

A Brief History of Shipbuilding Digital Technical Data

NSRP VIRTUAL
ALL PANEL MEETING
MARCH 2021



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Why do we care about the 3D Model-Based Definition?



Entered service : 21 October 1797
Years in Service : 223 years

DDG 51 Digital Data Transfer Program



SEAWOLF Digital Data Transfer Program



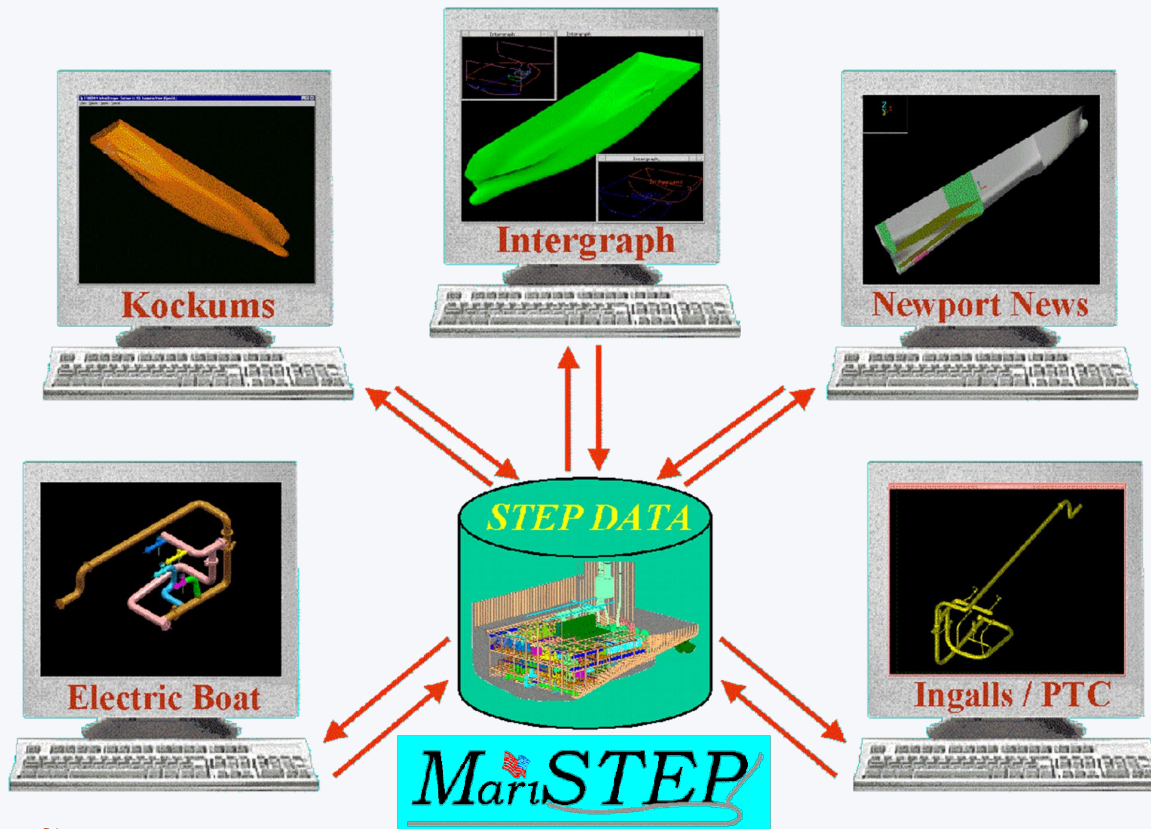
San Antonio Program



Zumwalt Program



EXCHANGING DESIGN AND CONSTRUCTION INFORMATION BETWEEN U.S. SHIPBUILDERS, SUPPLIERS, AND CUSTOMERS



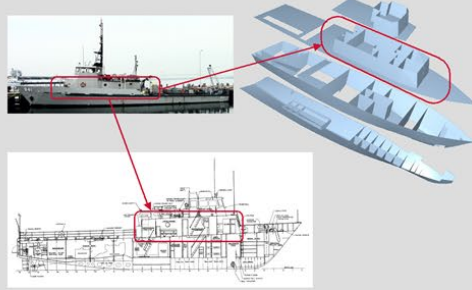
- Enable the virtual shipyard.
- Enhance the competitive position of the US shipbuilding industry.
- Improve the communication processes within the shipyard
- Improve the product model capabilities within the shipyard
- Standardize product model definition within the US marine industry

