USACE Asset Management Update & the FY15 O&M Budget

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US Army Corps of Engineers
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Agenda

- Outputs of Maintenance Management Improvement Plan(MMIP) pilots
- Asset Management products and processes to influence the FY15 O&M budget development
- Future state of USACE budget development and execution

Vision

1. Accurate, credible estimates of all maintenance needs by asset as the basis for developing O&M budget work packages and asset lifecycle plans

2. Transparent, repeatable risk-informed analysis to prioritize O&M budget work packages and optimize the USACE budget in terms of Value to the Nation and overall Risk Reduction

3. A means of tracking completed and deferred maintenance by asset, and the resulting impacts on condition and risk exposure

4. Feedback from maintenance accomplished/deferred to inform asset lifecycle planning and future budget cycles

Products/Processes to Achieve Vision

1. **USACE Maintenance Management Strategy:** implemented via Maintenance Management Improvement Plan

2. **Budget Analysis:** Asset Management Portfolio Analytics (AMPA), Integrated Budget Evaluation Tool (iBET), Operational Condition Assessments/Operational Risk Assessments (OCA/ORA), Residual Risk evaluations

3. **Budget Execution Tracking:** Work Packages linked to FEM Work Orders

4. **Budget Feedback:** Completed Work Orders with condition/risk impacts tied to future budget work packages

1. Maintenance Management

- Completed 9 Maintenance Management Improvement Plan (MMIP) pilots
- Focused on Critical Assets/Components (defined by OCAs)
- Tested draft MM definitions and Levels of Performance
- Developed draft Project Maintenance Management Plans (PMMPs) for each pilot location
- Next Steps:
  - Complete draft MMIP pilot report in Feb-Mar 2013
  - Use pilot outputs to revise draft MMIP for implementation
  - ✓ Incorporate Dam Safety maintenance considerations via Bluestone Dam MMIP effort

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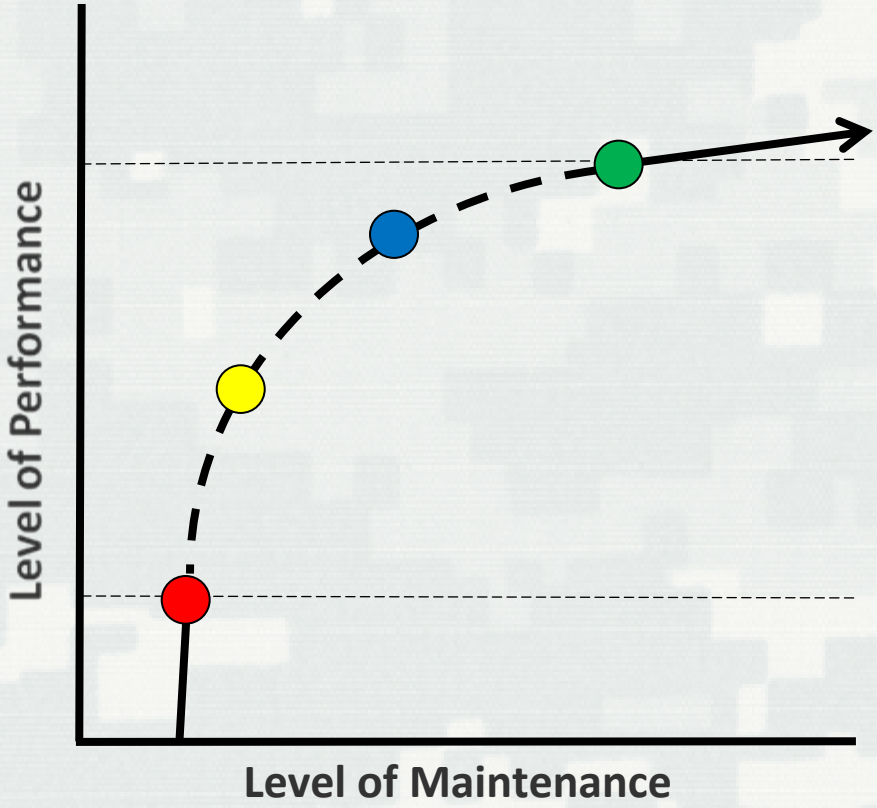
MMIP Pilots - Levels of Performance

