

Ship Common Information Model (SCIM)

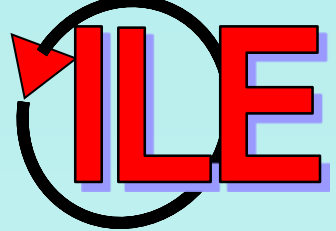
Presented by :

Dr. Burton Gischner
GENERAL DYNAMICS
Electric Boat

Date:

October 4, 2011

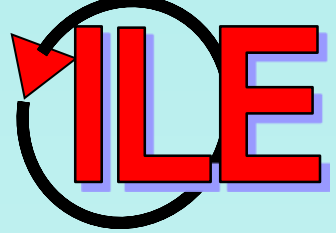
NSRP All Panel Meeting
Newport News, VA



AGENDA



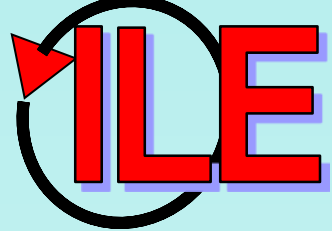
- **Definition of Terms**
- **Interoperability Problem in Shipbuilding**
- **STEP, ISE, NPDI, SCIM**
 - **Have we found the solution?**
- **Data Exchange Requirements in Shipbuilding**
- **Integrated Logistics Environment Project (ILE)**
 - **SCIM Evaluation**
 - **Migrating VIRGINIA Class IPDE Data**
 - **Exchanging Structural Design Data with Manufacturing Systems for DDG 1000 and CVN 21**
 - **SCIM Development**
 - **Completion and Delivery of the Standard**
- **Adopting the SCIM for Production Use**



STEP – Standard for the Exchange of Product Model Data



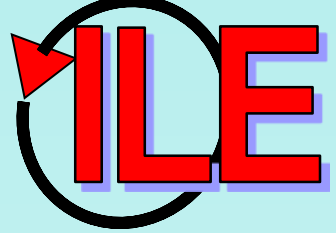
- ISO 10303 (STEP) is an international standard for the computer-interpretable representation and exchange of product manufacturing information
- Its official title is: *Automation systems and integration — Product data representation and exchange*
- It is known informally as "STEP", which stands for "Standard for the Exchange of Product model data"



ISE – Integrated Shipbuilding Environment Projects



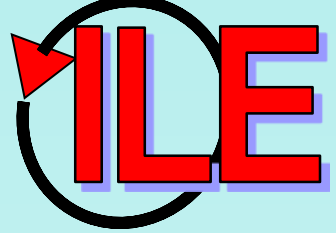
- A series of NSRP Projects devoted to developing, prototyping, and implementing a set of standards for the exchange of shipbuilding product model data
- Supported development of the ISO STEP Shipbuilding Application Protocols (APs)
- Active over a ten year period
- Addressed data exchange standards and issues in multiple shipbuilding disciplines including: structure, piping, HVAC, electrical, electrical, engineering analysis, and product life cycle support



IPDE – Integrated Product Data Environment



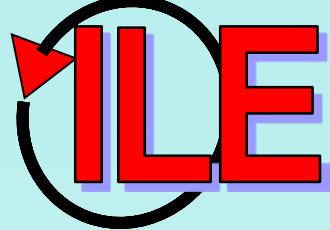
- **An Integrated Product Data Environment (IPDE) is a collection of business processes, computer systems, and associated services, which house the product model data, and enable people to work in concert towards common business goals throughout the life cycle of a product**
- **Designing and maintaining a ship using an IPDE can add significant efficiencies to the process, but if not done wisely, it can also add unacceptable cost and risk to a shipbuilding program**



NPDI – Navy Product Data Initiative



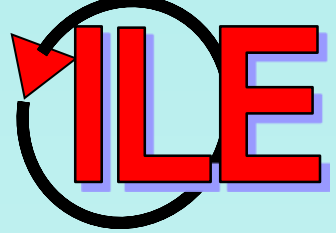
- Established in response to a NAVSEA request to reduce ship acquisition and maintenance costs associated with computer systems used in the design, manufacture, and life cycle support of shipbuilding programs
- The effort was sponsored by the National Shipbuilding Research Program (NSRP) and funded by the Program Executive Offices (PEO) Submarines, Carriers and Ships
- NAVSEA tasked NSRP to specify the requirements for and drive the implementation of product data systems based on an open architecture having suitable functionality and enterprise-wide interoperability to support affordable Navy vessel design, construction and service life support
- The NPDI developed an Integrated Product Data Environment (IPDE) specification to be invoked on future shipbuilding/service life contracts, and an assessment mechanism to measure compliance, effectiveness and provide guidance for a shipbuilder's IPDE implementation



SCIM - Ship Common Information Model



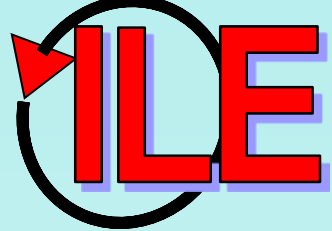
- **The SCIM provides an information model that defines the minimum entities and attributes that must be transferred for applications supported by the IPDE**
- **Background**
 - These models were developed under the Integrated Shipbuilding Environment (ISE) Project under NSRP over the past ten years
- **Association with IPDE Specification produced under NPDI**
 - Is a separate document
 - Is referenced by IPDE Specification
 - All common terms in the two documents will share one definition
 - Definitions will be detailed in the SCIM
 - Updates and revisions to SCIM and IPDE Specification can be issued independently
 - SCIM will be placed on Web and made available as Open Source



ILE – Integrated Logistics Environment Project



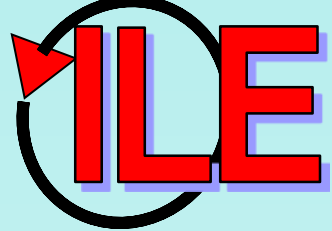
- **An NSRP Project that is focused on validation and completion of the Ship Common Information Model (SCIM)**
- **Project is currently active, with scheduled completion in June 2012**



Interoperability Problem



- **Communication between diverse computer systems is a big challenge in today's environment:**
 - **As CAD/CAE/CAM systems have expanded in U.S. shipyards, interoperability among these systems has become a major issue**
 - **Interoperability is an issue within a shipyard as well as between partnering yards and with the Customer**
- **These problems are exacerbated because:**
 - **Most recent and future ship design and build contracts involve multiple shipyards**
 - **Length of time to design and build a ship often exceeds the life span of current computer systems**
 - **Requirements for life cycle support of the ship will far exceed the life span of current computer systems**



