

# Investment Program Action Team (IPAT): Updating the Capital Projects Business Model

IPAT Briefing

Inland Waterways Users Board Meeting #73

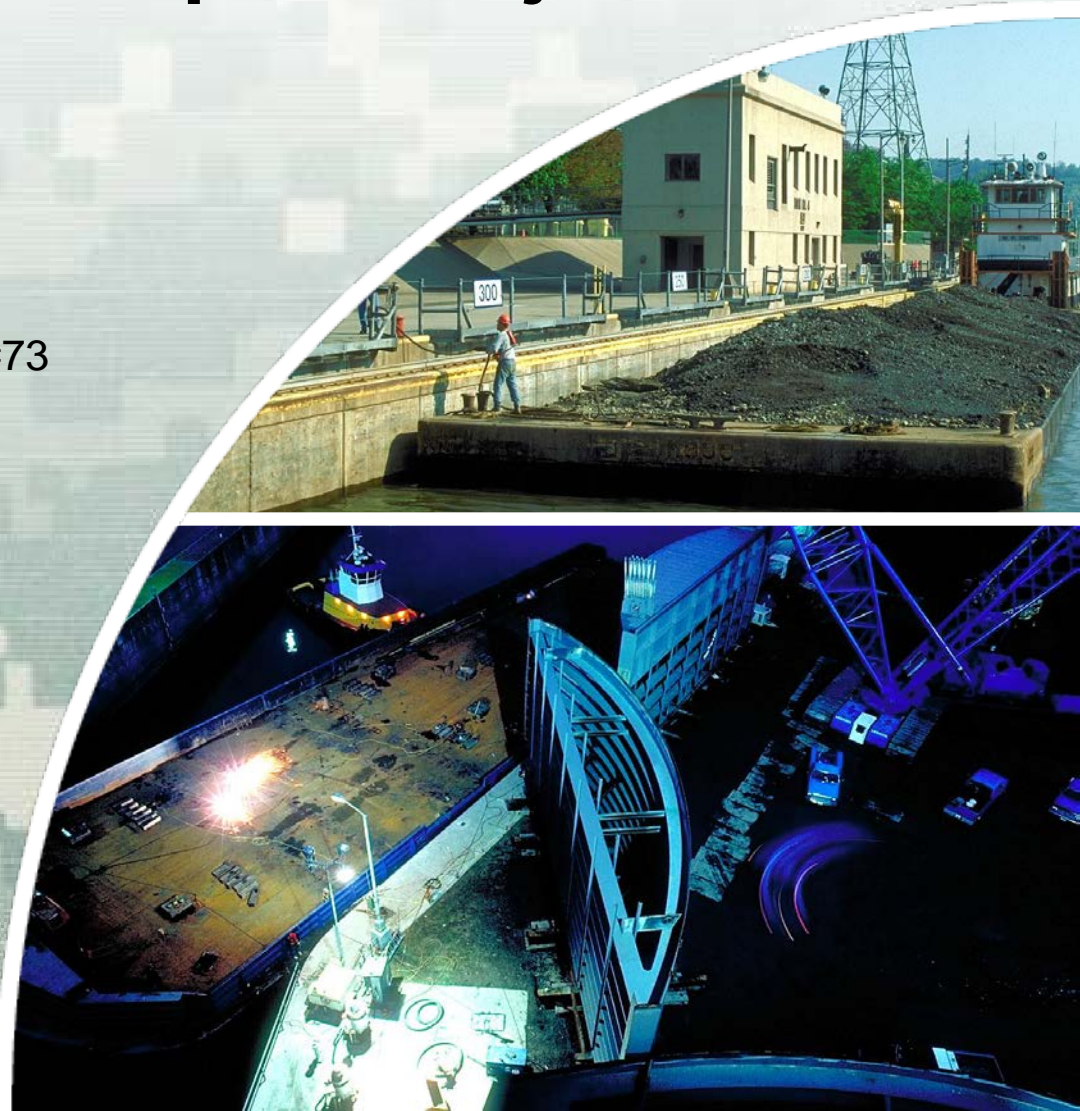
November 18, 2014

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IMTS Program Manager

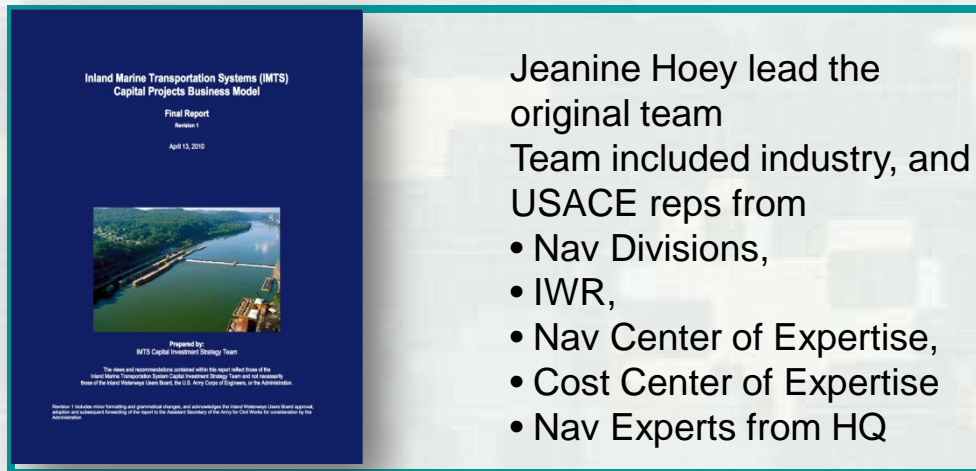


US Army Corps of Engineers  
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# IMTS Capital Projects Business Model (CPBM) (Original team from 2010)

- Product: National Capital Investment Strategy and Implementation Process for evaluating IMTS capital investments
- Partnership between USACE and Inland Waterways Industry (including IW Users Board)



Jeanine Hoey lead the  
original team  
Team included industry, and  
USACE reps from

- Nav Divisions,
- IWR,
- Nav Center of Expertise,
- Cost Center of Expertise
- Nav Experts from HQ



# Capital Projects Business Model (CPBM)

Published April 2010

## Inland Marine Transportation Systems (IMTS) Capital Projects Business Model

Final Report  
Revision 1

April 13, 2010



Prepared by:  
IMTS Capital Investment Strategy Team

The views and recommendations contained within this report reflect those of the Inland Marine Transportation System Capital Investment Strategy Team and not necessarily those of the Inland Waterways Users Board, the U.S. Army Corps of Engineers, or the Administration.