Business Lines
Identify Levels of Performance



Compliance	Safety, Legal, Environmental, etc.
Marginally Functional	Baseline reliability and availability to meet mission
Fully Functional	Optimal reliability and availability to meet mission
Optimizing Total Cost of Ownership	Maximum performance and like-new condition

Available Resources
Maintenance Investment required for each Level of Performance

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MMIP Pilots - PMMP Development Example

CHIEF JOSEPH POWERHOUSE

Chief Joseph Equipment and ,Checklists Sorted by System Equipment Type	Total Quantity of Each Equipment Type	Annualized Labor-Hrs for Each Type of Equipment	Labor-Hrs by Maintenance Frequencies for Total Quantities of Equipment: W	M	Q	S	A	Total Annualized Labor-hrs for Each Equip. Type
SAFETY/SECURITY								
Heat and Vent System	5	11.050	49.430	[illegible]	[illegible]	[illegible]	[illegible]	104.680
Indication and Annunciation	2	2.138	19.772	[illegible]	[illegible]	[illegible]	[illegible]	42.454
Fire Pumps	3	2.060	29.658	[illegible]	[illegible]	[illegible]	[illegible]	44.022
Piping and Valves	312	4.336				[illegible]	36.472	63.336
BMS	1	2.336		[illegible]	[illegible]	[illegible]	[illegible]	11.341
Proximity Card System	1	1.336			0.312	[illegible]	[illegible]	5.371
EMERGENCY POWER								
125 VDC Battery Bank #1	1	16.080			0.624	[illegible]	[illegible]	15.314
125 VDC Battery Bank#2	1	16.080			0.624	[illegible]	[illegible]	15.314
250 VDC Battery Bank #3	1	[illegible]			0.312	[illegible]	[illegible]	[illegible]
Battery Switchboard	1	[illegible]			[illegible]	[illegible]	[illegible]	[illegible]
Chargers	2	5.822			0.624	[illegible]	[illegible]	11.090
Emergency Lighting	23	5.640			[illegible]	[illegible]	[illegible]	123.533
24/48 VDC Battery Bank	2	5.640			[illegible]	[illegible]	[illegible]	10.742
Preferred AC P[illegible]	1	5.640			0.312	[illegible]	[illegible]	5.371
MECHANICAL								
HVAC Precipitron Units	4	33.924	[illegible]	[illegible]	[illegible]	0.152	39.544	123.768
Heat Pump	1	5.316	9.240	3.544	[illegible]	0.443	0.443	13.670
Boiler	2	1.179					2.246	2.246
Compressed Air System	1	5.099			2.428	1.214	1.214	4.856
Service Air System	1	12.887		6.992	1.748	0.874	3.237	12.887
Units 1-16 Circuit Breaker Air System	16	10.907		111.872	27.968	13.984	20.688	174.512
OTHER EQUIPMENT								
Bridge Crane #1	1	12.887		6.992	1.748	0.874	3.237	12.887
Bridge Crane #2	1	10.907		6.992	1.748	0.874	1.293	10.907
Tailrace Crane	1	9.912				4.956	4.956	9.912
Safety and Security Shop Labor-Hours by Frequency =			38.860	38.868	12.786	24.112	79.846	294.452
Emergency Power Shop Labor-Hours by Frequency =					0.312	1.241	3.818	5.371
Mechanical Shop Labor-Hours by Frequency =			48.200	348.152	84.492	45.265	102.283	626.392
Generation Shop Labor-Hours by Frequency =			213.208	255.208	[illegible]	[illegible]	[illegible]	1611.652
Plumbing Shop Labor-Hours by Frequency =			11.800	39.584	[illegible]	[illegible]	[illegible]	112.458
Electrical Shop Labor-Hours by Frequency =			1.101	1999.378	847.194	432.281	477.977	3757.931
Structure Shop Labor-Hours by Frequency =								
Other Equipment Shop Labor-Hours by Frequency =								
Total Labor-Hours =			371.169	2681.210	1067.268	1000.285	1248.364	6368.296
Labor Hours per 10,000 SF =								626.4

