Domain Specific Product Data Definition

A forward looking retrospective

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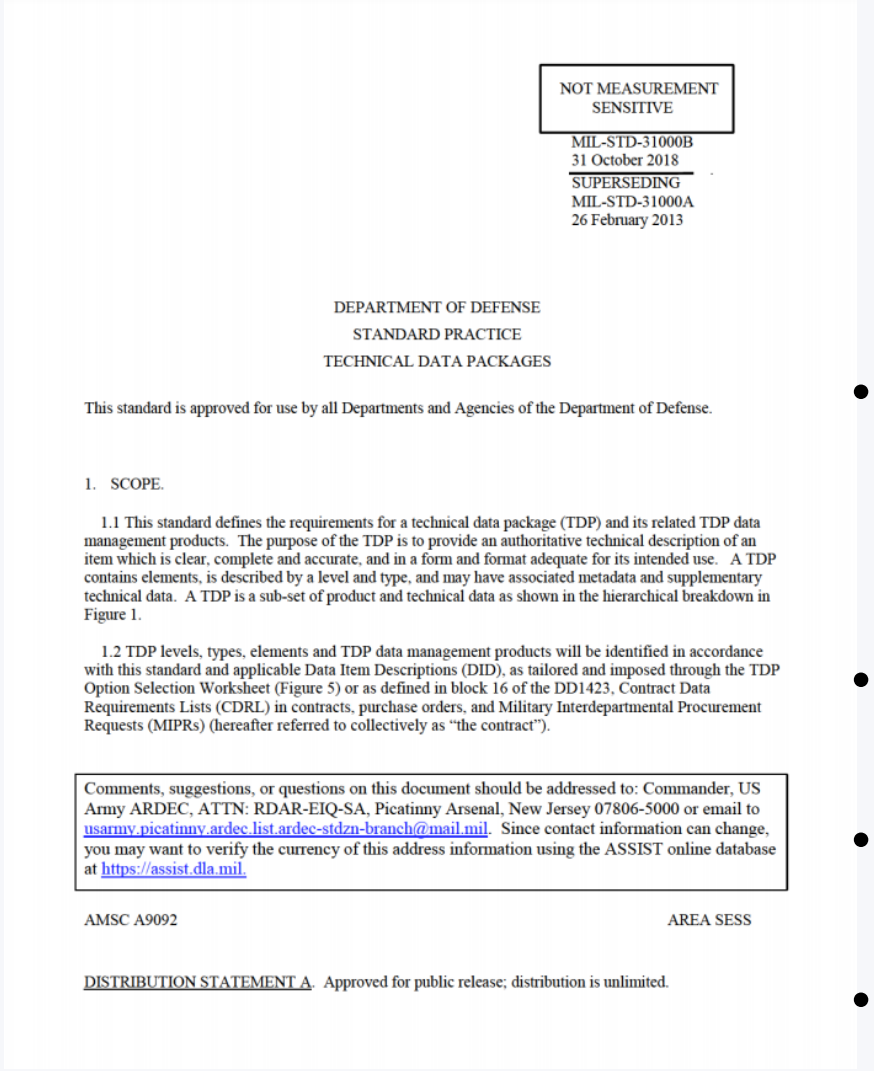
Senior Consultant
Digital Engineering

03 April 2019

LMI

MIL-STD-31000

The acquisition of the product model data



NOT MEASUREMENT SENSITIVE

MIL-STD-31000B
31 October 2018
SUPERSEDING
MIL-STD-31000A
26 February 2013

DEPARTMENT OF DEFENSE
STANDARD PRACTICE
TECHNICAL DATA PACKAGES

This standard is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE.

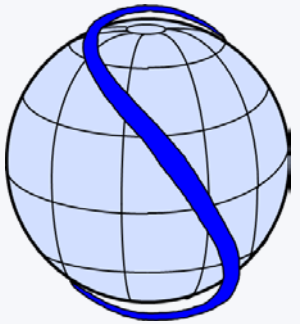
1.1 This standard defines the requirements for a technical data package (TDP) and its related TDP data management products. The purpose of the TDP is to provide an authoritative technical description of an item which is clear, complete and accurate, and in a form and format adequate for its intended use. A TDP contains elements, is described by a level and type, and may have associated metadata and supplementary technical data. A TDP is a sub-set of product and technical data as shown in the hierarchical breakdown in Figure 1.

1.2 TDP levels, types, elements and TDP data management products will be identified in accordance with this standard and applicable Data Item Descriptions (DID), as tailored and imposed through the TDP Option Selection Worksheet (Figure 5) or as defined in block 16 of the DD1423, Contract Data Requirements Lists (CDRL) in contracts, purchase orders, and Military Interdepartmental Procurement Requests (MIPRs) (hereafter referred to collectively as "the contract").

Comments, suggestions, or questions on this document should be addressed to: Commander, US Army ARDEC, ATTN: RDAR-EIQ-SA, Picatinny Arsenal, New Jersey 07806-5000 or email to usarmy.picatinny.ardec.list.ardec-stdzn-branch@mail.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST online database at https://assist.dla.mil.

AMSC A9092 AREA SESS

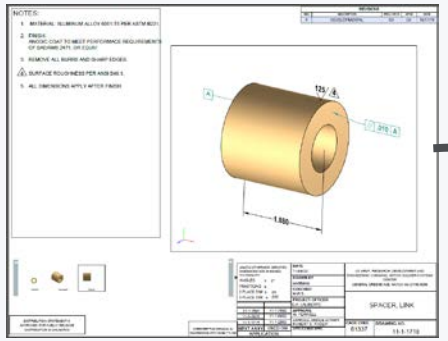
DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

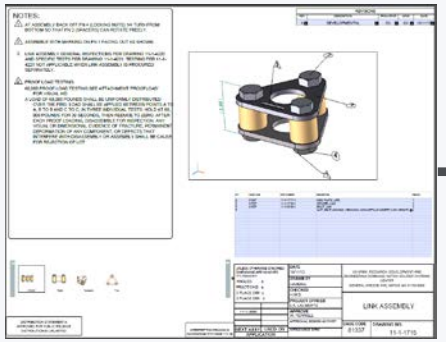


- A huge shout out to Allison and the hundreds of people that decades ago developed STEP and dragged me kicking and screaming away from the Initial Graphics Exchange Specification.
- Another huge shout out to Jeff and the dozens of people that made MIL-STD-31000 what it is today.
- This standard defines requirements for a technical data package.
- This standard does NOT define the specific data elements that comprise the technical data package

Technical Data Package

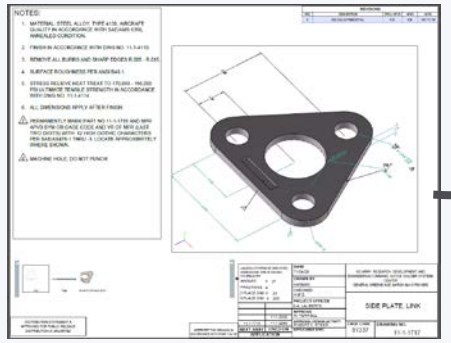
Manufacture and Inspect

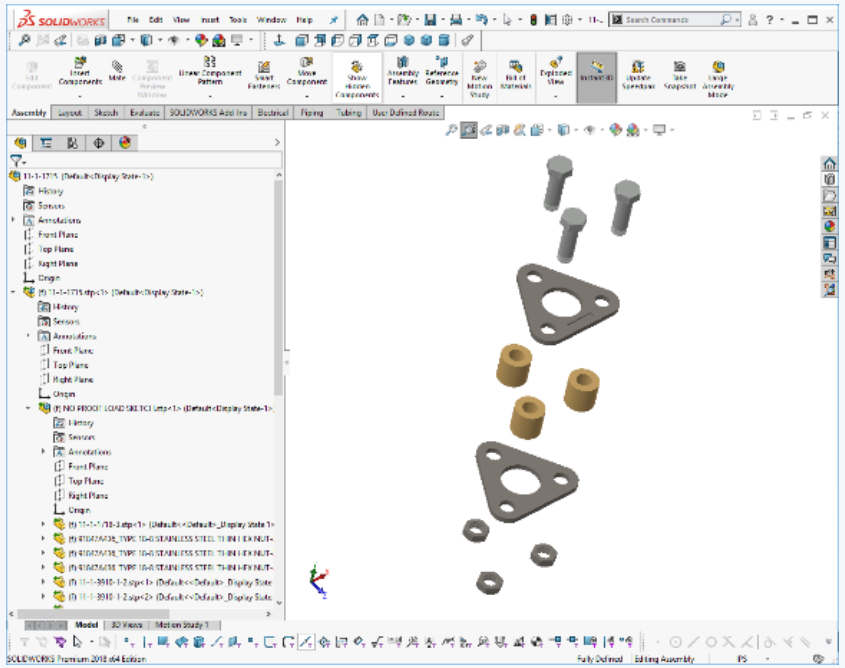


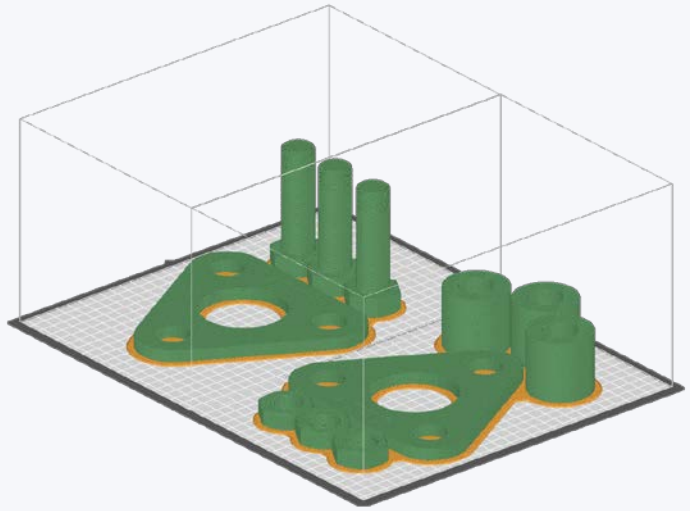


ISO 10303 – 203

ISO 14739-1







The emphasis on STEP over the past couple of decades and 31000 during this MBD evolution has been on design and manufacturing.

Part & System Definition
- Caterpillar 3512
- Starboard Main Engine
- Propulsion System

