ASSET MANAGEMENT is the business and decision-making process for the operation, maintenance, repair, rehabilitation and replacement or disposal of assets that allows managers to maximize the asset productivity and manage the related risks and costs.
Purpose

- Update Program and Progress of the LRD Asset Management for O&M Initiative
  - Status - Developing and Testing an AM Process for NAV and FRM Projects which Identifies and Quantifies Project Needs, Risks, and Impacts Status - Facility
  - Status - Condition Assessment Process and Execution

- Identify Future Program Direction
One Team: Relevant, Ready, Responsive, Reliable

**Background** – Provide a Consistent, Unbiased, Defendable AM Process to Prioritize Projects and Project Needs Based Upon...

- Greatest Need
- Greatest Risk
- Greatest Regional Impact ($)
- Sound Investment Decision (Repair/Replace/Dispose)
- Other Priorities
Background - Provide Management Tools to Evaluate System Health

- Graphically Tell our Story
- Overall System Health
- “Drill Down” Capability by Project in 1–3 Clicks
- Auto Update from Condition Assessment

**Project** – Lock and Dam 7, Allegheny River

**Condition** – Component: US gate machinery out of service – hyd...

**Risk** – Single lock out of service

**Impact** – Regional loss of $1

**Estimated Cost to Repair** – $500K
Background - Goals and Objectives

- Develop an Asset Management process that is unbiased, transportable, transparent and defendable.

- Measure and compare project needs, risks and impacts using the same process and the same relative scale for regional prioritization.

- Prioritize project budget packages on a regional basis considering needs, risks and impacts.

- Automate assessment process/analysis as much as possible.
Automation Objectives

- **Condition Assessment Laptop Tool**
  - Consistent data format and data entry
  - User friendly/field use friendly
  - Build on past assessment data and photos
  - Judgment consistency “-10” manual

- **Management and Analysis Tool**
  - Automated update from laptop field tool for real time analysis and display
  - Incorporates GIS graphics in presentations
  - “Low Tech” displays w/ “drill down” capability to tell our story
LRD Asset Management for O&M – Process Framework

**NEED**

- Facility Condition Assessment
  - Standard
    - Assessment Methodology
    - Assessment Team
    - Rating Scale
    - Cost Effective
- Reliability Centered Maintenance (Preventative)
  - FEM/Maximo
- Risk & Consequence Assessment
  - Risks Categories
    - Mission
    - Safety
    - Security
    - Regulatory
    - Consequences
      - Unscheduled
      - Closures
      - Loss of Service
      - Property Damage/Loss
      - Other

**RISK**

**ECONOMIC IMPACT**

- Regional Economic Considerations (Impacts)
  - Unscheduled Loss of Service = $ Impacts or $ Benefit Loss

**DECISION**

- Prioritization
  - Need
  - Risk
  - Impact

Programming and Budgeting Process FY10
Component Based Condition Assessments

- Project **condition assessments** begin at major component level

- Components are grouped as part of a **standard equipment hierarchy** for common roll up

- Component **needs** are based upon **Condition and PM**.
  - Condition assessment is an educated judgment based upon documented or observed conditions. (5 level scale)
  - Condition levels are down graded when major component PM is past due.
Component Identification

Component - specifically identified if ......

- Consequences of component failure will directly affect Mission, Safety, Security, Compliance

- Cost to maintain or repair component requires separate O&M budget package and can not be addressed under normal annual routine/recurring maintenance budget (Level 2)
**Condition Rating Scale**

