

GENERAL DYNAMICS

Affordability in Shipbuilding

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Summary of Key Points

- **Describe the Design Build Process and its impact on affordability**
- **Describe actions to facilitate affordability**
 - **Design Build**
 - **Collaborative environment**
- **Examples**
 - **VIRGINIA – Cost Plus**
 - **T-AKE – Fixed Price**
 - **Commercial Ships – Fixed Price**



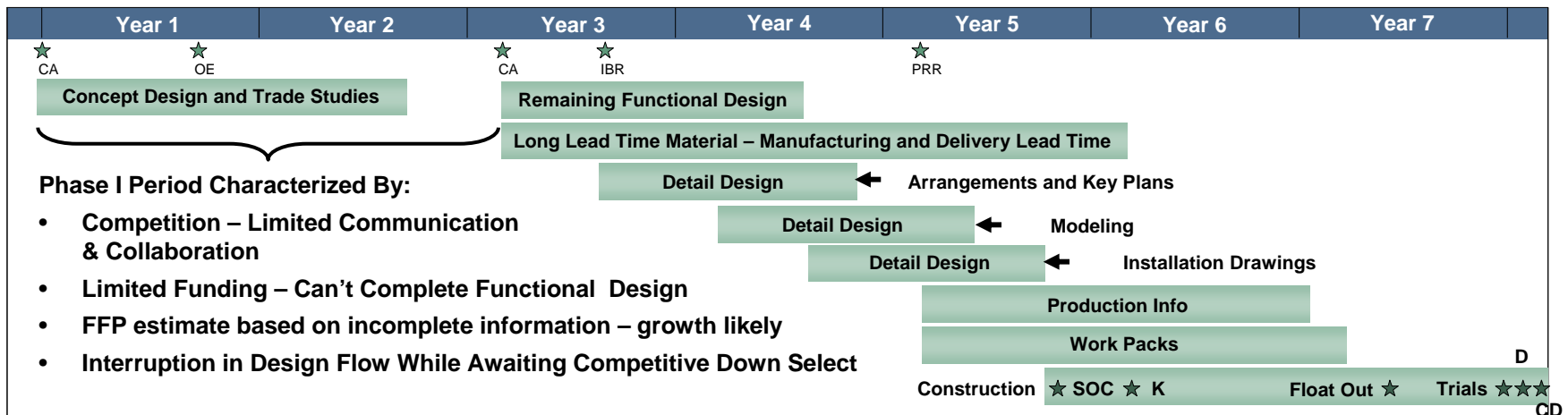
Design-Build Objectives

- Design high quality, low cost, mission-ready ships which meet the operational requirements of the Navy
- Establish a cost effective process that ensures the design is complete, material is available and work packages are developed prior to construction start
- Develop a cost effective ship construction plan
 - Increase Modularization
 - Reduce construction labor and cost – Goal: Achieve 3rd ship learning curve on the lead ship
 - Reduce design changes identified by trades during construction



