

The myth of the single authoritative source

Overlap and evolution of product data through the total lifecycle



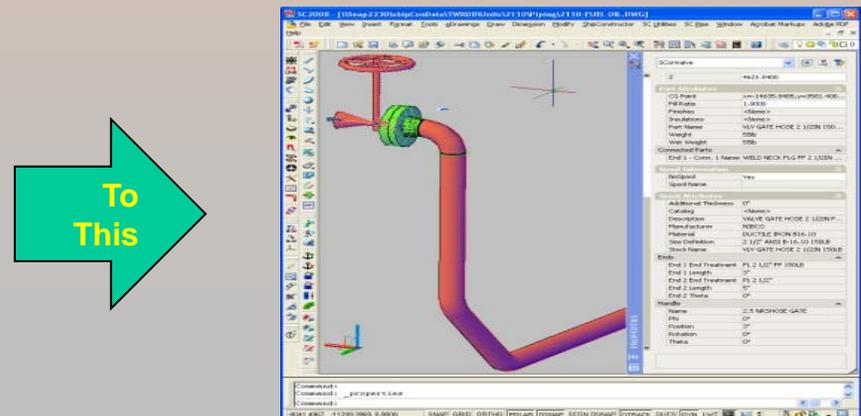
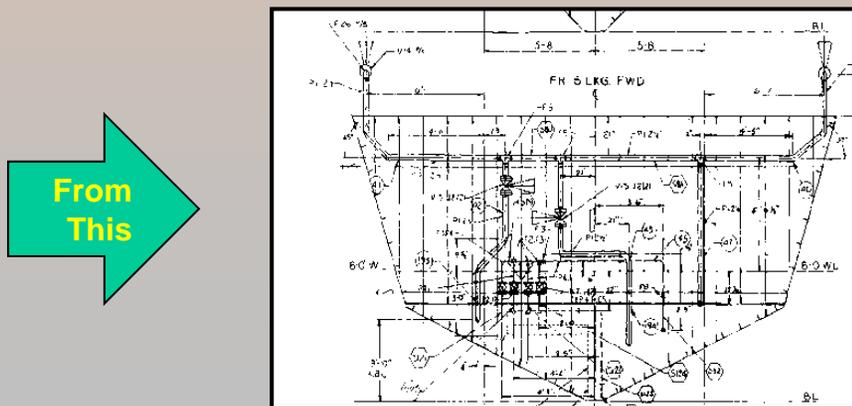
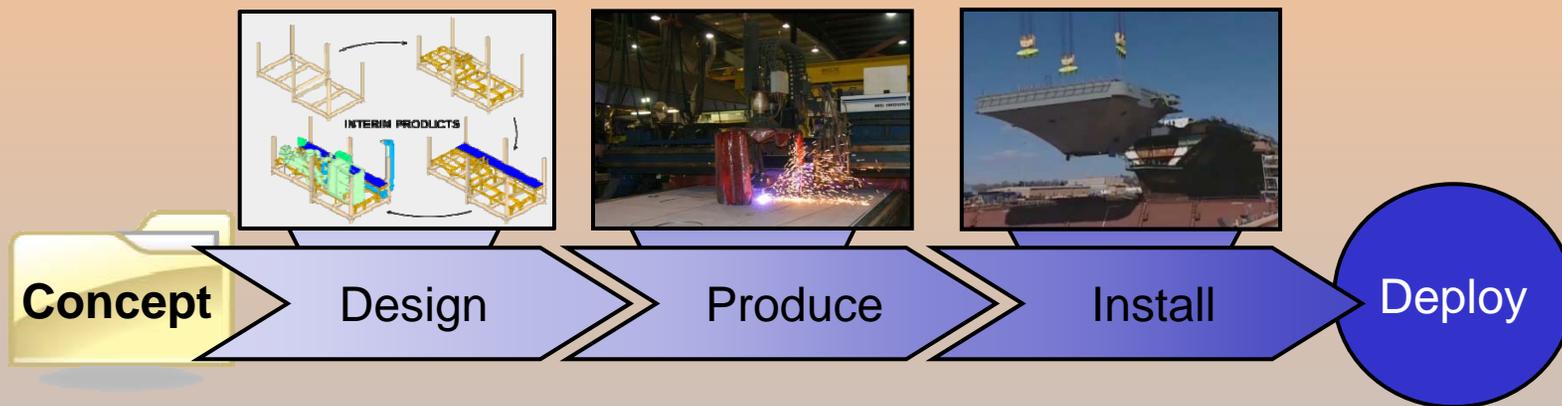
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Recent Navy investment in the Model Based Environment are focused on completing the Digital Thread. These activities will help identify challenges, conduct research, overcome implementation issues, and provide lessons learned in manufacturing and quality assurance where a complete digital 3D product model serves as the authoritative information source for all activities in the product's lifecycle. In all, an effective and high quality digital foundation will help create affordable next generation naval platforms.

