# INFO ALERT

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## NSWC CARDEROCK TAKES A "LEAP" FORWARD TO AN INTEGRATED DIGITAL ENVIRONMENT

In 1996, the Executive Director of the Naval Surface Warfare Center, Carderock Division (NSWCCD), decided it was time to "leap" forward in the Division's modeling and simulation (M&S) activities as a means for integrating the flow of ship design information across the 3,700-person organization. The Leading Edge Architecture for Prototyping Systems (or LEAPS) project provides an Integrated Digital Environment (IDE), whose scope includes:

- **Modeling and Simulation (M&S) for ship design and evaluation**
- **cost vs. operational effectiveness assessments, and**
- **elicitation of related technology requirements.**

A NSWCCD LEAPS Innovation Center Team, composed of representatives from each of the Division's major technical disciplines, quickly realized that the focus of a successful effort required an approach that provided users with these elements:

- **a source of rich, context-based knowledge about products**
- **the means to quickly extract that knowledge from a repository and transform it to the data requirements of an individual's application tool**
- **the further enrichment of that knowledge with the results from the application, and**
- **the ability to expand the scope of the products and the applications from those initially targeted**

That realization of these requirements resulted in the following capabilities:

- **development of common, generic representations of products, i.e., product meta-models**
- **aggregation of single-instanced information into domain-specific views**
- **development of data and system relationships, including geometric, physical, and functional**
- **development of translators/wrappers to:**

  ***-extract accurate and targeted information quickly from a physically-distributed repository and transform the information to the requirements of end-user applications***

  ***-populate the repository with multiple forms of application results targeted to the multiple expected uses of the information, while being flexible enough to provide for new applications***

Although LEAPS is being developed and applied by a Government-Industry Team led by NSWCCD, LEAPS capabilities transcend Carderock's ship and submarine platform product lines. LEAPS provides the ability to develop common, generic virtual representations, or schemas/meta-models, of products such as ships, submarines, aircraft, tanks, missiles, automobiles, etc., to which application tools can be linked. A specific schema can then be used to establish a data repository for a specific instance of that product type and linkages, or translators, with application tools.

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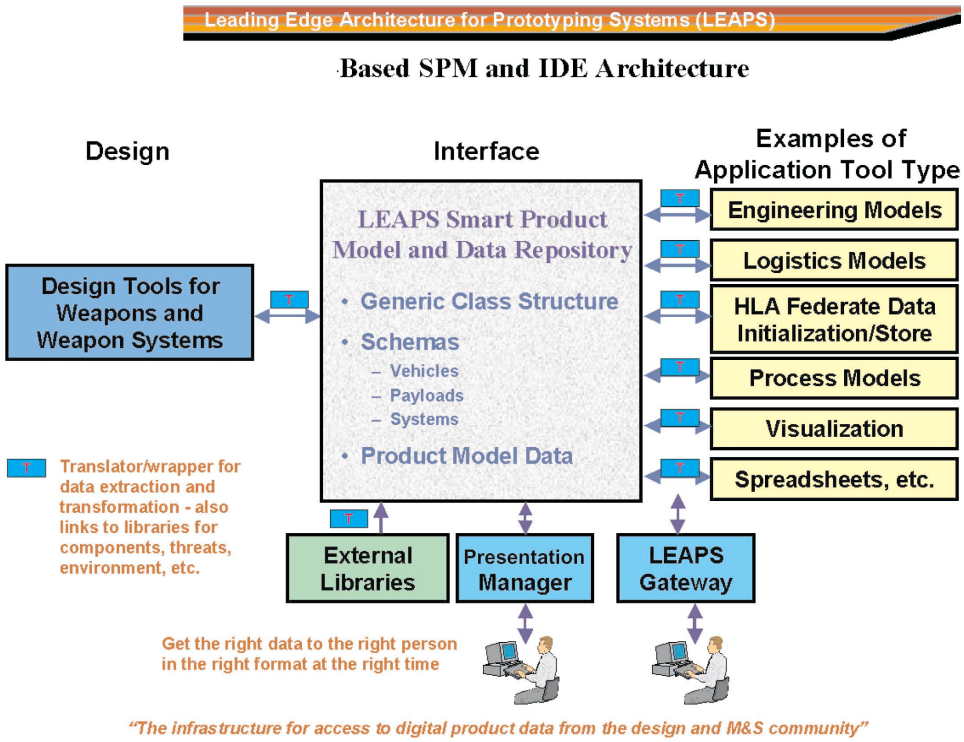
In addition, LEAPS can be used to develop and understand robust relationships among the data in the repository, including complete sets of geometric, physical, and functional associations, thus giving rise to the term - Smart Product Model (SPM). LEAPS is unique in that it can enable SPM and IDE visions across the portfolio of DoD systems. This sketch depicts such a vision:




The LEAPS Team has developed a product meta-model for surface ships, has started populating it with ship instances, and is developing translators for a number of applications. The LEAPS application programmer's interface (API) is available to partnering organizations for developing their product meta-models and translators.

The new DoD Regulation 5000.2-R, Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) Acquisition Programs, dated June 2001, requires employment of Integrated Product and Process Development (IPPD) (Section C5.1), Modeling and Simulation throughout the product life cycle (Section C5.2.3.5.2.1), system and information interoperability (Section C2.7), planning for Simulation Based Acquisition (SBA) (Section C2.6.7), and the establishment of Integrated Digital Environments (IDE) (Section C2.6.3). The establishment of the IDE will facilitate the accomplishment of all these activities.

What DOD Regulation 5000.2-R doesn't say is how each Program Manager should develop the program's IDE, what its capabilities should be, what tangible benefits should be expected, and how it should interrelate with other IDEs. A question that might be asked is: Does a common IDE framework exist which (1) is applicable to a broad set of products; (2) is reusable, in whole or in part, for a new or modernized product; (3) has a significantly mitigated initial risk; and (4) provides information which will be interoperable with information in other product IDEs developed under the same framework. If a Program Manager is looking for such a capability, he/she may want to consider using Leading Edge Architecture for Prototyping Systems (LEAPS).

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