Traditional Acquisition Strategy

Limited Collaboration, Maximum Cost and Schedule Risk



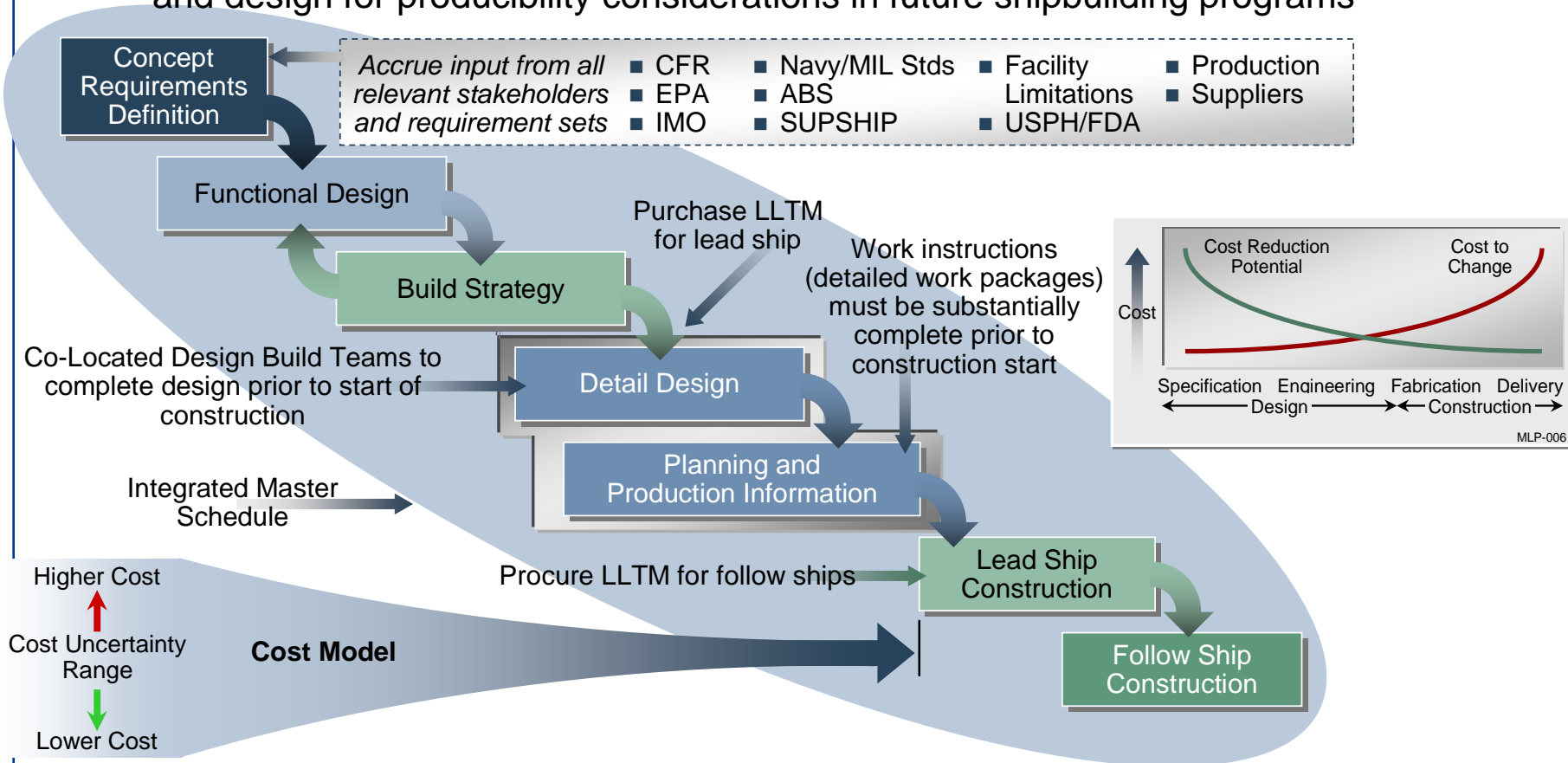
● Phase II Period Characterized By:

- End of competition typically results in significant design changes
 - Impacts schedule – causes shipbuilder to revisit early decisions, delays detail design
 - Impacts cost performance – Phase II FFP bid inadequate, shipbuilder financial risk
- Must expedite functional design to start detail design and support LLTM Order
 - World shipbuilding boom – LLTM in excess of 32 months
 - Forces design decisions that fail to optimize total cost
- Significant Overlap between functional and detail design – rework
- Significant Overlap between detail design and start of construction
 - Lack of a mature design at SOC results in poor cost and schedule performance
 - Build strategy is sub-optimized – construction sequence is sacrificed