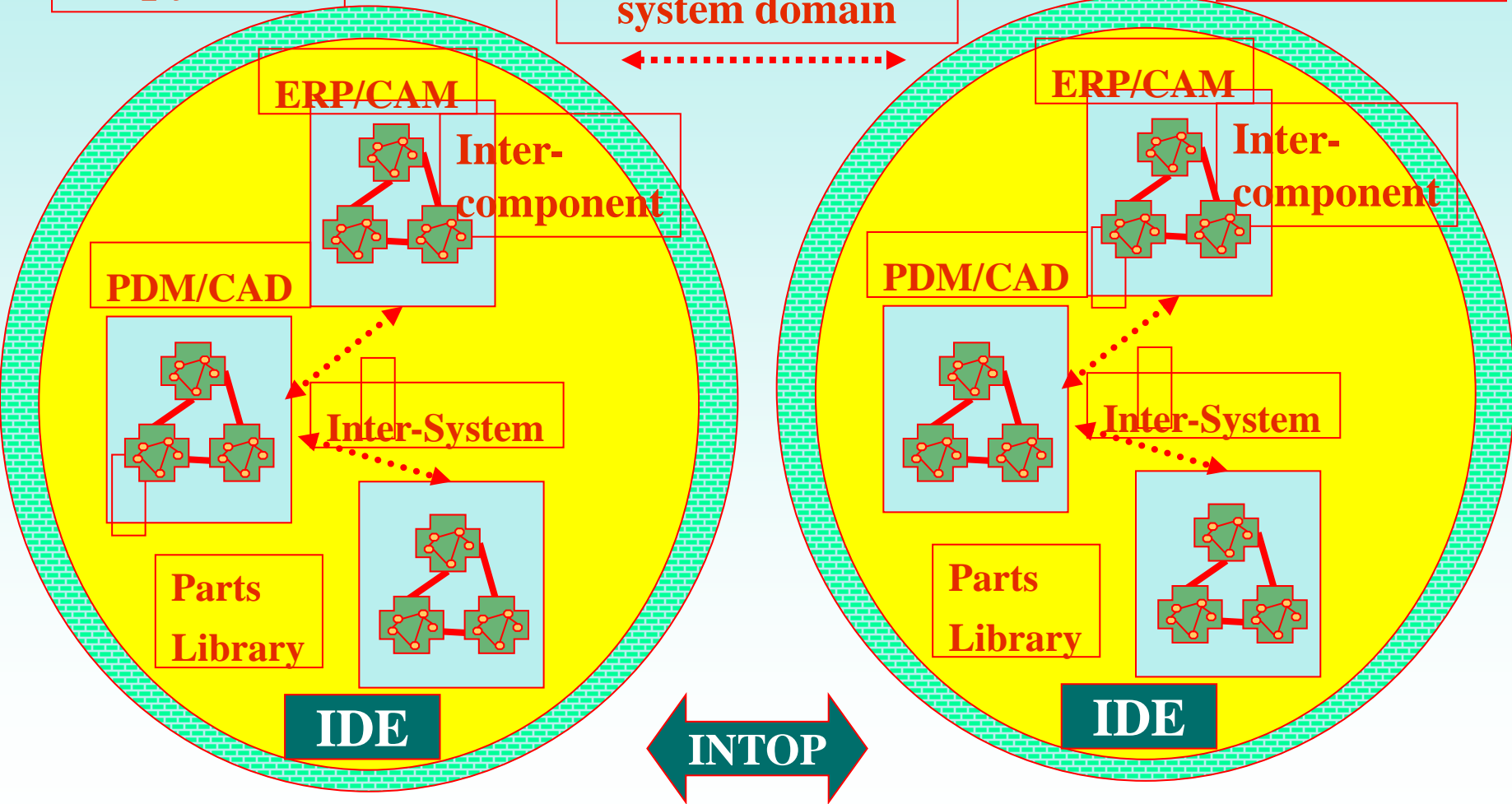
Levels of Interoperability

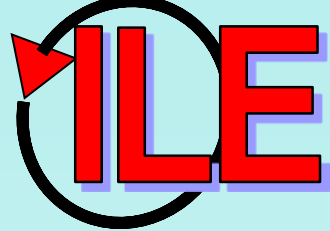


Shipyard A

Inter-business
system domain

Shipyard B

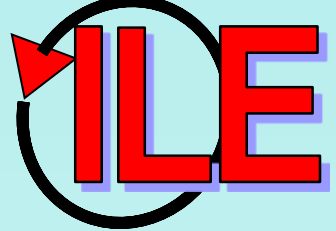




Collaboration Among Shipyards is Required in Today's Environment



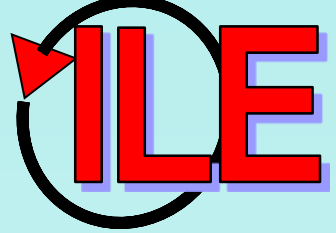
- Almost every major recent U.S. Navy ship design and/or construction contract has involved collaboration among multiple shipyards
 - For example:
 - CVNX (HII - Newport News & EB)
 - DDG1000 (HII - Ingalls & Bath)
 - VIRGINIA (EB & HII – Newport News)
- This trend will continue
- Navy views system interoperability as enabling multiple yards to be viewed as “One Shipyard”



Integrated Logistics Environment Project



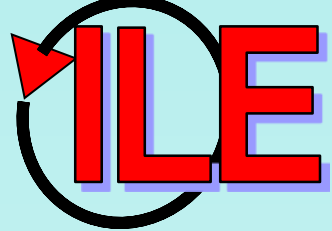
- Over the past several years the ISE Projects under NSRP have been developing and prototyping tools to enable an Integrated Shipbuilding Environment (ISE)
- A current NSRP project is continuing those efforts with a special emphasis on creating an environment to facilitate data exchange and interoperability throughout the entire life cycle of the ship
- This natural transition brings project focus on creating a standards-based Integrated Logistics Environment (ILE)



NPDI and SCIM



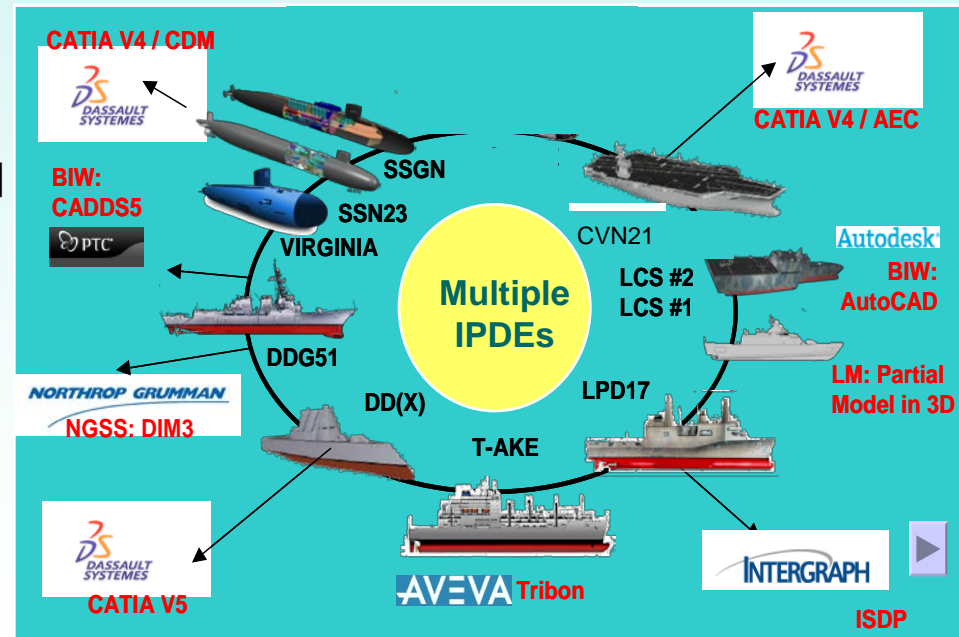
- **NSRP has led the way in developing standards and prototyping tools to facilitate product model exchange between shipyards and the Navy throughout the life cycle of the ship**
- **In conjunction with the Navy Product Data Initiative (NPDI) effort, a Ship Common Information Model (SCIM) was defined to specify information exchange requirements within and among IPDE environments throughout the life cycle of the ship**
- **The current project for an Integrated Logistics Environment (ILE) is evaluating and validating the SCIM models that have been developed, as well as completing the SCIM document for several additional disciplines**