Revision 1 includes minor formatting and grammatical changes, and acknowledges the Inland Waterways Users Board approval, adoption and subsequent forwarding of the report to the Assistant Secretary of the Army for Civil Works for consideration by the Administration.

Table ES-1. IMTS Investment Strategy Criteria Weighting

Criteria	Phases 1 and 2	Phase 3
<b>Risk and Reliability</b>	40	60
Condition Index for Locks (rated A through F)		
DSAC for Dams (rated 5 through 1)		
<b>Economic Return</b>	60	40
Net Benefits	15	
BCR	5	
RBRCR	25	
Economic Impact	15	40
<b>Totals</b>	<b>100</b>	<b>100</b>

Table 4-8. Total Ranking for the 10 Highest Ranked Projects

Project Name	Subproject Name	Criteria Total	Rank
Olmsted Locks and Dam	Olmsted L/D Construction	90.5	1
Monongahela Locks and Dams 2, 3, and 4	Lower Mon 2,3,4, Dam Features	69.5	2
Monongahela Locks and Dams 2, 3, and 4	Lower Mon 2,3,4, Lock Features	68.8	3
Greenup Lock, Ohio River	Greenup Lock Extension PED	59.0	4
Chickamauga Lock	Chickamauga Replacement Lock	40.2	5
Upper Mississippi & Illinois Waterway, L/D 25	1200' Lock Addition	26.9	6
Upper Mississippi & Illinois Waterway, L/D 22	1200' Lock Addition	26.5	7
Kentucky Lock Addition	Kentucky Lock Addition	26.3	8
Inner Harbor Navigation Canal Lock	IHNC	23.9	9
Upper Miss. & Illinois Waterway, Lagrange	1200' Lock Addition	23.2	10

Good results using data and information available at that time!!