	Level 1 Labor-Hrs	Level 2 Labor-Hrs	Level 3 Labor-Hrs	Level 4 Labor-Hrs
SAFETY/SECURITY				
Heat and Vent System	[illegible]	49.430		
Indication and Annunciation	[illegible]	19.772		
Fire Pumps	[illegible]	[illegible]		
Piping and Valves	[illegible]	[illegible]		
BMS	[illegible]	[illegible]		
Proximity Card System	[illegible]	[illegible]		
EMERGENCY POWER				
125 VDC Battery Bank #1	[illegible]	0.624		
125 VDC Battery Bank#2	[illegible]	0.624		
250 VDC Battery Bank #3	[illegible]	[illegible]		
Battery Switchboard	[illegible]	[illegible]		
Chargers	[illegible]	0.624		
Emergency Lighting	[illegible]	7.176		
24/48 VDC Battery Bank	[illegible]	[illegible]		
Preferred AC P[illegible]	[illegible]	[illegible]		
MECHANICAL				
HVAC Precipitron Units	[illegible]	[illegible]	[illegible]	[illegible]
Heat Pump	[illegible]	0.886	[illegible]	[illegible]
Boiler			2.246	
Compressed Air System			2.428	2.428
Service Air System		4.111	1.748	6.992
Units 1-16 Circuit Breaker Air System		34.672	27.968	111.872
OTHER EQUIPMENT				
Bridge Crane #1		4.111	1.748	6.992
Bridge Crane #2		2.167	1.748	6.992
Tailrace Crane			4.956	4.956
Annualized				
		0.912		
		40.430	91.890	387.540
1041.912		88.86[illegible]	[illegible]	275.128
		24.844	[illegible]	53.629
26.31[illegible]		889.635	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]

Compiled Labor-Hours

Level 1	[illegible]			
Level 1 - 2				
Level 1 - 3			[illegible]	
Level 1 - 4				[illegible]

Assets
Sorted by System

Estimated Costs (time, labor, & materials)
Sorted by Frequency
Categorized by Level of Performance

Total Cost by Level of Performance
- *Compliance*
- *Low functionality*
- *High functionality*
- *Optimizing ownership*

Total Estimated Cost
By System and Frequency

Annualized Estimated Cost
By System, Frequency, and Level of Performance

Total Estimated Cost

Note: The PMMPs also facilitate integration and consistency with O&M Costs in Planning Feasibility Studies

2. Budget Analysis

- Asset Management Portfolio Analytics (AMPA)
  - Based on industry standard methodology of portfolio analytics
  - Examines entire portfolio using Pareto analysis to demonstrate efficiency in terms of Value vs. Investment
  - 'Value' incorporates Safety, Economics, and Environment through evaluation of risk (more objective)
  - Transcends artificial constraints such as increments
- Integrated Budget Evaluation Tool (iBET)
  - Based on 8 Administration priorities – more specific valuations than AMPA (more subjective)
  - Does not address risk
- Residual Risk evaluation
  - Uses OCA data & ORA analytics to evaluate Total Risk Exposure
  - Provides insights to evaluate & validate investment decisions

2. Budget Analysis

- Asset Management Portfolio Analytics (AMPA) Case Study
  - **National:** Data source was 5x5 risk matrices for Nav, Hydro, FRM (*Value*), and all FY14 budget request work packages from OFA increments 3-5 (*Investment*)
  - **MSC:** Data source was Mission-Safety value determinations for Nav, Hydro, FRM (*Value*), and LRD's FY14 budget request of 1,050 work packages from OFA increments 1-5 (*Investment*)
- AMPA results clearly demonstrated that significant portfolio efficiencies could be gained by reallocation of existing funds

