

LPD 17 Total Ownership Cost Program TOC/CAIV Workshop 99-2



Harvey Speight
28 July 1999

Agenda



- **Background**
- Vision
- Strategy
- Process
- Success Stories
- Lessons Learned



LPD 17 Program



Requirement:

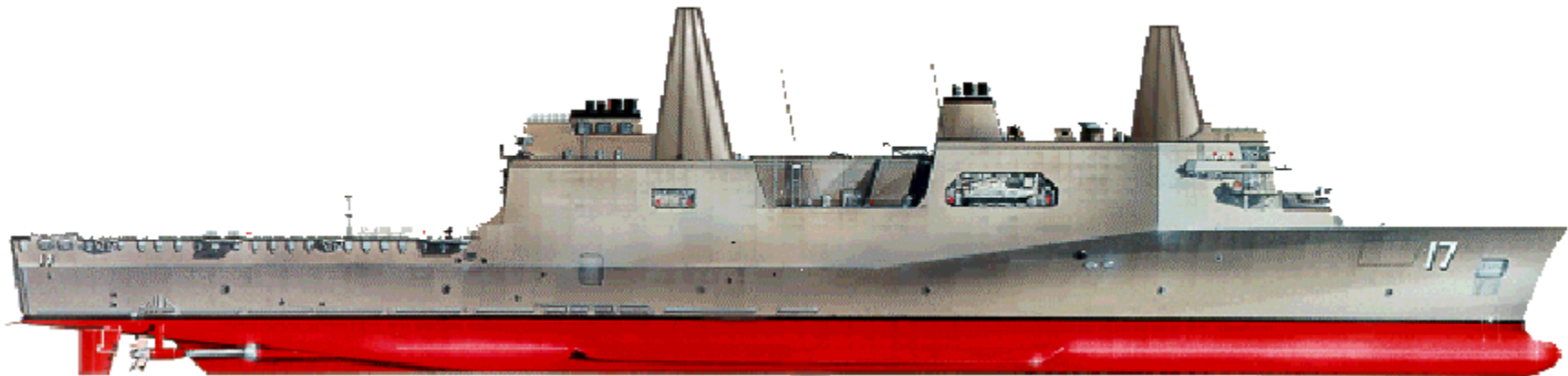
- The LPD 17 Class is the functional replacement for the 41 ships of the LST 1179, LKA 113, LSD 36 and LPD 4 classes built in the 1960s. These twelve new LPD s are the key to rounding out the fiscally constrained 2.5 Marine Expeditionary Brigades (MEBs) amphibious lift requirement and are the versatile centerpiece of the 12 Amphibious Readiness Groups (ARGs) of the 21st Century.

Description:

- The LPD 17 will be a highly reliable, warfare capable, 25,000 ton, twin shaft, diesel powered ship. It will be the most survivable amphibious ship ever put to sea. The design incorporates state-of-the art self-defense capabilities, C4I, and reduced signature technologies. Reduced total ownership costs and adaptability to technological advances over its forty year service life are key design factors. LPD 17 incorporates the latest quality of life standards for the embarked Marines and Sailors with the flexibility to accommodate female Marines and Sailors as part of the crew and embarked troops.



Build A Ship From Fundamental Principles Of .



**WARFARE
CAPABLE**

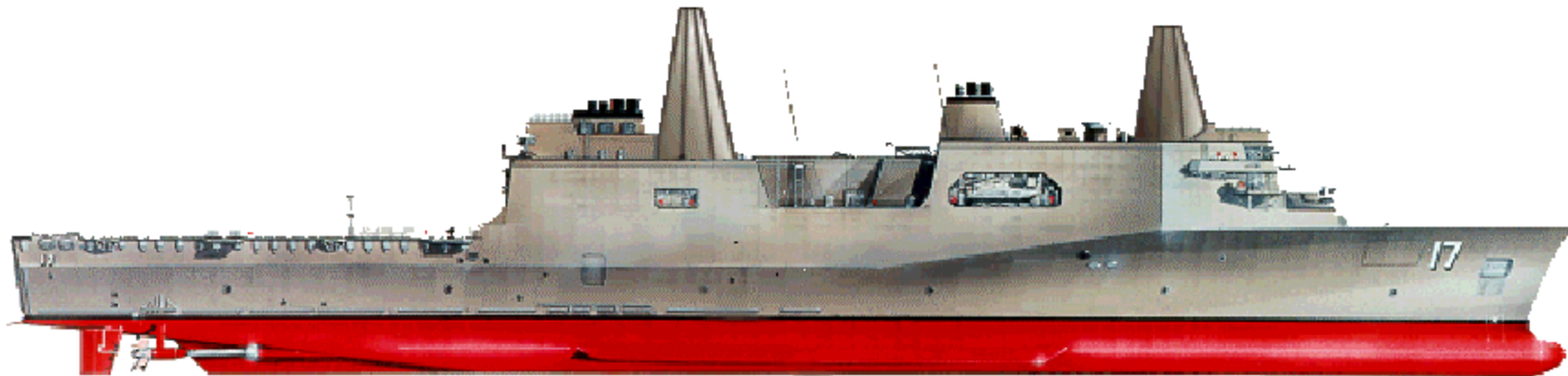
**MISSION
FLEXIBLE**

**TECHNICALLY
ADAPTABLE**

**AFFORDABLY
SUPPORTABLE**

FOR THE OPERATOR, MAINTAINER AND TRAINER.

LPD 17 OUTBOARD PROFILE



GENERAL CHARACTERISTICS

LENGTH (LOA)	208.5 M (684 FT)
BEAM (MAX)	31.9 M (105 FT)
DRAFT	7.0 M (23.0 FT)
DISPLACEMENT (FLD)	25.3K MT (24.9K LT)
PROPULSION	4 MED SPEED DIESEL
SHAFT POWER	30 MW (40K HP)

MISSION CHARACTERISTICS

VEHICLE AREA	2.32K M ² (25K FT ²)
CARGO VOLUME	1007 M ³ (36K FT ³)
TROOPS	720
LCAC	2
AVIATION	2 SPOTS
	FLTDK/HANGAR
MEDICAL	SECONDARY CRTS (124 BEDS/2 ORs)



TOC Reductions: A Matter of Institutional Survival



FACT: We Have Half the Budget for the Required Force Level

FACT: Our Existing Force Costs Too Much to Own

THE COST REDUCTION MESSAGE:

- Must be Large (20% - 50%)
- Must be Now



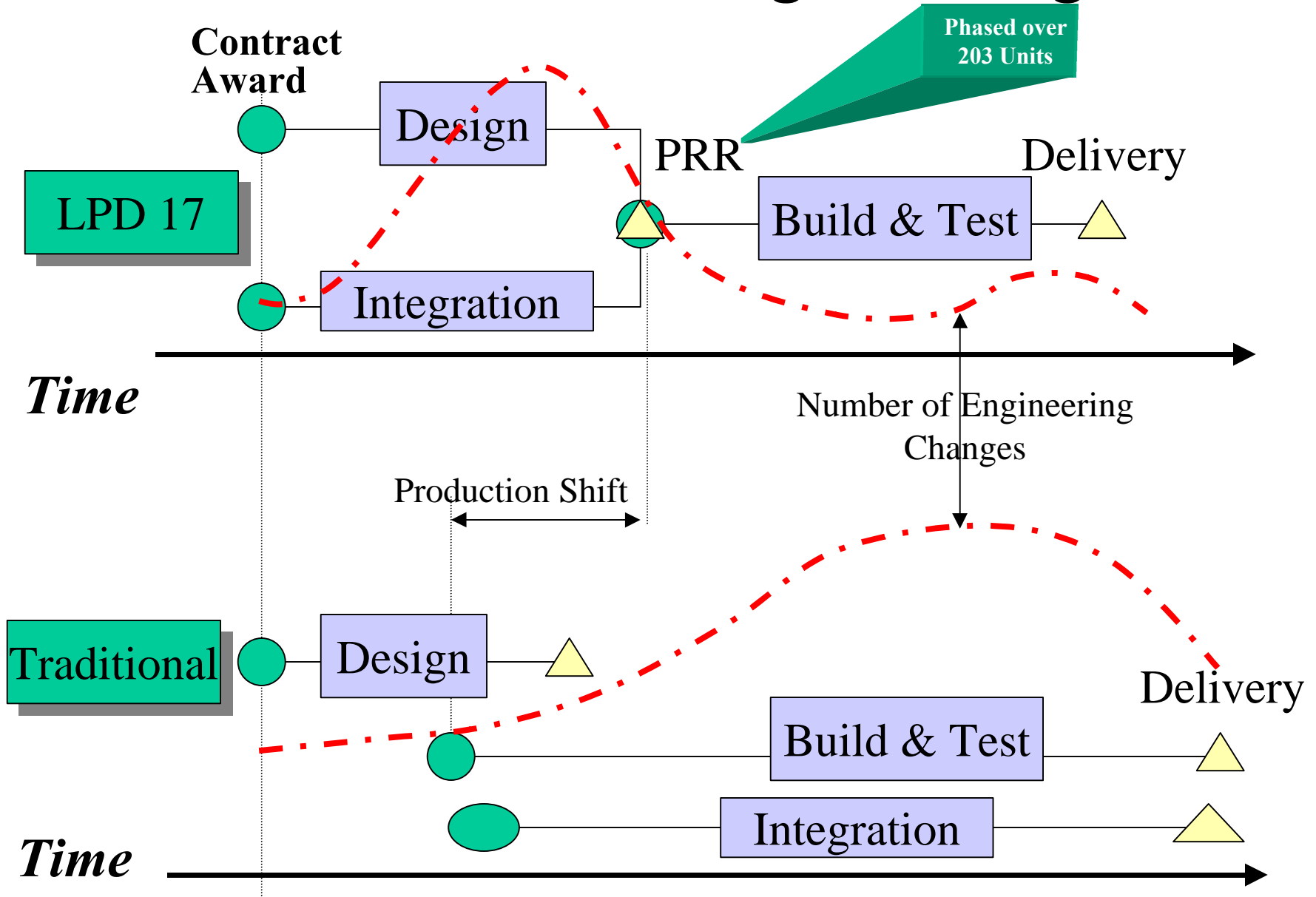
How LPD 17 Is Different



- Emphasis on Approach to Reducing Total Ownership Costs (TOC)
- Government/Contractor IPPD Approach
- Integrated Product Data Environment (IPDE)
- Master Integrated Resource and Work Schedule (MIRWS)
- Production Readiness Review (PRR)
- Long Term Relationship for follow on construction contracts, Life Cycle Support Planning option and future Planning Yard Contract
- Final Contract Incentive Clause



LPD 17 Concurrent Engineering



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LPD 17 TOC Vision



ACHIEVE LARGE TOC REDUCTION

- Design, produce, support and dispose of the LPD 17 Class with the lowest achievable Total Ownership Cost (TOC)