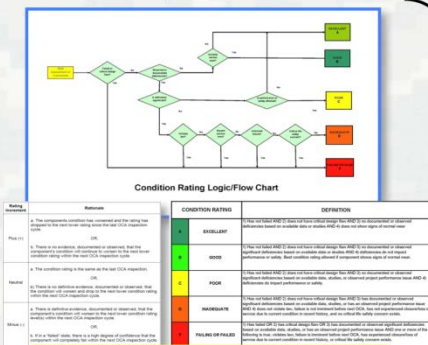
# IMTS Investment Program Action Team (IMTS IPAT)

- Product: IMTS Long Term Integrated Life Cycle Investment Strategy
  - Process for evaluating IMTS capital investments and associated operation & maintenance
  - USACE team with update/input from Inland Waterways Users Board (IWUB)
- IMTS Investment Program Action Team (IPAT) formed within the IMTS Working Group to review and update the 2010 CPBM report per WRRDA requirements.
  - No National processes for operational risk assessment when original report was developed – now have National processes.
  - Will develop a long term integrated life cycle strategy over the next 50 years prioritizing Capital Investments and associated O&M
  - Initial screening will use risk exposure approach to maximize risk buy down
    1. Define Projects based on initial screening
    2. Rough Order of Magnitude (ROM) Cost Estimates for Return on Investment (ROI)
    3. Other prioritization criteria will include Benefits Cost Ratio (BCR), Remaining Benefits Remaining Cost Ratio (RBRCR), Dam Safety Action Classification (DSAC)
  - Biweekly meetings with industry to get input/comments
  - Final report due June 2015 (Draft mid-January 2014)
  - Review through Office of the Assistant Secretary of the Army for Civil Works (OASA-CW) and the Office of Management and Budget (OMB)



# Progress Since 2010 CPBM

## Assigning Condition Ratings



Consistent and Repeatable Process!



- Operational Condition Assessments (OCA) developed by IMTS BPR group, approved by IMTS BoD and implemented by MSC Teams

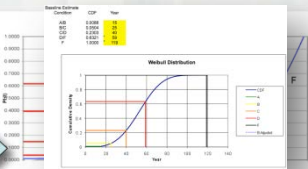
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Probability of Operational Failure X Consequence of Failure (Unsatisfactory Performance)



1. Correlate OCA

- Baseline Probability of Failure [P(f)] curves developed by Risk Management Center with support from MSC SME's



Condition Rating	Number Condition Value	Surrogate Probability of Failure/Reliability P(f)/R
Excellent	9.325	0.925
A	7.965	0.875
B	6.865	0.805
C	5.875	0.715
D	5.005	0.605
E	4.335	0.435
F	3.775	0.375
G	3.345	0.345
H	2.915	0.295
I	2.585	0.255
J	2.255	0.225
K	1.925	0.195
L	1.595	0.155
M	1.265	0.125
N	0.935	0.095
O	0.605	0.065
P	0.275	0.025
Q	0.005	0.005



