ARRC TAM Phase 2

Business Process Reengineering

December 10, 2020

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1. Purpose

Implementing new software applications requires changes in business processes and workflow. Some impacts of these changes may include changes in responsibility, improved accountability, streamlined workflows, increased use of computing devices, and changes in the type or number of positions. This document identifies some of the roles and their challenges and opportunities as processes change when implementing more advanced asset management systems.

2. References

The EAM Functional Requirements Analysis produced during TAM Phase 1 laid the foundation for the requirements gathering in Phase 2 and can be consulted for additional context on current state, potential benefits, and recommendations.

Document	Date	TAM Phase	Produced By
EAM Functional Requirements Analysis	9/9/19	Phase 1	Kimley Horn and Intueor
TAM Phase 2 Requirements Matrix	10/29/20	Phase 2	CTG

3. Roles

A high-level assessment has been made of challenges and opportunities presented by the detailed requirements gathered during TAM Phase 2 for work roles. In some cases, a person may have more than one role.

3.1. Mechanic / Technician

The front-line Mechanic / Technician role performing "wrench work" is likely to need to spend more time recording and categorizing the work than in the past in order to collect asset and work management data accurately and consistently.   To an extent this may be balanced out by improvements in the accessibility of information which could reduce time spent in troubleshooting and repair. Mechanic / Technician role would also likely benefit if there was a continued shift from urgent break-fix to more scheduled corrective actions as a result of preventative maintenance and problem detection.

3.1.1. Challenges

The largest challenge for Mechanic / Technicians with implementation of asset management systems are requirements for recording additional data about the work.

As examples below are some of the requirements that may involve additional effort by Mechanic / Technician:

- Capture All Work on Work Orders
    - Ability to easily capture all work (inspection, condition assessment, work activity) on a work order to ensure that a record is made of the work and costs are captured consistently

- Task Coding on Work Orders

  - Ability to code tasks on work orders that may include system, subsystem, component, position, and activity (e.g. inspect, install, remove, repair, replace) for accurate information on maintenance activity and costs

- Mechanic/Technician Records Work

  - Mechanic/Technician records their work on the work order and has access to info they need through the system. Only person with direct knowledge of work is Mechanic/Technician and they should be able to record their work as it is done.

- Hours Worked on Work Order / Asset

  - Record time worked on a work order and integrate with time keeping. Preference is hours are recorded on work orders (direct and indirect time) that is carried over to the time card to simplify time entry and management.

3.1.2. Opportunities

Challenges may be balanced by opportunities presented by other requirements that are intended to provide more information at the point of maintenance or simplify existing processes:

- Ease of Use

  - Focus on ease of use for recording work yet need the ability to record meaningful information to be useful (e.g. Task Coding)

- Time Tracking

  - A straightforward method of recording time against work orders that flows to the time card system; avoid duplicate entry or manipulation of time records

- Central System of Record

  - Objective is a central source of information including asset and work activity; acknowledging that specialized systems may be used (and possibly linked or integrated) for configuration, status, and notifications

- Minor Work

  - Ability to quickly record minor work on a work order against an asset such as inspection and service (i.e. objective is to avoid using a standing or bucket work order that is not asset-specific for non-parts work less than 1 hour)

- Failure Analysis

  - Improved ability to analyze failures and their causes. Currently can only rely on what has been written on the work orders; and its necessary to look at each individual work order.

- Complaint / Cause / Correction (3C's)

  - Support the ability to record complaint, cause, and correction in a standardized way for more efficient failure analysis and identification of common issues, causes, and their resolution

- Work Packages

    o Ability to create pre-defined work order template with a standard set of tasks for a particular inspection, condition assessment, complaint, etc

- Document Management and Linking

    o Support a centralized approach to storing and accessing asset-related documents including drawings, schedules, manuals, pictures, etc. for both digital and paper documents

- Work Order Attachments

    o Automatically output, link, and/or display (if digital) procedures, checklists, and bills of materials needed for work order

- Checklists (Digital)

    o Ability to define digital (not paper) checklists for condition assessments, inspections, or regular work activities connected to a work orders.   Checklists save the results recorded by the user, are attached to work order, and may be available from asset.