<table>
<thead>
<tr>
<th>Condition Classification</th>
<th>Definitions</th>
</tr>
</thead>
</table>
| **A** Adequate           | - There is a high level of confidence that the feature will perform well under the designed operating conditions. This confidence level is supported by data, studies or observed project characteristics which are judged to meet current engineering or industry standards.  
- There is a limited probability that the verified degraded conditions will cause an inefficient operation, or degradation or loss of service. |
| **B** Probably Adequate  | - There is a low level of confidence that the feature will perform well under designed operating conditions, and may not specifically meet engineering or industry standards. The feature may require additional investigation or studies to confirm adequacy. The feature may require additional investigation or studies to confirm adequacy. The feature may require additional investigation or studies to confirm adequacy.  
- There is a low probability that the verified degraded conditions will result in inefficient operation, or degradation or loss of service. |
| **C** Probably Inadequate| - There is a low level of confidence that the feature will not perform well under designed operating conditions, and may not specifically meet engineering or industry standards. The feature may require additional investigation or studies to confirm adequacy. The feature does not meet current engineering or industry standards.  
- There is a moderate probability that the verified degraded conditions will result in inefficient operation, or degradation or loss of service. |
| **D** Inadequate         | - There is a high level of confidence that the feature will not perform well under designed operating conditions. Physical signs of distress and deterioration are present. Analysis indicates that factors of safety are near limit state. The feature deficiencies are serious enough that the feature no longer performs at a satisfactory level of performance or service.  
- There is a low probability that the verified degraded conditions will result in inefficient operation, or degradation or loss of service. |
| **F** Failed             | - The feature has FAILED  
- Historically the feature regularly experiences scheduled or unscheduled closures or loss of service for repairs. |

- Historically the feature regularly experiences scheduled or unscheduled closures or loss of service for repairs.
Standard Equipment Hierarchy (systems) for NAV/FRM Projects

Projects by HUC Code

- Dam
  - Structure
  - Gates & Operating Machinery
- Overall Project Support
  - Utilities, Distribution & Controls
  - Maintenance & Emergency Closure System
  - Misc. Support Components
- Lock Chamber (Primary & Auxiliary)
  - Structures
  - Gates & Operating Machinery
  - Filling & Emptying System
Component Date Base Requirements

- Component Risk Category Application-weighted consequence of component failure wrt:
  - Mission
  - Safety
  - Security
  - Compliance
  - Catastrophic Failure(?)

- Components dependency on other components

- Components redundancy with other components
Automated Tools - Risk Consequences
Categories & Levels Set by FCAT

◆ **Mission**
  - High – Unscheduled Loss of Service (only level to have impact $)
  - Medium – Unscheduled Reduction in Service
  - Low – Deficiency Should Not Degrade Service Level or Efficiency

◆ **Safety**
  - High – Could Cause Loss of Life or Property
  - Medium – Could Increase Employee Exposure or Cause Personal Injury
  - Low – Unsafe Condition Exists but Can be Controlled by Management Action which may Result in Inefficient Operation

◆ **Compliance**
  - High – Violates Statute
  - Medium – Violates Regulation
  - Low – Violates Policy

◆ **Security**
  - High – Deficiency will Compromise Mission Essential and Vulnerable Areas (MEVA) Could Affect Mission
  - Medium – Deficiency has Limited Affect on MEVA
  - Low – Deficiency Does Not Affect MEVA
Prioritization Metrics

- **Need** - Condition & PM Assessments
  - Based upon ability to “perform”
  - Probability of component failure which results in loss of service

- **Risk** – Probability of Consequence
  - Components assigned consequence type and level (based component failure)

- **Impacts**
  - Benefit or Dis-benefit Costs
  - Based only on loss of service (Daily for NAV, Annual for FRM)
  - Population at Risk for FRM

Relative Condition/Risk Indicator (Value)

Dollars & People
## Automated Condition Reporting Process

- Standard Equipment Hierarchy
- Flexible at Component Level
- Mission Critical Indicator
- Condition Rating
- Comments (Standard/Unique)
- Risk Category Indicators
- Automated Version to Include Additional Information, Help Features, Logic and Auto Rollup
- Photographs

### Project: Markland L&D

<table>
<thead>
<tr>
<th>MCC (Y/N)</th>
<th>Condition Rating (5 Levels)</th>
<th>Risk Category (5 Categories)</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A, B, C, D, F</td>
<td>SF, SC, M, ST, CF</td>
<td></td>
</tr>
</tbody>
</table>

**Miter Gate & Operating Machinery Conditions**

<table>
<thead>
<tr>
<th>Condition Assessment</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Lock - US Gates</td>
<td>Primary gates have reached their fatigue life and should be replaced per the major rehab study performed by the Louisville District.</td>
</tr>
<tr>
<td>Primary Lock - DS Gates</td>
<td>Auxiliary gates are near the end of their fatigue life and should be replaced per the major rehab performed by the Louisville District.</td>
</tr>
</tbody>
</table>