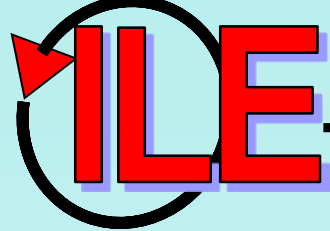


Integrated Product Data Environment (IPDE):

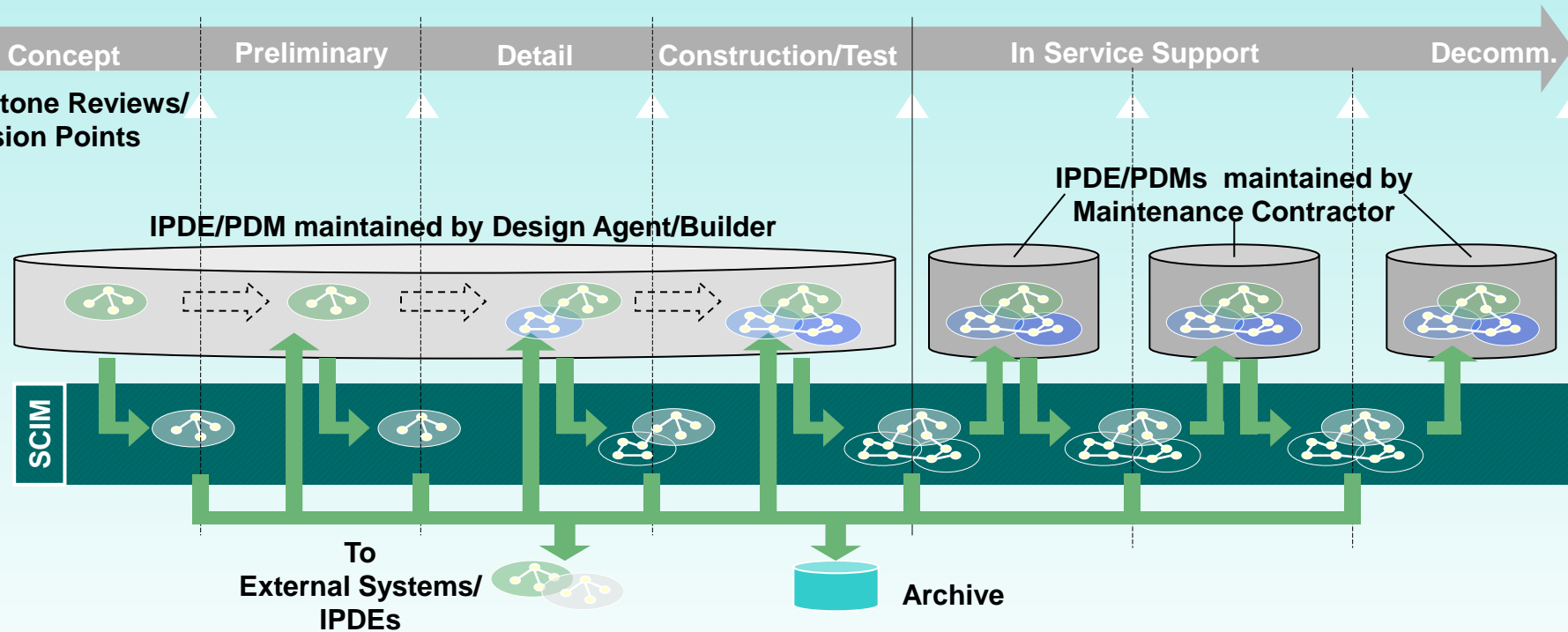


- A collection of business processes, computer systems, and associated services, which house the product model data, and enable people to work in concert towards common business goals throughout the life cycle of the product
- Each shipyard approaches IPDE development differently leading to the following challenges
 - Systems are complex and expensive to build and integrate
 - Common problems are addressed independently
 - Product information for service life support is inconsistent and expensive
 - Cost of change is impacting shipboard technology insertion and modernization
- Industry does not have an agreement on resolving these challenges





Product Model Data Needs to Transition Throughout the Life Cycle

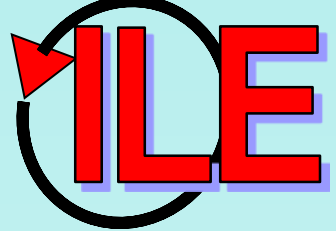


- During design and construction phases a set of PDM and application tools capture and maintain product model data in native format
- However at any time during those phases, product model data may need to be transferred to external systems or archived
- These transfers should comply with the Ship Common Information Model (SCIM)

ISE Interoperability Solution



- **The Integrated Shipbuilding Environment Project (ISE) has attacked the interoperability problem on a broad front involving numerous standards, tools, and organizations including:**
 - XML (Extensible Markup Language)
 - STEP (Standard for Exchange of Product Model Data)
 - isetools.org Website
- **Drive development of shipbuilding product data standards**
 - Construct a single shipbuilding information model
 - Demonstrate and educate U.S. shipbuilding community
- **Develop and demonstrate tools that are low cost**
 - Can be selectively used by shipyards to support interoperability
 - Capitalize on XML and related Internet technologies
- **Accessible to large and small shipyards**
 - Only system dependency is Web infrastructure
 - Utilizes open standards
- **Permissive (mediation) architecture**
 - Lets each enterprise choose its own tool set
- **Amenable with CAD platforms used by U.S. shipbuilders**



Adoption of ISE Information Models



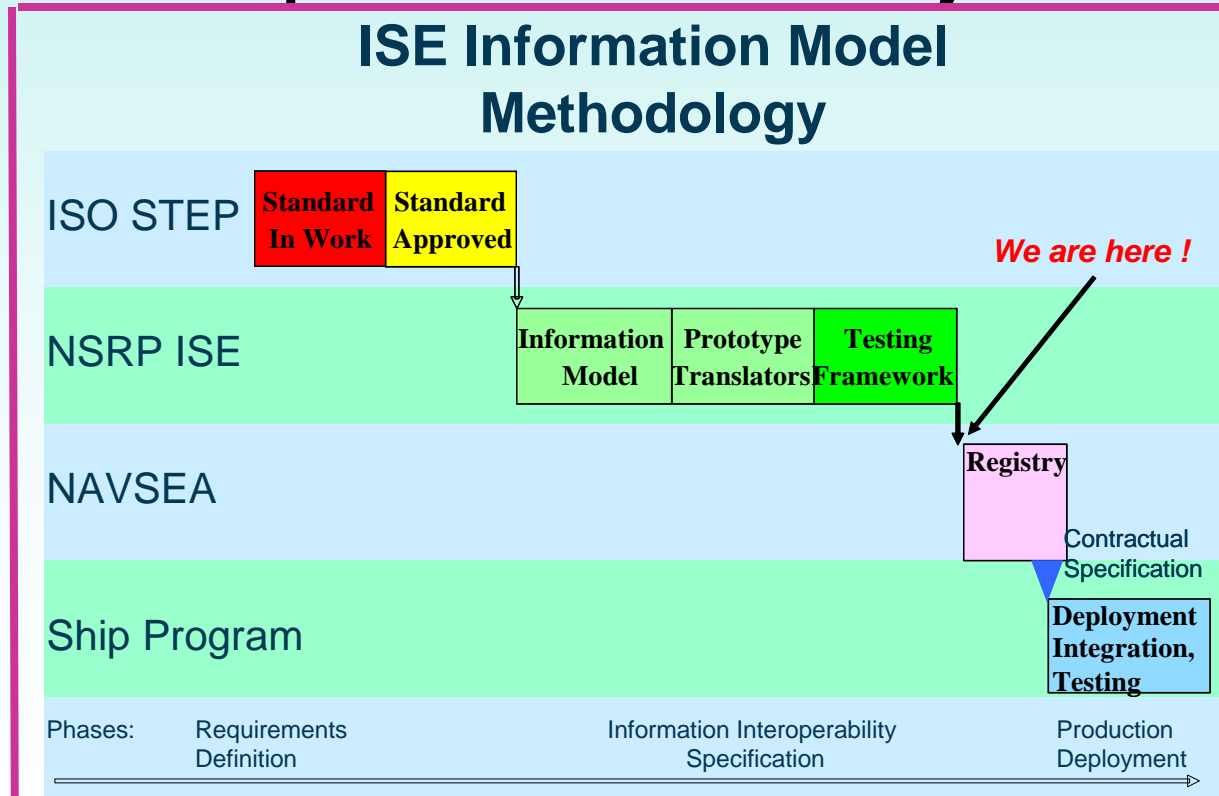
Diagram below of “ISE Information Model Methodology” was developed years ago to show plan for adoption of ISE information models