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Project	Costs in thousands of dollars									
	1	3	5	10	15	30	45	60	75	90
Mississippi L&D 20	\$ 60	\$ 793	\$ 1,880	\$ 5,690	\$ 11,123	\$ 31,492	\$ 51,921	\$ 72,350	\$ 92,779	\$ 113,208
Mississippi L&D 21	\$ 105	\$ 1,061	\$ 1,966	\$ 6,318	\$ 12,016	\$ 35,176	\$ 56,105	\$ 77,034	\$ 97,963	\$ 118,892
Mississippi L&D 22	\$ 78	\$ 799	\$ 2,288	\$ 6,613	\$ 13,096	\$ 36,648	\$ 58,200	\$ 79,752	\$ 101,304	\$ 122,856
Mississippi L&D 24	\$ 86	\$ 933	\$ 2,359	\$ 7,690	\$ 13,746	\$ 39,652	\$ 61,504	\$ 83,356	\$ 105,208	\$ 127,060
Mississippi L&D 25	\$ 60	\$ 876	\$ 2,015	\$ 6,090	\$ 11,776	\$ 34,462	\$ 55,391	\$ 76,320	\$ 97,249	\$ 118,178
Mississippi L&D 27	\$ 49	\$ 323	\$ 1,025	\$ 5,336	\$ 8,806	\$ 22,203	\$ 35,600	\$ 49,000	\$ 62,400	\$ 75,800
Mississippi L&D 3	\$ 34	\$ 276	\$ 695	\$ 2,280	\$ 4,441	\$ 13,119	\$ 21,797	\$ 30,475	\$ 39,153	\$ 47,831
Mississippi L&D 4	\$ 33	\$ 431	\$ 864	\$ 3,012	\$ 5,598	\$ 15,132	\$ 24,666	\$ 34,200	\$ 43,734	\$ 53,268
Mississippi L&D 5	\$ 47	\$ 424	\$ 1,164	\$ 2,926	\$ 5,557	\$ 14,773	\$ 23,986	\$ 33,200	\$ 42,414	\$ 51,628
Mississippi L&D 6A	\$ 29	\$ 443	\$ 1,107	\$ 2,591	\$ 5,031	\$ 14,244	\$ 23,457	\$ 32,670	\$ 41,884	\$ 51,097
Mississippi L&D 6	\$ 53	\$ 409	\$ 1,072	\$ 3,504	\$ 6,752	\$ 17,882	\$ 28,012	\$ 38,142	\$ 48,272	\$ 58,402
Mississippi L&D 7	\$ 37	\$ 484	\$ 1,197	\$ 3,479	\$ 6,150	\$ 17,651	\$ 28,152	\$ 38,653	\$ 49,154	\$ 59,655
Mississippi L&D 8	\$ 53	\$ 488	\$ 1,252	\$ 3,290	\$ 6,385	\$ 18,665	\$ 29,166	\$ 39,667	\$ 50,168	\$ 60,669
Mississippi L&D 9	\$ 67	\$ 599	\$ 1,244	\$ 4,007	\$ 7,569	\$ 21,062	\$ 32,563	\$ 44,064	\$ 55,565	\$ 67,066
Mogantown L&D	\$ 2	\$ 26	\$ 84	\$ 94	\$ 184	\$ 458	\$ 732	\$ 1,006	\$ 1,280	\$ 1,554
Monongahela L&D 3	\$ 1	\$ 5	\$ 3	\$ 370	\$ 378	\$ 400	\$ 422	\$ 444	\$ 466	\$ 488
Monongahela L&D 4	\$ 32	\$ 326	\$ 631	\$ 1,586	\$ 2,903	\$ 7,757	\$ 12,611	\$ 17,465	\$ 22,319	\$ 27,173
Montgomery L&D	\$ 61	\$ 622	\$ 857	\$ 2,655	\$ 4,303	\$ 10,428	\$ 16,553	\$ 22,678	\$ 28,803	\$ 34,928
Montgomery Point L&D	\$ 33	\$ 293	\$ 733	\$ 2,006	\$ 3,511	\$ 10,314	\$ 17,922	\$ 25,530	\$ 33,138	\$ 40,746
Moore Haven L&D	\$ 0	\$ 1	\$ 3	\$ 3	\$ 9	\$ 15	\$ 23	\$ 31	\$ 46	\$ 92
Murray L&D	\$ 14	\$ 206	\$ 515	\$ 1,321	\$ 2,415	\$ 7,533	\$ 11,919	\$ 18,159	\$ 27,873	\$ 39,603
New Cumberland L&D	\$ 11	\$ 82	\$ 140	\$ 1,444	\$ 1,758	\$ 2,622	\$ 3,418	\$ 4,375	\$ 5,332	\$ 6,289
New Savannah Bluff L&D	\$ 80	\$ 851	\$ 1,308	\$ 5,020	\$ 8,991	\$ 22,857	\$ 41,494	\$ 64,540	\$ 87,586	\$ 110,632
Newburgh L&D	\$ 7	\$ 130	\$ 277	\$ 844	\$ 1,710	\$ 4,070	\$ 8,108	\$ 12,146	\$ 16,184	\$ 20,222
New Graham L&D	\$ 21	\$ 78	\$ 208	\$ 518	\$ 967	\$ 2,569	\$ 4,408	\$ 6,105	\$ 8,335	\$ 10,565
Norrell L&D	\$ 26	\$ 365	\$ 756	\$ 2,071	\$ 3,422	\$ 9,963	\$ 16,567	\$ 23,356	\$ 30,145	\$ 36,934
Ohio River L&D 52	\$ 56	\$ 534	\$ 1,166	\$ 3,855	\$ 7,099	\$ 18,703	\$ 33,242	\$ 48,448	\$ 63,654	\$ 78,860
Ohio River L&D 53	\$ 18	\$ 62	\$ 144	\$ 659	\$ 1,196	\$ 3,182	\$ 5,482	\$ 8,402	\$ 11,322	\$ 14,242
Old Hickory L&D	\$ 18	\$ 147	\$ 328	\$ 736	\$ 1,419	\$ 4,130	\$ 6,700	\$ 9,385	\$ 12,070	\$ 14,755
Old River L&D	\$ 124	\$ 949	\$ 1,255	\$ 2,553	\$ 3,858	\$ 8,893	\$ 15,080	\$ 23,807	\$ 36,700	\$ 50,607

- Economic Consequence on Shippers and Carriers (varying durations, 1-365 days) from Planning Center of Expertise for Inland Navigation (PCXIN)

Economic Conseq to Shippers and Carriers

Recovery Durations

- Baseline "Recovery Durations" to restore Mission after an Unscheduled Outage due to a Critical Component Failure

