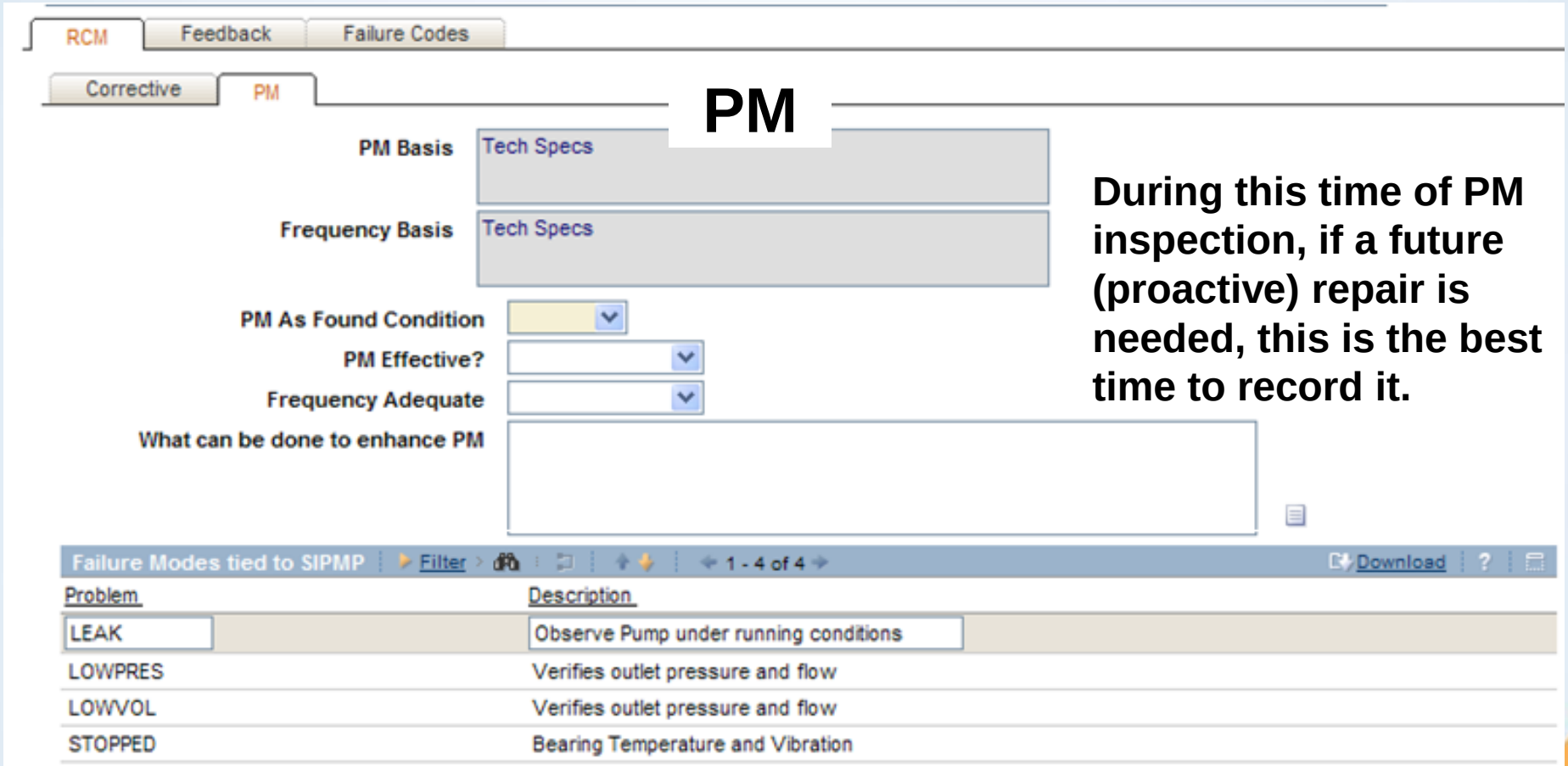
- - WO RCM tab for PM - -



During this time of PM inspection, if a future (proactive) repair is needed, this is the best time to record it.

The best strategy for maintenance is to keep analyzing results and make periodic adjustments in light of the experience gained.