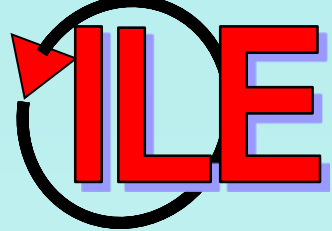
ISE Project has achieved the top two lines for the major product disciplines

- Development
- Approval
- Prototype Testing of ISO Standards

Models must now be:

- Published
- Managed
- Invoked on Navy Contracts
- Implemented by Shipyards and Vendors





What remains to be done...



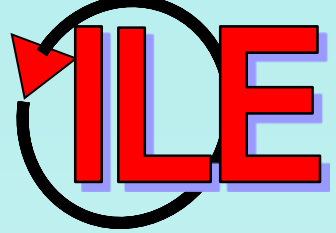
- The information exchange requirements assembled by ISE have been published in a formal, XML-based notation
- Remaining work:
Package the ISE work in a manner that is:
 - Fully documented and user-friendly
 - Usable by shipyard personnel, including non-IT specialists
 - Capable of validation
 - Suitable for contractual specification
 - Of practical use for agreements between shipbuilder and CAD/system vendors
- ILE Project is completing this remaining work – SCIM will be available for production use by 2012

ISE Developed the Basis for the Ship Common Information Model



- Shipbuilding information requirements are a prerequisite both for IPDE implementation and for interoperability
- Over the past ten years ISE has formulated the U.S. Navy shipbuilding requirements:
 - Identifying from the comprehensive ISO standards, those requirements that apply to U.S. Navy shipbuilding
 - Formulating the technical approaches for implementation including:
 - Simplification of information models
 - Definition of an implementation-independent means of specifying information requirements

SCIM is codifying the information models developed and prototyped under ISE



SCIM Background



The SCIM provides an information model that defines the data exchange requirements to enable interoperability among Shipyard and Navy systems

■ Background

- Information models developed, prototyped, and tested under the NSRP Integrated Shipbuilding Environment (ISE) Project
- SCIM is codifying the information models developed under ISE

■ Association with NPDI IPDE Specification

- Separate document referenced by IPDE Specification
- SCIM will be placed on Web and made available to the Shipbuilding community



SCIM is Based on (ISO 10303) - Standard for the Exchange of Product Model Data (STEP)

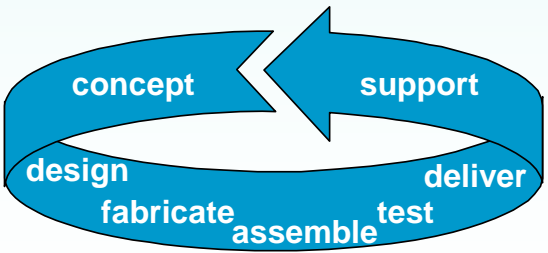
A large graphic with a blue background featuring a stylized wave. The text "STEP Technology" is written in large, bold, yellow letters. Below it, the tagline "the Neutral Data Integration Wave of the Future" is written in a smaller, yellow font. To the right, a list of key features is presented in white text: Interoperability, Supply Chain Integration, Web-based Collaboration, Life Cycle Management, Long Term Data Retention, and Systems Engineering.

STEP Technology

the Neutral Data Integration Wave of the Future

- Interoperability
- Supply Chain Integration
- Web-based Collaboration
- Life Cycle Management
- Long Term Data Retention
- Systems Engineering

What is STEP?



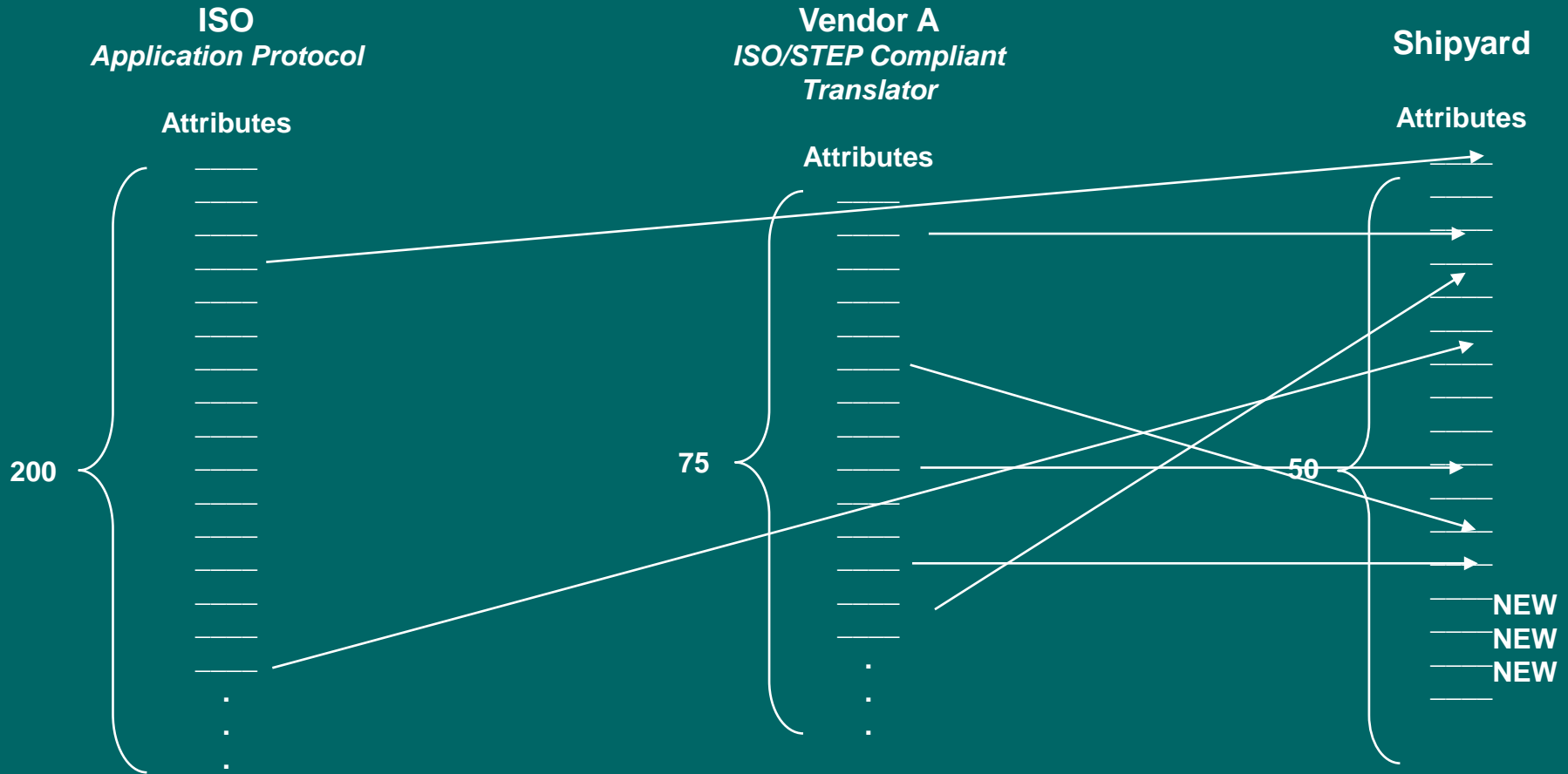
...a computer interpretable definition of the physical and functional characteristics of a product throughout its life cycle



