

# CPAT

## Capability Portfolio Analysis Tool

### Highlights

#### What does CPAT Enable?

- Decision support for portfolio resourcing and capability of a large fleet of systems
- Comprehensive investment plans that ensure an optimal balance between capability, cost, and schedule

#### Why is CPAT important?

- Provides analytical rigor to strategic portfolio management process
- Provides a repeatable way of assessing different investment strategies and provides insights into the impacts of these strategies
- Develops detailed fielding plans from high-level modernization goals and strategies, which show layout of funds and can be evaluated for implementability, schedule/performance risk, etc.

#### Key to Success

- Collaboration with analytical community
- Validated data sources (cost & performance)
- Senior leadership engagement and involvement

#### Example Applications

##### Trade Studies

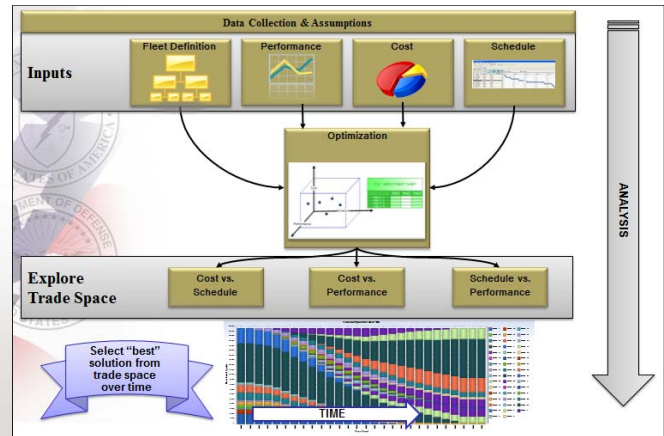
- Evaluate modernization strategies and courses of action for input to high-level portfolio reviews
- Assess modernization alternatives under different funding levels
- Evaluate current modernization plans for impacts on performance and cost, and provide insight into operational and industrial base impacts
- Investigate how decisions in a single modernization program impact the entire fleet

##### Sensitivity Analyses

- Assess which programs are cornerstones of an optimal modernization strategy
- Evaluate robustness of modernization strategy to changes in program cost, performance, and/or schedule

### CPAT Overview

CPAT is a powerful fleet management analysis tool which optimizes investment and fielding decisions to provide maximum fleet performance under cost, schedule and programmatic constraints. It is capable of solving highly complex fleet modernization optimization problems – problems spanning many mission areas and modernization programs over several decades – in sufficiently short timeframes to enable interactive analytics and a high degree of responsiveness to evolving plans and assumptions. CPAT has been developed and applied in partnership with the US Army Program Executive Office for Ground Combat Systems to provide unprecedented analytical capability in support of modernization and investment decisions.



Fleet Management Optimization Process

		FY13	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	FY32	FY33	FY34	FY35	FY36	FY37	FY38	FY39	FY40		
\$20.866B																															
\$4.078B	Mission 1	Vehicle 6	30	30	30	30	28	26	22	21	18	15	12	9	6	3															
	Vehicle 7				2	5	8	9	10	11	12	13	14	15	16	14	12	10	8	6	4	3	2	1							
	Vehicle 11									1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	17	17	17	17	
\$555.102M	Mission 2	Vehicle 30	30	30	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	10	10	10	10	10	10
	Vehicle 31				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	20	20	20	20	20	20	
	Vehicle 33																														
\$390.457M	Mission 3	Vehicle 41		2	4	4	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	Vehicle 42				1	2	4	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	Vehicle 43									2	4	6	8	10	12	14	16	18	20	22	24	24	24	24	24	24	24	24	24	24	
\$969.461M	Mission 4	Vehicle 34	30	30	28	26	24	22	20	18	16	14	12	10	8	6	4	2													
	Vehicle 41				2	4	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
	Vehicle 42									2	4	6	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	
\$1.071B	Mission 5	Vehicle 35	30	30	28	26	24	22	20	18	16	14	12	10	8	6	4	2													
	Vehicle 41				2	4	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
	Vehicle 42									2	4	6	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	
	Vehicle 43														2	4	6	8	10	12	14	16	18	20	22	22	22	22	22	22	