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AMPA Initial Analysis

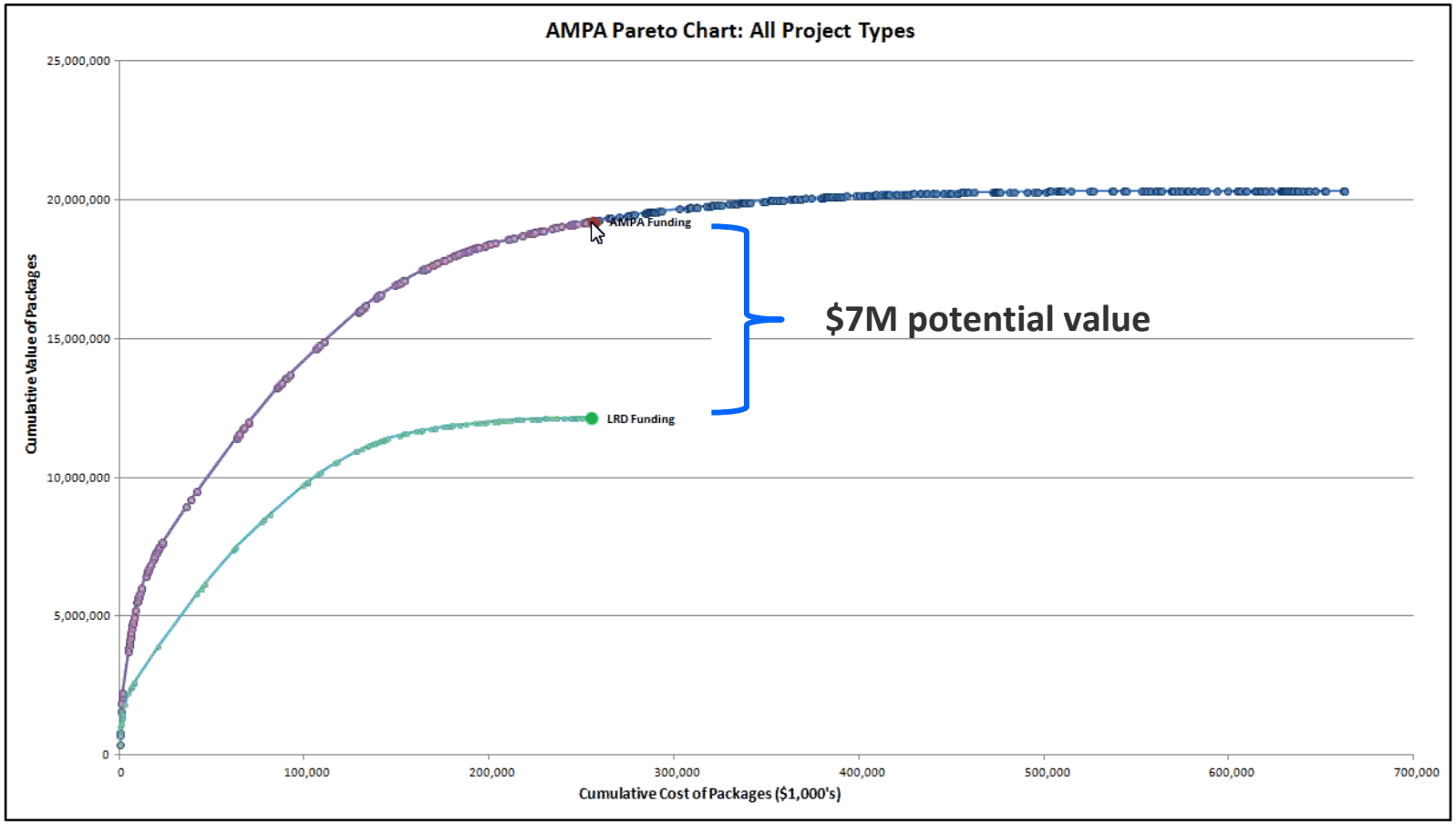
AMPA Pareto Chart Analysis

Select a new Project ID Type:	(All)

Update Pareto Chart

Current Project ID Type	(All)
LRD Funded Cost ($1,000's)	255,489
LRD Funded Value	12,145,373
AMPA Funded Cost ($1,000's)	256,999
AMPA Funded Value	19,195,125

This worksheet will create Pareto charts of the AMPA and LRD budget data. The main blue curve indicates all of the available packages and represents an unbounded analysis. The Green data point marks the LRD budget, while the Red datapoint marks the AMPA funding recommendation. The "Project ID Type" box can be changed using the dropdown box at the top. Clicking the "Update Pareto Chart" button will then update the data and chart below.