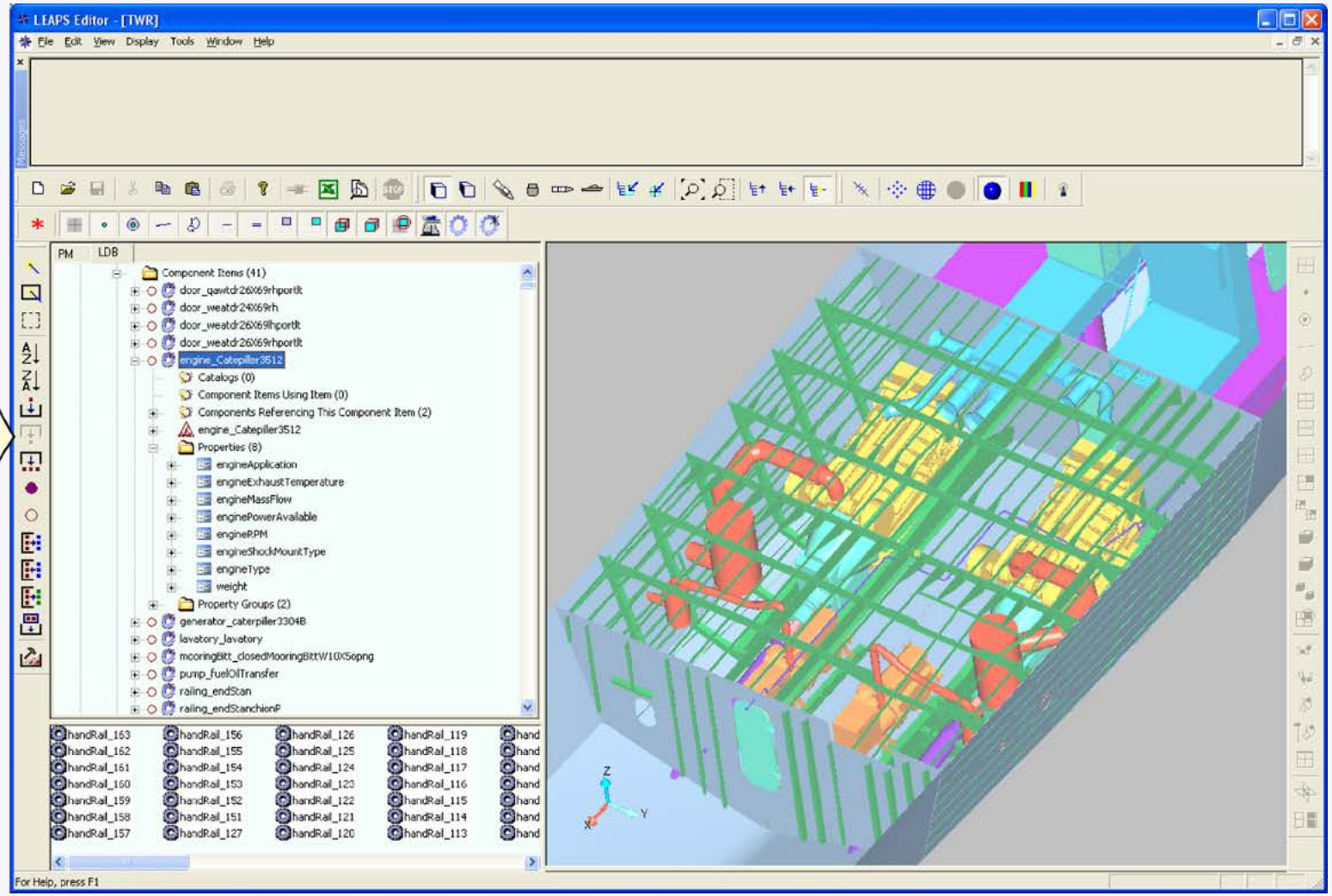
Design Definition
- 12 cylinder
- 4 stroke
- Diesel

Physical
- Geometry
- Material
- Connections

Engineering Definition
- 1175 HP
- 6464kg
- 170mm bore
- 190mm stroke

Process Definition
- Starting instructions
- Shaft alignment

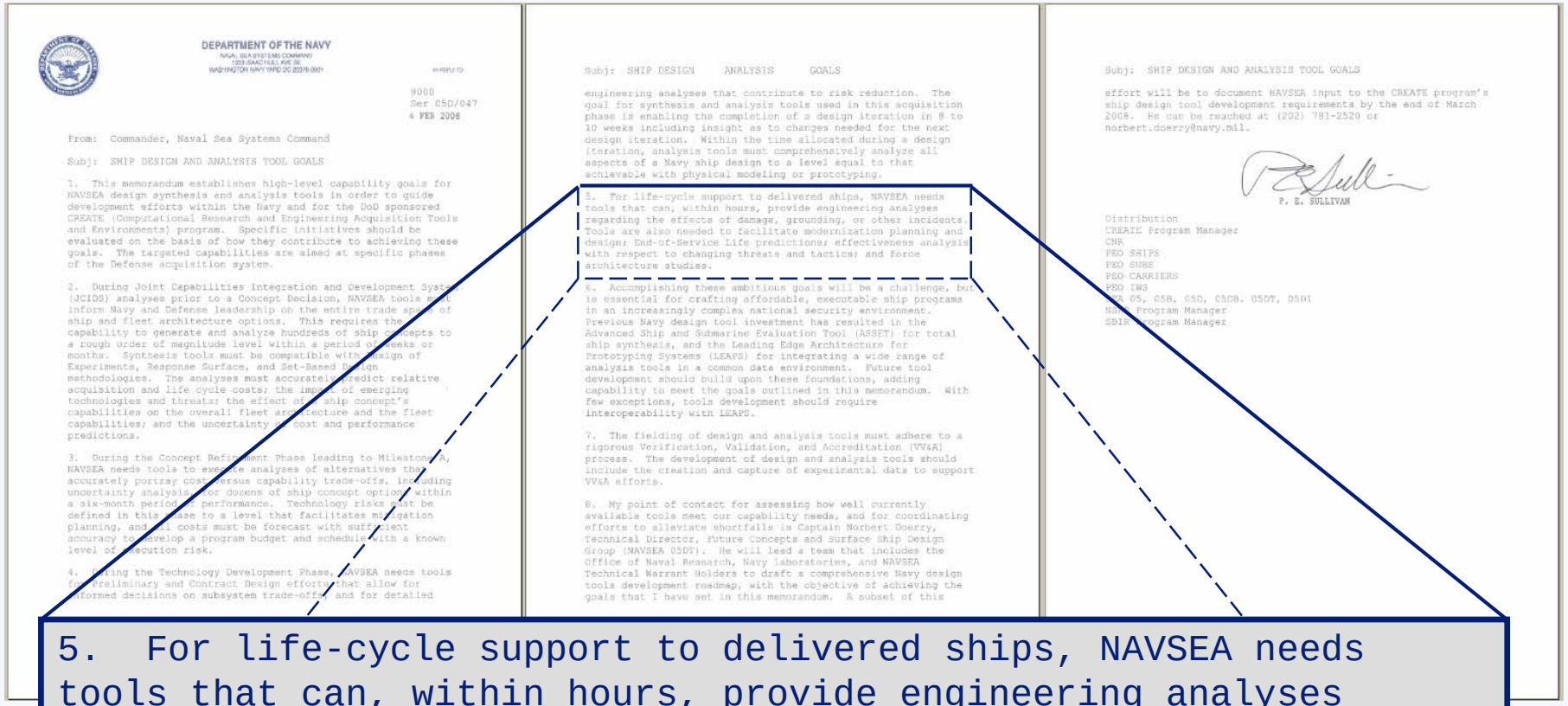
Logistics Support
- FGC
- SCLSIS



… product model in a neutral form without the loss of completeness and integrity, throughout the lifecycle of a product.

Digital Product Model Data

Is much more than what is needed to manufacture a part



DEPARTMENT OF THE NAVY

NAVAL SEA SYSTEMS COMMAND
1333 ISAAC HULL AVE SE
WASHINGTON NAVY YARD DC 20376-0001

IN REPLY TO

9000
Ser 05D/047
4 FEB 2008

From: Commander, Naval Sea Systems Command

Subj: SHIP DESIGN AND ANALYSIS TOOL GOALS

1. This memorandum establishes high-level capability goals for NAVSEA design synthesis and analysis tools in order to guide development efforts within the Navy and for the DoD sponsored CREATE (Computational Research and Engineering Acquisition Tools and Environments) program. Specific initiatives should be evaluated on the basis of how they contribute to achieving these goals. The targeted capabilities are aimed at specific phases of the Defense acquisition system.

2. During Joint Capabilities Integration and Development System (JCIDS) analyses prior to a Concept Decision, NAVSEA tools must inform Navy and Defense leadership on the entire trade space of ship and fleet architecture options. This requires the capability to generate and analyze hundreds of ship concepts to a rough order of magnitude level within a period of weeks or months. Synthesis tools must be compatible with Design of Experiments, Response Surface, and Set-Based Design methodologies. The analyses must accurately predict relative acquisition and life cycle costs; the impact of emerging technologies and threats; the effect of a ship concept's capabilities on the overall fleet architecture and the fleet capabilities; and the uncertainty in cost and performance predictions.

3. During the Concept Refinement Phase leading to Milestone A, NAVSEA needs tools to execute analyses of alternatives that accurately portray cost versus capability trade-offs, including uncertainty analysis for dozens of ship concept options within a six-month period of performance. Technology risks must be defined in this phase to a level that facilitates mitigation planning, and all costs must be forecast with sufficient accuracy to develop a program budget and schedule with a known level of execution risk.

4. During the Technology Development Phase, NAVSEA needs tools for Preliminary and Contract Design efforts that allow for informed decisions on subsystem trade-offs and for detailed

Subj: SHIP DESIGN ANALYSIS GOALS

engineering analyses that contribute to risk reduction. The goal for synthesis and analysis tools used in this acquisition phase is enabling the completion of a design iteration in 8 to 10 weeks including insight as to changes needed for the next design iteration. Within the time allocated during a design iteration, analysis tools must comprehensively analyze all aspects of a Navy ship design to a level equal to that achievable with physical modeling or prototyping.

5. For life-cycle support to delivered ships, NAVSEA needs tools that can, within hours, provide engineering analyses regarding the effects of damage, grounding, or other incidents. Tools are also needed to facilitate modernization planning and design; End-of-Service Life predictions; effectiveness analysis with respect to changing threats and tactics; and force architecture studies.

6. Accomplishing these ambitious goals will be a challenge, but is essential for crafting affordable, executable ship programs in an increasingly complex national security environment. Previous Navy design tool investment has resulted in the Advanced Ship and Submarine Evaluation Tool (ASSET) for total ship synthesis, and the Leading Edge Architecture for Prototyping Systems (LEAPS) for integrating a wide range of analysis tools in a common data environment. Future tool development should build upon these foundations, adding capability to meet the goals outlined in this memorandum. With few exceptions, tools development should require interoperability with LEAPS.

7. The fielding of design and analysis tools must adhere to a rigorous Verification, Validation, and Accreditation (VV&A) process. The development of design and analysis tools should include the creation and capture of experimental data to support VV&A efforts.

8. My point of contact for assessing how well currently available tools meet our capability needs, and for coordinating efforts to alleviate shortfalls is Captain Norbert Doerry, Technical Director, Future Concepts and Surface Ship Design Group (NAVSEA 05DT). He will lead a team that includes the Office of Naval Research, Navy laboratories, and NAVSEA Technical Warrant Holders to draft a comprehensive Navy design tools development roadmap, with the objective of achieving the goals that I have set in this memorandum. A subset of this

Subj: SHIP DESIGN AND ANALYSIS TOOL GOALS

effort will be to document NAVSEA input to the CREATE program's ship design tool development requirements by the end of March 2008. He can be reached at (202) 781-2520 or norbert.doerry@navy.mil.

P. E. SULLIVAN

Distribution
CREATE Program Manager
CNR
PEO SHIPS
PEO SUBS
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05, 05B, 05D, 05DB, 05DT, 05D1
MDA Program Manager
SBIR Program Manager

5. For life-cycle support to delivered ships, NAVSEA needs tools that can, within hours, provide engineering analyses regarding the effects of damage, grounding, or other incidents. Tools are also needed to facilitate modernization planning and design; End-of-Service Life predictions; effectiveness analysis with respect to changing threats and tactics; and force architecture studies.