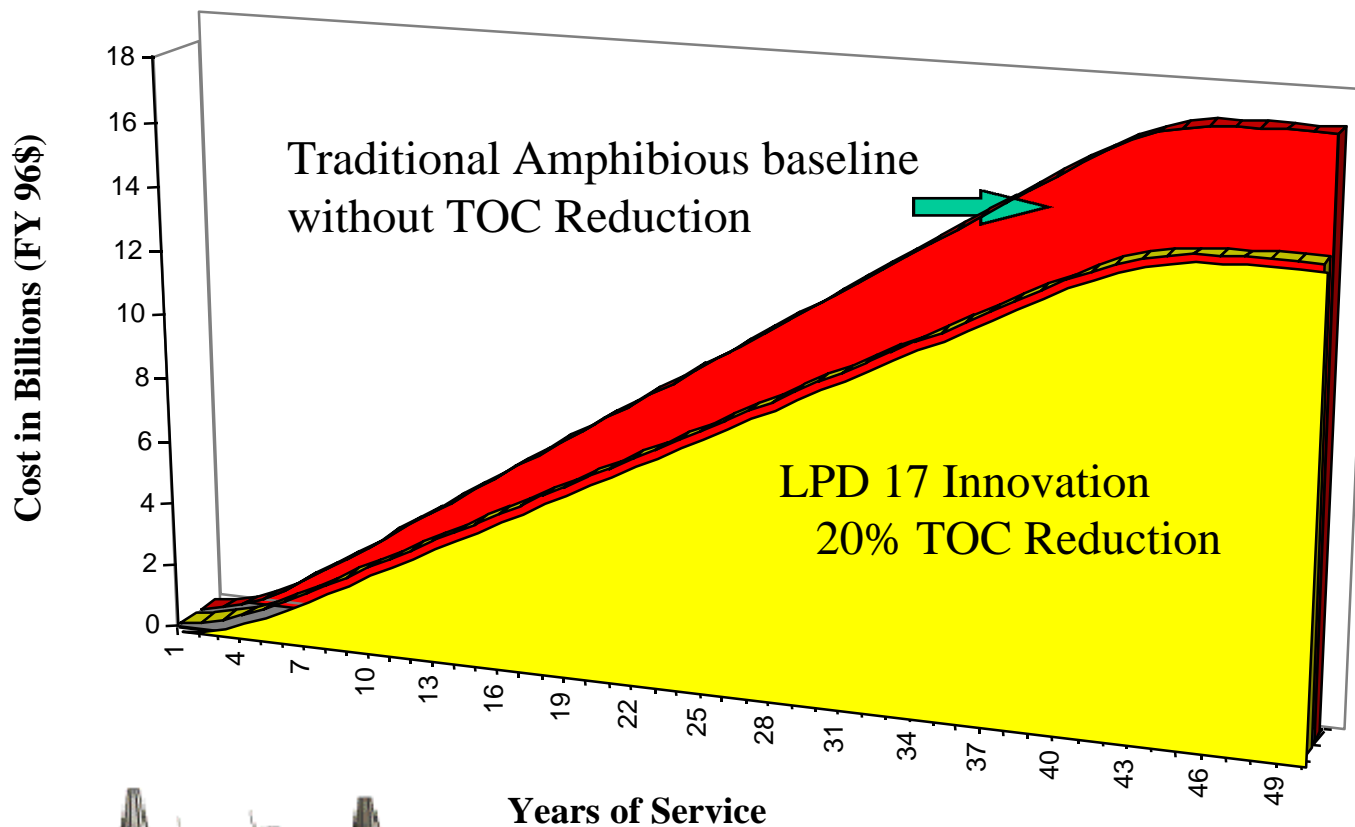


Focus on Operational Support Cost



Target \$5.2 Billion in Savings

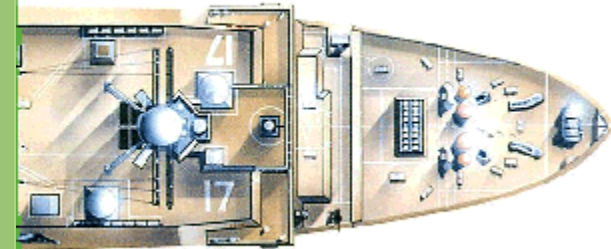
LPD 17 Class O&S Cost Target



LPD-17 Total Ownership Cost (TOC) Perspective



Operating and Support expenses will be 2/3 of the Total Cost of LPD 17 over its 40 year life cycle



- **1st Navy Shipbuilding Program To Invest in TOC!!**
 - PMS 317/Avondale Alliance striving for TOC avoidance
 - Seeking construction and operational efficiencies
 - Current level of investment : \$18M/ship
- **TOC Reduction Goal of 20% O&S = \$5.2B** (MS II estimate updated using COMET model for manpower cost)

\$3.2B in TOC avoidance



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LPD 17 TOC Reduction Approach



- Key Program Focus
- TOC Conscious environment
- New Processes Developed/In Use
- Achieving Large Savings
- Additional Investment = Additional TOC Reduction



Cornerstones of TOC Reduction Approach



- Integrated Process and Product Development (IPPD)
- Integrated Product Data Environment (IPDE)
- Integrated Management Plan (IMP)
- Master Integrated Resources and Work Schedule (MIRWS)
- Designing for Ownership (DFO)
- Concurrent Engineering and Supportability Analysis (CESA)



TOC Strategic Objectives



- Implement a team wide methodology/process
- Identify critical TOC drivers
- Set aggressive, realistic cost objectives and targets
- Validate TOC Reduction
- Maintain Warfighter focus