Design Build Acquisition Strategy

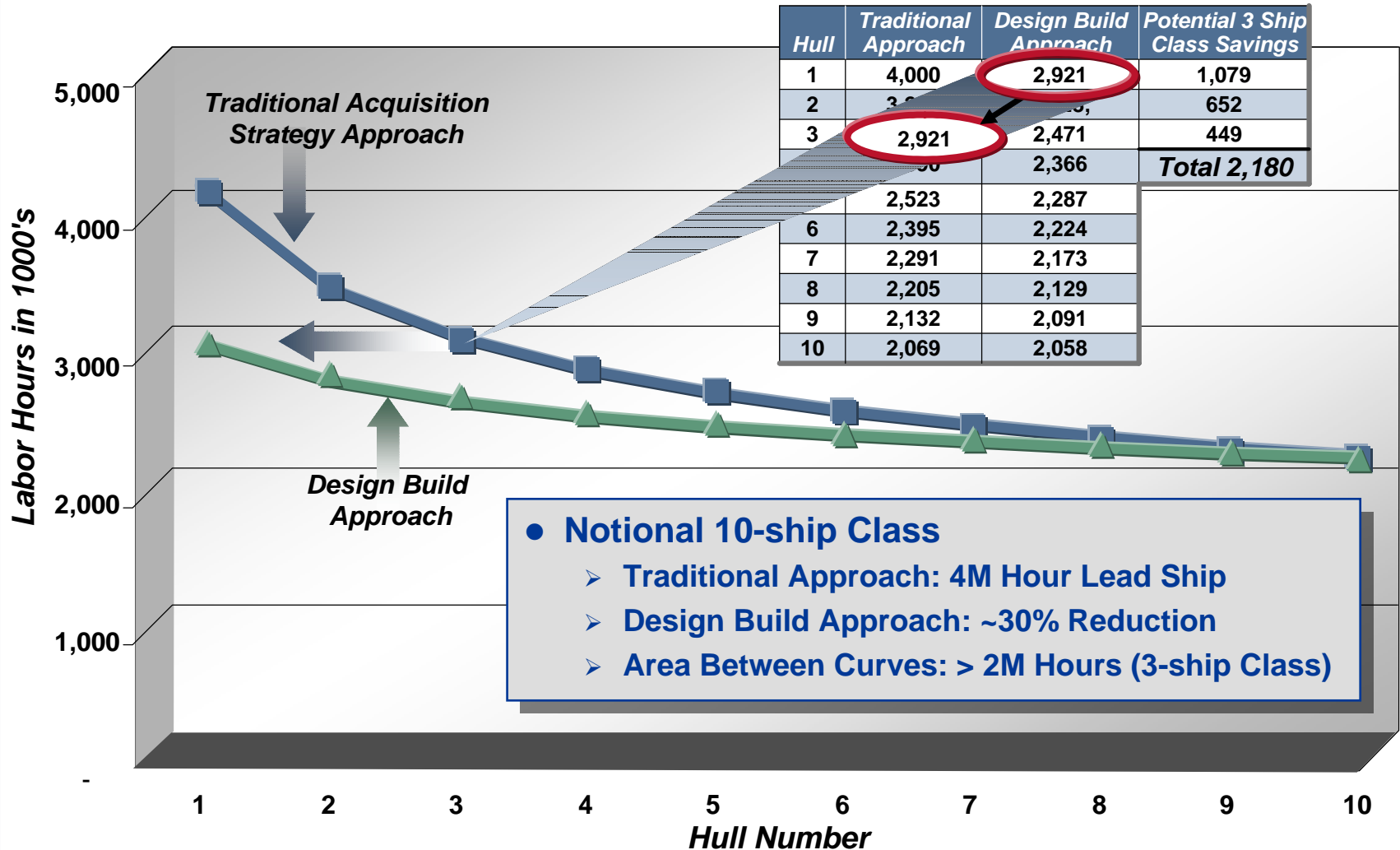
Establishes Potential for Success

- For US Shipbuilding to be affordable, a paradigm shift must take place
 - Create Govt/Shipbuilder partnership early enough to maximize impact of collaboration and design for producibility considerations in future shipbuilding programs