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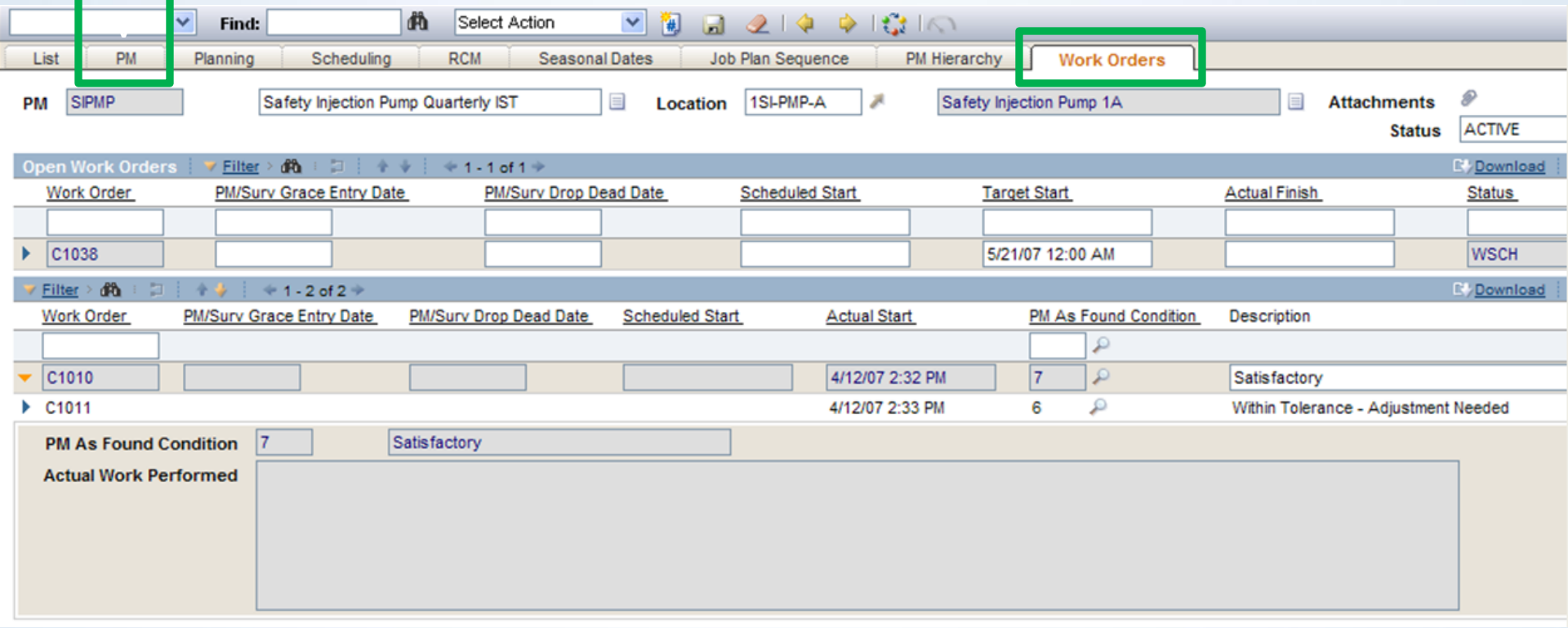
- - PM Work Orders tab - -