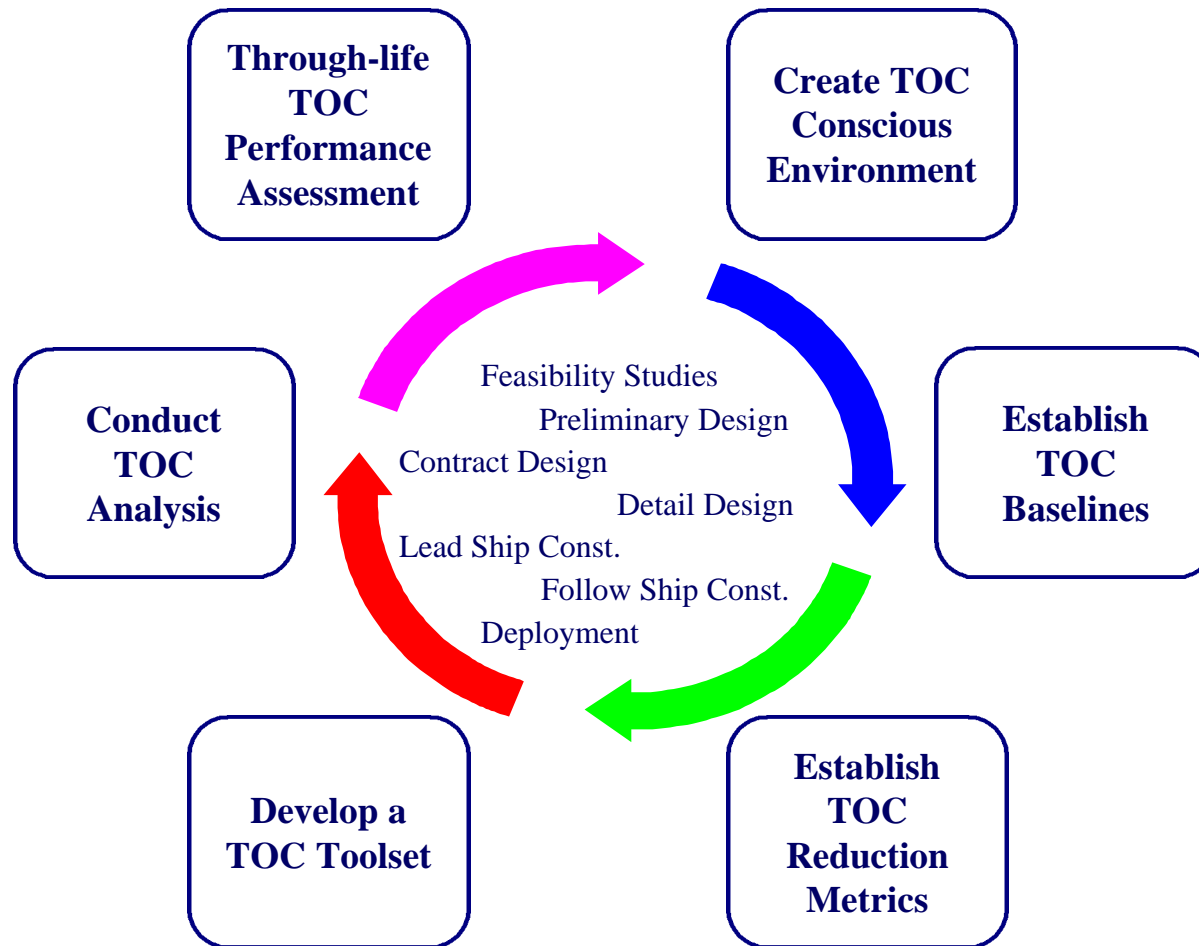
Agenda



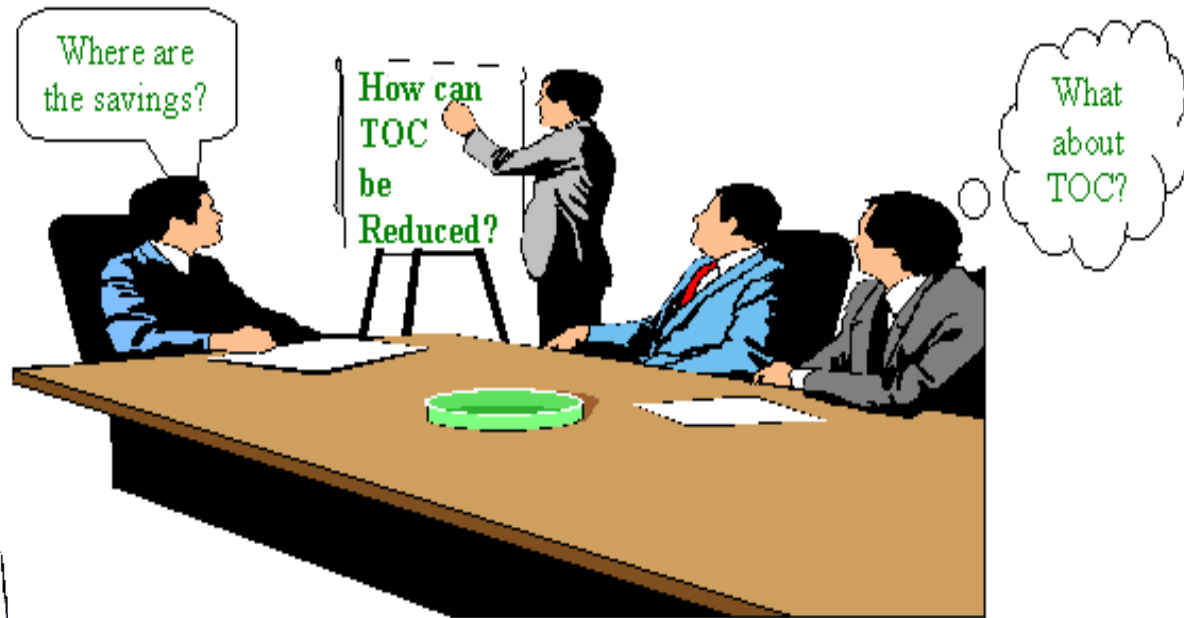
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TOC Reduction Program Methodology



TOC Conscious Environment



Team Wide TOC Focus



TOC Baseline



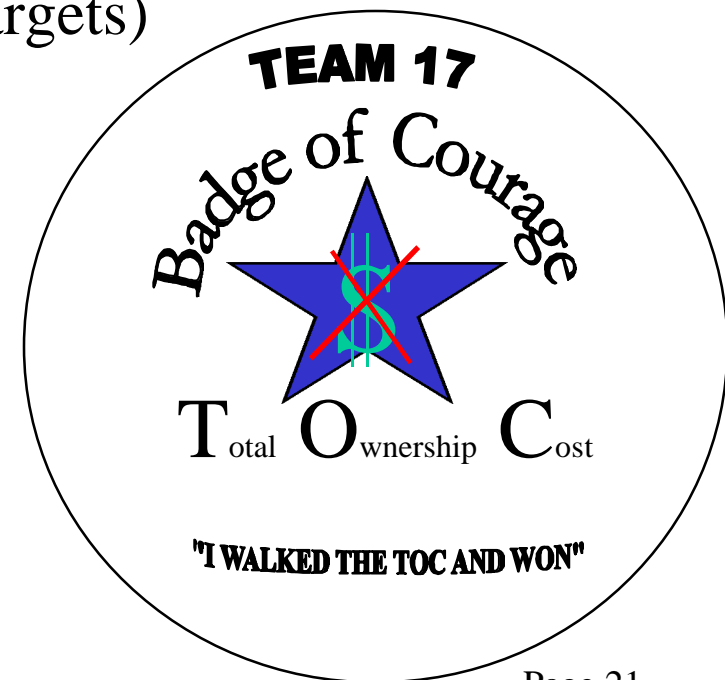
- TOC baseline established at MS II as the Program Manager Life Cycle Cost Estimate
- Program baseline revised to reflect higher manpower costs in accordance with COMET