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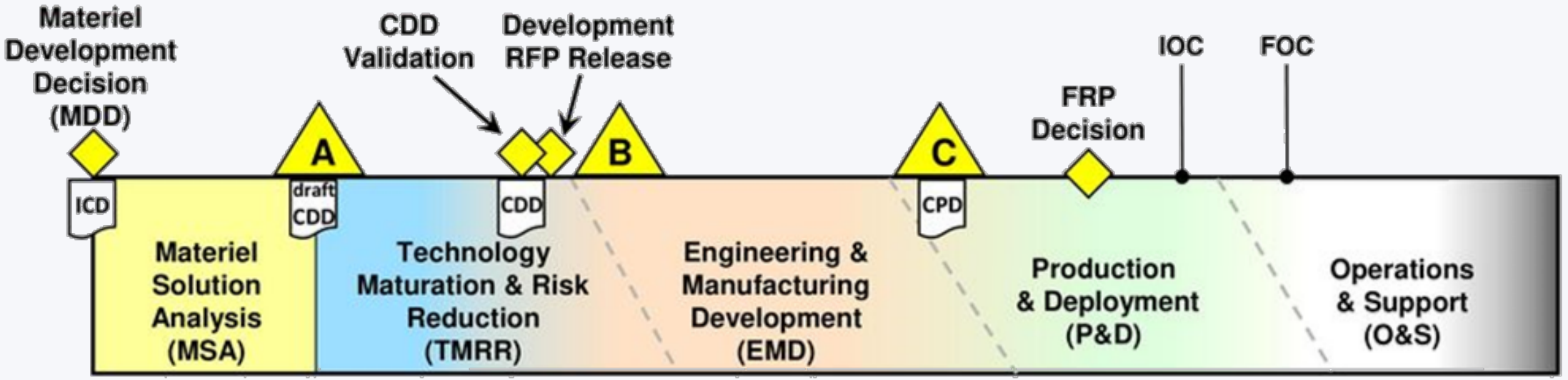
Digital Product Model Data

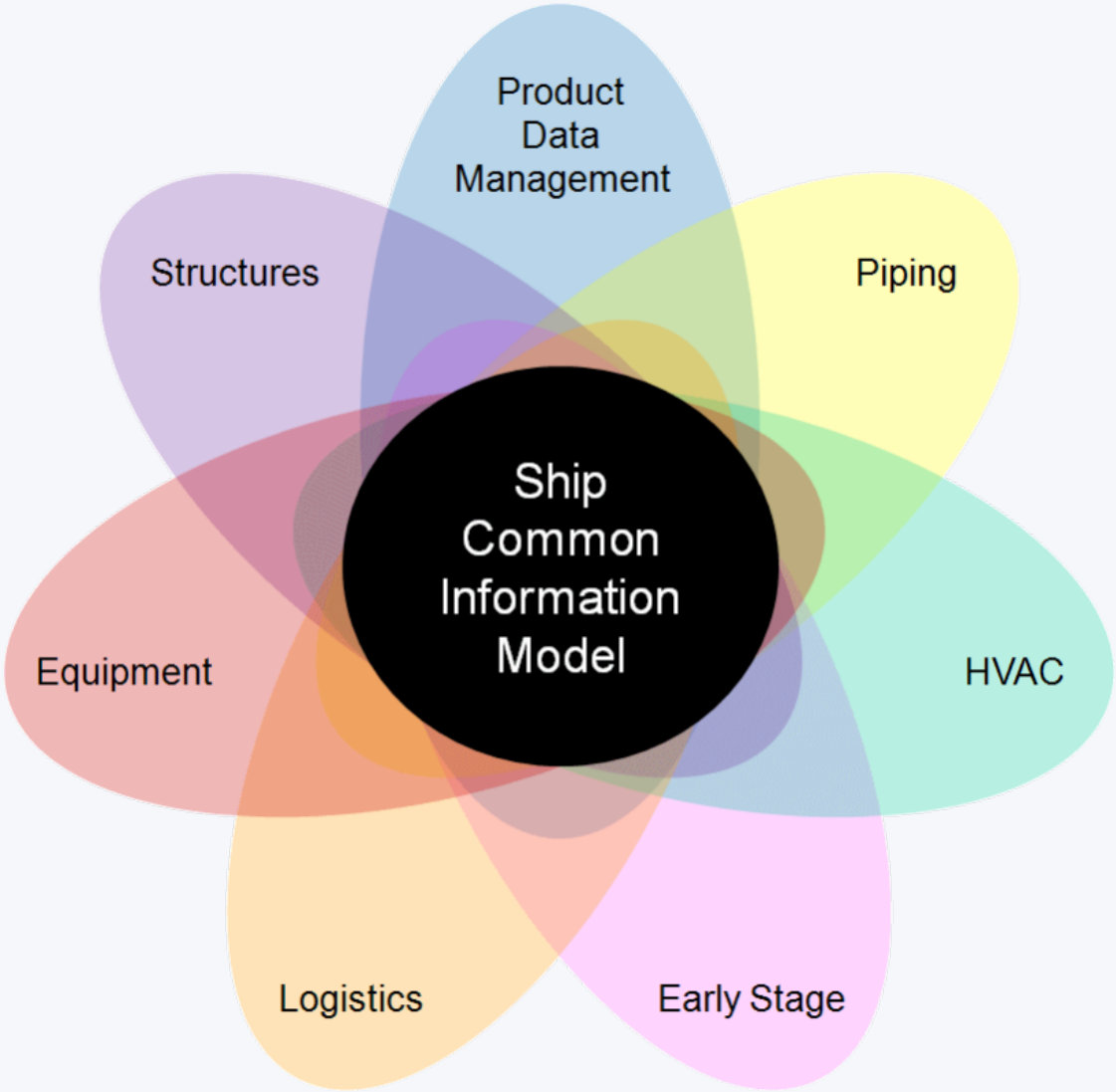
supports the entire life cycle of the product



- The focus has been on model-based systems engineering, product design, and manufacturing.
- Sustainment can no longer be neglected.
- Was a “nice to have,” but with emerging technologies it is becoming a fundamental requirement.
- Extensibility is necessary as data is added through the products life cycle.
- The authoritative source.

Neutral Product Model Definition

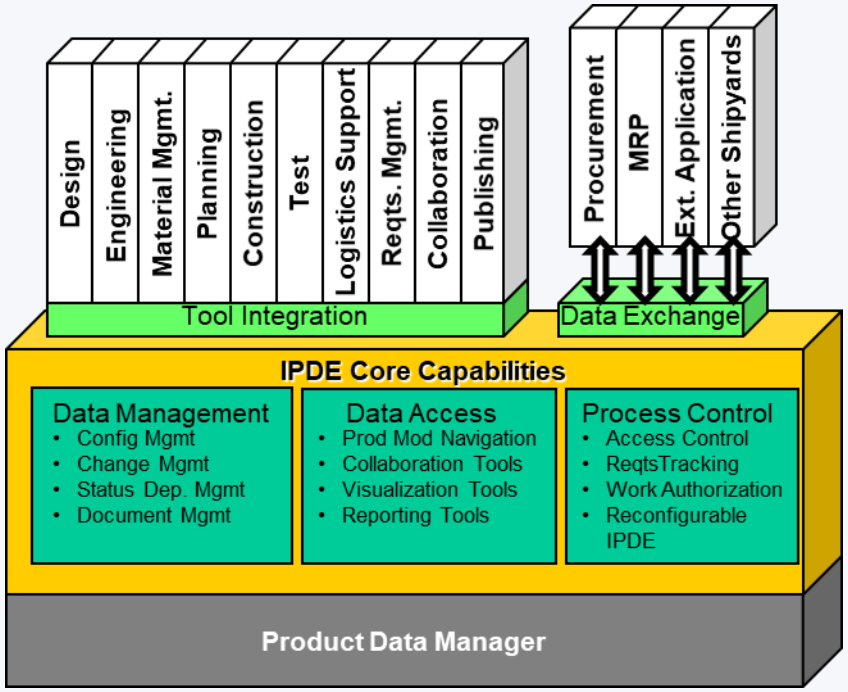
An Application and Process Perspective



Product Model Data and Exchange

A Shipbuilders Perspective

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



Evolution of STEP for Shipbuilding

AP development, prototyping, and testing

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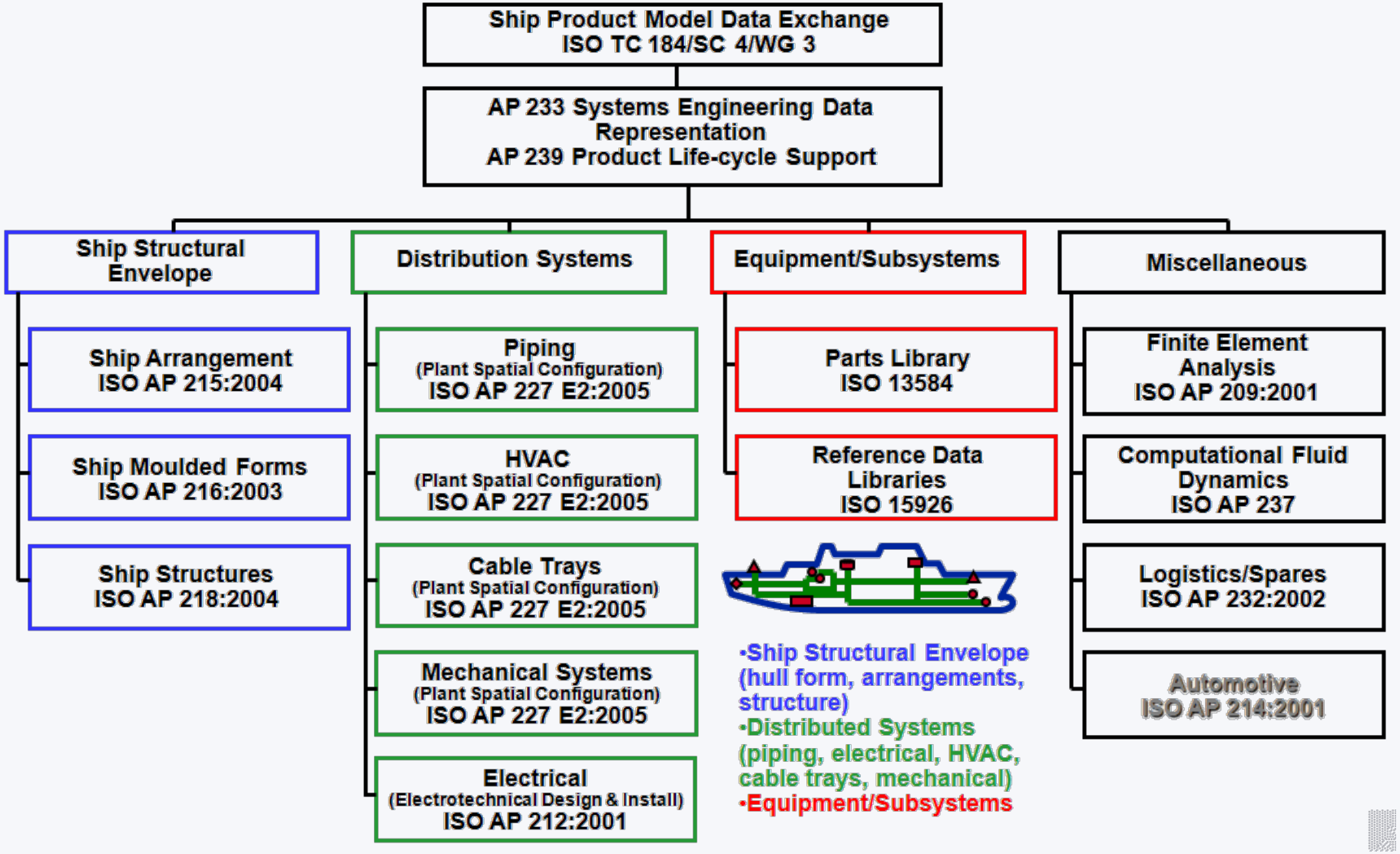
Neutral Product Model Definition