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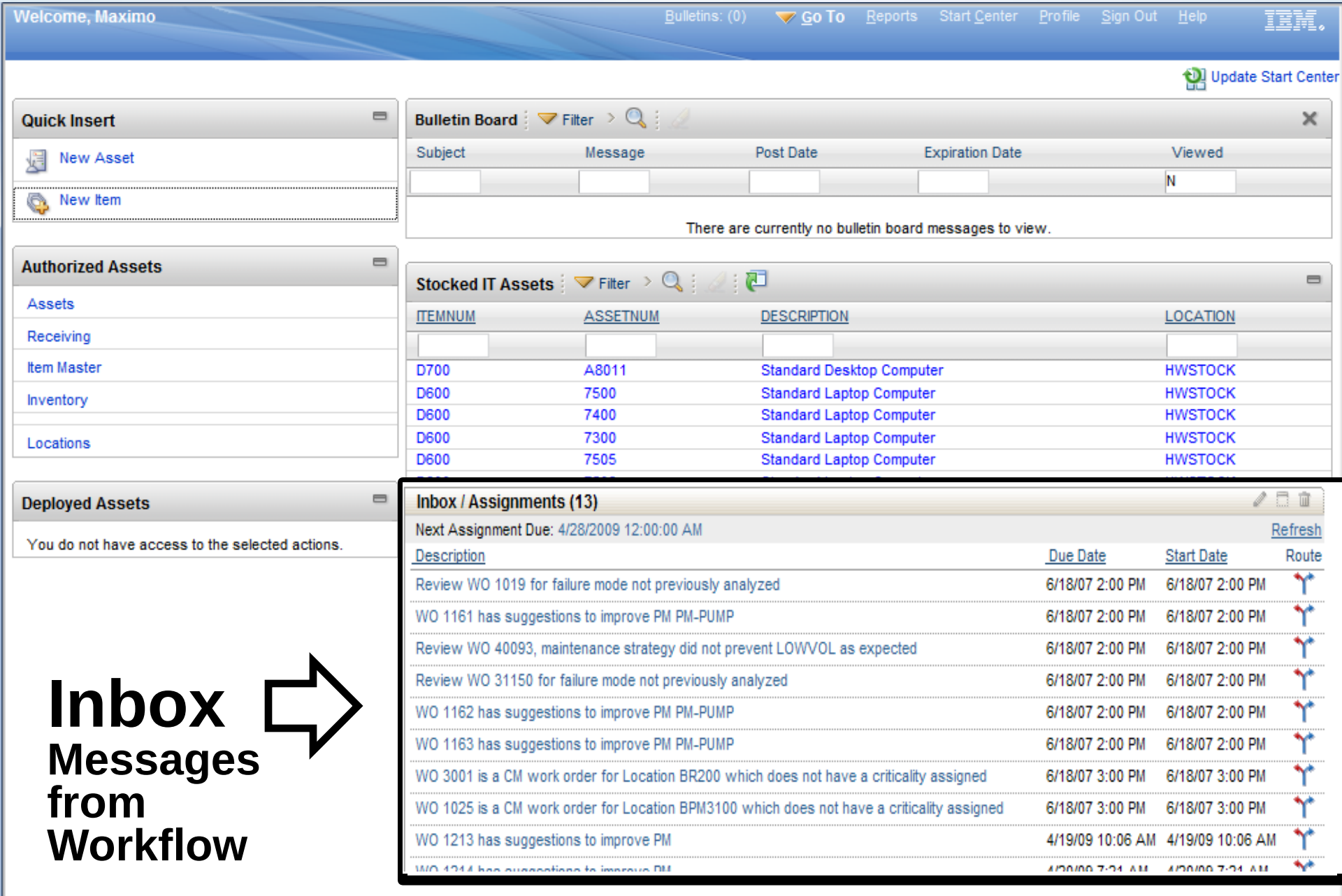
Using Maximo to Build/Optimize the Process

- **Escalations** along with **Workflow/Notifications** help automate the review process and leverage the data.
- This feedback can be used to help build missing foundation data and fill in the blanks.
- Escalations/Workflow can be used to act on and track responses to feedback.
- Escalations can also be used to mine the data for anomalies which need follow up and provide Notifications.

Maximo Start Center



Inbox

Messages from Workflow

Maximo Start Center

Inbox - examples

Inbox / Assignments (13)