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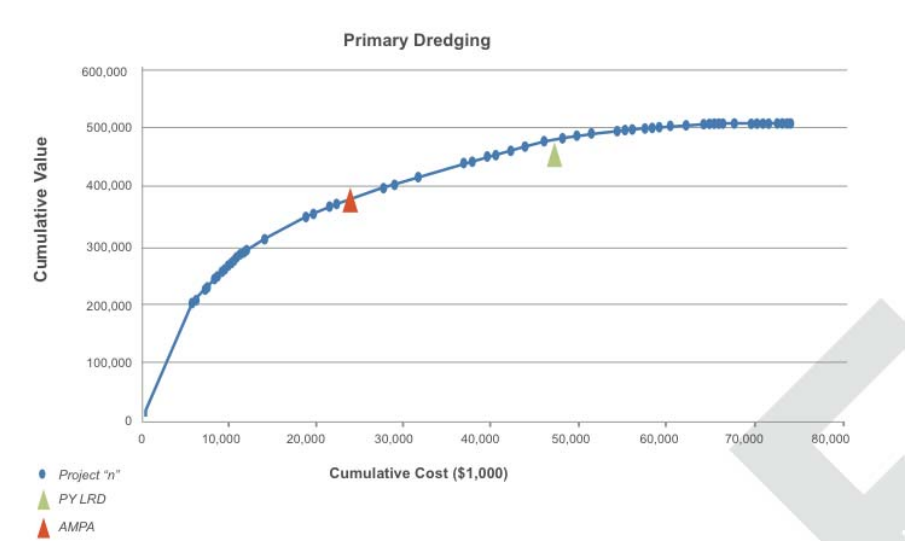
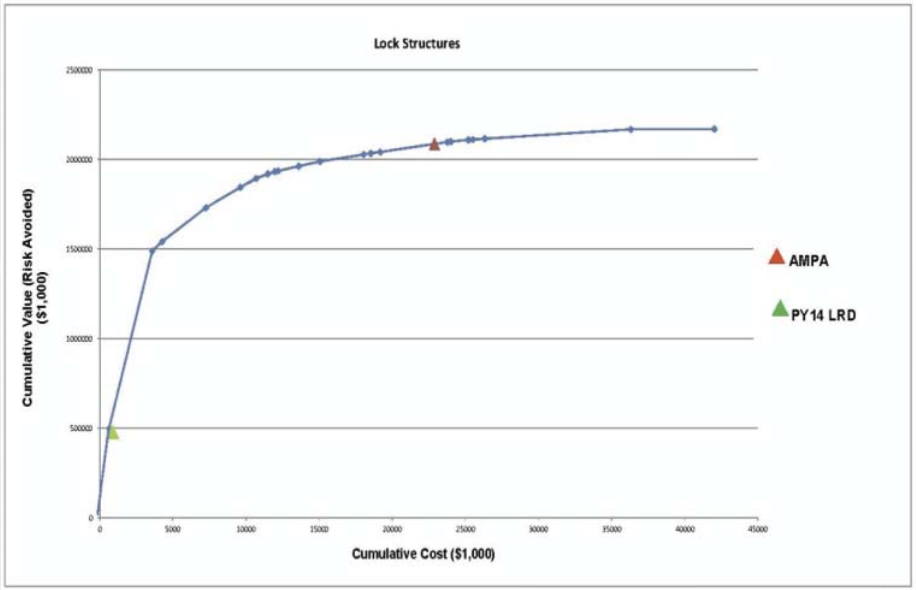
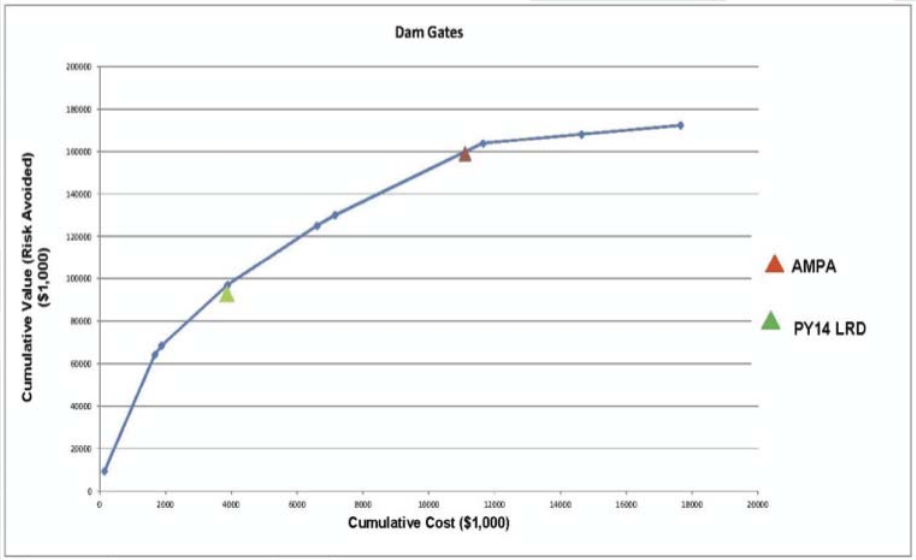
Examples of Inefficient vs. Efficient Investments