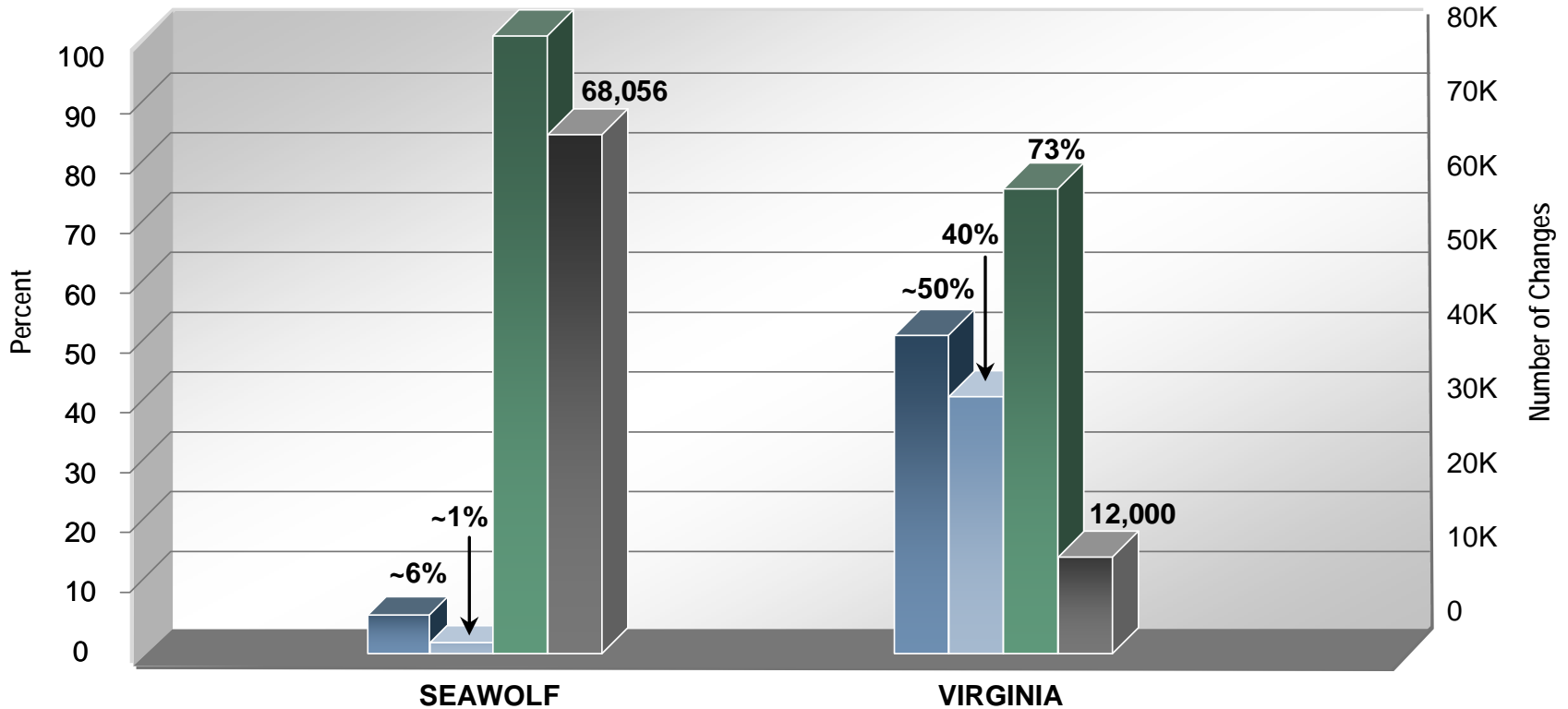
Traditional Versus Design Build Approach