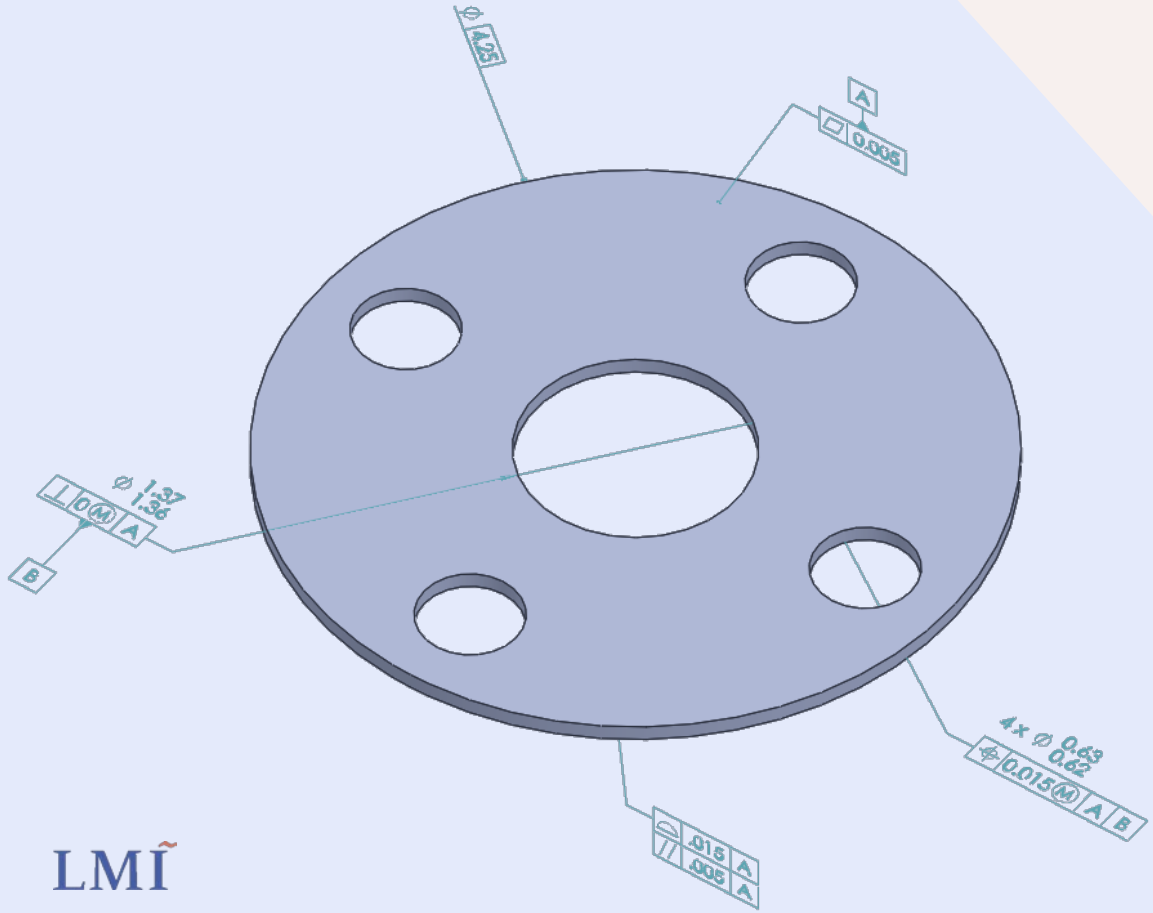
STEP Application Protocols

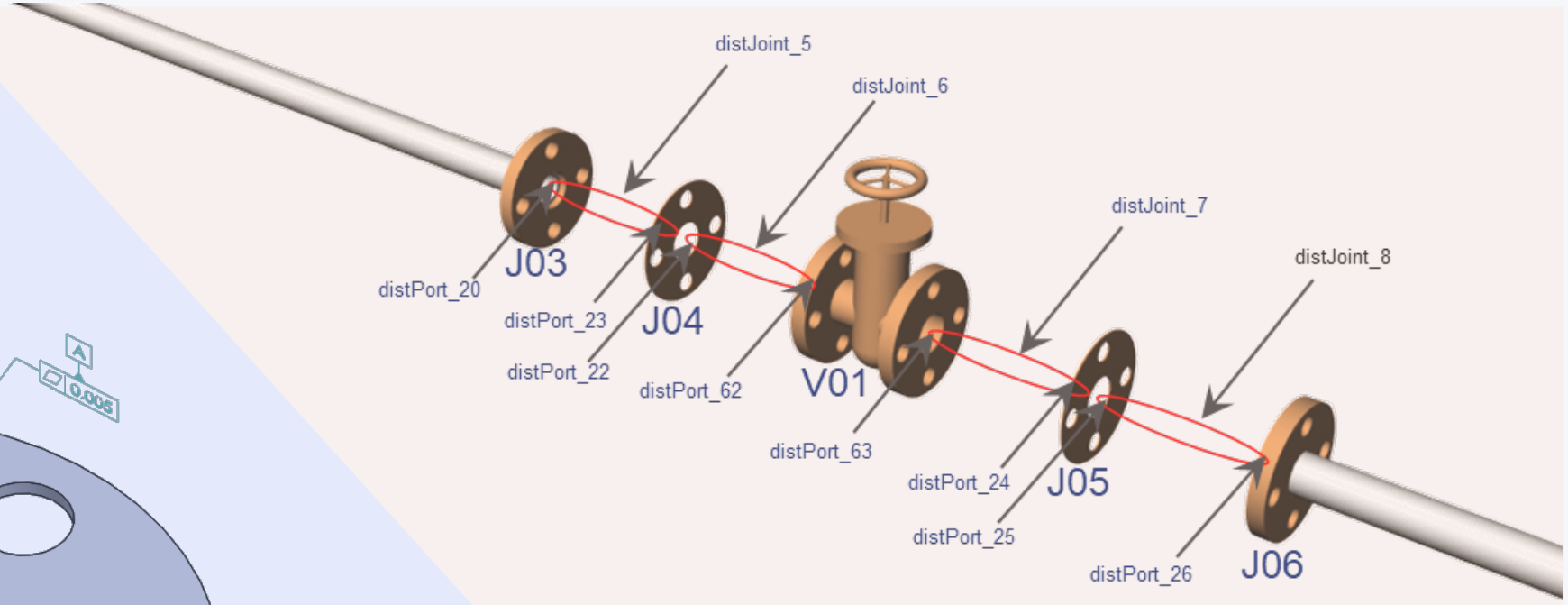


Shape Data and PMI is important

… but product data is so much more

Shape and Product Manufacturing Information





Functional Definition
Systems Engineering
Simulation and Analysis
Configuration Control

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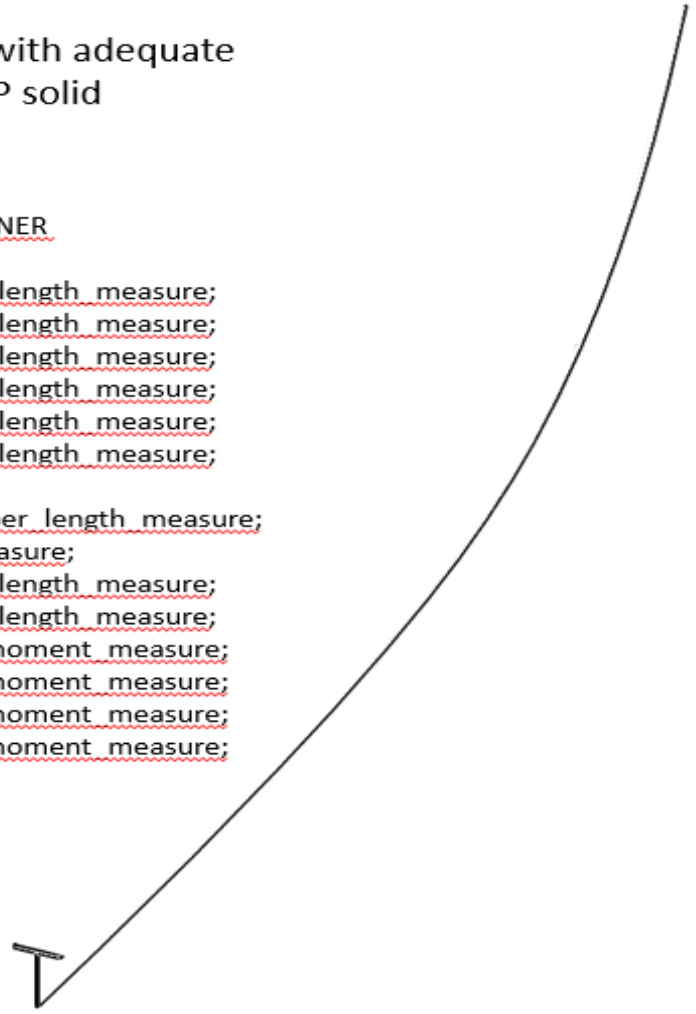
Neutral Product Model Definition

STEP Application Protocols

Stiffener defined as Structure with adequate information to generate a BREP solid

```
ENTITY profile_functional_definition
    Structural_part_functionality.STIFFENER
ENTITY w_shape_cross_section
    depth                 : positive_length_measure;
    width                 : positive_length_measure;
    web_thk               : positive_length_measure;
    flange_thk            : positive_length_measure;
    radius                : positive_length_measure;
    k                     : positive_length_measure;
ENTITY section_properties;
    nominal_mass_per_len  : weight_per_length_measure;
    area                  : area_measure;
    na_u                  : positive_length_measure;
    na_v                  : positive_length_measure;
    moi_                  : inertia_moment_measure;
    moi_v                 : inertia_moment_measure;
    moi_uv                : inertia_moment_measure;
    tr                    : inertia_moment_measure;
```