Evolution of STEP

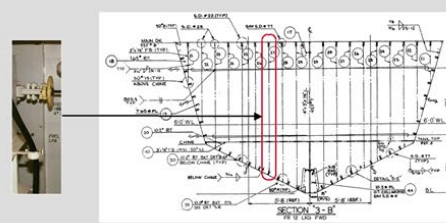


Evolution of STEP

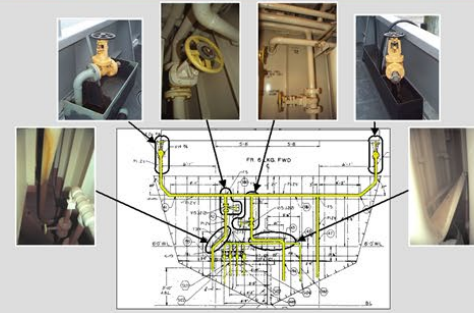
AP216 Ship moulded forms



AP218 Ship structures

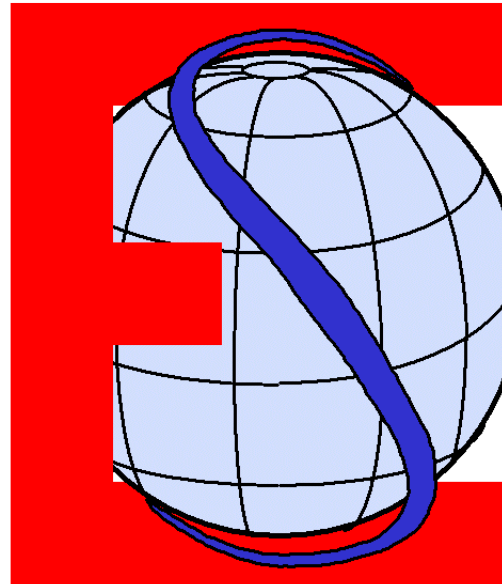


AP227 Plant spatial configuration



STEP Tools, Inc.