Next Assignment Due: 4/28/2009 12:00:00 AM

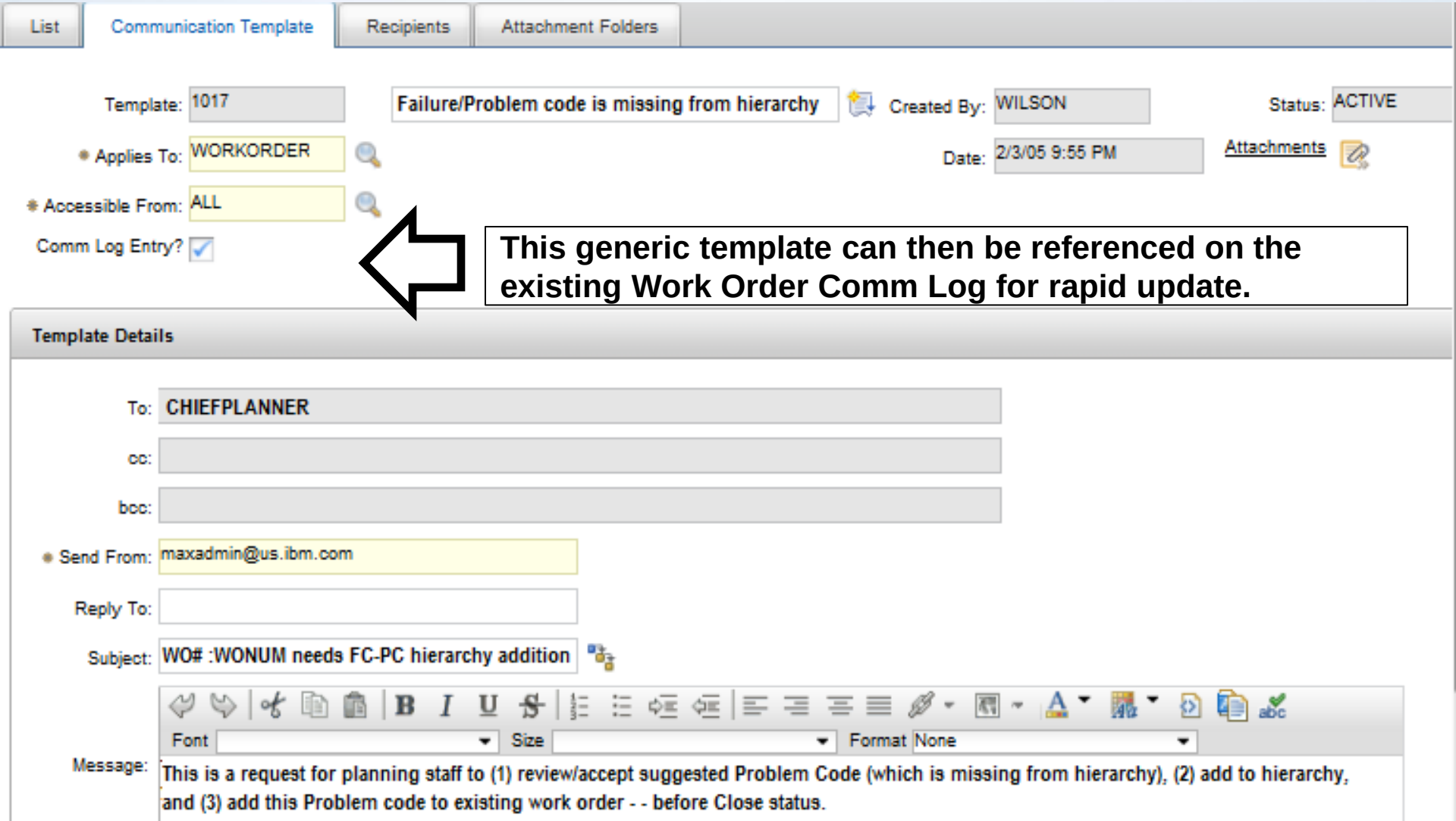
Refresh

Description	Due Date	Start Date	Route
Review WO 1019 for failure mode not previously analyzed	6/18/07 2:00 PM	6/18/07 2:00 PM	
WO 1161 has suggestions to improve PM PM-PUMP	6/18/07 2:00 PM	6/18/07 2:00 PM	
Review WO 40093, maintenance strategy did not prevent LOWVOL as expected	6/18/07 2:00 PM	6/18/07 2:00 PM	
Review WO 31150 for failure mode not previously analyzed	6/18/07 2:00 PM	6/18/07 2:00 PM	
WO 1162 has suggestions to improve PM PM-PUMP	6/18/07 2:00 PM	6/18/07 2:00 PM	
WO 1163 has suggestions to improve PM PM-PUMP	6/18/07 2:00 PM	6/18/07 2:00 PM	
WO 3001 is a CM work order for Location BR200 which does not have a criticality assigned	6/18/07 3:00 PM	6/18/07 3:00 PM	