John U. Carney, Director, Affordability Initiatives Division and Navy ManTech Program



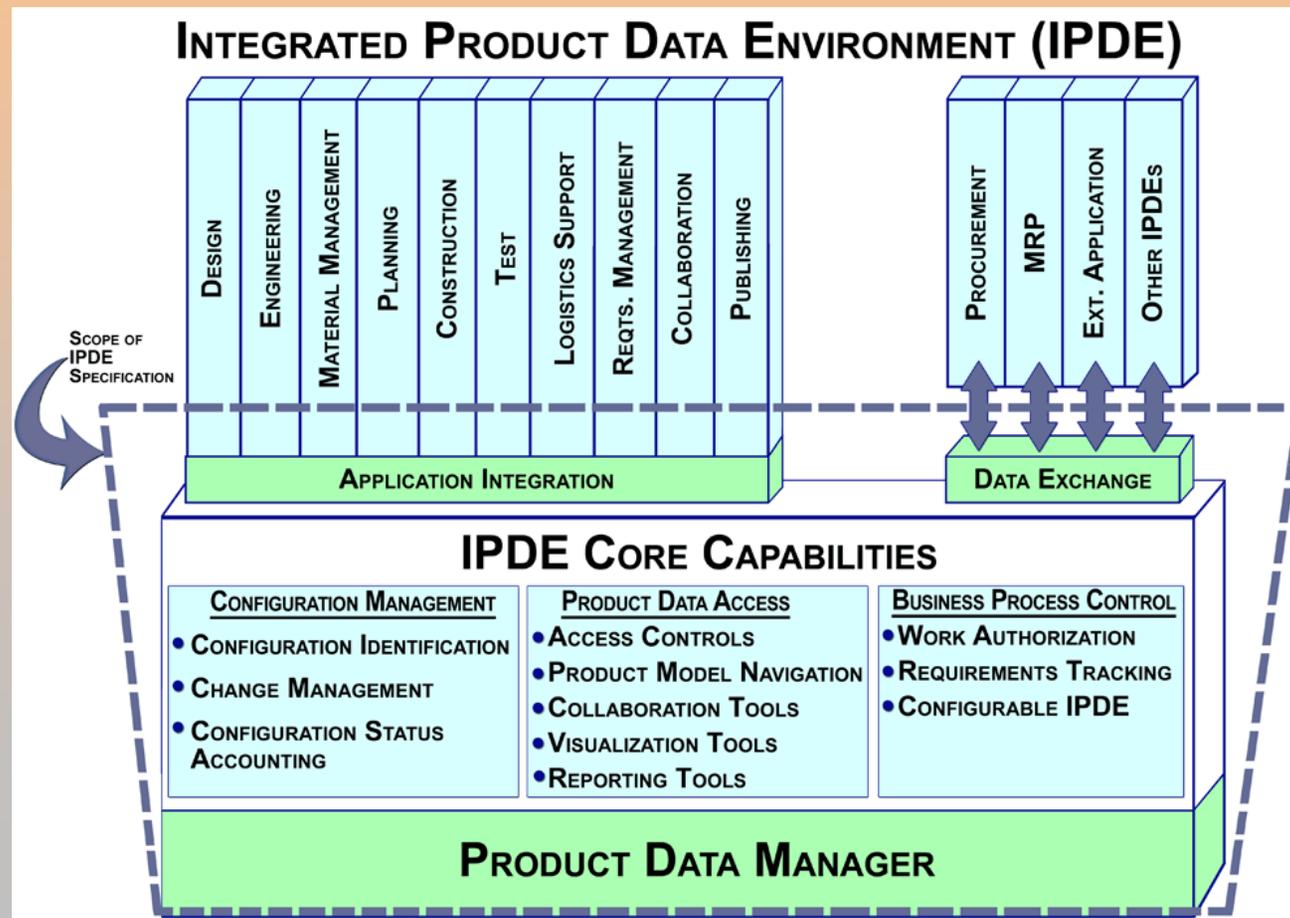


Integrated Product Data Environment

The backbone of Product Lifecycle Management

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The specification focuses on requirements for the core capabilities of an Integrated Product Data Environment along with requirements for Interoperability and Data Exchange between the major applications that make up an IPDE.





Product Model Data and Exchange

A NAVSEA perspective

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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.



Model Based Environment

Lessons Learned

- The communication of information between technical departments and fabrication facilities can be inconsistent and in many cases introduces inefficiencies into the process.
- The use of CAD is widespread but in many cases the 3D models are used to generate drawings or may not be suitable to support manufacturing processes.

The technology is an issue, the culture is the concern

- Most material removal operations are supported using numerical control parts programming that require not only a geometric definition but a fair amount of Product Manufacturing Information.
- The problem will be amplified as additive manufacturing processes become more common because the product model may have to include process definition.
- Enterprise level policy should address the authoritative source of data, synchronization of product data in a heterogeneous modeling environment, configuration control, or workflow management.



Model Based Environment

Lessons Learned

- As with the development and implementation of any type of technology within an enterprise this will require cooperation and compromise at the technical level, the executive level, and most important by our mid level managers.

The goal is to migrate to a model based environment to support the complete lifecycle of mechanical piece parts and electro mechanical assemblies that are designed, manufactured, tested, installed, maintained, and operated by the technical departments and fabrication facilities within an enterprise.

- The technology really needs to be developed by, and with true buy-in from the end users to satisfy the executives vision. Mid level managers will need to have the patience to allow their people to climb the learning curve and the discipline to enforce the consistent use of the processes developed to enable the model based environment.
- Be cautious about a “one size fits all” solution. What makes sense to support a model manufacturing use case may not work at all when applied to an early stage ship design Modeling & Simulation use case.