NORTHROP GRUMMAN
Ship Systems



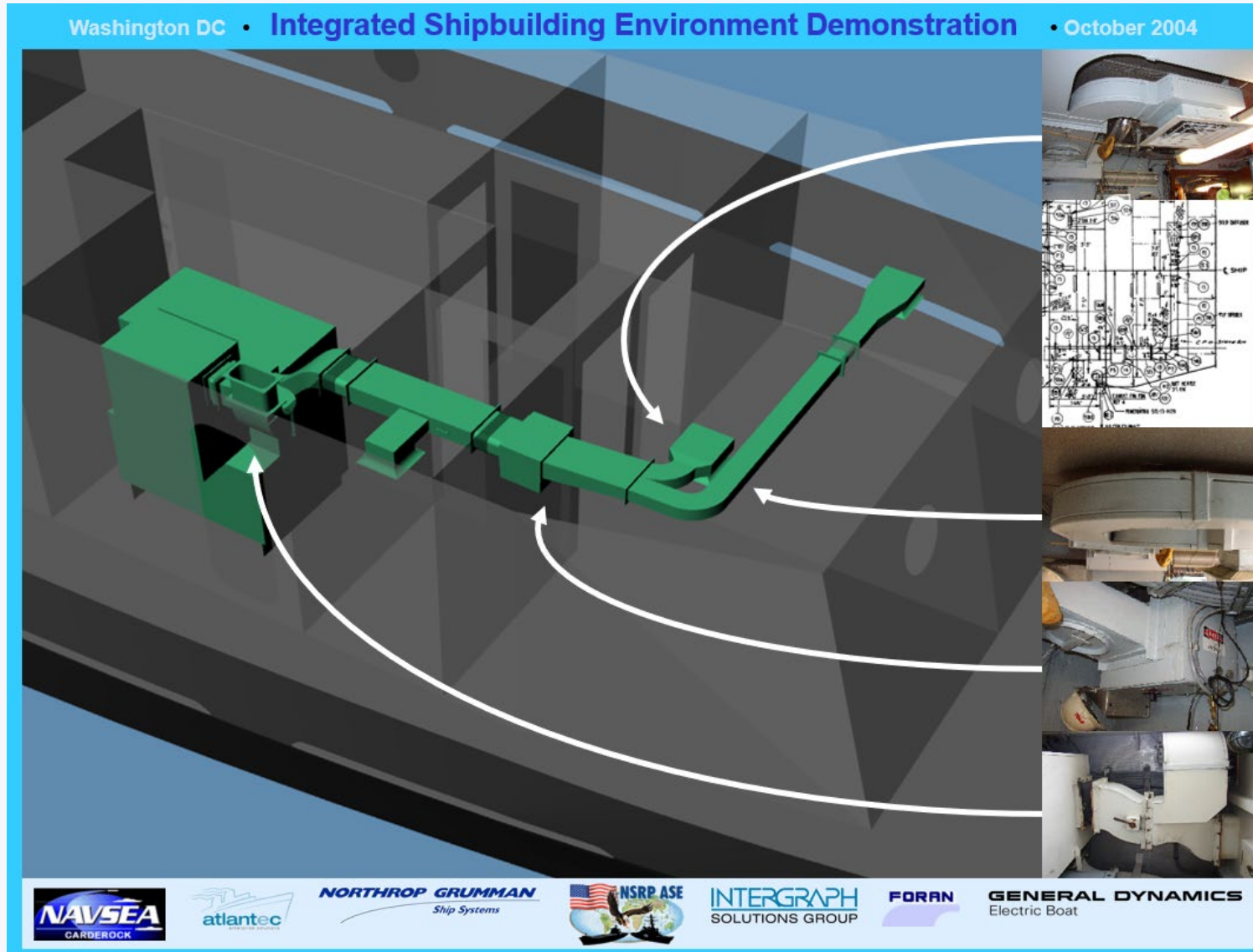