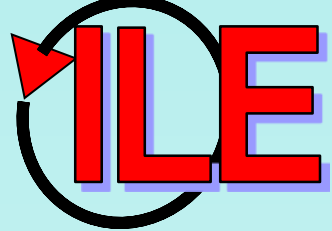
...an international standard (ISO 10303) for exchanging data between different systems (CAD, CAM, CAE and PDM)



Relationship of ISO Standards to SCIM Models



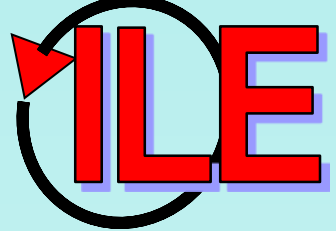
- Attributes and properties in SCIM models will be a subset of the attributes and properties in the associated STEP Standard
- They will be the subset required for U.S. shipbuilding product model exchanges



Justification for SCIM Philosophy



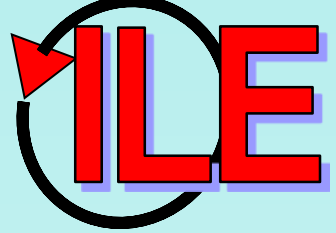
- **Neutral file exchange requires translators from vendors**
 - Minimal interest from CAD or PDM vendors has been shown in supporting the STEP Shipbuilding APs
 - Product data may reside in multiple systems of an IPDE, so (even when it is developed) a given vendor's translator may not be sufficient
 - SCIM allows for neutral file exchanges using ISO 10303-28 (STEP XML)
 - However, it also permits the use of other XML translators which may be available on the sending or receiving systems
 - Such a transfer would involve the use of a “Mediator”
- **STEP APs contain more product data than is available in current IPDEs or at points in the design process where data must be exchanged**
 - Even Conformance Classes in the STEP APs do not resolve this problem
 - SCIM attempts to define a subset of each STEP AP that contains a minimum information model and can be supported in today's IPDE environments
- **It is recognized that this minimum subset may have to be modified to meet the needs of a particular program or ship class, but in general it should be very close to the desired solution**



Layout of Each SCIM Section



- **Front Matter for Each Discipline**
 - **Overview**
 - **Data Definitions of Terms**
 - **Usage Guides and Implementation Agreements**
- **Content for Each Entity**
 - **Entity Name**
 - **Definition**
 - **Intent**
 - **Motivation**
 - **Structure**
 - **Information Requirements**
 - **Properties**
 - **Implementation Consequences**
 - **XML**



STEP APs to be Invoked by SCIM



- **SCIM will define requirements for data transfer with entities and properties based on STEP APs**
 - **AP203 – Configuration Controlled Design**
 - **AP209 – Engineering Analysis**
 - **AP212 – Electrotechnical**
 - **AP215 – Ship Arrangements**
 - **AP216 – Ship Moulded Forms**
 - **AP218 – Ship Structures**
 - **AP227 – Plant Spatial Configuration for Ship Piping and HVAC**
 - **AP239 – Product Life Cycle Support**



SCIM Application Areas



SCIM Chapters Completed

- PDM and Change Management Fundamentals
- Structural Moulded Forms
- Ship Arrangements
- Structural Detailed Design
- Piping Functional Design
- Piping Physical Design
- Common Parts: Procurement
- Product Life Cycle Support

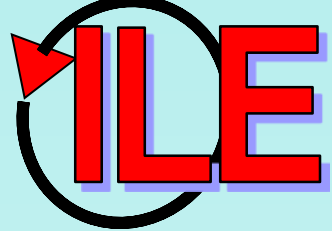
*To be Validated
under Task 1*

SCIM Chapters Required

- HVAC Functional Design
- HVAC Physical Design
- Electrotechnical Functional Design
- Electrotechnical Physical Design
- Engineering Analysis
- Pipe Stress Analysis
- Structural CAM

*To be Developed
under Task 2*

- (This functionality will be captured within Structural Detailed Design Chapter)



Status of NPDI and SCIM Efforts



- **IPDE Specification from NPDI Project has been completed and delivered to the Navy**
- **SCIM document development is underway**
 - **First eight sections are complete**
 - **Work on remaining seven sections will be completed as part of the current ILE Project**
- **SCIM is separate document from IPDE Spec**
 - **Will be referenced by IPDE Specification**
 - **Could be updated or revised independently of IPDE Spec**
 - **Is vital to enabling interoperability among various IPDEs**



Integrated Logistics Environment (ILE) Project Tasks



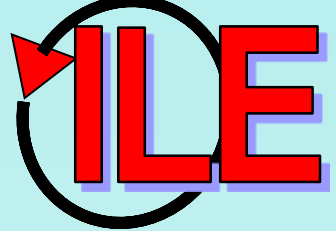
- **Task 1 – Tools and Methods for Supporting the Next Generation Shipbuilding IPDE**
(SCIM Evaluation)
 - **Subtask 1.1 – Migrating VIRGINIA Class IPDE Data**
 - **Subtask 1.2 - Exchanging Structural Design Data with Manufacturing Systems**
- **Task 2 – Completion of the Ship Common Information Model**
(SCIM Development)



ILE Project Objectives



- **Apply the tools and methods developed by the ISE team to two current shipbuilding requirements**
 - **VIRGINIA Class IPDE data migration**
 - **Sharing of structural design data with manufacturing systems across shipyards**
- **Demonstrate the use of the NPDI SCIM as a means for supporting Shipyard and Navy interoperability**
- **Validate that the SCIM chapters meet Navy and Shipyard requirements for specific data exchange scenarios**
- **Complete the development of the SCIM**



Subtask 1.1



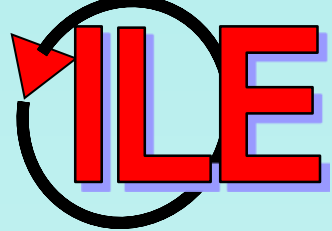
- **Migrating VIRGINIA Class IPDE Data**
- **VIRGINIA has been designed in an IPDE environment featuring CATIA and CDM**
- **Migration is currently underway to a new IPDE featuring NX and TeamCenter**
- **VIRGINIA design and construction efforts will continue for several more years, so the VIRGINIA product models must be successfully moved to the new IPDE**
- **Task is led by Electric Boat Corporation**