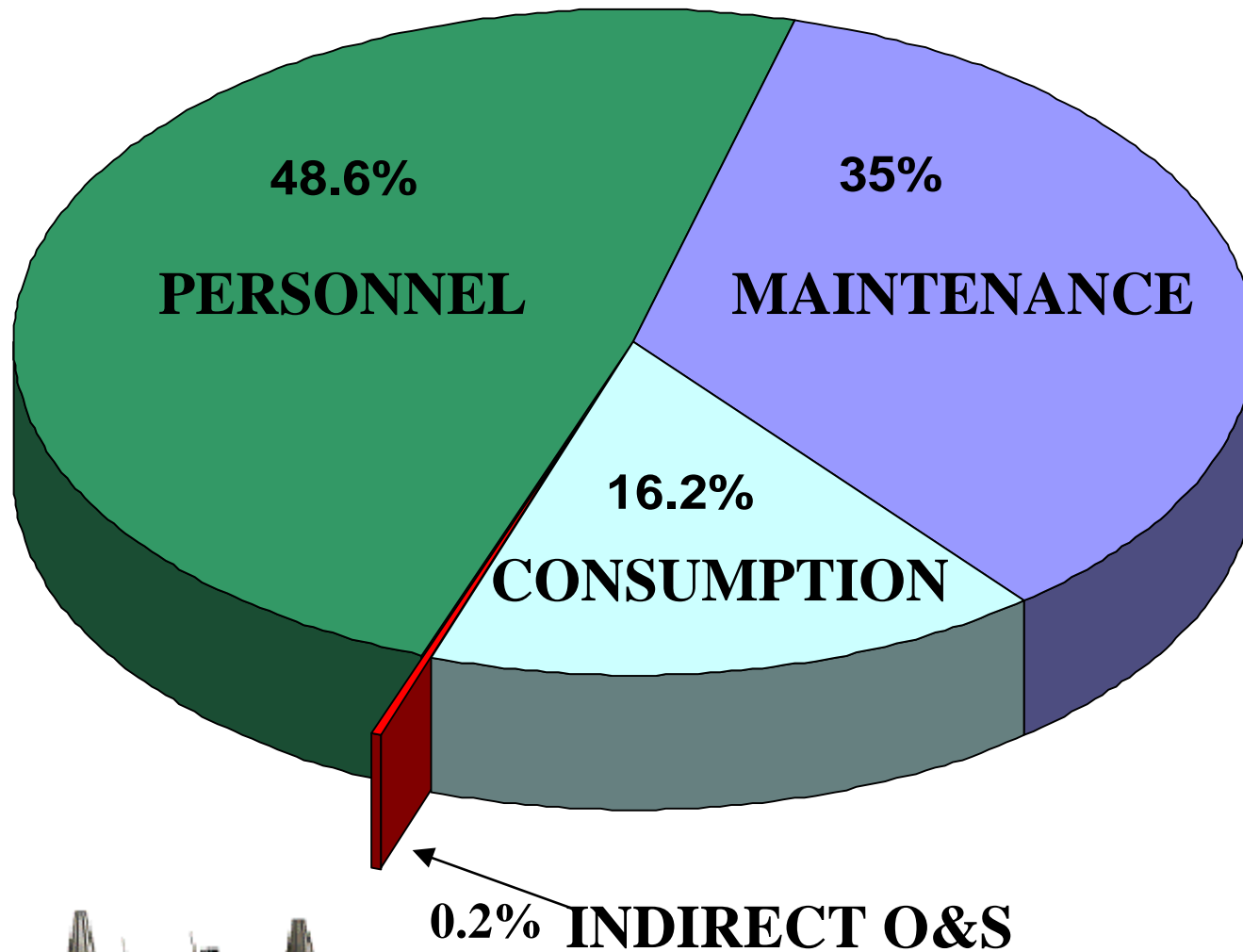
Establish TOC Reduction Metrics



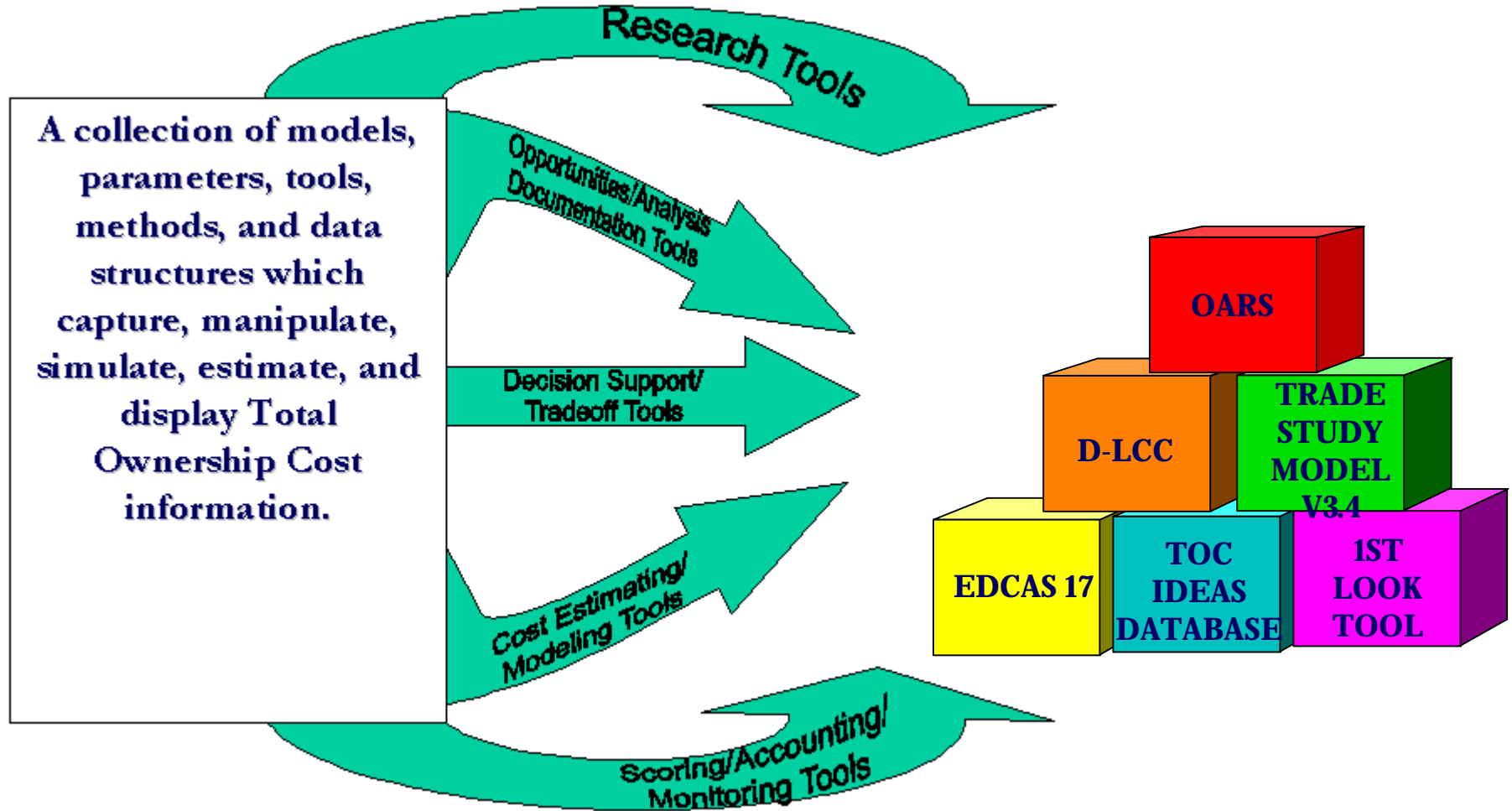
- Identified high level TOC drivers
- Identified lower level TOC drivers
- Identifying TOC opportunities
- Allocated initial TOC metrics (targets)
to IPTs