INTERGRAPH
SOLUTIONS GROUP



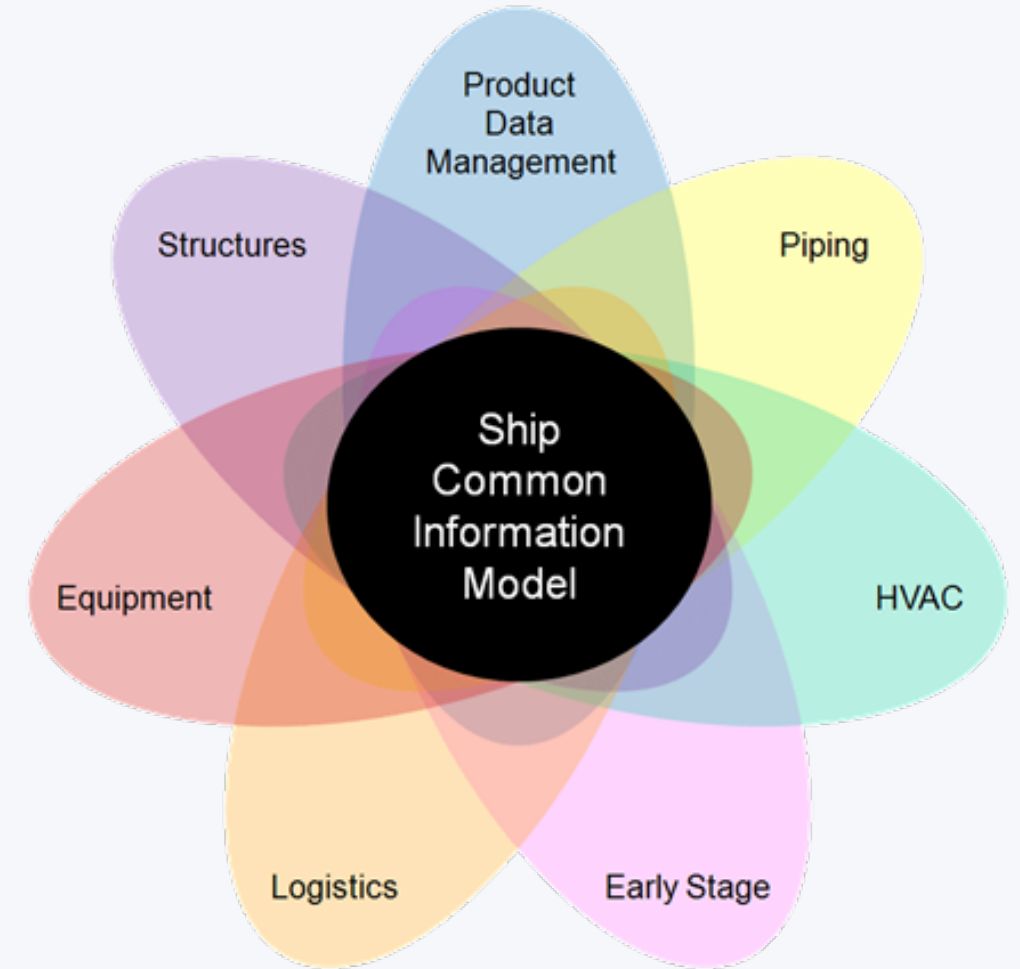