Equipment	Importance Rating		Impact Recovery Period Duration (Days)		Recovery Duration (Days)	Recovery Duration (Days)
	Maximum	Minimum	Maximum	Minimum		
Equipment 1	70	10	1	1	1	1
Equipment 2	50	10	1	1	1	1
Equipment 3	50	10	1	1	1	1
Equipment 4	50	10	1	1	1	1
Equipment 5	50	10	1	1	1	1
Equipment 6	50	10	1	1	1	1
Equipment 7	50	10	1	1	1	1
Equipment 8	50	10	1	1	1	1
Equipment 9	50	10	1	1	1	1
Equipment 10	50	10	1	1	1	1
Equipment 11	50	10	1	1	1	1
Equipment 12	50	10	1	1	1	1
Equipment 13	50	10	1	1	1	1
Equipment 14	50	10	1	1	1	1
Equipment 15	50	10	1	1	1	1
Equipment 16	50	10	1	1	1	1
Equipment 17	50	10	1	1	1	1
Equipment 18	50	10	1	1	1	1
Equipment 19	50	10	1	1	1	1
Equipment 20	50	10	1	1	1	1
Equipment 21	50	10	1	1	1	1
Equipment 22	50	10	1	1	1	1
Equipment 23	50	10	1	1	1	1
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Equipment 27	50	10	1	1	1	1
Equipment 28	50	10	1	1	1	1
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Equipment 32	50	10	1	1	1	1
Equipment 33	50	10	1	1	1	1
Equipment 34	50	10	1	1	1	1
Equipment 35	50	10	1	1	1	1
Equipment 36	50	10	1	1	1	1
Equipment 37	50	10	1	1	1	1
Equipment 38	50	10	1	1	1	1
Equipment 39	50	10	1	1	1	1
Equipment 40	50	10	1	1	1	1
Equipment 41	50	10	1	1	1	1
Equipment 42	50	10	1	1	1	1
Equipment 43	50	10	1	1	1	1
Equipment 44	50	10	1	1	1	1
Equipment 45	50	10	1	1	1	1
Equipment 46	50	10	1	1	1	1
Equipment 47	50	10	1	1	1	1
Equipment 48	50	10	1	1	1	1
Equipment 49	50	10	1	1	1	1
Equipment 50	50	10	1	1	1	1



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All of this for 166,000 asset components across the IMTS!! And Used to Build Risk-Informed Annual Critical Non-Routine Budget Work Packages

# Then → Now

## CPBM 2010

1. Single Condition – *only* at Lock and Dam “top level”
2. “Risk of Failure” *not* considered
3. Shipper-Carrier Cost (SCC) Model *only* used for Annual Transportation Rate Savings
4. Recognized that future “life-cycle asset management analysis will provide criteria for prioritization”

## Life Cycle Asset Management

1. Condition assessments for 166,000 components across entire IMTS
2. Baseline Failure Curves
3. Economic impacts from SCC Model considering various intervals of unscheduled outages from 1 to 365 days

Can use all of the above to determine the ***Total<sub>N</sub> Risk Exposure*** for EACH Site in IMTS

“Best IMTS” = Lower “Total<sub>N</sub> Risk Exposure” (TRE)



# IPAT Milestones

- 3 IPAT face to face meetings
- Regular IPAT telecons/webinars since June
- Regular IPAT telecons/webinars beginning Nov 6th
- 3 Briefings to the IWUB
- 3 briefings to industry on methodology and team progress.
- IPR with supplemental briefing to senior Corps staff
- Presentation on IPAT at WCI annual meeting
- IPR with Corps Operations Chiefs



# IPAT Schedule

- Bi-weekly IPAT telecoms/webinars continuing
- Bi-weekly Industry telecoms/webinars continuing
- Nov 18 - IWUB #73 - Update on investment strategy
- Dec 2 – IMTS BoD Meeting – Update on IPAT progress
- Early Jan 2015 – 4<sup>th</sup> IPAT face to face meeting
- Jan 2015 - Initial draft report and investment strategy. Obtain review comments by Corps and Industry
- Feb 2015 - Revise and update report and investment strategy as required
- Feb 2015 - IWUB #74 – Present current status and get comments
- Mar 2015 – IMTS BoD meeting
- Mar 2015 - Final draft report for review/comment by Corps and Industry
- Apr 2015 – OASA(CW) Review and input
- May 2015 - IWUB #75 – Present final report and recommendations
- May 2015 - OMB review and input
- June 2015 - Final WRRDA report to Congress





# Questions?