- Mobile Digital Work Orders

    o Record data where and when the work occurs (create, update, and close) through mobile digital work orders that support an offline mode.

- Mobile Access to Documents

    o Ability to access digital documents outside of the office; if on mobile possibly allow offline mode by caching documents related to the assets

3.2. Planner / Scheduler

For those in a Planner / Scheduler role (even if it is not a separate position) there are some challenges in setting up and maintaining an asset management system based on the requirements but also significant opportunities to manage planning and scheduling which should especially help those where there is not a dedicated Planner / Scheduler.

3.2.1. Challenges

Although the Mechanic / Technician role, end-users, or the asset management system may initiate work orders there are aspects that the Planner / Scheduler would probably be involved in setting up and maintaining.   These include things that would make the Mechanic / Technician role easier such as Work Packages for standard jobs and PM Job Plans as well as the preventative maintenance schedules, out of service coding, and availability calculations are setup and maintained.

- Work Packages

    o Ability to create pre-defined work order template with a standard set of tasks for a particular inspection, condition assessment, complaint, etc.

- PM Job Plan
    - Ability to setup standard template for labor and parts for preventative maintenance routines to allow for forecasting of parts and labor needed
- Work Order Attachments
    - Automatically output, link, and/or display (if digital) procedures, checklists, and bills of materials needed for work order
- Out of Service Coding and Duration
    - Capture out of service codes and time duration (e.g delay impacting operations, or no impact - may include status such as waiting for parts, shop space, labor, etc.); intent is to support reliability analysis and reporting
- Availability Calculations
    - Show availability over time at asset and also at hierarchy (grouping of assets) levels. Differentiate between types of out of service (e.g. seasonal or intentionally stored)
- Availability - Seasonal Variations
    - Ability to indicate seasonal status (e.g. open /closed, not being used, etc.)
- PM Service Calculation
    - Ability to calculate PM service requirements on more than one aspect of asset usage (e.g. calendar time, hours, miles, fuel usage, etc.)

3.2.2. Opportunities

The opportunities for the Planner / Scheduler are in system automation in creating work orders and then planning, assigning, and scheduling work.

- Scheduling and Planning
    - Ability to plan and schedule work within the system rather than having to track outside of it (e.g. Excel)
- Prioritization of Work Orders
    - Ability to prioritize or rank work orders; a default prioritization may be based on criticality rating of asset
- Future and Unscheduled Work Orders
    - Support the ability to have unscheduled or future date work orders to record work and have it available for scheduling
- Work Order Notifications
    - Ability to configure notifications for new or outstanding work including PM, inspection, or work orders to designated users (e.g. on being created or assigned)

- Inspection Schedules

  - Support ability to schedule recurring inspections that will automatically create a work order

- PM Notification

  - Ability for notifications to be automatically sent to maintenance and assigned user group when a PM is due (or created by the system)

- Automated Compliance Tracking and Planning

  - Automated planning and compliance tracking of regulatory inspection requirements

- End-Users and Work Orders

  - Ability for end users (e.g. Operations) to initiate work requests through a complaint process and to see status and history of work orders

- Generate Work Orders from Inspection Results

  - Ability to generate work orders from inspection results (would typically be categorized as corrective actions)

- Group Work Orders by Geographic Area

  - Group work orders by geographic area so they do not need to be manually grouped for review and assignment

- Custom Categorize Work Orders

  - Ability to categorize work orders in a custom way such as by campaign, program, or season.   This may aid in grouping work as part of prioritization and scheduling.

- Assign Work Orders

  - Ability to assign work orders to technicians within the appropriate skillset pool and/or geographic location

- Reassign, Split, or Child Work Order

  - Ability to reassign, split off part of a work order, or create a child work order so that more than one group can record activity against a work order yet still maintain the link to the single event

- Digital Workflows for Review and Approval

  - Support digital workflows for review and approval for inspections (and where otherwise required) that is consistent with any regulatory workflow requirements

- Reporting Tools

  - Base requirement are tools that are better than an Excel export. There is a need for analytics for trending, analysis, failure, and investment planning. Analytics may be in a separate tool but the information to support it must be reportable. Currently Excel is the reporting tool - either data is manually entered or exported from JDE

- Estimated Effort on Work Orders

  o Ability to set an estimated labor or costs on work orders to aid in planning and scheduling or to provide estimates to end users

- Material Inventory Field Locations

  o Ability to easily add and remove materials in arbitrary field locations identified with GPS (either by device or selection from map). Material locations correlated to asset hierarchy for reporting (e.g. Mile Post)

- Inventory Purchase Plan

  o Purchase plan based on forecasted preventative and overhaul work (done manually now but should be able to forecast based on work packages / planned work orders in system)

3.3. Supervisor

The Supervisor role can keep the right front-line workers on the right tasks and ensure that day-to-day objectives are being met such as keeping assets available for end-users.