**Miter Gate Structures, Seals and Contact Blocks**

<table>
<thead>
<tr>
<th>Condition Assessment</th>
<th>Observations</th>
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</thead>
<tbody>
<tr>
<td>Primary Lock - US Gates</td>
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<td>Primary Lock - DS Gates</td>
<td>Auxiliary gates are near the end of their fatigue life and should be replaced per the major rehab performed by the Louisville District.</td>
</tr>
</tbody>
</table>

**Miter Gate Anchorage, Pinion and Miter Device**

<table>
<thead>
<tr>
<th>Condition Assessment</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Lock - US Gates</td>
<td>Strut arms need replacement when miter gates are replaced.</td>
</tr>
<tr>
<td>Primary Lock - DS Gates</td>
<td>Auxiliary gates are near the end of their fatigue life and should be replaced per the major rehab performed by the Louisville District.</td>
</tr>
</tbody>
</table>

**Miter Gate Operating Equipment**

<table>
<thead>
<tr>
<th>Condition Assessment</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Lock - US Gates</td>
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</tr>
<tr>
<td>Primary Lock - DS Gates</td>
<td>Auxiliary gates are near the end of their fatigue life and should be replaced per the major rehab performed by the Louisville District.</td>
</tr>
</tbody>
</table>

**Miter Gate Controls and Position Indicators**

<table>
<thead>
<tr>
<th>Condition Assessment</th>
<th>Observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Lock - US Gates</td>
<td>Strut arms need replacement when miter gates are replaced.</td>
</tr>
<tr>
<td>Primary Lock - DS Gates</td>
<td>Auxiliary gates are near the end of their fatigue life and should be replaced per the major rehab performed by the Louisville District.</td>
</tr>
</tbody>
</table>
## Automated Assessment Tool

The Automated Assessment Tool is designed for evaluating flood damage reduction projects. It allows evaluators to assess various components, such as control shelters, maintenance buildings, and dam structures, based on predefined and custom comments. This tool facilitates the evaluation process by providing a structured way to document and assess the condition of each component.

### Project Selection

- **District**: LRP-Pittsburgh

### Component Evaluation

<table>
<thead>
<tr>
<th>Component</th>
<th>Mission Critical</th>
<th>Rating</th>
<th>View DASH-10</th>
<th>Help</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Shelters</td>
<td></td>
<td>ADEQUATE</td>
<td>View Help</td>
<td></td>
</tr>
<tr>
<td>Maintenance Building</td>
<td></td>
<td></td>
<td>View Help</td>
<td></td>
</tr>
<tr>
<td>Land Wall Operations Building</td>
<td></td>
<td></td>
<td>View Help</td>
<td></td>
</tr>
<tr>
<td>Middle Wall Lock Building</td>
<td></td>
<td></td>
<td>View Help</td>
<td></td>
</tr>
<tr>
<td>River Wall Lock Building</td>
<td></td>
<td></td>
<td>View Help</td>
<td></td>
</tr>
<tr>
<td>Admin Building</td>
<td></td>
<td></td>
<td>View Help</td>
<td></td>
</tr>
<tr>
<td>Davis Building</td>
<td></td>
<td></td>
<td>View Help</td>
<td></td>
</tr>
<tr>
<td>Miscellaneous</td>
<td></td>
<td></td>
<td>View Help</td>
<td></td>
</tr>
</tbody>
</table>

### Predefined Comments

Predefined comments can be selected here. These are populated from the DASH-10 document.

### Custom Comments

Custom comments can be entered by the evaluator here.

### Images

- View All Images
- Add Image

**Laptop Screen Under Development and Revision**
Automated Management Tool
- GIS Presentation

US Army Corps of Engineers
Project Details

**District:** LRL - Louisville

**Division:** Great Lakes and Ohio River Division

**Waterway:** Ohio

**Project:** Markland Lock Dam

### Project Risk

<table>
<thead>
<tr>
<th>Risk Type</th>
<th>Impact Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mission Critical</td>
<td>1.35</td>
</tr>
<tr>
<td>Safety Risk</td>
<td>1.11</td>
</tr>
<tr>
<td>Security Risk</td>
<td>0.45</td>
</tr>
<tr>
<td>Compliance Risk</td>
<td>0.94</td>
</tr>
</tbody>
</table>