Lead Ship at Third Ship Cost



Design Build in Practice

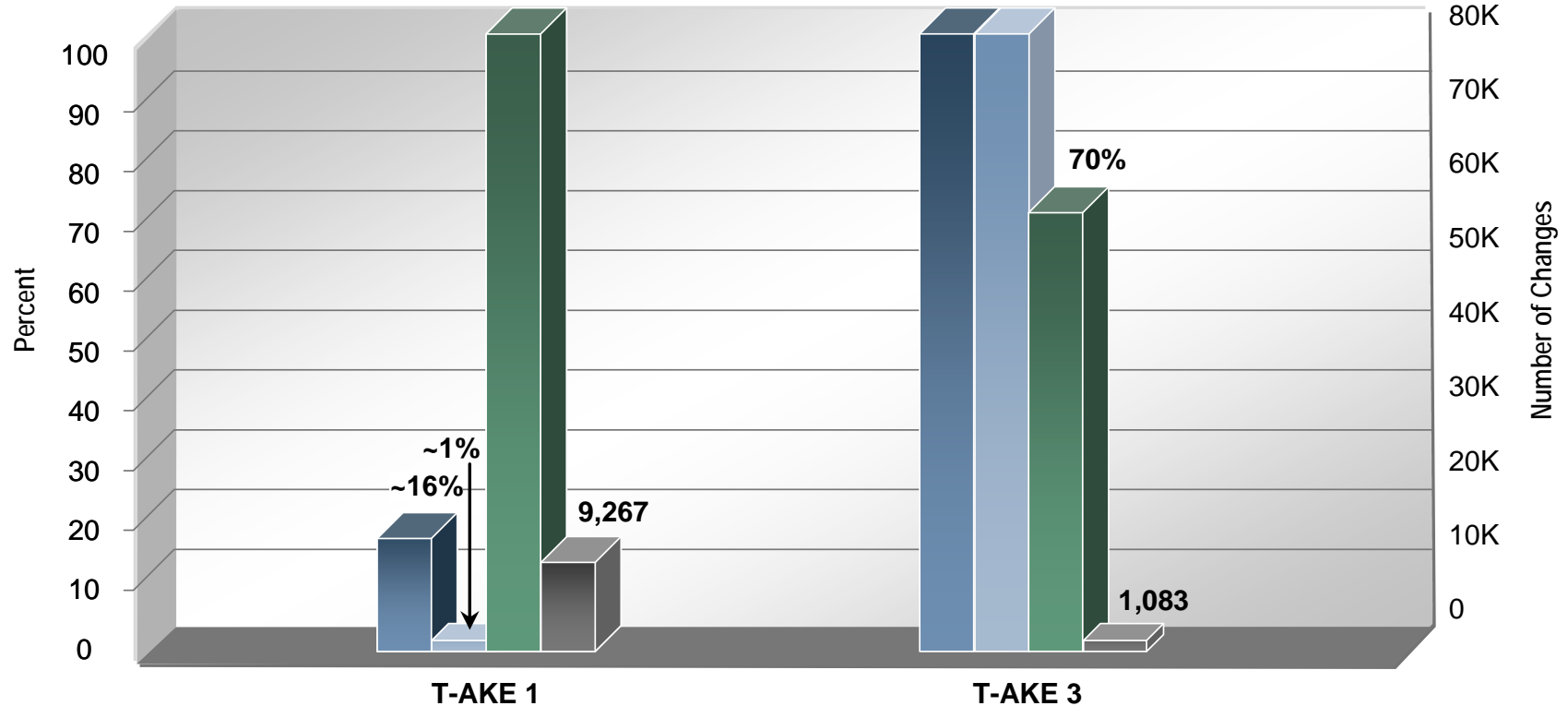
SEAWOLF and VIRGINIA Submarine Programs



- Percent Design Complete at SOC
- Percent Planning Complete at SOC
- Percentage of Construction Manhours Comparison
- Number of Trade Identified Construction Changes at Delivery