WO 1025 is a CM work order for Location BPM3100 which does not have a criticality assigned	6/18/07 3:00 PM	6/18/07 3:00 PM	
WO 1213 has suggestions to improve PM	4/19/09 10:06 AM	4/19/09 10:06 AM	
WO 1214 has suggestions to improve PM	4/20/09 7:21 AM	4/20/09 7:21 AM	
WO 1215 has suggestions to improve PM ML-PUMP	4/20/09 6:01 PM	4/20/09 6:01 PM	
WO 1216 has suggestions to improve PM ML-PUMP	4/21/09 9:27 AM	4/21/09 9:27 AM	
WO 1218 has suggestions to improve PM ML-PUMP	4/28/09 11:27 AM	4/28/09 11:27 AM	

1 to 13 of 13

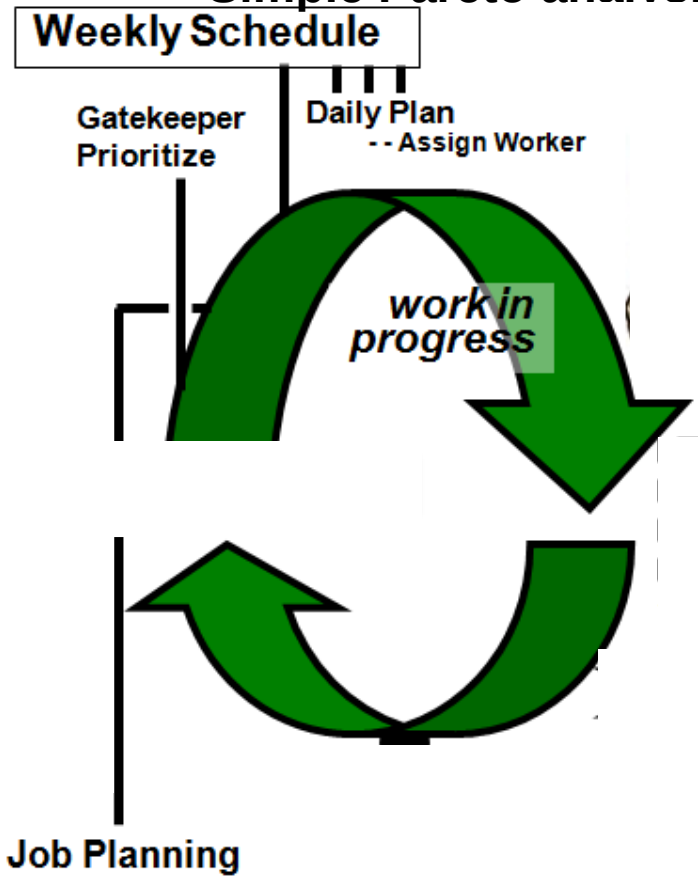
Maximo Communication Template

By setting up a pre-built communication template you can leverage this media to assist the working level in easy update to the system informing management that foundation data is missing.