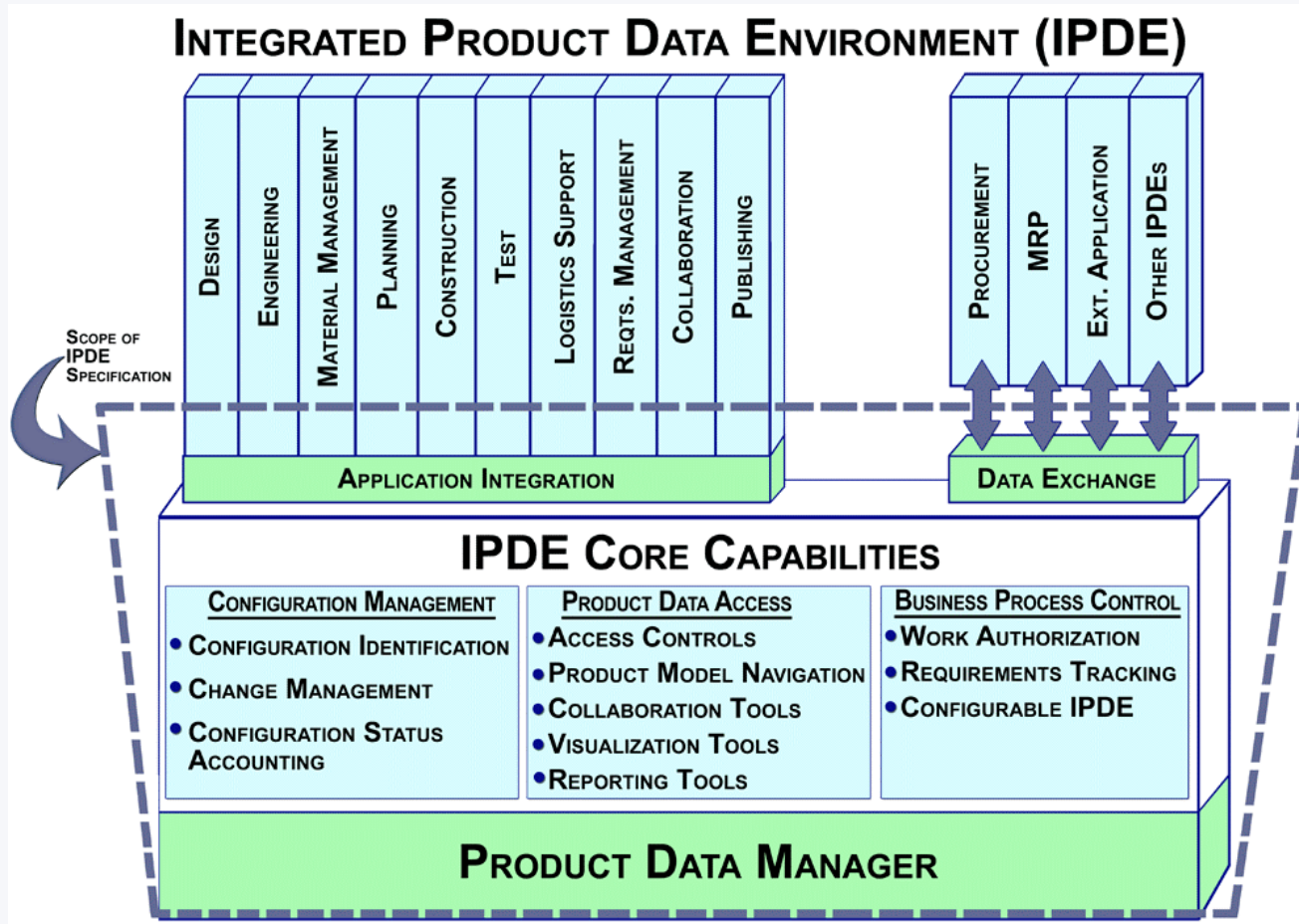
SENER