AMPA Potential Recommendations

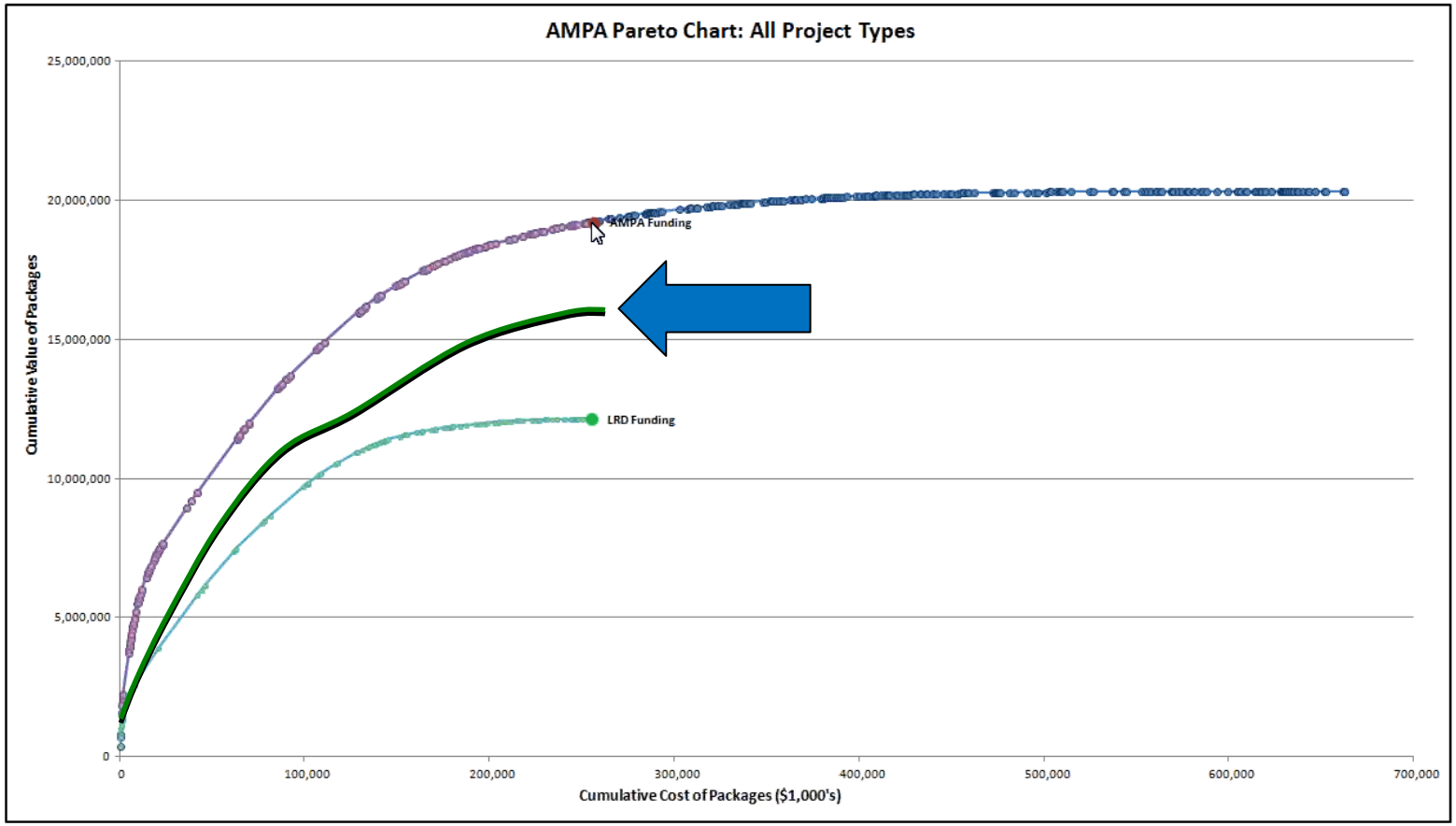
AMPA Pareto Chart Analysis

Select a new Project ID Type: (All)

Update Pareto Chart

Current Project ID Type	(All)
LRD Funded Cost ($1,000's)	255,489
LRD Funded Value	12,145,373
AMPA Funded Cost ($1,000's)	256,999
AMPA Funded Value	19,195,125

This worksheet will create Pareto charts of the AMPA and LRD budget data. The main blue curve indicates all of the available packages