Design Maturity at SOC Reduces Cost

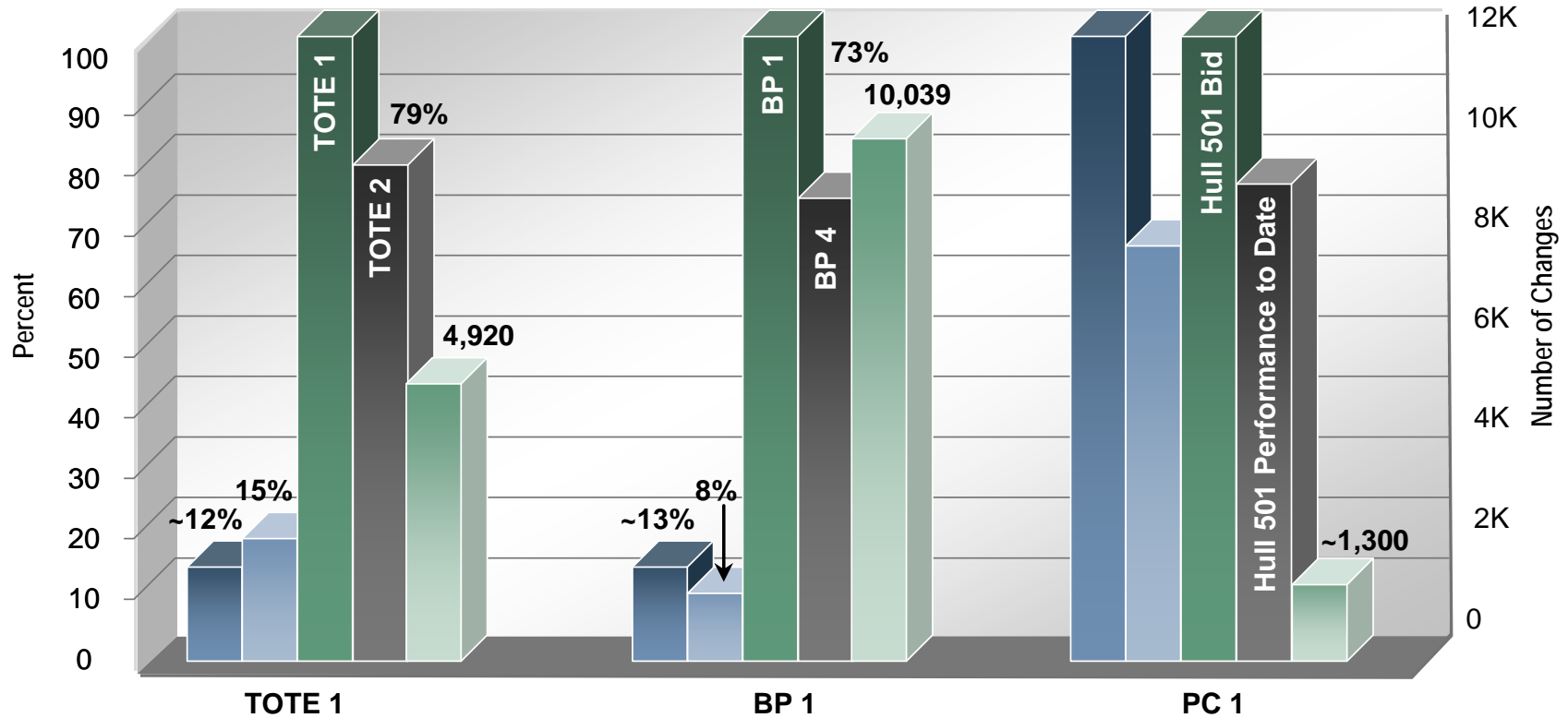
T-AKE 3 Represents a 30% Reduction in Cost



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Design Maturity at SOC Reduces Cost

Commercial Shipbuilding Examples



Conclusions

- **The Government/Shipbuilder Team must Change the Navy Acquisition Strategy to Achieve the Desired Outcome**
 - Realistic Cost Estimating
 - Predictable Schedule Performance
 - High Quality, Mission Ready Ships
- **Shipbuilder Focus:**
 - Early Requirements Definition
 - Early Functional Design Completion
 - Work Paper ready at SOC
- **Government Focus:**
 - Short Competition for Good Ideas
 - Maximize Opportunities for Collaboration Before the Start of Detail Design
- **Design-Build Represents the Way Ahead – Results are Well Established**
 - VCS Program – 27% reduction in lead ship labor hours
 - PC-1 Program – Lead ship on schedule, under budget, minimal design change