Stiffener defined as a BREP solid

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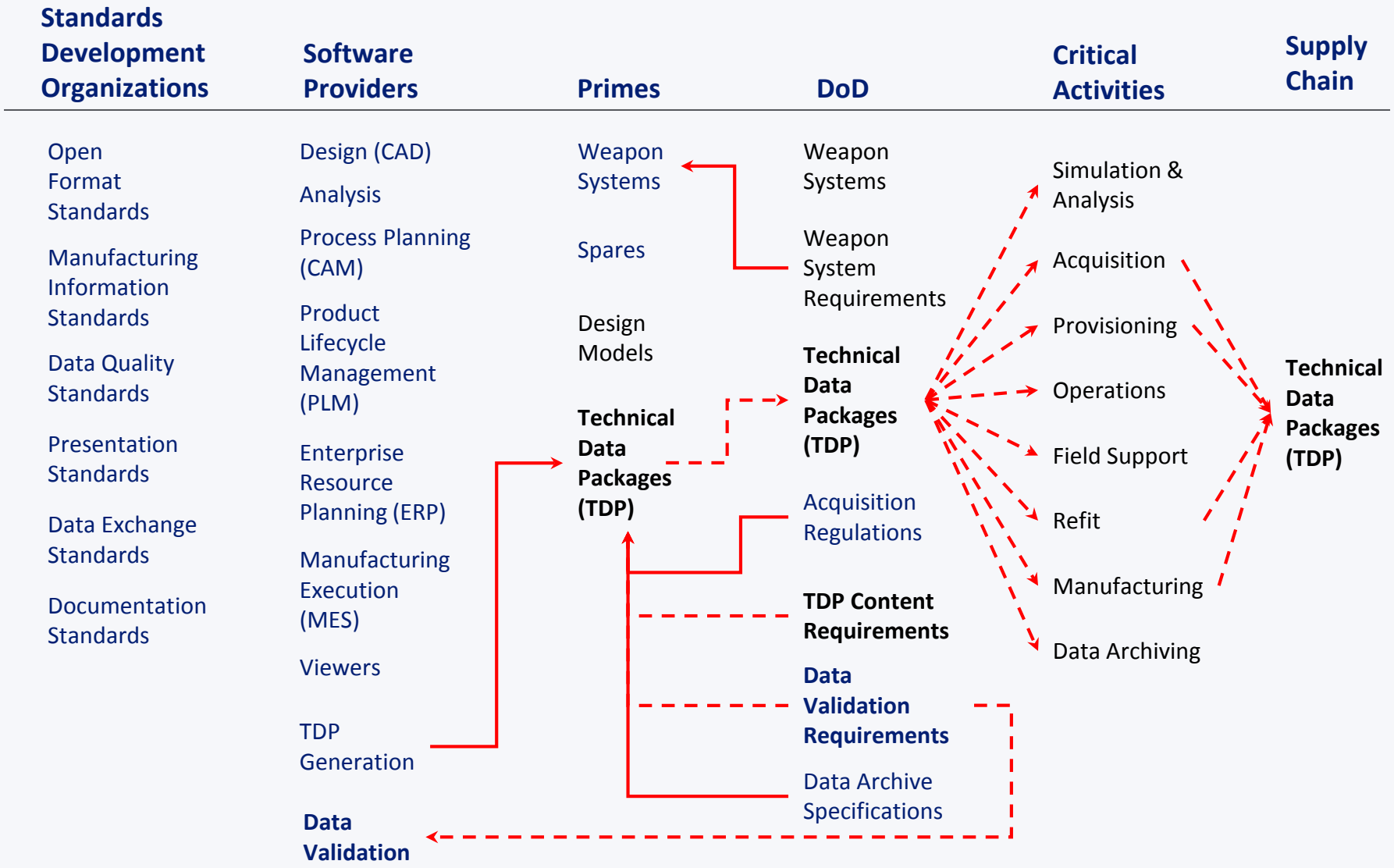
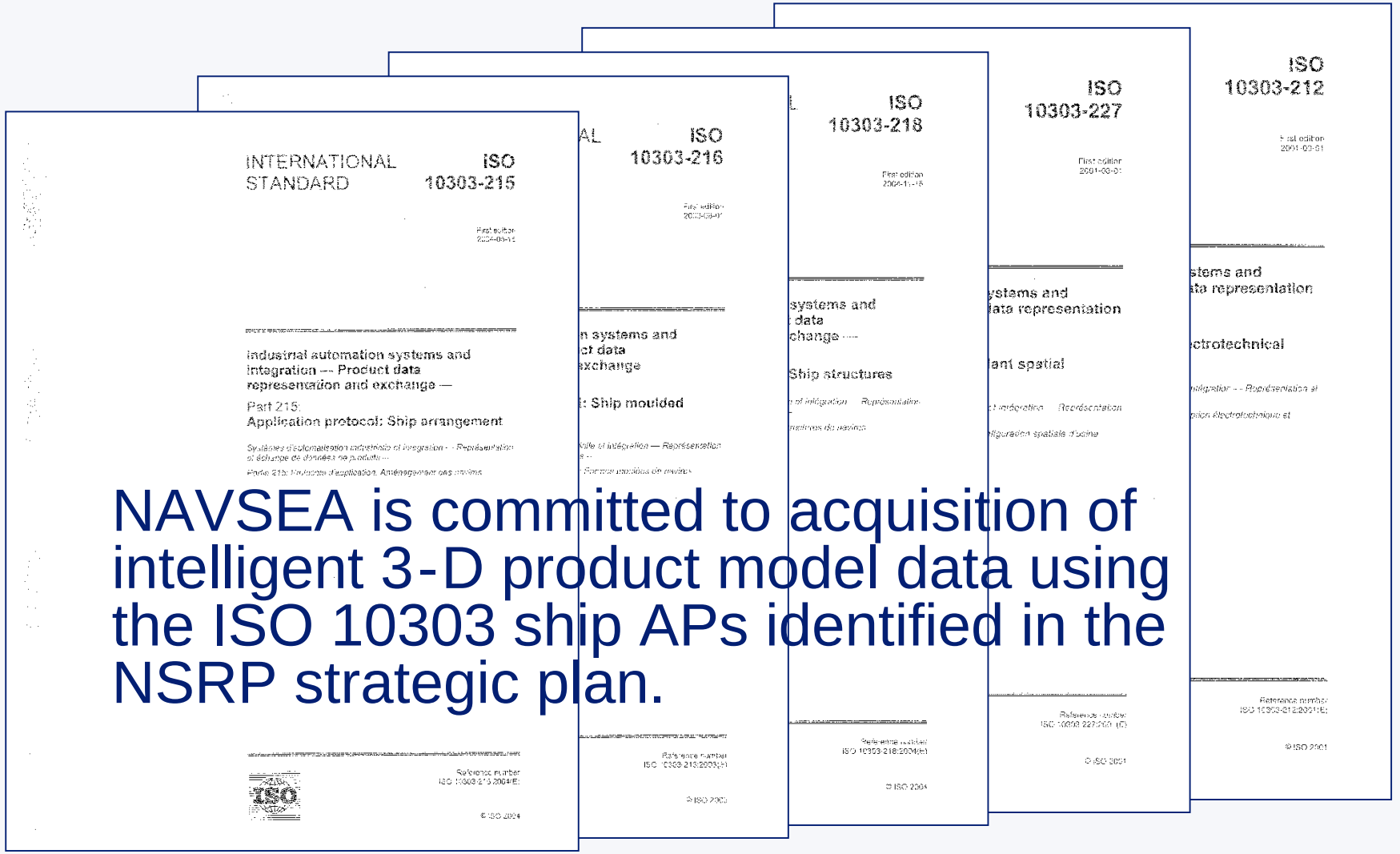
Sustainment Processes

… TDP Workflow



STEP Shipbuilding Application Protocols

Standards developed by the Shipbuilding industry



NAVSEA is committed to acquisition of intelligent 3-D product model data using the ISO 10303 ship APs identified in the NSRP strategic plan.

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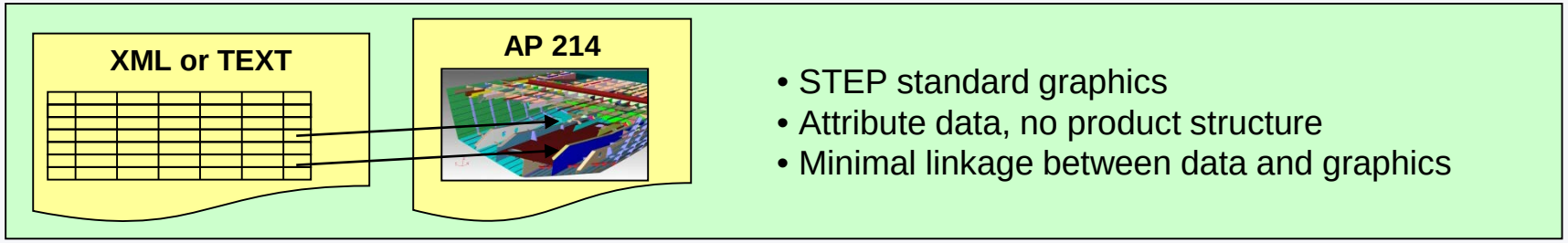
Hundreds of different application protocols

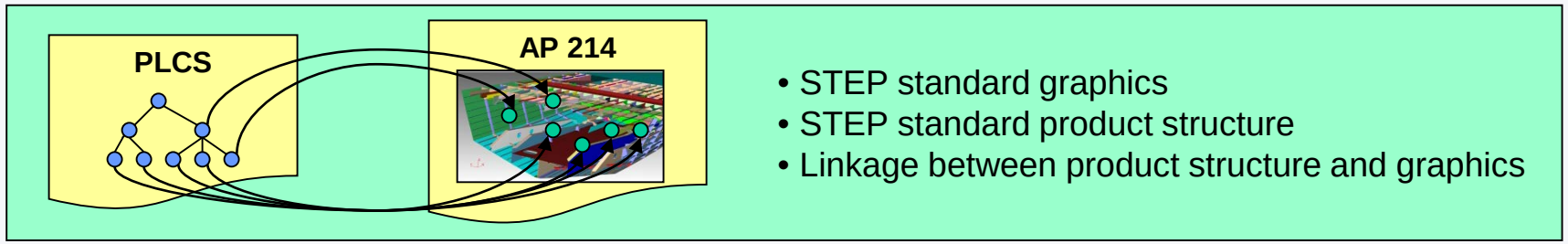
… is there another way



- CAD vendors can deliver AP 214 software now.
- Practically everyone can deliver 3-D AP 214 data
- AP 242 has some capabilities to provide a more complex fully attributed product model that suitable for digital engineering
- AP 214 defuses the criticism that STEP data is too expensive to deliver.
- AP 214 can provide needed 3-D shape definition for part library/catalog items.
- An accompanying XML schema can provide context and perhaps design intent
- The non graphical attributes can usually be extracted without CAD vendor involvement

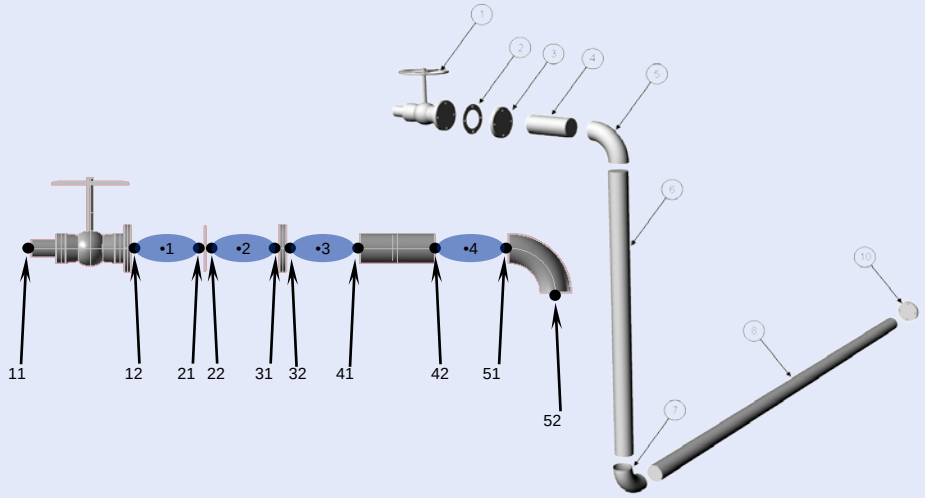
Hundreds of different application protocols

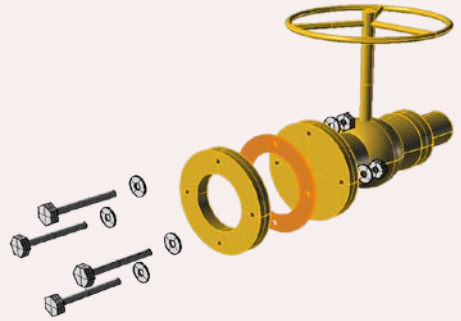
… and there is a pure STEP option



- STEP standard graphics
- STEP standard product structure
- Linkage between product structure and graphics

AP239 defines product structure, design parameters, and the relationships between objects.

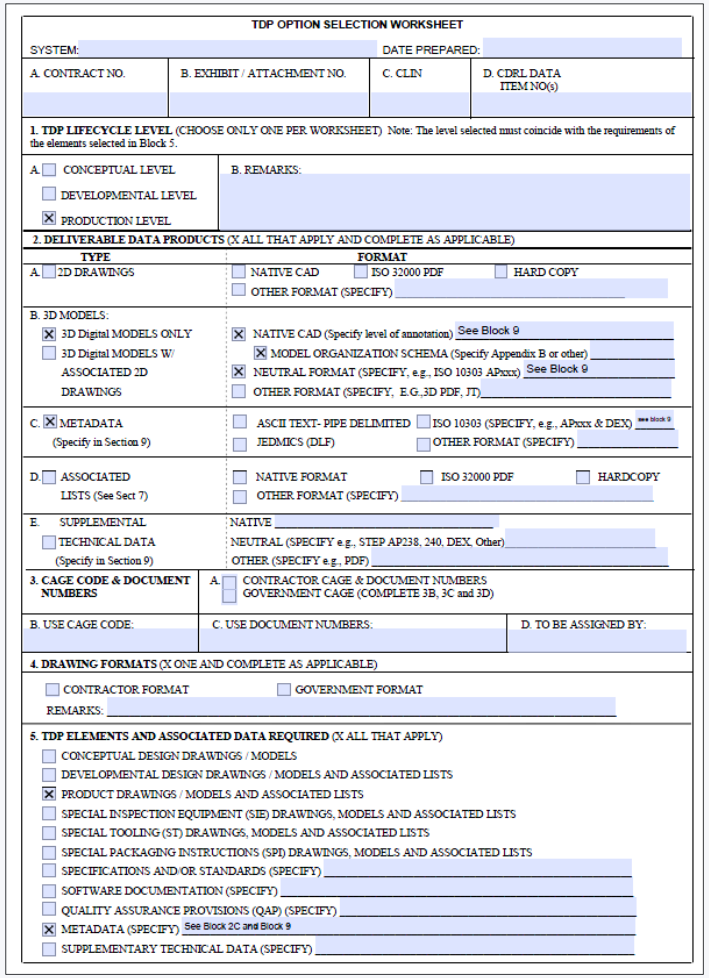




AP203 or AP214 to define shape.

Explicit geometry.

- You still need a subject matter expert to provide the details.
- There are contracts being written that specify “The Technical Data Package shall be provided in accordance with MIL-STD-28000.



TDP OPTION SELECTION WORKSHEET

SYSTEM: DATE PREPARED:

A. CONTRACT NO.	B. EXHIBIT / ATTACHMENT NO.	C. CLIN	D. CDRL DATA ITEM NO(s)

1. TDP LIFECYCLE LEVEL (CHOOSE ONLY ONE PER WORKSHEET) Note: The level selected must coincide with the requirements of the elements selected in Block 5.