and represents an unbounded analysis. The Green data point marks the LRD budget, while the Red datapoint marks the AMPA funding recommendation. The "Project ID Type" box can be changed using the dropdown box at the top. Clicking the "Update Pareto Chart" button will then update the data and chart below.



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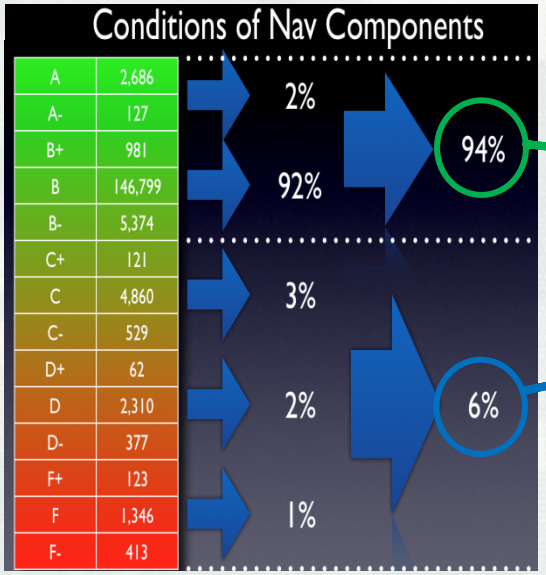
Residual Risk Summary – WCI Forum Example