Subtask 1.1 Objectives



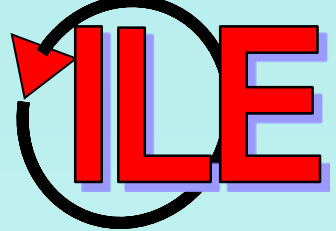
- **Tools and Methods for Supporting Next Generation Shipbuilding IPDE (SCIM Evaluation)**
 - **Demonstrate the capabilities of the NPDI SCIM as the means for supporting the next generation IPDE**
- **This subtask will apply the tools and methods developed by the ISE team to the VIRGINIA Class IPDE Data Migration**
- **Moreover, this subtask used the NPDI Ship Common Information Model (SCIM) as the basis for this pilot**
- **As a result, this subtask will potentially benefit the VIRGINIA program, but its primary objective was to validate and demonstrate the capabilities of the SCIM**



Subtask 1.1 Approach



- **VIRGINIA Class submarine is in the midst of its production cycle with several more hulls pending**
- **VIRGINIA Class IPDE**
 - **Platform is approaching its end of life and EB is in the process of implementing a new next generation IPDE**
 - **Highly customized solution that evolved and grew as the VIRGINIA Class design progressed and as new requirements and issues revealed themselves**
- **SCIM is intended to provide the information requirements to guide the extraction of product data and specifies the entities, attributes, and properties required**
- **Focus was on analyzing piping and structural models that have been transferred from CATIA/CDM to NX/TeamCenter and analyzing how SCIM supported VIRGINIA Data Migration efforts**



Subtask 1.1 Approach cont'd.



- Piping and structural models are extracted from NX/TeamCenter (using PLMXML) and translated into SCIM format using an XML mediator
- Validation is then be done on the resulting SCIM files
- This approach enables validation of the SCIM format and reveals any errors or discrepancies in that format, while it takes advantage of the work already done in the VIRGINIA Data Migration Task
- Deficiencies revealed in the SCIM chapters relating to piping or structures have been noted and will be corrected as part of Task 2 under the ILE Project

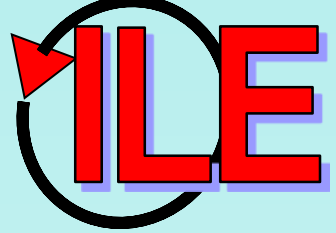
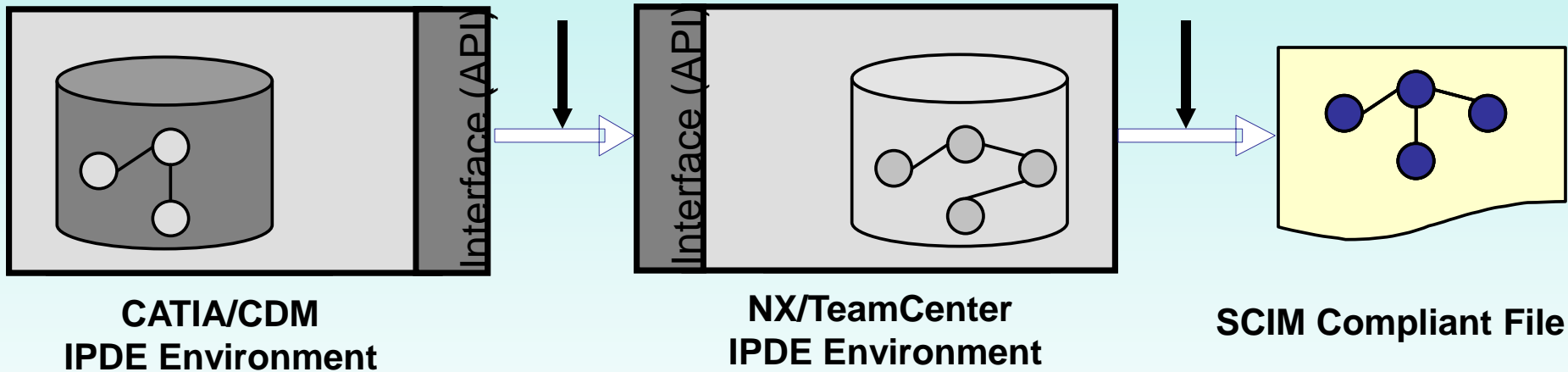


Diagram of SCIM Validation Effort

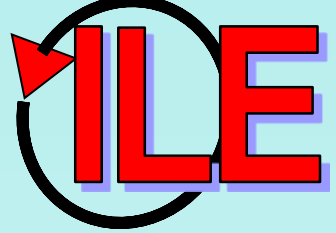


Transfer Done as Part of
Data Migration Project

Develop Mediator



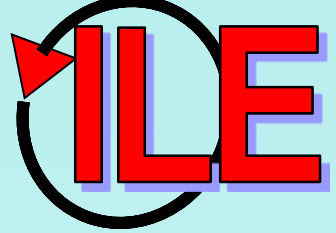
- Requires development of only one mediator
- Can evaluate if model is well represented by current SCIM or by proposed modifications to SCIM
- Builds upon results of VIRGINIA Data Migration Project



SCIM Chapters Needed for VIRGINIA Migration



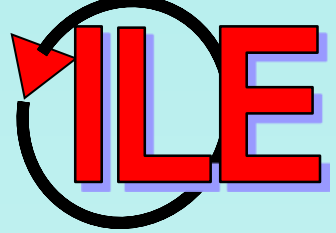
- **Subtask 1.1 has attempted to validate the SCIM approach by looking in detail at the information models in four different SCIM chapters**
 - **Product Data Management (PDM)**
 - **Piping Physical**
 - **Piping Functional**
 - **Structural Detailed Design**



Subtask 1.2



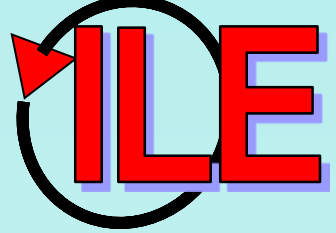
- **Exchanging Structural Design Data with Manufacturing Systems**
- **Focus on applicability of the SCIM for exchange of structural product models on two current design and manufacturing projects**
 - **DDG 1000**
 - **CVN 21**



Subtask 1.2 Objectives



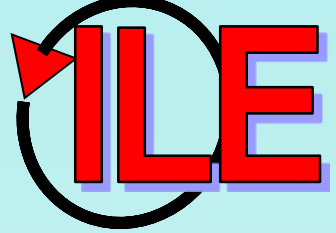
- **Demonstrate use of the NPDII SCIM as means for supporting Shipyard and Navy interoperability**
- **Address data sharing challenge in multiple shipyard development environments**
 - **Exchange of structural design between prime designer and manufacturing, either in same shipyard or second shipyard**
- **Validate and demonstrate capabilities of the SCIM on current programs**
- **Recommend improvements to SCIM**



Subtask 1.2 Participants



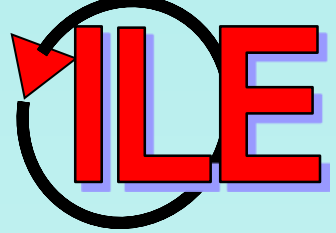
- **Huntington Ingalls Industries – Ingalls**
- **Huntington Ingalls Industries – Newport News**
- **Northrop Grumman Technical Services**
- **Product Data Services Corporation**