**Failure Impact Cost:** $0.0
### Automated Management Tool - Analysis Presentation

**Mission Critical Risk:** 1.35

**Safety Risk:** 1.11

<table>
<thead>
<tr>
<th>System</th>
<th>Mission Criticality Average</th>
<th>Safety Criticality Average</th>
<th>Security Criticality Average</th>
<th>Compliance Criticality Average</th>
<th>Show System Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lock and Dam Maintenance</td>
<td>3.95</td>
<td>4.38</td>
<td>0.00</td>
<td>0.00</td>
<td>✓</td>
</tr>
<tr>
<td>Utilities, Distribution and Control Systems</td>
<td>3.50</td>
<td>2.50</td>
<td>2.50</td>
<td>3.25</td>
<td>✓</td>
</tr>
<tr>
<td>Miter Gate &amp; Operating Mechanisms</td>
<td>3.37</td>
<td>3.25</td>
<td>0.00</td>
<td>0.00</td>
<td>✓</td>
</tr>
<tr>
<td>Lock Structures Conditions</td>
<td>3.00</td>
<td>1.50</td>
<td>1.50</td>
<td>1.50</td>
<td>✓</td>
</tr>
<tr>
<td>Filling/Emptying System</td>
<td>2.76</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>✓</td>
</tr>
<tr>
<td>Dam Gates &amp; Operating Mechanisms</td>
<td>2.53</td>
<td>2.50</td>
<td>0.00</td>
<td>0.00</td>
<td>✓</td>
</tr>
<tr>
<td>Dam Structures Conditions (Fixtures)</td>
<td>2.50</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>✓</td>
</tr>
<tr>
<td>Miscellaneous Support Systems</td>
<td>2.33</td>
<td>2.23</td>
<td>2.00</td>
<td>2.00</td>
<td>✓</td>
</tr>
</tbody>
</table>

**District:** LRL - Louisville

**Waterway:** Ohio

**Division:** Great Lakes and Ohio River Division

**Project:** Markland Lock Dam
## Project Details
- **District:** LRL - Louisville
- **Division:** Great Lakes and Ohio River Division
- **Project:** Markland Lock & Dam

## Project Risk System Risk

<table>
<thead>
<tr>
<th>Component</th>
<th>Mission Criticality</th>
<th>Safety Criticality</th>
<th>Security Criticality</th>
<th>Compliance Criticality</th>
<th>Show System Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulkhead</td>
<td>4.50</td>
<td>4.50</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Gate Structures: Primary Lock - US Gates</td>
<td>4.50</td>
<td>4.50</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Gate Structures: Primary Lock - DS Gates</td>
<td>4.50</td>
<td>4.50</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Power Cabling Load Side of Switchgear</td>
<td>4.50</td>
<td>3.50</td>
<td>2.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bulkheads</td>
<td>4.00</td>
<td>4.00</td>
<td>2.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bulkhead Crane</td>
<td>3.50</td>
<td>4.50</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Cross-overs in Lock Chamber: Primary Lock</td>
<td>3.50</td>
<td>2.50</td>
<td>0.00</td>
<td>0.00</td>
<td></td>
</tr>
<tr>
<td>Gate Anchorage: Primary Lock - DS Gates</td>
<td>3.50</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gate Anchorage: Primary Lock - US Gates</td>
<td>3.50</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Project Risk Mission Critical Risk
- **Mission Critical Risk:** 1.35

