

Acquisition Research Symposium

A Case for Continuous Concept Development in Ship Design

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Research Question

- **How can we change the beginning of the JCIDS and DAS to add agility and learning to the process, maintain the spirit and intent of the guiding documents, and reduce the cycle time of the entire process to deliver relevant capabilities to sailors faster?**

Motivation and challenge

Strategic Competition

- Maintain advantage

Speed of change

- Adapt to change

Long acquisition cycle times

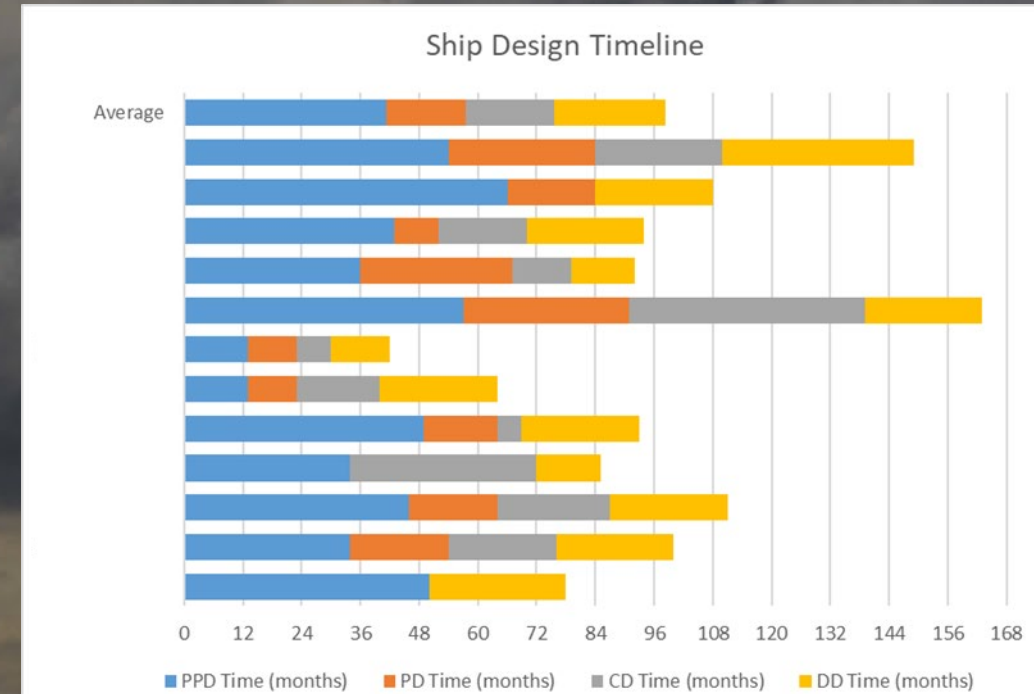
- Manage changing requirements

Long service lives

- Maintain relevance

Increased complexity and complicatedness

- Manage uncertainty, difficulty





Surface Combatant Force Analytical Engine

Current State – Islands of Analysis

Strategic
(FYDP +25)

Future Surface Combatant Force (FSCF) Analysis
Mission and force level modeling against evolving future threats. Provides the warfighting effectiveness framework to inform Resource decisions to evolve the capacity, capability, and employment of the surface combatant force over the long time horizon.

Operational
(FYDP +2)

Naval Capabilities Integration Process – From the Sea (NCIP-FTS)
Threat-based analysis examining current and near-future Navy capabilities through a quantitative mission and campaign modeling, simulation, and analysis (MS&A) architecture. Fully integrated with NCIP-FTA, -IW, and -MC.

Tactical

Next Generation Strike Weapon (NGSW)
Dynamic enclave of threat models to validate effectiveness of current & future weapons, systems & concepts

Other internal studies
Branch, division, directorate, or program office led studies for individual, typically focused questions.

Other external studies
Individual studies to support OPNAV analytic priorities.

Foundational
(Continuous)

Collaborative Enduring Concepts and Tools (COLLECT)

- *Small investments in design tools (CREATE) and workforce development (CISD).*

Individual Analyses answering analytical questions with awareness of each other but no explicit integration of efforts.