A. ☐ CONCEPTUAL LEVEL
☐ DEVELOPMENTAL LEVEL
☒ PRODUCTION LEVEL

B. REMARKS:

2. DELIVERABLE DATA PRODUCTS (X ALL THAT APPLY AND COMPLETE AS APPLICABLE)

TYPE	FORMAT
A. ☐ 2D DRAWINGS	☐ NATIVE CAD ☐ ISO 32000 PDF ☐ HARD COPY ☐ OTHER FORMAT (SPECIFY)
B. 3D MODELS: ☒ 3D Digital MODELS ONLY ☐ 3D Digital MODELS W/ ASSOCIATED 2D DRAWINGS	☒ NATIVE CAD (Specify level of annotation) See Block 9 ☒ MODEL ORGANIZATION SCHEMA (Specify Appendix B or other) ☒ NEUTRAL FORMAT (SPECIFY, e.g., ISO 10303 APxxx) See Block 9 ☐ OTHER FORMAT (SPECIFY, E.G.,3D PDF, JT)
C. ☒ METADATA (Specify in Section 9)	☐ ASCII TEXT- PIPE DELIMITED ☐ ISO 10303 (SPECIFY, e.g., APxxx & DEX) see block 9 ☐ JEDMICS (DLF) ☐ OTHER FORMAT (SPECIFY)
D. ☐ ASSOCIATED LISTS (See Sect 7)	☐ NATIVE FORMAT ☐ ISO 32000 PDF ☐ HARDCOPY ☐ OTHER FORMAT (SPECIFY)
E. ☐ SUPPLEMENTAL TECHNICAL DATA (Specify in Section 9)	NATIVE NEUTRAL (SPECIFY e.g., STEP AP238, 240, DEX, Other) OTHER (SPECIFY e.g., PDF)

3. CAGE CODE & DOCUMENT NUMBERS

A. ☐ CONTRACTOR CAGE & DOCUMENT NUMBERS
GOVERNMENT CAGE (COMPLETE 3B, 3C and 3D)

B. USE CAGE CODE:	C. USE DOCUMENT NUMBERS:	D. TO BE ASSIGNED BY:

4. DRAWING FORMATS (X ONE AND COMPLETE AS APPLICABLE)

☐ CONTRACTOR FORMAT ☐ GOVERNMENT FORMAT
REMARKS:

5. TDP ELEMENTS AND ASSOCIATED DATA REQUIRED (X ALL THAT APPLY)

☐ CONCEPTUAL DESIGN DRAWINGS / MODELS
☐ DEVELOPMENTAL DESIGN DRAWINGS / MODELS AND ASSOCIATED LISTS
☒ PRODUCT DRAWINGS / MODELS AND ASSOCIATED LISTS
☐ SPECIAL INSPECTION EQUIPMENT (SIE) DRAWINGS, MODELS AND ASSOCIATED LISTS
☐ SPECIAL TOOLING (ST) DRAWINGS, MODELS AND ASSOCIATED LISTS
☐ SPECIAL PACKAGING INSTRUCTIONS (SPI) DRAWINGS, MODELS AND ASSOCIATED LISTS
☐ SPECIFICATIONS AND/OR STANDARDS (SPECIFY)
☐ SOFTWARE DOCUMENTATION (SPECIFY)
☐ QUALITY ASSURANCE PROVISIONS (QAP) (SPECIFY)
☒ METADATA (SPECIFY) See Block 2C and Block 9
☐ SUPPLEMENTARY TECHNICAL DATA (SPECIFY)

6. TDP DATA MANAGEMENT PRODUCTS

☐ SOURCE CONTROL DRAWING (SOCD) APPROVAL REQUEST
☐ DRAWING NUMBER ASSIGNMENT REPORT
☐ PROPOSED CRITICAL MANUFACTURING PROCESS DESCRIPTION

7. ASSOCIATED LISTS (X AND COMPLETE AS APPLICABLE)

A. PARTS LISTS (X ONE)	☐ (1) INTEGRAL	☐ (2) SEPARATE	☐ (3) CONTRACTOR SELECT
B. DATA LISTS	☐ REQUIRED (Specify Levels of Assy)		
C. INDEX LISTS	☐ REQUIRED (Specify Levels of Assy)		
D. WIRING LISTS	☐ REQUIRED (Specify Levels of Assy)		
E. APPLICATION LISTS	☐ (1) INTEGRAL	☐ (2) SEPARATE	☐ (3) CONTRACTOR SELECT
F. OTHER	☐ REQUIRED (Specify)		

8. APPLICABILITY OF STANDARDS. THE FOLLOWING STANDARDS APPLY: (X AS APPLICABLE)

☐ ASME Y14.100 ENGINEERING DRAWING PRACTICES
WITH APPENDICES:
☐ B ☐ C ☐ D ☐ E

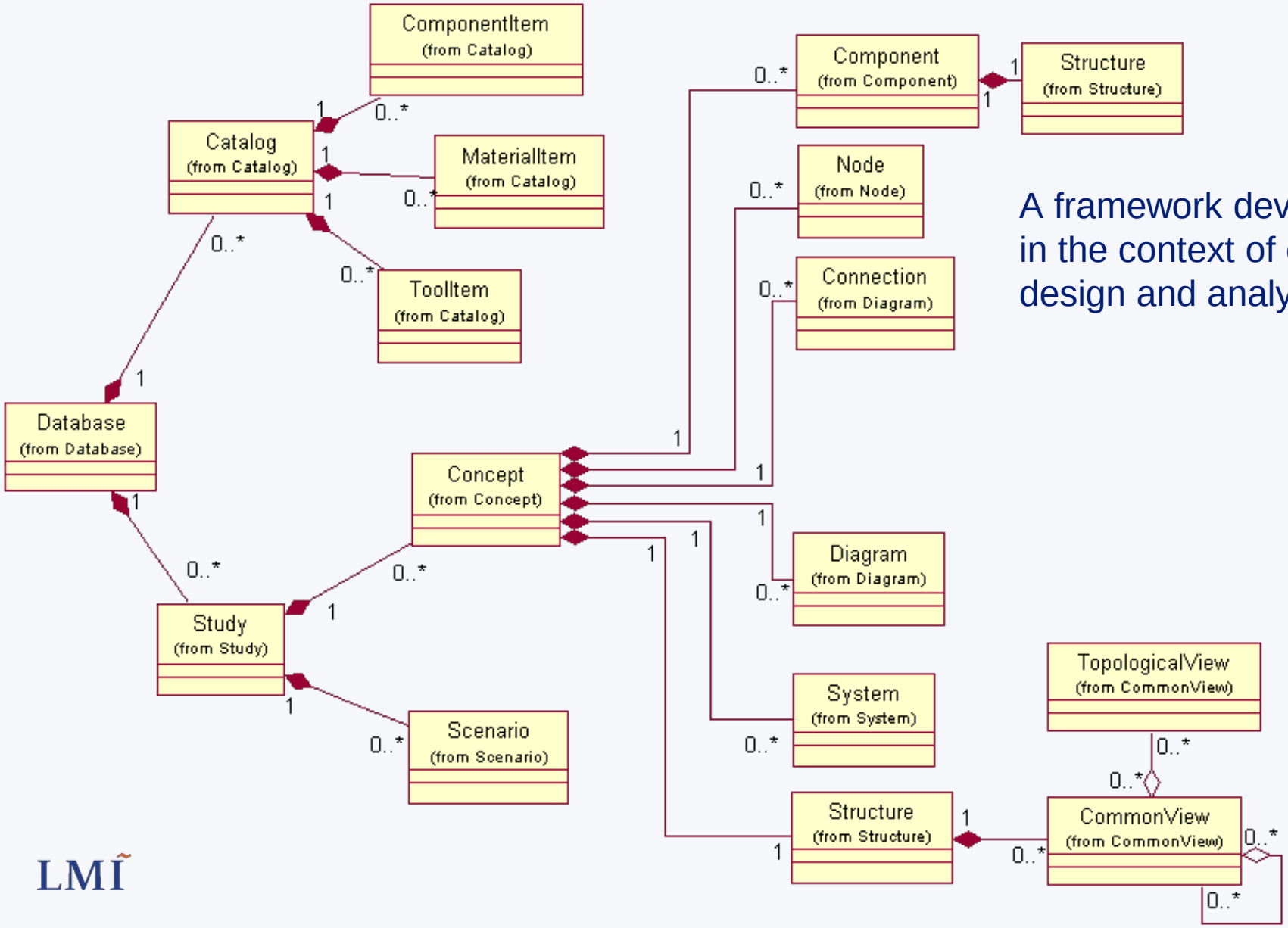
☐ ASME Y14.24 TYPES AND APPLICATIONS OF ENGINEERING DRAWINGS
☐ ASME Y14.34 ASSOCIATED LIST
☐ ASME Y14.35M REVISION OF ENGINEERING DRAWINGS AND ASSOCIATED LIST
☐ ASME Y14.41 DIGITAL PRODUCT DEFINITION DATA PRACTICES
☐ ASME Y14.5 DIMENSIONING AND TOLERANCING

☒ OTHER STANDARDS APPLY AS DESCRIBED:
COMPANY STANDARDS PERMITTED
☐ YES ☒ NO
References to information contained in company standards must be explicitly stated in design document, drawing, or model as applicable. Cited references to

9. OTHER TAILORING (ATTACH ADDITIONAL SHEETS AS NECESSARY)

Block 2B. 3D MODELS NEUTRAL FORMAT - Geometry shall be provided in the following formats
STEP : ISO 10303-242. Subsequent to the approval of ISO 10303-242 as an International Standard geometry may be delivered using ISO 10303-214.
X3D : ISO/IEC 19775-1 and ISO/IEC 19775-2.
The 3D geometry shall be defined such that each object can be selected individually. Each object shall be of sufficient detail to conduct virtual platform-shore interface supportability/compatibility assessments in geospatially accurate virtual shore facility scenarios. The 3D geometry shall be accurate to within the tolerance provided in the contractor's design product model. The geometry for the 3D Shore Interface Model will be organized in the following object classes:
a. Hull
b. Appurtenances
c. Superstructure
d. Superstructure Appurtenances
e. Propulsion Appurtenances
f. Deck Components
g. Mooring and Berthing Systems
h. Hatches/Accesses
i. Shore interface connections
These data classes apply to both native and neutral representations.