## Automated Management Tool - Analysis Presentation
## Top Dozen

### Roll-Up by Risks and Impacts

<table>
<thead>
<tr>
<th>Navigation Project</th>
<th>Risk Summary</th>
<th>Components at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>McAlpine</td>
<td>O: Red</td>
<td>Dam &amp; Miter Gates</td>
</tr>
<tr>
<td>L/D 53</td>
<td>M: Yellow</td>
<td>Lock Walls (Missing Section), Miter Gate, Valves</td>
</tr>
<tr>
<td>L/D 52</td>
<td>S: Green</td>
<td>Bear Traps, Miter Gates, Lock Walls, Access</td>
</tr>
<tr>
<td>Greenup</td>
<td>SC: Orange</td>
<td>Miter Gates, Dam/Lock Bulkheads, Crane</td>
</tr>
<tr>
<td>Markland</td>
<td>C: Green</td>
<td>Miter Gates, Valves, Bulkhead Crane</td>
</tr>
<tr>
<td>Smithland</td>
<td>O</td>
<td>Dam Gates &amp; Connections, Sill Damage</td>
</tr>
<tr>
<td>Emsworth</td>
<td>M</td>
<td>Dam Gates, Bulkheads &amp; Structure</td>
</tr>
<tr>
<td>Soo</td>
<td>S</td>
<td>Poe Lock Gates, Mac Lock Machinery &amp; Maint. Bulkheads</td>
</tr>
<tr>
<td>Winfield</td>
<td>SC</td>
<td>Lock Wall Deterioration, Dam Gate Cables/Chains</td>
</tr>
<tr>
<td>Montgomery</td>
<td>C</td>
<td>Dam Gates, Valve Machinery, Bulkhead Lifting Beam</td>
</tr>
<tr>
<td>Dashields</td>
<td>O</td>
<td>Lock Wall Movement</td>
</tr>
<tr>
<td>J.T. Meyers</td>
<td>M</td>
<td>Stilling Basins, Dam Gate Cables/Conn, Switch Gear</td>
</tr>
</tbody>
</table>

*(Prioritized by Impact Costs then Overall Condition/Risk Indicators)*
Status of Condition Assessments

- Navigation Projects: Baseline Condition Assessments
  - 60 Projects Assessments Completed
  - Data entered into software
  - Initial prioritization output looks promising

- Flood Risk Management Projects: Baseline Condition Assessments
  - Aug-Sep 07 complete baseline condition assessments for FRM, 21 projects
  - Oct – Dec 07 complete remaining 36 projects and load all field data into laptop tool
# Program Progress Summary

<table>
<thead>
<tr>
<th>Task Description</th>
<th>NAV</th>
<th>FRM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facility Condition Assessment Process – Beta Test</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Target Completion</td>
<td>30 Jan 07</td>
<td>1 Mar 07</td>
</tr>
<tr>
<td>Execute Condition Assessments – 60 Navigation Sites and 83 FRM Sites</td>
<td>100%</td>
<td>37%</td>
</tr>
<tr>
<td>Target Completion</td>
<td>11 May 07</td>
<td>30 Nov 07</td>
</tr>
<tr>
<td>Assessment Report Reviewed and Analyzed for Rollup (Condition Based)</td>
<td>100%</td>
<td>6%</td>
</tr>
<tr>
<td>Target Completion</td>
<td>18 May 07</td>
<td>30 Dec 07</td>
</tr>
<tr>
<td>Complete Development of Automated Data Input tool for Condition and PM</td>
<td>70%</td>
<td>40%</td>
</tr>
<tr>
<td>Target Completion</td>
<td>30 Sep 07</td>
<td>30 Oct 07</td>
</tr>
<tr>
<td>Complete Development of Automated Management Tools</td>
<td>70%</td>
<td>20%</td>
</tr>
<tr>
<td>Target Completion</td>
<td>30 Nov 07</td>
<td>30 Dec 07</td>
</tr>
<tr>
<td>FEM/Maximo Data Input for PM</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>Target Completion</td>
<td>30 Sep 07</td>
<td>30 Sep 07</td>
</tr>
</tbody>
</table>
Complete baseline condition assessments for FRM, 36 projects

Test, Refine, Further Develop
- Laptop Assessment Tool
- Risk and Impact Data Base for FRM and NAV
- Rollup Analysis for FRM

Implement FEM/Maximo Data Input for Major PM - Sep 07

Incorporate PM data extraction from FEM into analysis process

Formally define connection with PRA and PI Programs

Incorporate latest “Value” data requirement into analysis (What is the Value of Risk are We Buying Down?)
Direction for FY/CY08

- Structure and staff AM to meet demands - “....provide a permanent capability in LRP for AM”....M. White

- Automation Needs
  - Move from single computer to central server concept
  - Move from central server concept to Web based system

- Analyze, Summarize and Report – Dec 07

- Internal Technical Review

- Compare output of system to FY08-09 Budget Submittals

- Apply process FY10 Budget – Jan 08

- Customize individual project component data bases (failure consequences, impacts dependencies, redundancies)
Questions?