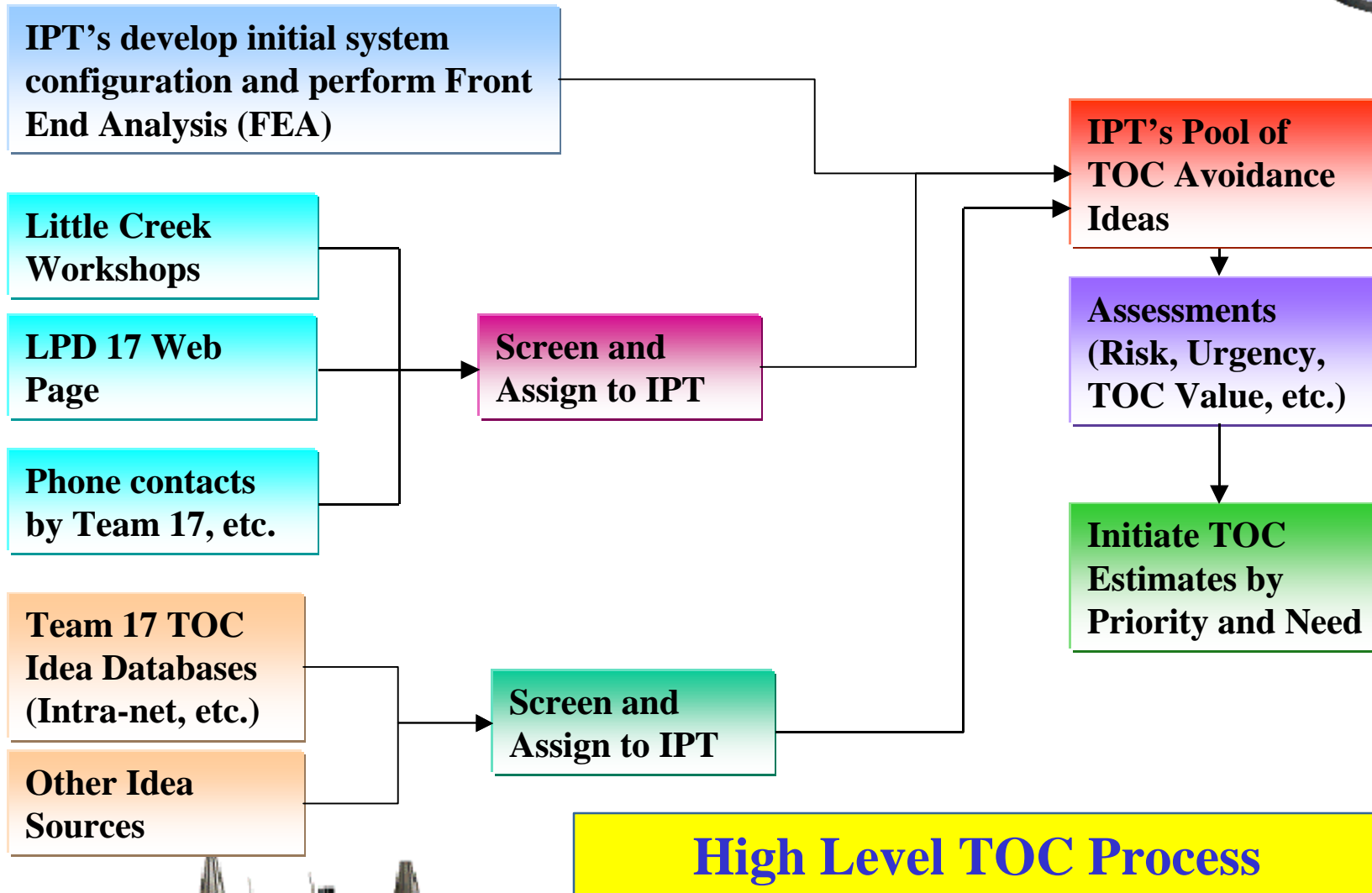
Operating & Support Cost (baseline plus comet)



Develop TOC Toolset



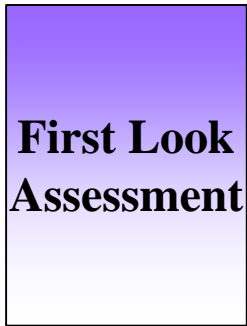
Conduct TOC Analysis



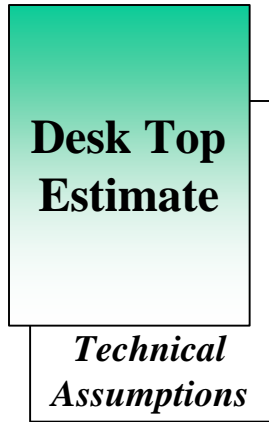
Progressive Levels of TOC Estimating



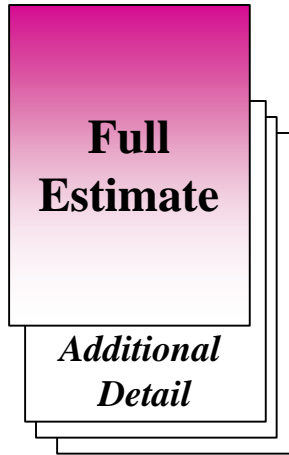
Value Assessment | Progressively More Detailed Levels of Estimates



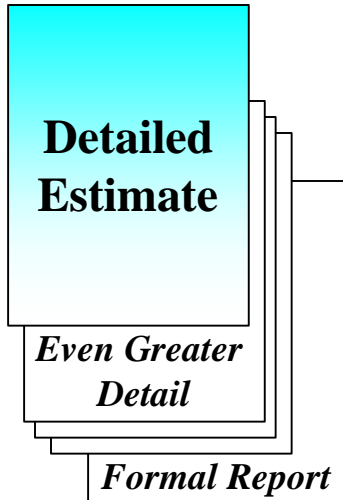
- Sanity Check
- Quick Simple
- Non-dollar
- Prioritize Ideas For TOC Estimating
- Possible Originator Estimates