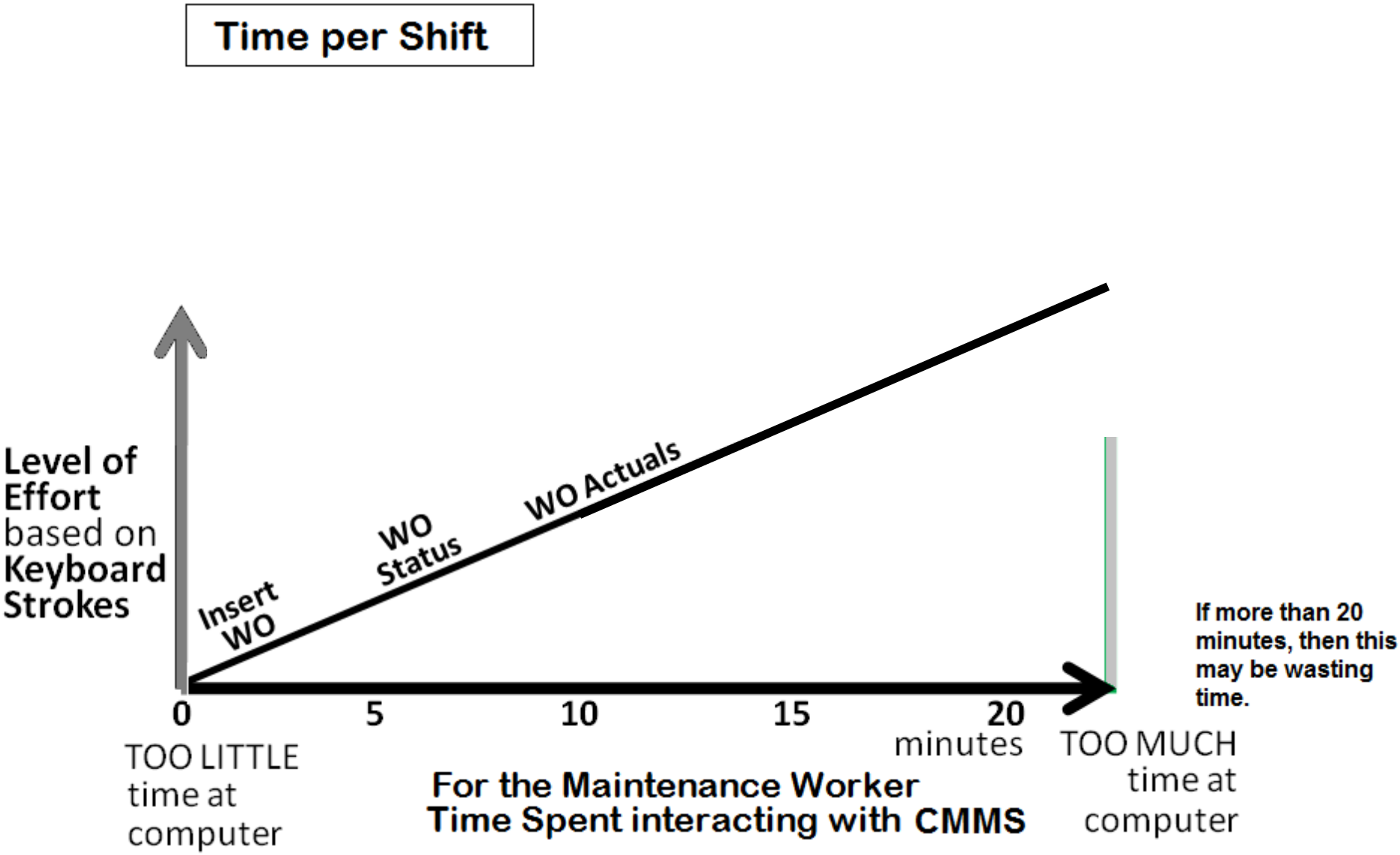


RCM-WO Feedback coupled with Failure Analysis provides the best results

Simple Pareto analysis can provide significant improvements



Additional time by trades adds substantial value



RCM Extension - in Summary

- Cohesive Solutions helps organizations improve **equipment reliability** through the use of technology, process and leading practices.
- The RCM Extension assists the Maintenance/Engineering staff by **storing** feedback, creating actionable data, setting up automated reviews.
- This analysis supports continuous improvement through enhanced PM/PdM strategies which in turn helps staff work on the right asset at the right time.