River	L&D Site	Current Performance Econ Risk Exposure ($K)*	Residual Risk Exposure IF C-F "Fully Repaired" to B Condition*	Potential Risk Exposure Buy Down Factor	Residual Risk (Currently B- or better)	Maintain or Rehab Factor	
Upper Miss	L&D 12	$1,649	$293	5.63	$69,001	41.84	Focus on Strategic Maintenance Management and Operations Zone
Upper Miss	L&D 15	$550	$94	5.85	$8,471	15.40	
Upper Miss	L&D 17	$5,596	$630	8.88	$79,909	14.28	
Upper Miss	L&D 13	$5,147	$496	10.38	$56,797	11.03	
Upper Miss	L&D 16	$12,138	$870	13.95	$90,262	7.44	
Illinois	TJ Obrien	$3,750	$685	5.47	$18,341	4.89	
Illinois	Brandon Road	$21,265	$4,049	5.25	$88,477	4.16	
Upper Miss	L&D 20	$57,369	$6,001	9.56	$230,698	4.02	
Upper Miss	L&D 24	$39,546	$6,258	6.32	$128,948	3.26	
Illinois	Marseilles	$31,086	$4,042	7.69	$73,159	2.35	
Upper Miss	L&D 27	$35,406	$6,967	5.08	$69,389	1.96	
Upper Miss	L&D 14	$33,426	$6,837	4.89	$64,643	1.93	
Upper Miss	Mel Price	$1,913	$242	7.90	$3,617	1.89	
Ohio	Smithland	$1,158	$187	6.19	$1,935	1.67	
Upper Miss	L&D 25	$103,930	$9,145	11.36	$170,548	1.64	
Upper Miss	L&D 22	$107,579	$10,364	10.38	$140,794	1.31	Maintain or Restore Threshold Zone
Upper Miss	L&D 11	$38,702	$3,517	11.00	$50,423	1.30	
Upper Miss	L&D 19	$30,947	$4,562	6.78	$38,980	1.26	
Illinois	Lockport	$31,243	$4,822	6.48	$37,087	1.19	
Illinois	Starved Rock	$61,550	$9,498	6.48	$68,511	1.11	
Kaskaskia	Kaskaskia	$2,232	$369	6.05	$2,179	0.98	
Illinois	Dresden Island	$77,860	$8,997	8.65	$65,106	0.84	
Illinois	Peoria	$88,393	$12,812	6.90	$58,429	0.66	PAST Point of No Return Zone - Rehab is ONLY Option - Update CPBM
Upper Miss	L&D 21	$283,472	$22,576	12.56	$154,984	0.55	
Upper Miss	L&D 18	$125,697	$11,476	10.95	$48,762	0.39	
Illinois	Lagrange	$163,626	$11,833	13.83	$60,378	0.37	
Ohio	Lock 53	$15,532	$2,168	7.16	$3,587	0.23	
Ohio	Lock 52	$144,101	$13,627	10.57	$23,617	0.16	
* Based on FY13 data		$1,524,863	$163,417	9.33	$1,907,032	1.25	

3. Budget Execution Tracking

- Link Budget Work Packages to FEM Work Orders
  - Capability exists at present
  - This proposed 1:1 linkage overcomes P2, CEFMS, FEM naming and clarity issues
  - Child Work Orders can link subsets of Work Package funding directly to assets/components and OCA ratings
  - WO will contain WP funding information as estimates
- Provides means to comply with FY14 Budget EC Commander's Intent memo of 11 Apr 2012:

  "Budget Packages that are substantiated by Facility Equipment Maintenance Work Orders with Cost Estimates and Operational Condition Assessments will be given high budget consideration."

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Budget → Execution

We tell the Administration and Congress that we **NEED $X** — TO — Do (Execute) **WORK** on **STUFF** — AT — A **PROJECT** or Project "**SITE**" — TO — Ensure "**BENEFITS**" or "**VALUE**" or "**RISK REDUCTION**"

Investment — What — Where — Why

FY12 PresBud | **FY12 FEM**

Mississippi River Between Missouri River and Minneapolis (MVR Portion)

$18,656,000

Not at all! → Very

Lock and Dam 12

$167,096 or ??%

Dardenelle Lock & Dam, AR

$1,873,601

Very → Not at all!

Russellville Project

$122,046 or 6.5%!

Relative Level of Specificity

4. Budget Feedback

- Completed Work Orders record maintenance accomplished/deferred and actual costs
  - will link directly to OCAs through asset/component
  - can be used to track changes in Condition (& therefore Risk)
- Asset Lifecycle Plan can be developed for each USACE asset/component showing:
  - annual maintenance needs required for ideal sustainment
  - annual maintenance accomplished/deferred
  - future component renewal needs
  - asset replacement/rehab planning
- This information can be used for investment planning and to inform subsequent budget cycles

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Next Steps

- Continue to work closely with IWR & PID to align UIS effort
- Provide input to FY15 Budget EC
  - MM definitions
  - MM Levels of Performance
  - Maintenance Budget WP & Execution WO linkage
  - AMPA applied at HQ level for 3 major BLs
- Revise draft MMIP for implementation in spring 2013
- Develop corporate understanding of Value to the Nation and associated Consequences (will also define Risk more clearly)
- Work closely with DOL/ULA to integrate with CW through MMIP integration

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