- Good Basic TOC Impact Estimate
- Program, Service, Risk Assessments
- Categorize for Decisions and Next Steps



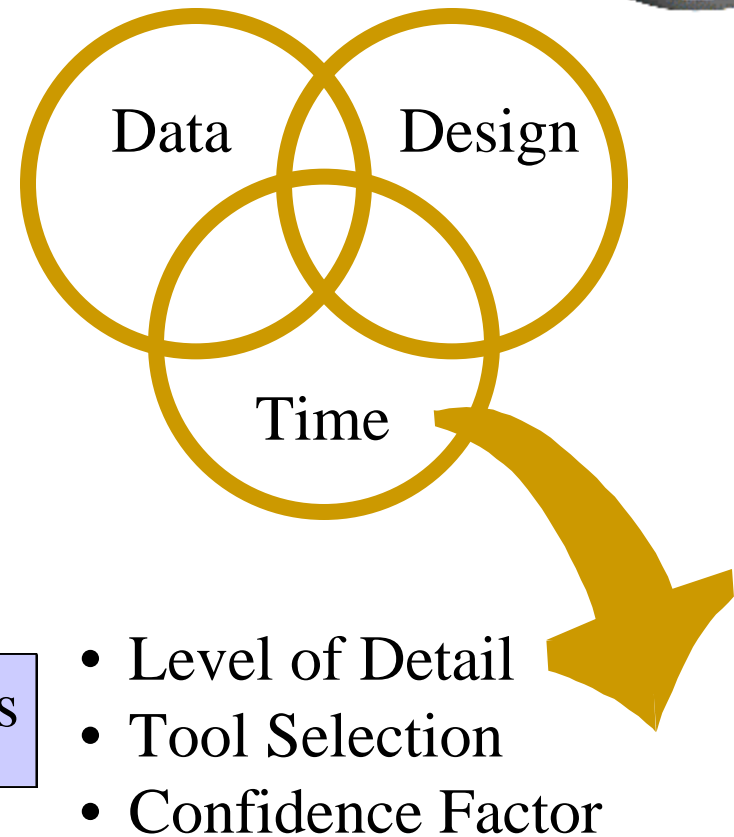
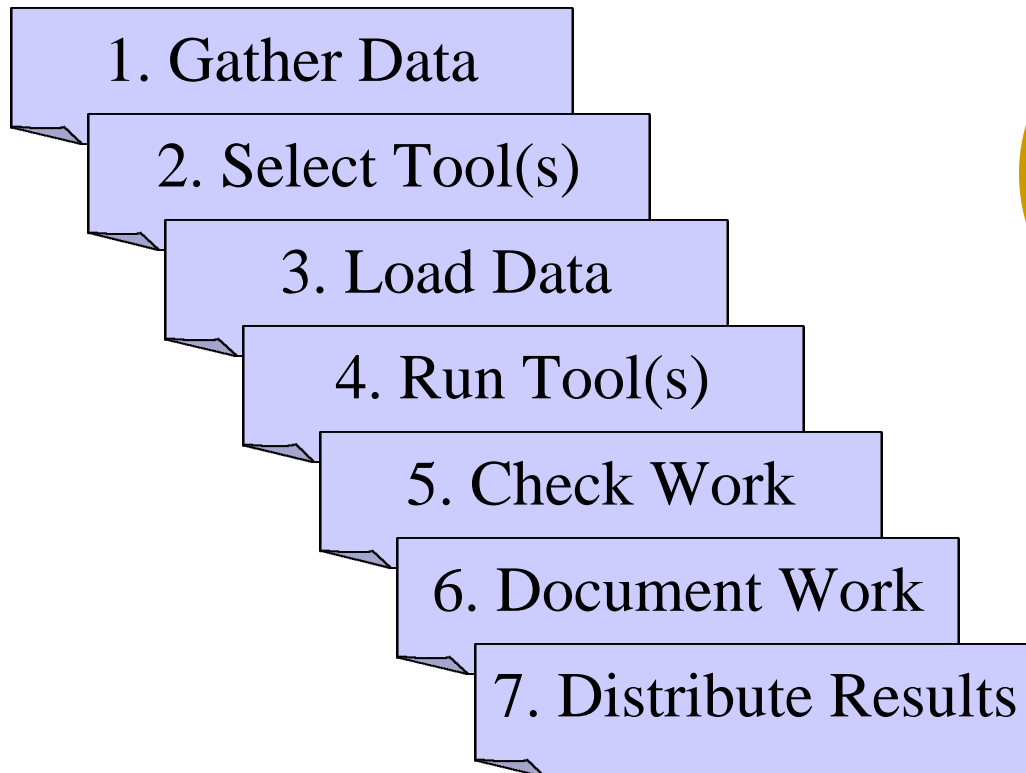
- More Source Data Research & Analysis
- Deeper Detail
- Refined Assessments
- Higher Confidence Investment Decisions



- Deeper and Broader
- Used for Extremely Complex Issues
- Decisions that Must Withstand Serious External Scrutiny



Seven Step Process



Basic steps apply in all levels of TOC estimating



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TOC Reduction in Design



Item: Refrigeration Plant

Original Design

Four 1.5 ton refrigeration plants
4 Units create complex system
Extensive time and training to shift online compressors
Overcrowded Space - accessibility and maintainability issues
High amount of corrective and preventive maintenance
33 1/3% Operational Redundancy

**Maintenance Driver
&
Cost Avoidance
Opportunity**

=



Revised Design

Two 4.6 ton refrigeration plants
Design is less complex to operate
Standard design (except compressor)
PMS is 1/2 requirement for original design
Reduced corrective maintenance
100% Operational Redundancy

=

**Reduced
Maintenance
&
~\$4.3M TOC Avoidance
per ship**



TOC Reduction in Design



Item: Ship Service Diesel Generators

Original Design

Five 2500 kW diesel generators
Required to accept transient load in one step
Results in larger than optimum diesel for given load

- Results in running at light load
- Reduced efficiency
- Reduced service life
- Increased maintenance

=

**Maintenance Driver
&
Cost Avoidance
Opportunity**

Revised Design

Five 2500 kW diesel generators
Requirement revised to accept transient load in two steps
No impact to operational performance
Allowed selection of more optimal (smaller) diesel

- More efficient
- Longer life
- Reduced maintenance

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**Reduced
Maintenance
&
~\$12M TOC Avoidance
per ship**