Subtask 1.2 Approach



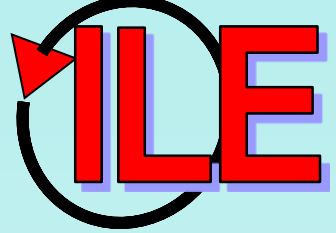
- **Defined the data model for the exchange of structural design data with manufacturing using existing programs as examples**
- **Compared the data model to the SCIM data model**
- **Identified gaps in the SCIM data model**
- **Made recommendations for improving the SCIM**
- **Analyzed data exchange between design and manufacturing for current programs**
 - **DDG 1000**
 - **CVN 21**
- **Focus was on the exchange of Design Product Model with manufacturing in order to perform production planning function and develop Manufacturing Product Model**



Subtasks for Phase 2 of ILE Project



- **Subtask 2.1 - Modification of SCIM Format**
- **Subtask 2.2 - Update Existing SCIM Chapters**
- **Subtask 2.3 - Develop Additional SCIM Chapters**
- **Subtask 2.4 - Finalize and Deliver SCIM Document**



Subtask 2.1- Modification of SCIM Format

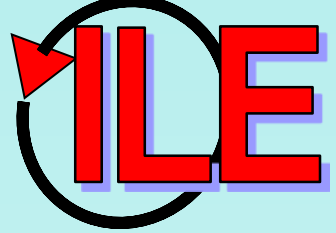


■ Description

- Team Members have suggested that the format of the SCIM Chapters could be improved to make them clearer and more understandable, especially to shipyard personnel who are not from the IT area
- At the start of Phase 2, the format of the SCIM Chapters was reviewed and an appropriate one selected for all the SCIM Chapters
- Software tools to be used for developing and packaging the SCIM were also selected

■ Lead

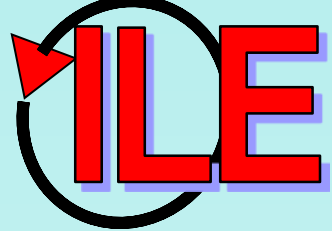
- Northrop Grumman Technical Services
- Supported by: EB, HII, PDS



Subtask 2.2 - Update Existing SCIM Chapters



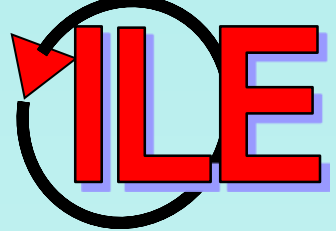
- **Description**
 - **Review the existing SCIM Chapters and update them based upon the results of Subtask 1.1 and Subtask 1.2 of the ILE Project and the format selected in Subtask 2.1**
 - **This task is currently underway and being conducted by the various ILE participants at:**
 - **EB, HII, NGTS, and PDS**



Subtask 2.2 - Update Existing SCIM Chapters *cont'd.*



<u>CHAPTER</u>	<u>LEAD</u>	<u>PLANNED DATES</u>
Product Data Management	PDS	Aug. 1-31, 2011
Structural Moulded Forms	PDS	Sept. 1-30, 2011
Ship Arrangements	PDS	Oct. 1-31, 2011
Piping Physical Design	EB	Aug. 1-31, 2011
Piping Functional Design	EB	Sept. 1-30, 2011
Common Parts: Procurement	EB	Oct. 1-31, 2011
Structural Detailed Design	HII	Aug. 1- Aug. 31, 2011
Product Life Cycle Support	HII	Sept. 1- Oct. 31, 2011

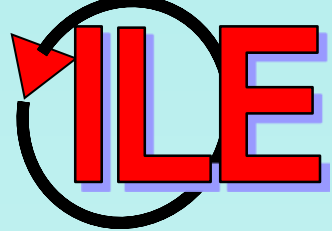


Subtask 2.3 - Develop Additional SCIM Chapters



■ Description

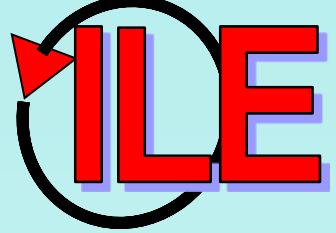
- Develop the remaining SCIM Chapters based upon the results of their implementations in various ISE Projects and based upon the format selected in Subtask 2.1
- Again, this task will be conducted by all of the ILE participants at:
 - EB, HII, NGTS, and PDS



Subtask 2.3 - Develop Additional SCIM Chapters *cont'd.*



<u>CHAPTER</u>	<u>LEAD</u>	<u>PLANNED DATES</u>
HVAC Physical Design	EB	Nov. 1 – Dec. 31, 2011
HVAC Functional Design	EB	Jan. 1 – Feb. 28, 2012
Pipe Stress Analysis	EB	Mar. 1 – Apr. 30, 2012
Electrotechnical Physical	HII	Nov. 1 – Dec. 31, 2011
Electrotechnical Functional	HII	Jan. 1 – Feb. 28, 2012
Engineering Analysis	PDS	Mar. 1 – Apr. 30, 2012
Structural CAM	HII	Aug. 1– Aug. 31, 2011
➤ To be incorporated as additional features in Structural Detailed Design Chapter		



Subtask 2.4- Finalize and Deliver SCIM Document



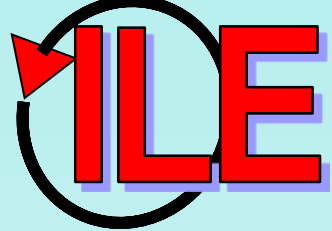
■ Description

- Review all chapters of the SCIM Document to make sure they are clear, consistent, and understandable
- Write explanatory material that will facilitate use of the SCIM at U.S. shipyards
- Deliver completed SCIM Document to the Navy
- Issue Final Report of the ILE Project

■ Lead – Electric Boat

- Supported by: HII, NGTS, and PDS

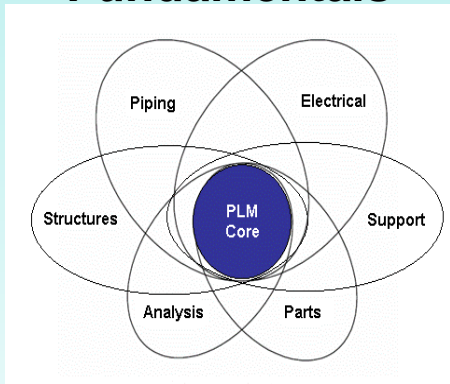
■ Planned Dates: May 1, 2012 – June 30, 2012