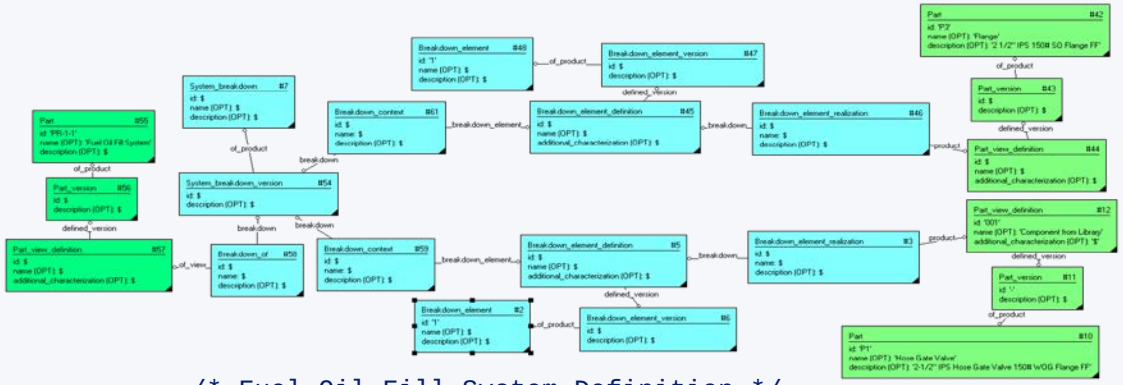
Block 2C. METADATA - Product Structure and Metadata to be provided using ISO 10303 AP239



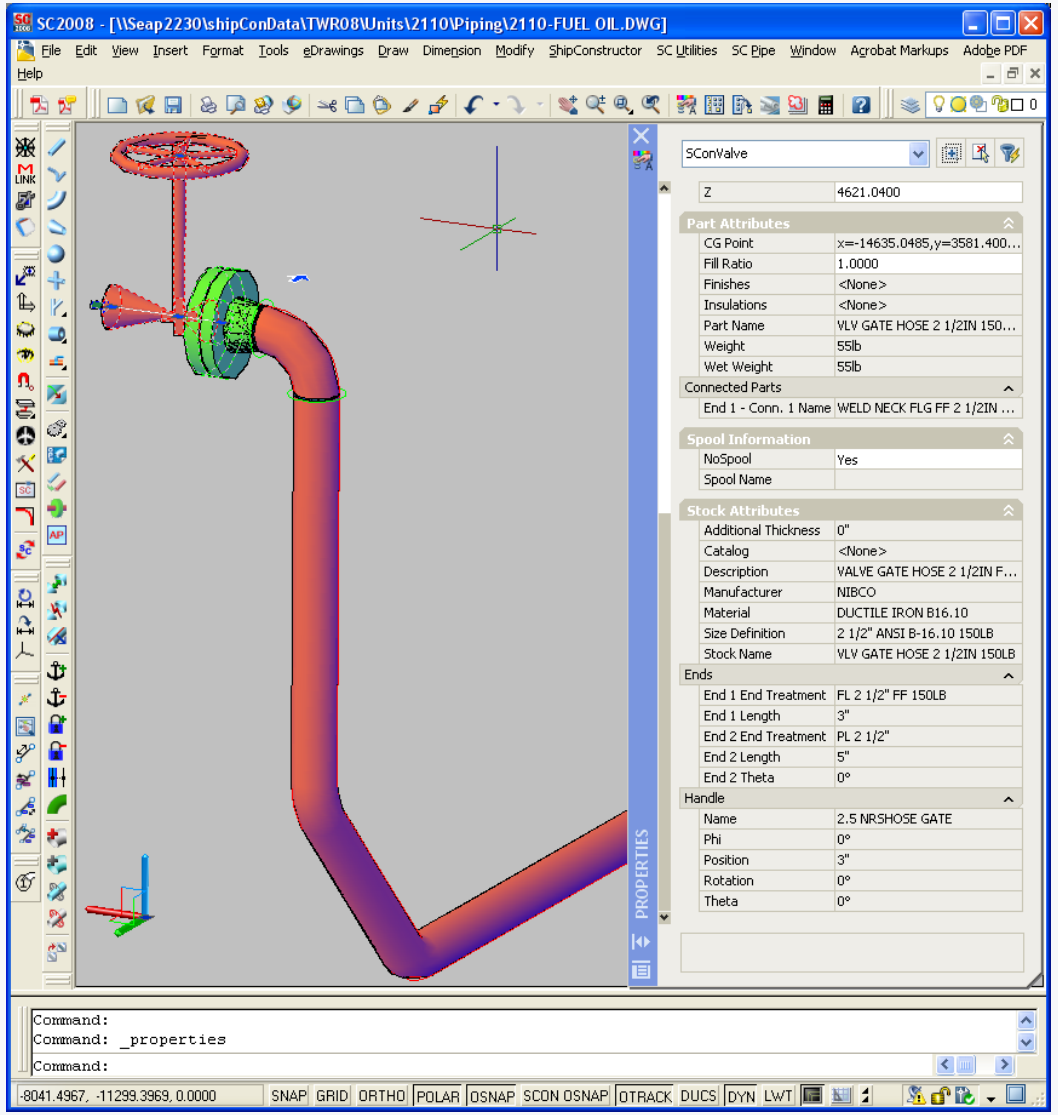
A framework developed to support virtual prototyping in the context of conceptual and preliminary ship design and analysis.

Neutral is Nice

but native is not nasty



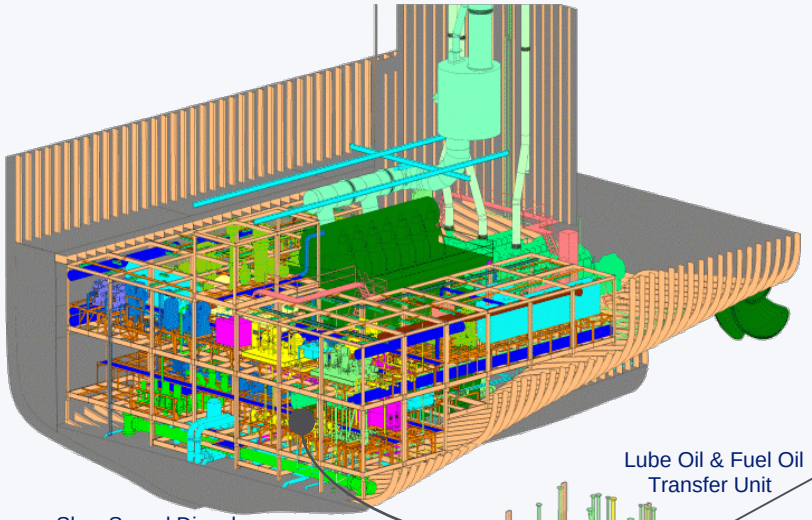
```
/* Fuel Oil Fill System Definition */
#58 = BREAKDOWN_OF($,$,$,#54,#57);
#54 = SYSTEM_BREAKDOWN_VERSION($,$,#7);
#7 = SYSTEM_BREAKDOWN($,$,$);
/* Hose Gate Valve as member of Fuel Oil Fill System */
#59 = BREAKDOWN_CONTEXT($,$,$,#54,#5);
#5 = BREAKDOWN_ELEMENT_DEFINITION($,$,$,$,(),#6);
#6 = BREAKDOWN_ELEMENT_VERSION($,$,#2);
#2 = BREAKDOWN_ELEMENT('1',$,$);
#3 = BREAKDOWN_ELEMENT_REALIZATION($,$,$,#5,#12);
/* Flange as member of Fuel Oil Fill System */
#61 = BREAKDOWN_CONTEXT($,$,$,#54,#45);
#45 = BREAKDOWN_ELEMENT_DEFINITION($,$,$,$,(),#47);
#47 = BREAKDOWN_ELEMENT_VERSION($,$,#48);
#48 = BREAKDOWN_ELEMENT('1',$,$);
#46 = BREAKDOWN_ELEMENT_REALIZATION($,$,$,#45,#44);
/* Connection between hose gate valve and flange */
#66 = INTERFACE_CONNECTION($,$,'bolted',#63,#64);
#65 = INTERFACE_CONNECTOR_DEFINITION($,$,'1/8" gasket,
4 - 3/8 - 16UNC" x 2" bolt ',$,(),$,$);
#64 = INTERFACE_CONNECTOR_OCCURRENCE($,$,$,#65,#44);
#63 = INTERFACE_CONNECTOR_OCCURRENCE($,$,$,#65,#12);
ENDSEC;
END-ISO-10303-21;
```



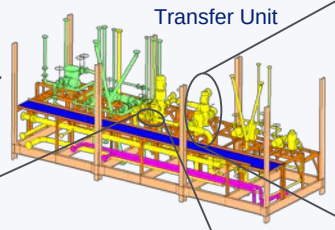
LMI

3D Technical Data Package

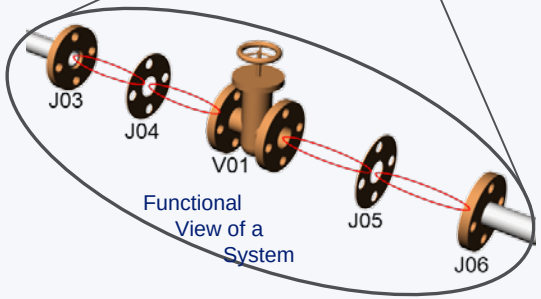
where System Engineering meets Product Design



Slow Speed Diesel Engine Room

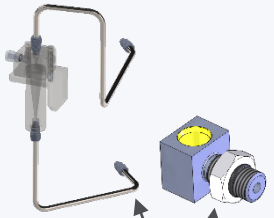


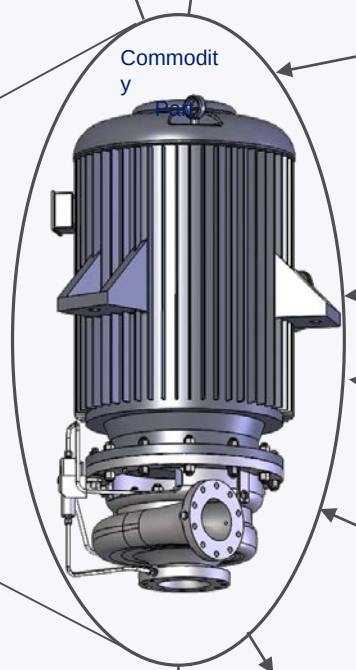
Lube Oil & Fuel Oil Transfer Unit

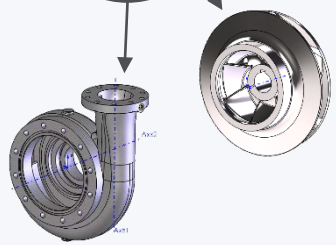


Functional View of a System

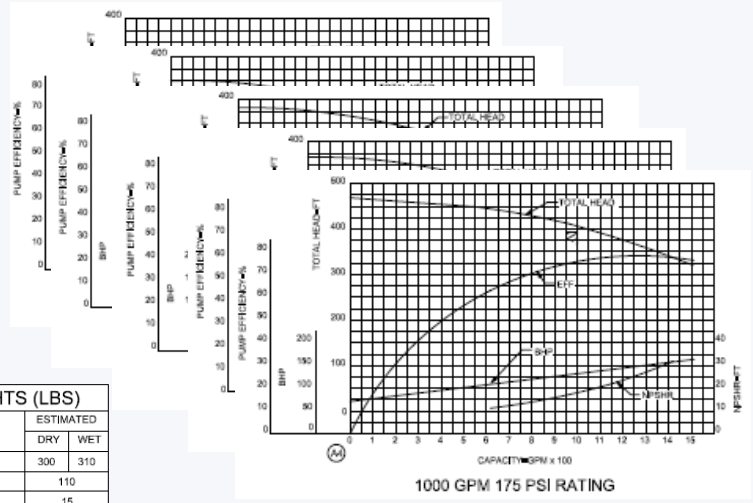
Component Name	Instance	Node	Node Unique ID	xPart	yPart	zPart	xModel	yModel	zModel
Flange, 150lb, FF, 1in	J03	J03 Port 1	distPort_20	0	0	0	106.88	30	3
Flange, 150lb, FF, 1in	J03	J03 Port 2	distPort_21	0.26	0	0	106.62	30	3
Gasket 1/16in, 150lb, 1in	J04	J04 Port 1	distPort_22	0	0	0	106.943	30	3
Gasket 1/16in, 150lb, 1in	J04	J04 Port 2	distPort_23	0.0625	0	0	106.8805	30	3
Gasket 1/16in, 150lb, 1in	J05	J05 Port 1	distPort_24	0	0	0	110.883	30	3
Gasket 1/16in, 150lb, 1in	J05	J05 Port 2	distPort_25	0.0625	0	0	110.9455	30	3
Flange, 150lb, FF, 1in	J06	J06 Port 1	distPort_26	0	0	0	110.945	30	3
Flange, 150lb, FF, 1in	J06	J06 Port 2	distPort_27	0.26	0	0	111.205	30	3
Valve Gate, 150lb, 1in, FF	V01	V01 Port 1	distPort_62	0	0	0	106.943	30	3
Valve Gate, 150lb, 1in, FF	V01	V01 Port 2	distPort_63	3.94	0	0	110.883	30	3







Cleared for Release



1000 GPM 175 PSI RATING

WEIGHTS (LBS)		
DESCRIPTION	ESTIMATED	
	DRY	WET
PUMP	300	310
CASING	110	
IMPELLER	15	
SEAL HEAD	106	
MOTOR	2195	
UNIT COMPLETE	2495	2505
MOTOR ROTOR ASSY	305	