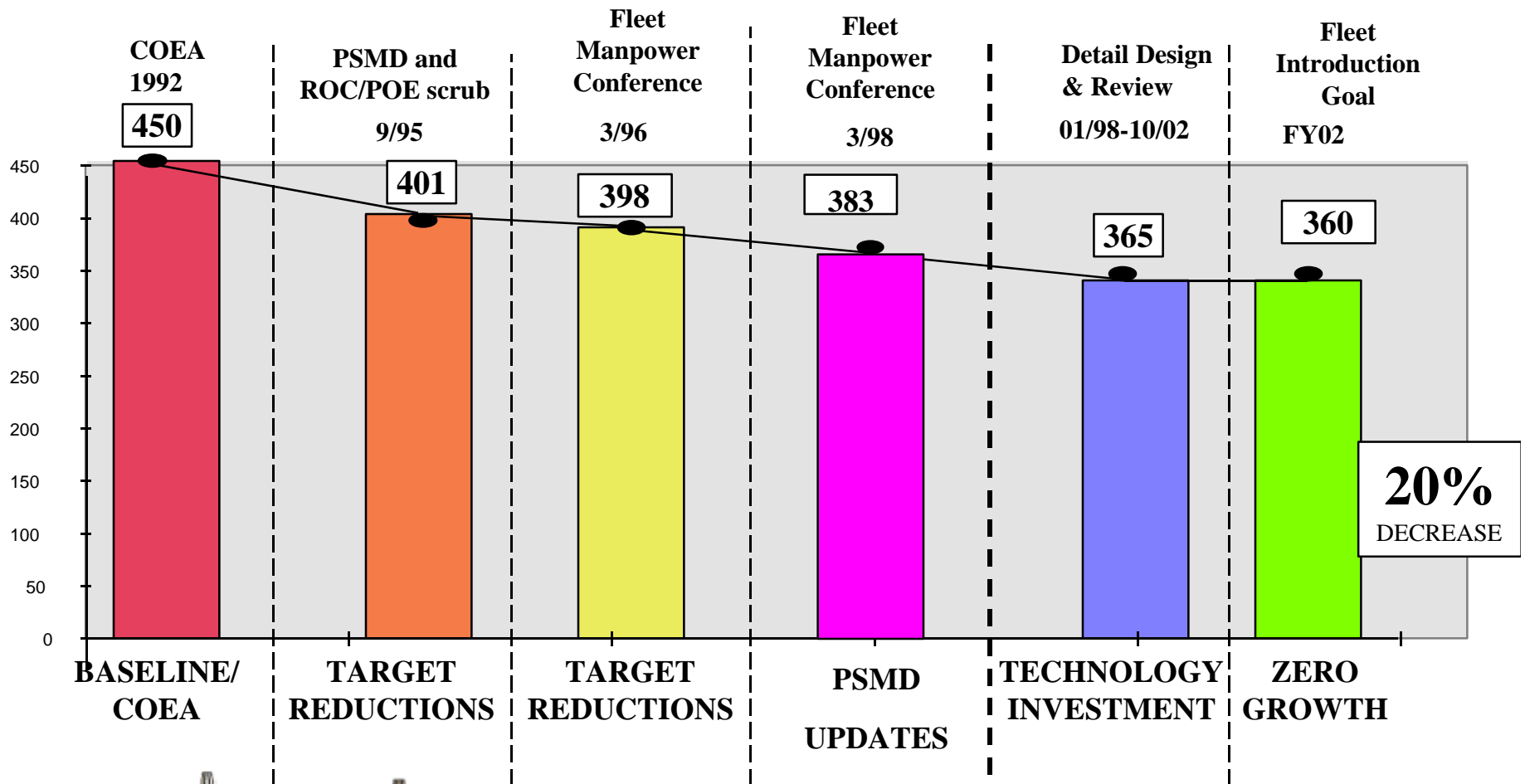
Additional TOC Reduction Achievements in Design



- Twin Screw Refrigeration Plants vs Navy STD (\$51.6M TOC)
- Hellan Sea Water Strainers (\$48M TOC)
- Solid Decking in the Machinery Spaces vs Grating (\$32M TOC)
- Reverse Osmosis Plants vs Navy STD 12K GPD (\$24M TOC)
- 10 GPM Oily Water Separator vs 50 GPM (\$22M TOC)
- Self Cleaning Lube Oil Filters for the Diesel Engines (\$15M TOC)
- No Attached Pumps on the Main Propulsion Diesel Engines (\$9M TOC)
- Diesel Engine & Central Jacket/Freshwater Temp Storage Tank (\$6M TOC)
- Anchor Washdown System (\$0.5M TOC)



LPD 17 Manning “Working the Process”

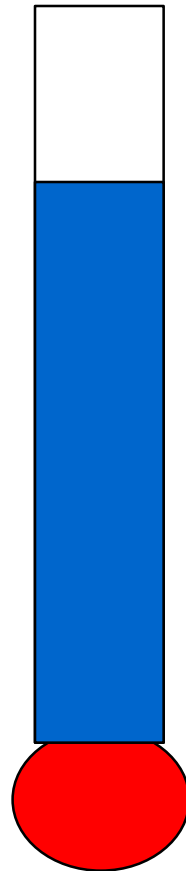


Measuring Our Success



Goal = \$5.2 Billion in Cost Avoidance

**Manning (353),
SSDG, LO/FO
Pumps, Seawater
Strainers**



**AEM/S, Food
Service, Refrigeration,
RO Units, MRG Lube
Oil Sump, CHT Pump,
HP/MP Air, Life Rafts**

**\$3.2B Cost
Avoidance**



Summary of Successes



- TOC is a key consideration in all decisions
- Team 17 approach and processes to TOC Reduction were reviewed by NCCA (September 98)
- PMS317 TOC Reduction Plan considered the model for other programs by ASN TOC Plan Review Team and well received by NARSOC Council
- Initiatives to date contribute over \$3.2 Billion avoidance in O&S costs



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TOC Lessons Learned



- Develop TOC Vision before implementation.
- Lack of proper Contractual/SOW language.
- Determine baseline to be used to measure TOC performance from the beginning
- Develop entire TOC process before implementation, whenever possible.
- Establish database of relevant government O&S cost returns and studies.



TOC Lessons Learned (Continued)



- Do not get hung up on precision early.
- Make sure the right resources are in place from the start.
- Train your people on TOC prior to implementation.
- Be prepared to spend more money upfront, not less.
- Get Government and Contractor on the same side.



Questions



.... And Answers?

