



# Identification of NSWCCD Modeling Gaps for MBSE Installation

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## Client Description

- Located in Dahlgren, VA
- NSWCDD is a warfare center for NAVSEA, which is operated by the United States Navy
- Provides research and development, and certification of naval warfare systems

## Project Background

- NEEC Grant:**
- The Naval Engineering Education Consortium (NEEC) Grant is a three year project between the U.S. Navy and Virginia Tech
  - ISE Senior Design Team 38 is a participant in Block 1 of this grant, tasked with identifying modeling gaps
  - Model Based Systems Engineering (MBSE) is a premier approach to bridging modeling gaps

### Project Description:

- Stage 1** Define Model Based Systems Engineering and identify drivers for implementation
- Stage 2** Create a tool to analyze and compare phases of NSWCCD's Engineering Process
- Stage 3** Assess where MBSE implementation can provide the largest value

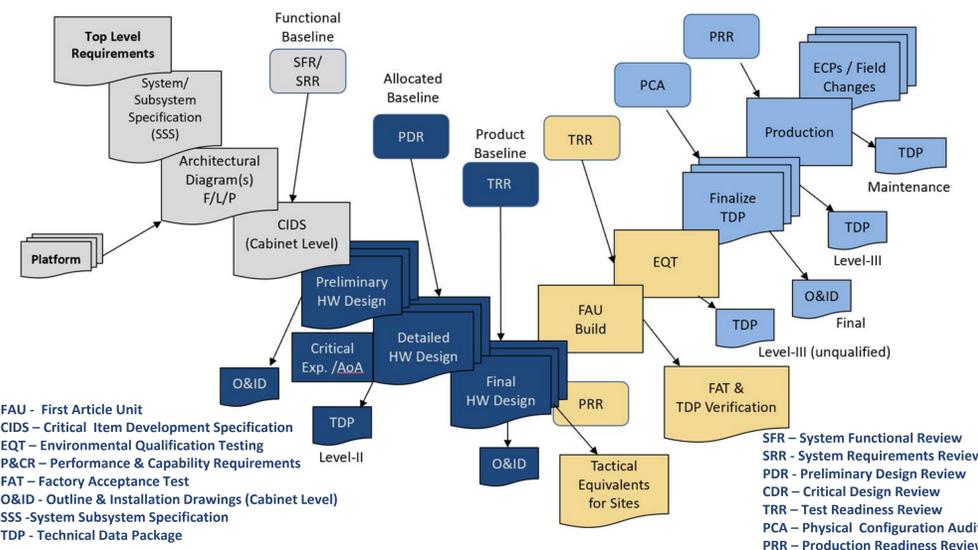
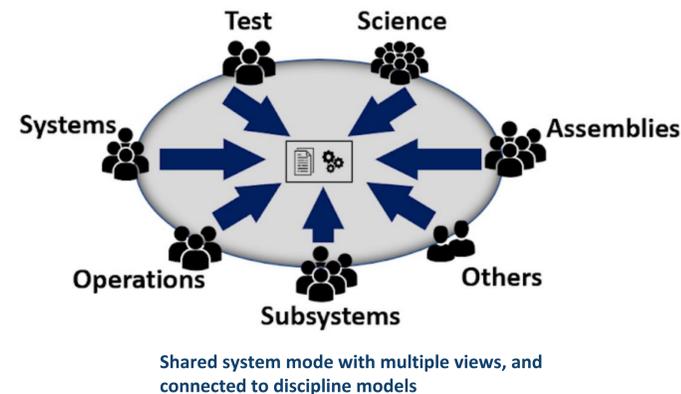
## Solution Approach

### Model Based Systems Engineering:

Central database that allows all teams involved in the engineering process to work on the product model at once

### Drivers of MBSE:

- Provides more capability
- Reduces manual work/time
- Decreases number of document-based files
- Reduces need for rework



### NSWCDD Engineering Design Process

- Each product NSWCCD creates goes through this process
- Broken up into four phases: Requirements Definition, Design Review, Prototype Build and Testing

### Process Evaluation Scorecard:

→ Blended MBSE Drivers into four independent categories

→ Weights and values inputted by the client to show evaluation of NSWCCD Design Process

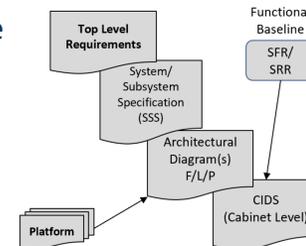
→ Values range from 0-100. The higher the value is, the more efficient NSWCCD is in the specific driver area

→ The phase with the lowest weighted total is deemed the phase with the most need for MBSE implementation

MBSE Drivers	Normalized Weights	NSWCDD Engineering Design Phases			
		Requirements	Design	Prototype	Test Readiness
Capability	45	35	50	85	90
Manual Work Time	38	40	33	40	50
Need for Rework	13	45	45	60	90
Documents Used	5	25	25	25	80
<b>WEIGHTED TOTAL</b>	<b>100</b>	<b>38.1</b>	<b>42.1</b>	<b>62.5</b>	<b>75.2</b>

## Results

The Requirements Phase in the NSWCCD Design Process possessed the lowest score at 38.1, and should be pursued.



### Current NSWCCD Requirements Phase:

- Duration of 6-9 months is not uncommon
- Product gets identity
- Physical paperwork created

### Possible MBSE Benefits:

- Reduced time in creating requirements
- Increased communication between teams and contractors
- Improved accuracy in identifying requirements

## Impact



- **Estimated Cost Savings: \$428,691**
- MBSE increases completeness and consistency of requirements, while improving communication between design teams
- Findings of ISE Senior Design Team 38 will be incorporated into Phase II of the NEEC Grant

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