RESPONSE

Toyota and SBCE

- Global automotive competition, speed to market

SBD

- Addresses complexity, complicatedness, competition
- Mapping design space, reducing rework, delaying decisions

Flexibility

- Addresses speed of change, cycle times, service lives, relevance
- Value sustainment, options, preparations

Predicament

- Limited documented SBD history in literature for startup
- Flexibility is generally considered an 'emergent' property
- Value proposition in public sector, no profit motive





<https://www.dvidshub.net/image/2603348/160421-n-ye579-005>

METHODOLOGY

Action Action Research

SBD Establish and execute SBD Process

Flex Establish and execute flexibility framework within SBD



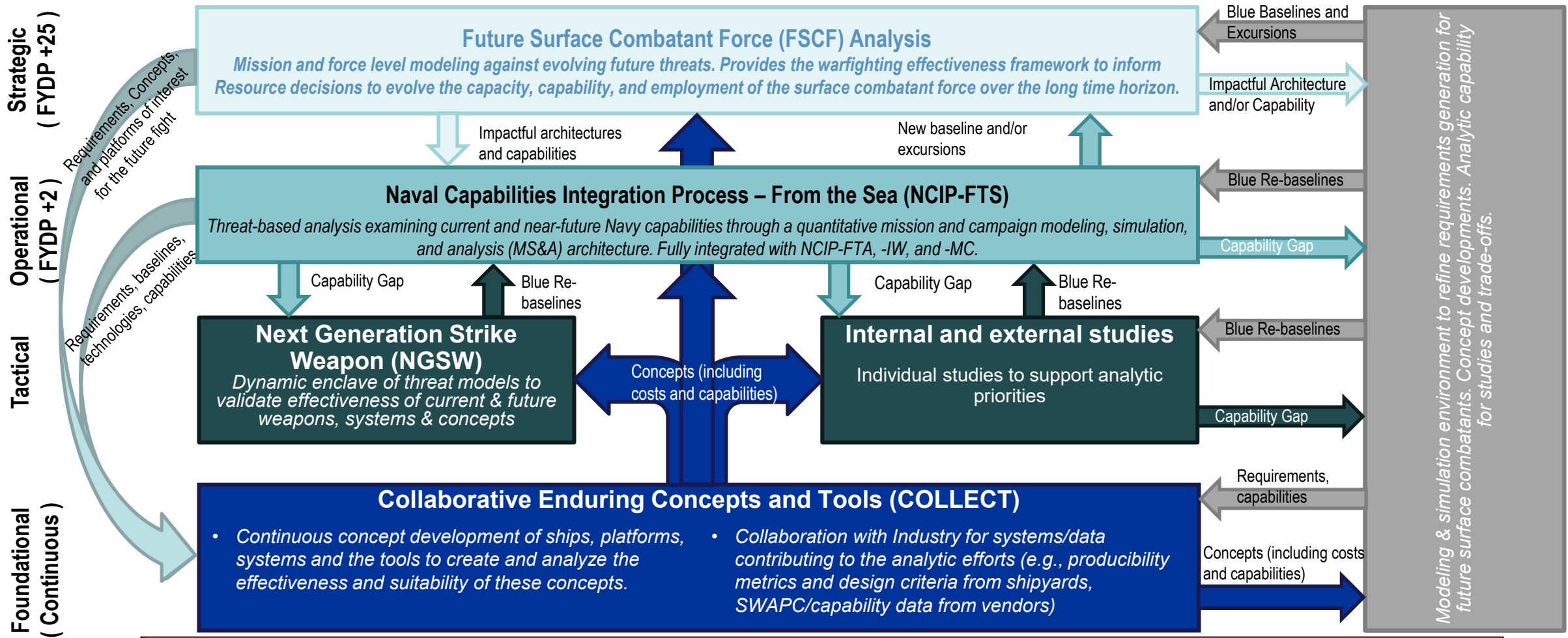
Results and Recommendation

- **Process worked and scaled to system of systems level**
 - Confident it will scale to Surface Enterprise level
- **Concurrent requirements and design**
 - Help resolve the paradox of requirements process: rigid requirements bound to change over time, but flexible requirements are not really requirements
- **Flexibility framework can identify and analyze uncertainties**
- **Continuous analysis and concept development**
 - Instead of status quo platform-by-platform approach
 - Develop generalizable and transferrable knowledge
 - Continuously validate CBAs and AoAs
 - Continuously develop concepts to support those and support transition to prelim design



Surface Combatant Force Analytical Engine

Future State - Data-driven foundation to inform Resources and Requirements



Fully integrated layers of threat-based analysis informing Requirements, Concept development, and resourcing decisions. The Engine operates at classifications from UNCLASS//CUI to SCI analyses and concepts.