Fleet Composition Over Time by Mission Role



# CPAT

## Capability Portfolio Analysis Tool

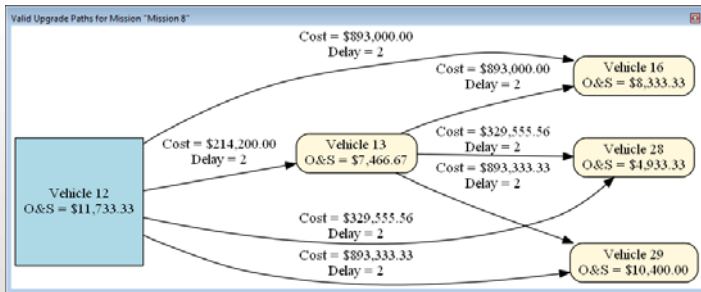
### Key Features

#### Optimization Features

- Identifies the highest-performing investments for fleet modernization over a complex trade space
- Analyzes problems spanning multiple mission areas and modernization programs over several decades
- Captures salient characteristics and constraints of the fleet management and modernization problem, for example:
  - Fielding gaps can be disallowed
  - Purchases can be required to occur in full brigade quantities
  - Different types of budget (procurement, O&S, R&D) can be allocated

#### Input Features

- Data architecture makes it easy to define the inputs despite high complexity of the problem
- Enforces consistency between inputs and provides the analyst multiple means of cross-checking input
- Allows definition of systems, mission roles, fleet structure, budgets, system performance and costs, and programmatic and production constraints and requirements



Potential Upgrade Paths for a Mission Role

#### Output Features

- Detailed fielding and retirement plans showing number of purchases/divestitures of a system type in each mission area per year
- Fleet composition over time
- Fleet performance and costs over time
- Multiple levels of output detail, from individual programs and mission areas up to the entire fleet

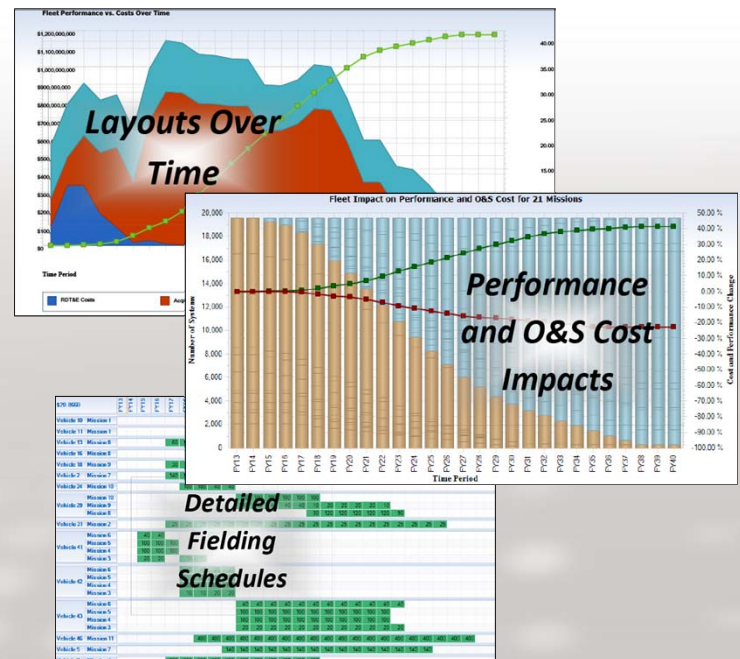
### Key Benefits

#### High Performance and Capability

- Makes sophisticated investment and scheduling tradeoffs between different mission areas and modernization programs to provide maximum overall fleet performance
- Careful problem formulation and use of gold-standard CPLEX optimization engine enable quick solution of highly complex modernization problems
  - Takes advantage of high-performance multicore computing capabilities
  - Can be quickly re-run with updated assumptions and constraints

#### Clean, Intuitive User Interface

- Streamlines data entry/model building process
- Effective data visualization
  - Enhances communication between stakeholders, analysts, and SMEs
  - Provides tools to assist analyst with data verification and validation
- Simplifies specification of different analysis cases
- Provides insightful results tables and charts



#### Contact Us

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