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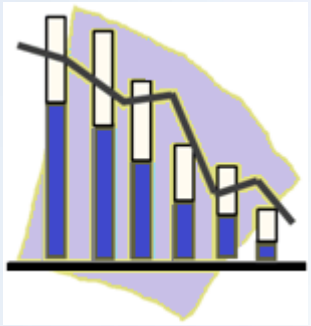
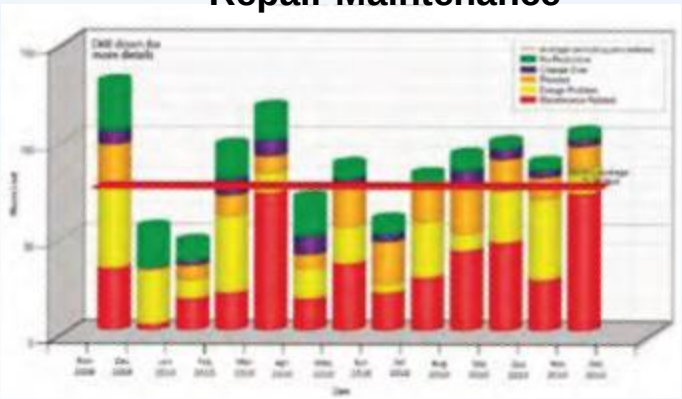
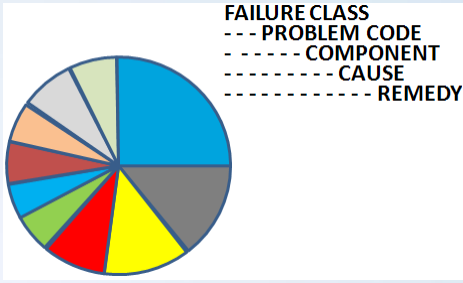
Proactive Reports

Asset/Location Condition Trending

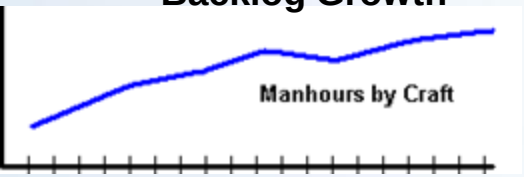


Cost by System relating to Repair Maintenance



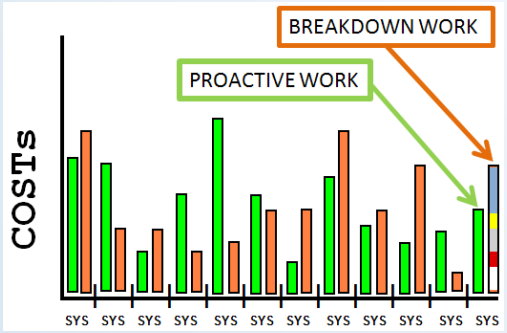


Backlog Growth

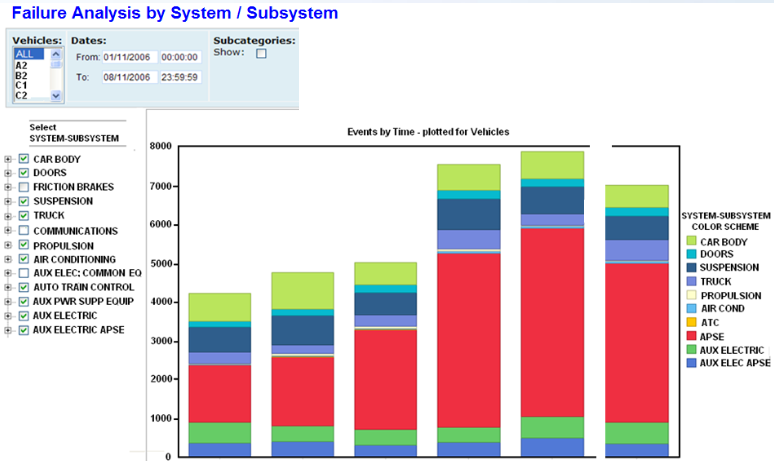


Missing Foundation Data

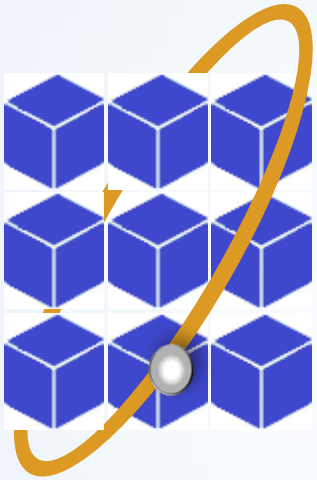
Safety / Environmental Issues over time



Planning Feedback



Your Input, Our Knowledge, Industry Best Practice



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For more information on the Cohesive RCM Extension for Maximo

http://www.cohesivesolutions.com/images/pdf/cis_workorderfeedback_09.pdf

or contact us directly at sales@cohesivesolutions.com

or 678-233-1280

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