3.3.1. Challenges

A key challenge is ensuring that front-line roles have the skills and training to effectively use an asset management system and that maintenance data is being entered consistently.

- Mechanic/Technician Records Work

  o Mechanic/Technician records their work on the work order and has access to info they need through the system. Only person with direct knowledge of work is Mechanic/Technician and they should be able to record their work as it is done.

- Capture All Work on Work Orders

  o Ability to easily capture all work (inspection, condition assessment, work activity) on a work order to ensure that a record is made of the work and costs are captured consistently

3.3.2. Opportunities

Opportunities are in better supervisory and responding to break-fix in a more effective manner that can be aided by the information fin the system ; including end-users initiated work orders.

- Automated Compliance Tracking and Planning

  o Automated planning and compliance tracking of regulatory inspection requirements

- Availability Calculations

  o Show availability over time at asset and at hierarchy (grouping of assets) levels. Differentiate between types of out of service (e.g. seasonal or intentionally stored)

- Service Level Agreements (SLA) for Response Times

    o Support the ability to set SLAs for response time on asset groups or categories and to record performance against them

- End-Users and Work Orders

    o Ability for end users (e.g. Operations) to initiate work requests through a complaint process and to see status and history of work orders

- Reporting Tools

    o Base requirement are tools that are better than an Excel export. There is a need for analytics for trending, analysis, failure, and investment planning. Analytics may be in a separate tool but the information to support it must be reportable. Currently Excel is the reporting tool - either data is manually entered or exported to/from JDE

3.4. Manager

The Manager role is key to the effective setup and use of an asset management system in the long term by working in conjunction with the other roles to identify the objectives, right levels of detail, and work practices.

3.4.1. Challenges

The greatest challenge is configuration of asset management systems and processes to enable front-line roles to accurately record their work and have access to asset and work history without creating a burden and "working for the system" recording data that is not used for a particular purpose.

- Ease of Use

    o Focus on ease of use for recording work yet need the ability to record meaningful information to be useful (e.g. Task Coding)

- Capture All Work on Work Orders

    o Ability to easily capture all work (inspection, condition assessment, work activity) on a work order to ensure that a record is made of the work and costs are captured consistently

- Task Coding on Work Orders

    o Ability to code tasks on work orders that may include system, subsystem, component, position, and activity (e.g. inspect, install, remove, repair, replace) for accurate information on maintenance activity and costs

- Complaint / Cause / Correction (3C's)

    o Support the ability to record complaint, cause, and correction in a standardized way for more efficient failure analysis and identification of common issues, causes, and their resolution

- Asset Hierarchy

    o Model and enforce hierarchical relationships between assets; particulary parent-child

- Classes or Grouping of Assets

    o Organize and manage equipment as a class or group; useful for planned maintenance programs and reporting

- Components

    o Include components and sub-components, assemblies, systems and similar entities

3.4.2. Opportunities

Opportunities for the Manager role include additional tools to manage the team to meet their asset management objectives and plan for work and asset replacement in the longer term.

- Central System of Record

    o Objective is a central source of information including asset and work activity; acknowledging that specialized systems may be used (and possibly linked or integrated) for configuration, status, and notifications

- Reporting Tools

    o Base requirement are tools that are better than an Excel export. There is a need for analytics for trending, analysis, failure, and investment planning. Analytics may be in a separate tool but the information to support it must be reportable. Currently Excel is the reporting tool - either data is manually entered or exported from JDE

- Capital Projects Reporting

    o Improved reporting on capital projects including estimates for labor, P-Card purchases, etc. prior to posting in the finance system (perhaps estimated from Work Order entries)

- Asset Category / Class Composition over Time

    o Ability to show the composition of assets in an asset category / class over time by asset hierarchy or groupings as well as ownership (e.g. ARRC, leased, rented)

- Replacement Plan (ULB / Obsolescence)

    o For multi-year planning support replacement planning including age, useful life benchmark, obsolescence, costs, usage, and asset category composition (e.g. owned vs leased / rented)

3.5. Business Systems Analyst

A Business Systems Analyst is the bridge between the business and IT with the skills and abilities to administer the business configuration of the asset management system as business requirements are refined or changed.