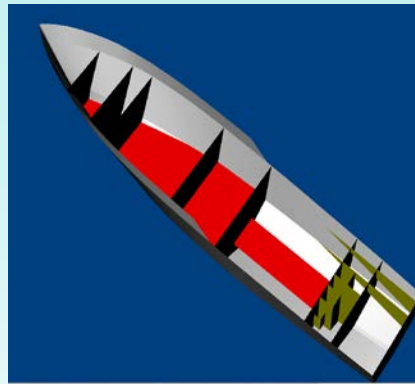
Previous Developed Sections of the SCIM



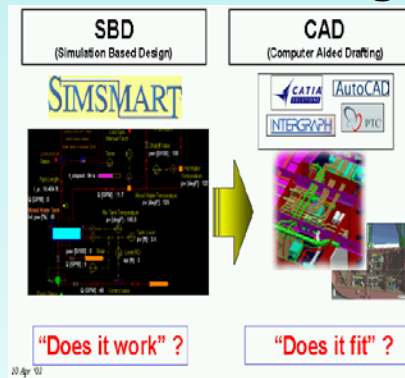
PDM and Change Management Fundamentals



Ship Arrangements



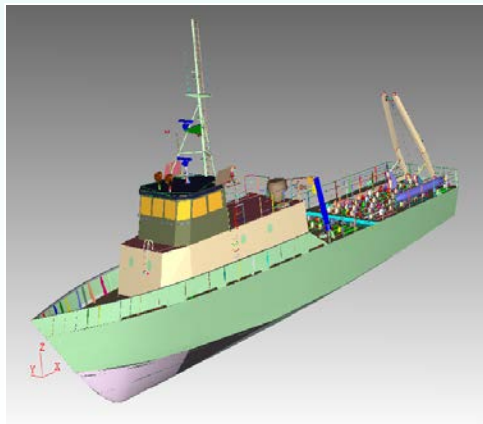
Piping Functional Design



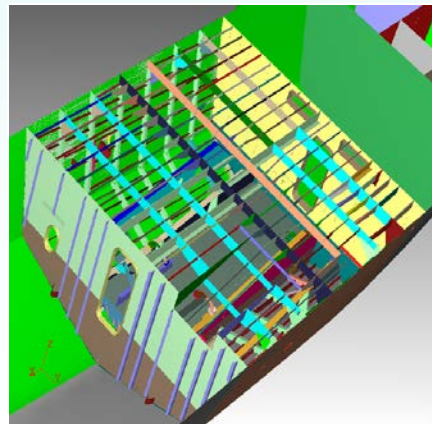
Common Parts: Procurement



Structural Moulded Forms



Structural Detailed Design



Piping Physical Design



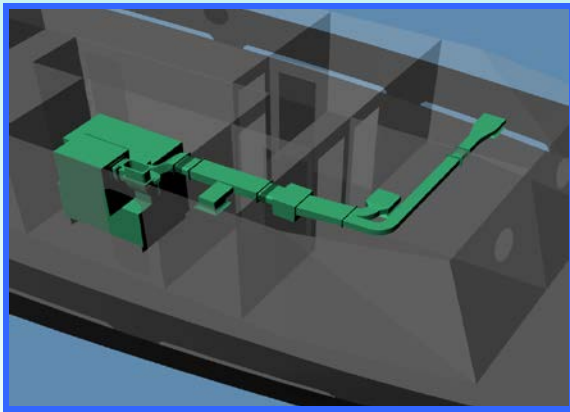
Product Life Cycle Support



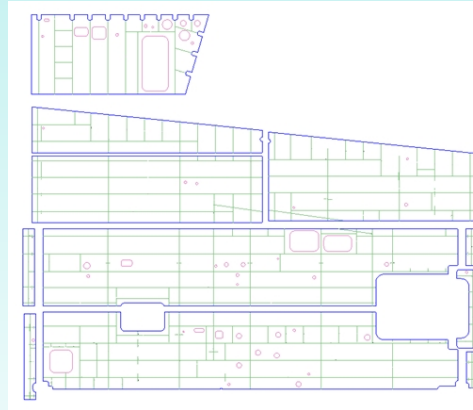
- SCLIS/CDMD-OA for Navy Logistics
- S1000D Electronic Document Authoring

Sections of SCIM being Completed in ILE Phase 2

HVAC Functional & Physical Design



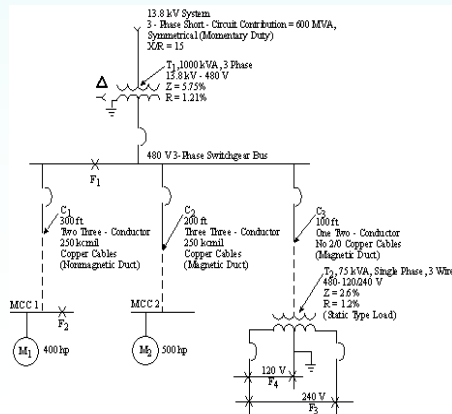
Structural CAM



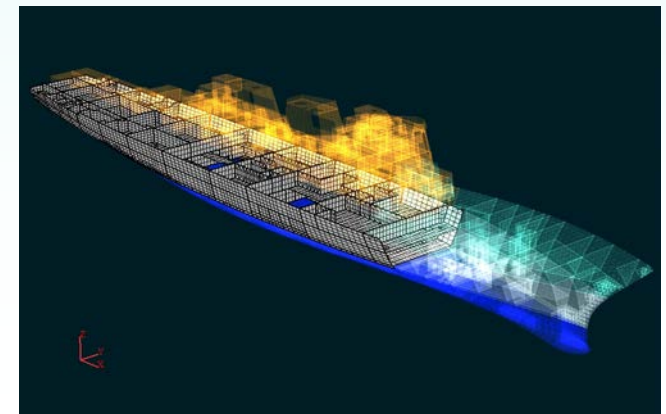
Pipe Stress Analysis

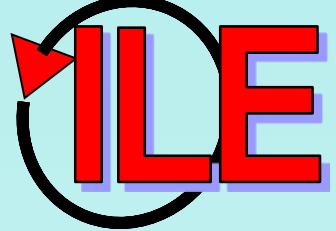


Electrotechnical Functional & Physical Design



Engineering Analysis

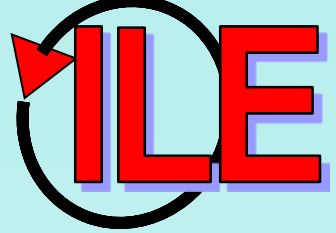




Relationship of the SCIM to other Ship Product Model Data Exchange Standards



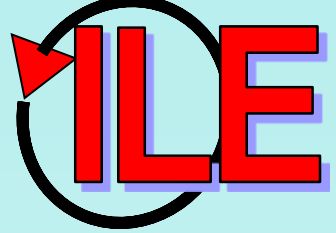
- The ISO STEP Ship Application Protocols define the requirements for sharing data between and among Shipyards, the Navy, Commercial ship owners, and Classification Societies
- CAD Vendors have not implemented the ISO Ship APs as Shipbuilding is a small part of their customer base
- The U.S. Yards and Navy need a version of the ISO Ship APs that are implementable in-house and fulfill just the requirements for Navy shipbuilding
- The SCIM subsets the ISO STEP Ship AP Object definitions to what is needed just for Navy ships, in a data format (XML) that can be extracted from commercial CAD/PDM systems, and that can be cost-effectively supported by Shipyard IT developers



Adopting the SCIM for Production Use



- **The Shipyards need to share data among pieces of their IPDE Design and Manufacturing solutions**
- **The Shipyards need to share data with their co-design and manufacturing partners**
- **The Shipyards need to deliver data to the Navy, and the Navy to the Shipyards**
- **Data in SCIM format can feed later lifecycle uses such as AP239 Ship Logistics support, simplified product model visualization, and part information within the Navy's systems**
- **The SCIM will be completed and available for production use by 2012**



Conclusion



- **There has been significant investment in interoperability and data exchange standards by the Shipyards and Navy through NSRP**
- **ILE Project is validating and publishing the results of this investment**
- **Next step is to implement the SCIM for specific high priority data exchange scenarios within the Shipyards and Navy**
- **Need feedback from Shipyards, Navy, and NSRP on candidate scenarios for implementation**