GENERAL DYNAMICS
Electric Boat

Integrated Shipbuilding Environment



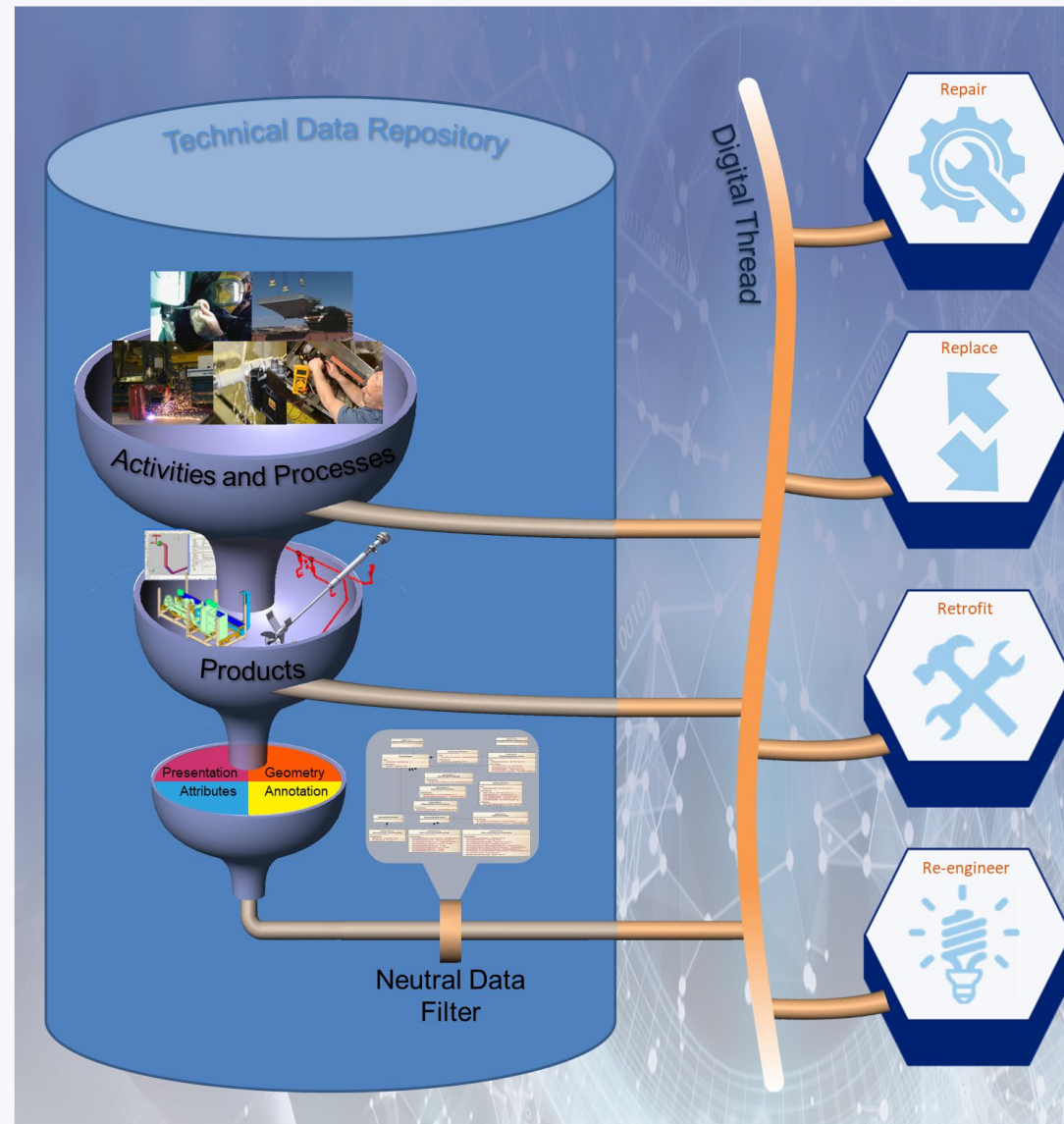
Navy Product Data Initiative



Life After SEAWOLF

- VIRGINIA Class
- LPD 17
- DDG 1000
- COLUMBIA Class
- Coast Guard
- Common Amphibious Ship Design Environment

Minimal Data Content



Minimal Data Content



Model-Based Definition Specifications

ISO 10303

- 3-D Geometry
- Product Manufacturing Information
- Plant Spatial Configuration
- Product Lifecycle Support
- Ship Design and Construction

ISO 14306

- 3D Technical Data Packages
- Product Visualization
- CAD Data Exchange

ISO 19975

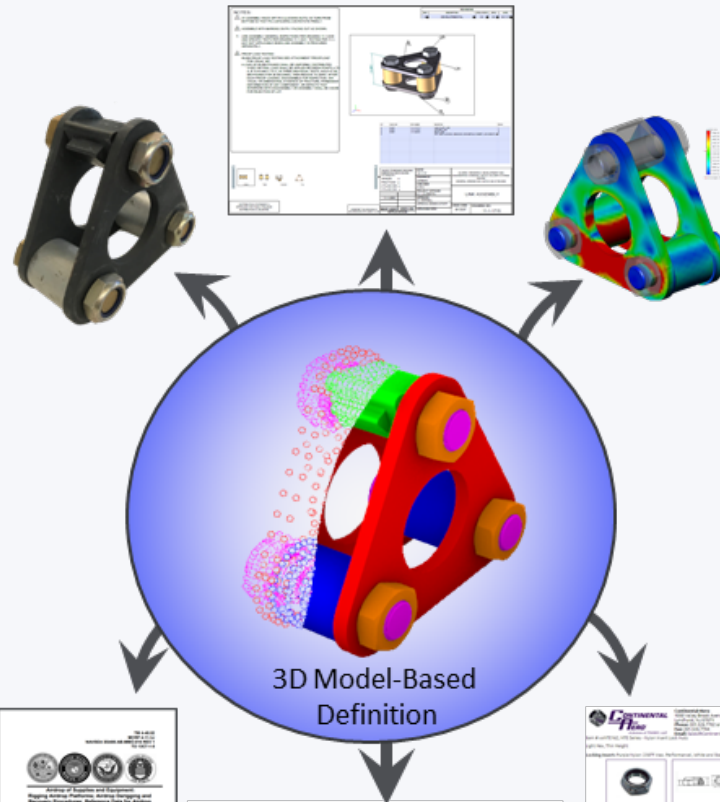
- 3-D Scenes
- Scientific Visualization

ISO 19650

- Building Information Model
- Physical characteristics
- Functional characteristics
- Construction logistics
- Building operations
- Building Maintenance