Ideally, the Business Systems Analyst would be able to become expert across the application portfolio and serve across all business disciplines.

3.6. IT Administrator

Increasing the number of asset management applications adds complexity to user access management, upgrades, backups and disaster recovery, as well as identification of systems affected by their outage and return to service afterwards.

3.7. IT Integrator

Increasing the number of asset management applications can greatly complicate integration, as each will have its own database, data model, and application interface methodology.   An example is ensuring that basic master data such as financial cost codes and employee numbers and names are available and current in applications that use them.

3.8. IT Director

Implementing asset management requirements raises a number of areas for the IT Director and their team to develop strategies, policies, and product evaluation criteria.

Work on several of these has been accelerated due to COVID-19 to enable employees to work remotely.

3.8.1. Access at Point of Work

Whether it is a mechanic in the shop or a technician at the field the requirements point to recording work by the user performing it.   Many locations do not currently have wi-fi and this may be a limiting factor for mobile workforce.

Some requirements that call for greater system access at the point of work include:

- Mechanic / Technician Records Work
- End-User Field Service
- Mobile Digital Work Orders
- Mobile Access to Documents

3.8.2. Digital-First

The recurring theme through requirements gathering was a digital-first approach to asset management. If data is recorded digitally in an application the first time then it is available for application automation and workflows, analysis, and reporting.   This removes the need to create, print, distribute, and then likely scan into "digital paper" and file paper forms and documents that would later have to manually searched to find useful information.

Some requirements that call for a digital-first approach include:

- Mechanic / Technician Records Work
- Digital-First Inspections
- Checklists (Digital)
- End-User Field Service
- Reporting Tools

- Mobile Digital Work Orders

- Mobile Access to Documents

3.8.3. Digitize and Index Existing Paper Documents

An extension of the digital-first theme is being able to digitize and access existing paper documents remotely. This may present challenges in how existing documents may be digitized, in what formats, how they are indexed, where they are stored, and then how they may be accessed and viewed by users and asset management applications.

Some requirements that may call for additional digitalization include:

- Document Management and Linking

- Mobile Access to Documents

- Work Order Attachments

3.8.4. Information Hub

An "Information Hub" may have two key components that would simplify application integration and provide better information to users: a data warehouse and integration hub and a reporting and dashboard solution.

Data warehouse and integration tools enable a hub and spoke approach rather than a web of individual many-to-many integrations that can be difficult to expand or maintain in the long-term. If more than one application is used for asset management, they will each have the need for consuming and producing the same or similar information for financials, timekeeping, and quite possibly purchasing and inventory. This is in addition to requirements for keeping external systems in sync with ARRC asset management information and importing or linking to transactional data to systems outside the asset management applications.

Centralizing the data needed for application integration in a data warehouse can also make the information available for reporting as well. There is a balance between using built-in reporting tools in an asset management system and using a general-purpose reporting solution outside of it. The more data exists outside of the asset management system the more likely an external reporting solution will be needed to provide users with a single view.

Some of the requirements that call for additional application integration and reporting:

- Reporting Tools

- Integrate Financial System

- Capital Projects Reporting

- Total Cost of Ownership Reporting

- Replacement Plan (ULB / Obsolescence)

- Asset Data Integration

- Data from External Asset Management Systems

- Data from Diagnostic Systems

- Import External Transaction Data

4. Revision Log

Date	Version	Changed By	Change Description
12/10/20	Final	Sawyer	First Version
11/2/20	Draft	Sawyer	First draft
10/30/20	Draft	Sawyer	Second in-progress draft
10/15/20	Draft	Sawyer	Initial draft for comment
12/24/19	Draft	Sawyer	Initial document outline