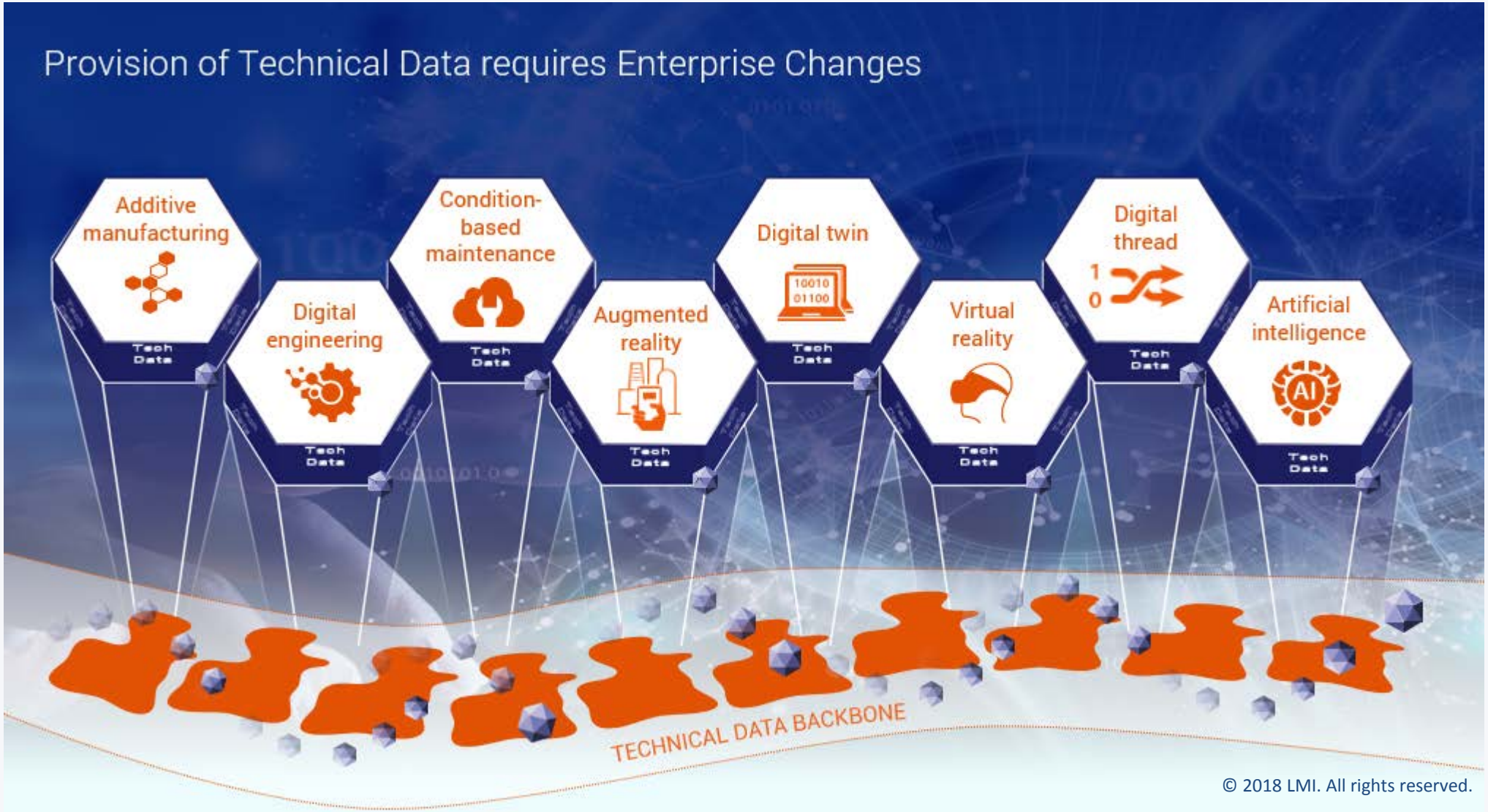
PUMP DATA						
RATING	125 PSI 750 GPM	150 PSI 750 GPM	125 PSI 900 GPM	125 PSI 1000 GPM	150 PSI 1000 GPM	175 PSI 1000 GPM
LIQUID PUMPED	SEA WATER	SEA WATER	SEA WATER	SEA WATER	SEA WATER	SEA WATER
SPECIFIC GRAVITY	1,03	1,03	1,03	1,03	1,03	1,03
LIQUID TEMPERATURE	85°C MAX	85°C MAX	85°C MAX	85°C MAX	85°C MAX	85°C MAX
SPEED AT CAPACITY	3585	3585	3585	3585	3585	3585
EFFICIENCY AT CAPACITY	70,3%	71,5%	74%	75%	75%	76%
RATED INPUT CAPACITY	78 BHP	92 BHP	89 BHP	97 BHP	117 BHP	134 BHP
MAXIMUM INPUT AT ANY CONDITION	95 BHP	116 BHP	101 BHP	115 BHP	134 BHP	167 BHP
ACTUAL SHUTOFF HEAD	147 PSI	170 PSI	154 PSI	161 PSI	183 PSI	207 PSI
HYDROSTATIC TEST PRESSURE	315 PSIG	315 PSIG	315 PSIG	315 PSIG	315 PSIG	315 PSIG
NPSHR	13 FT	13 FT	16,5 FT	18,5 FT	18,5 FT	18,5 FT
NPSHA, MAX	55 FT	55 FT	55 FT	55 FT	55 FT	55 FT
CRITICAL SPEED	6533 RPM	6533 RPM	6533 RPM	6533 RPM	6533 RPM	6533 RPM
MAXIMUM AXIAL THRUST LOAD (TOWARD SUCTION)	31,3 LBS	31,3 LBS	31,3 LBS	31,3 LBS	31,3 LBS	31,3 LBS

MOTOR DATA	
DESIGN SPEC	MIL-M-17060
TYPE	SQUIRREL CAGE INDUCTION
RPM (SYN.)	3600
RATED HP	150 NOM. 170 MAX.
AMBIENT TEMPERATURE	50 °C
ENCLOSURE	TEFC
BEARINGS	BALL, QUIET PER MIL-B-17931
INSULATION CL	B OR F - SEALED INSULATION SYSTEM
DUTY	CONTINUOUS
DESIGN	B
SPEED CLASS	CONSTANT
OPER. VOLTAGE	3/60/440
FRAME	505Z
NAVY SERVICE	A
IMBALANCE	0,34 OZ-IN MAX.
RATED LOAD CURRENTS	180 AMPS NORM. 200 AMPS MAX.

LMI

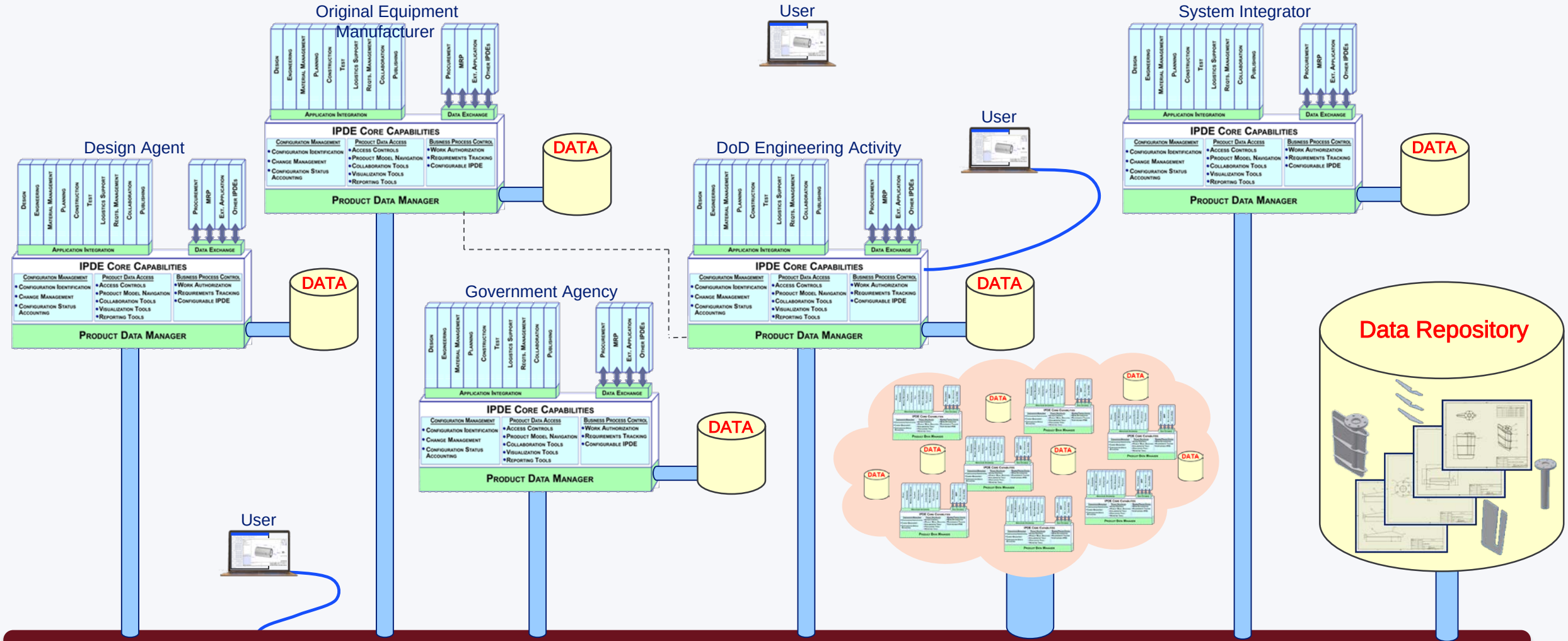
Technical Data

the new backbone of the enterprise



Potential R & D Topics

Connecting the Model Based Environment

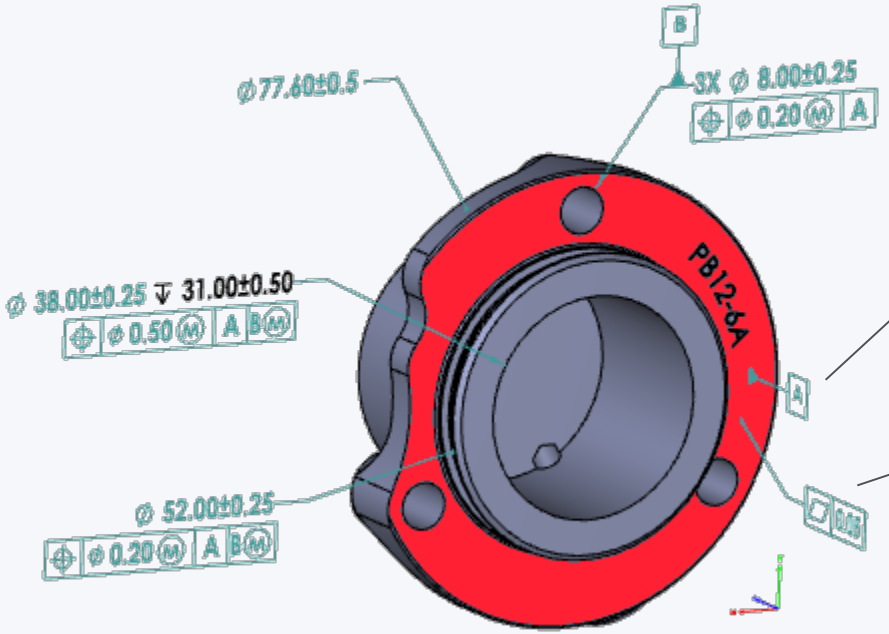


Network of connections between data repositories, PLM, and other enterprise systems

Current DoD Priority

Semantic with Visual

- Most 3D Technical Data Packages convey the non geometric data as text. This is referred to as Visual Product Manufacturing Information.
- A 3D Technical Data Package contains 3D geometric data.
- A Technical Data Package that contains spreadsheets, drawings, images, pages of text, and a single simple part formatted in “3D PDF” without any annotation is a 3D Technical Data Package.
- A Technical Data Package that contains nothing but 3D geometric data with all of the annotation defined semantically is a 3D Technical Data Package.



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