ISO 14739

- 3D Technical Data Packages
- Document Exchange
- Optimized to PDF



1670-00-162-4981 (11-1-1715-1) Data

1670-00-162-4981 (1670001624981) NSN Information					
NSN	FSC	NIN	Item Name	INC	
1670-00-162-4981	1670	001624981	Link Assembly, Coupling	77777	

1670-00-162-4981 Features					
MRC	Parameter	Characteristics			
TEXT	General Characteristics Item Description	Consists of 2 plates, 2 spacers, 1 cam, 3 screws, 3 nuts			

1670-00-162-4981 Manufacturing Part Numbers (SKUs)

MFG SKU	CAGE	STATUS	ISC	RNVC	RNCC	SADC	DAC	HCC	RNAA
11-1-1715-1	81337	A	5	2	3		1		AJ

1670-00-162-4981 Manufacturer

MFG SKU	CAGE	MANUFACTURER	Type	Status	Role
11-1-1715-1	81337	US Army Natick Soldier Center	F	A	



Integrated Logistics Support Specifications

S1000D

- Illustrated Parts Data
- Maintenance and Operation
- Descriptions
- Procedures
- Troubleshooting
- Training Modules

S2000M

- Initial Provisioning Lists
- Illustrated Parts Data

S3000L and S4000P

- Logistic Support Analysis (LSA)
- Maintenance Concept
- Corrective Maintenance Tasks
- Preventive Maintenance Tasks
- Maintenance Task Analysis and Planning
- Operational Tasks
- Human Factor Analysis
- Spares
- Tooling

S6000T

- Training Needs Analysis
- Training Objectives



Pragmatic Approach for the Future

A two level approach for the exchange of product model data

First level : Support configuration management, logistics support, provisioning, spares, and repairs through the use of STEP for geometry, product structure, non graphical attributes, and to manage configuration items of the as-built / as-maintained ship.

Second level : Deliver the as-designed class model of

- 1) molded forms suitable for defining a general arrangement
- 2) scantling level of detail of structure to support structural (and other types of) analysis
- 3) functional distributed systems model (i.e. path, components, and connections)
- 4) compartmentation, including accesses, opening, and tightness
- 5) plates, stiffeners, brackets, collars, and other structural components as parts
- 6) distributed system components, fittings, and equipment as parts.

Why do we care about the 3D Model-Based Definition?

AVAILABILITY OF 3D MODEL BASED TECHNICAL DATA TO SUPPORT THE NEXT GENERATION OF CATALOGING, SUSTAINMENT, AND PROCUREMENT

Model-Based Enterprise Readiness

- Do you have the tools?
- Do you have the people?
- Do you have a Digital Thread Enable Integrated Digital Environment?
- Can you collaborate with other enterprises using 3D Product Model and other Technical Data?

Intellectual Property Strategies

- Do you have the appropriate IP rights?
- Do you understand the trade space, and what options it has to acquire more rights?
- Does the program have a plan to mitigate risk of changing requirements?

Technical Data Availability

- Can you acquire technical data?
- Can you create technical data?
- Is the technical data appropriate?

Legacy Data Conversion & Validation

- Can you arbitrate authoritative source of truth?
- Does the program understand what capabilities both now and future are precluded by legacy data?
- Does the program have a plan for converting data if the capability is needed, does it understand the potential costs and risk of conversion?

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providing the foundation for the 3D MBE

understand the potential costs and risk of conversion?

But what is the MBE?

It is an Attitude, State of mind, and being.

Model-Based Enterprise



MBE is the Model-Based Enterprise. All of the information typically found in an entire set of engineering drawings and associated lists. Traditionally this included shape definition, product manufacturing information, materials, and assembly fit-up. This must expand beyond the domain of design and manufacturing

Model-Based Environment



MBE is the Model-Based Environment. Leveraging the Digital Thread to integrate between data repositories and applications; in which you can determine the pedigree of the data and identify the source of truth; that you can generate derivative data to meet a specific need, and forever associate that derivative data to its authoritative source, that you can augment derivative data and the source of truth with additional data thus increasing the scope of authoritative data.

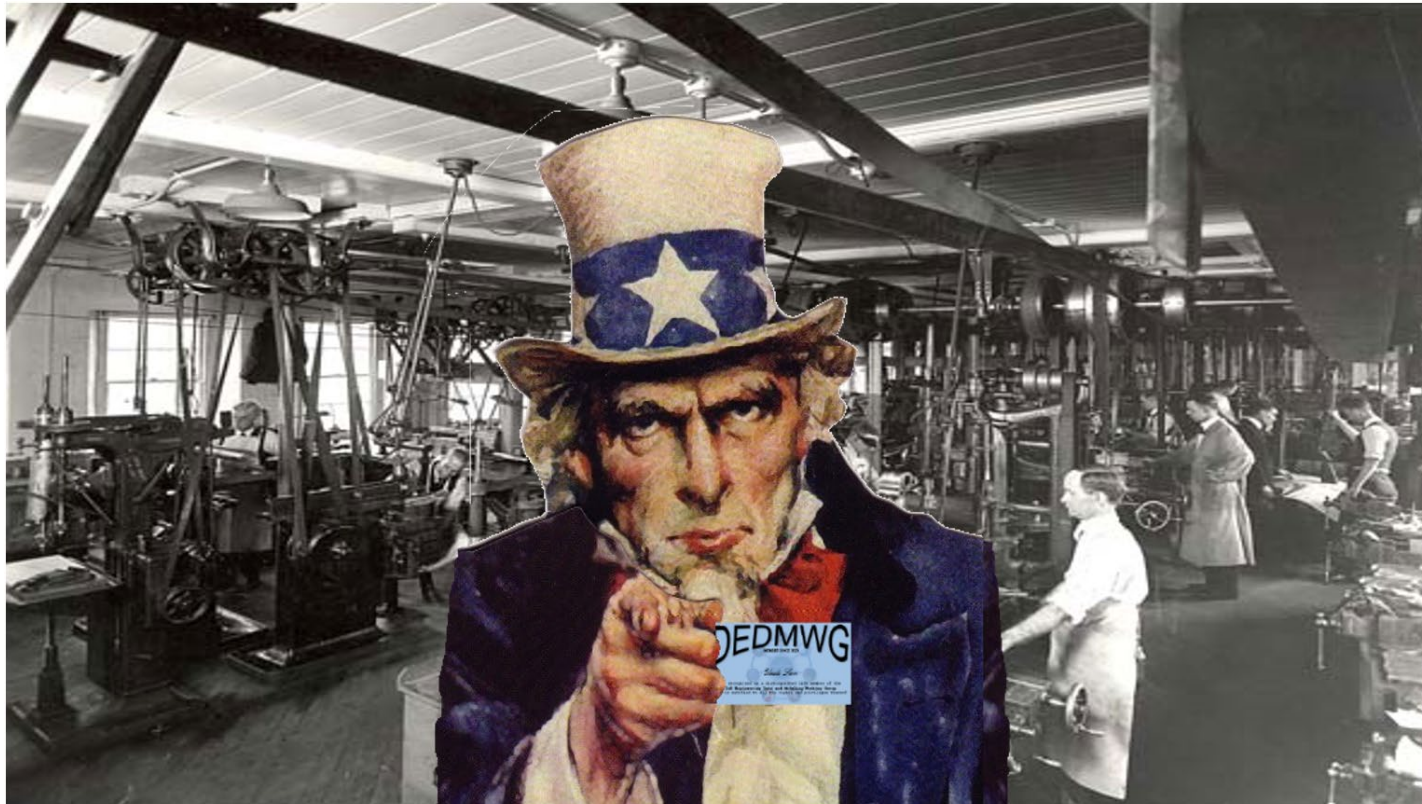
Model-Based Engineering



MBE is Model-Based Engineering. Performing engineering tasks using 3D Model-Based Product Data and other Technical Data in lieu of extracting information from documents.

DoD Engineering Data and Modeling Working Group

DEDMWG NEEDS YOU



Held during the 2021 Model-Based Enterprise Summit
Friday April 16, 2:00PM EDT