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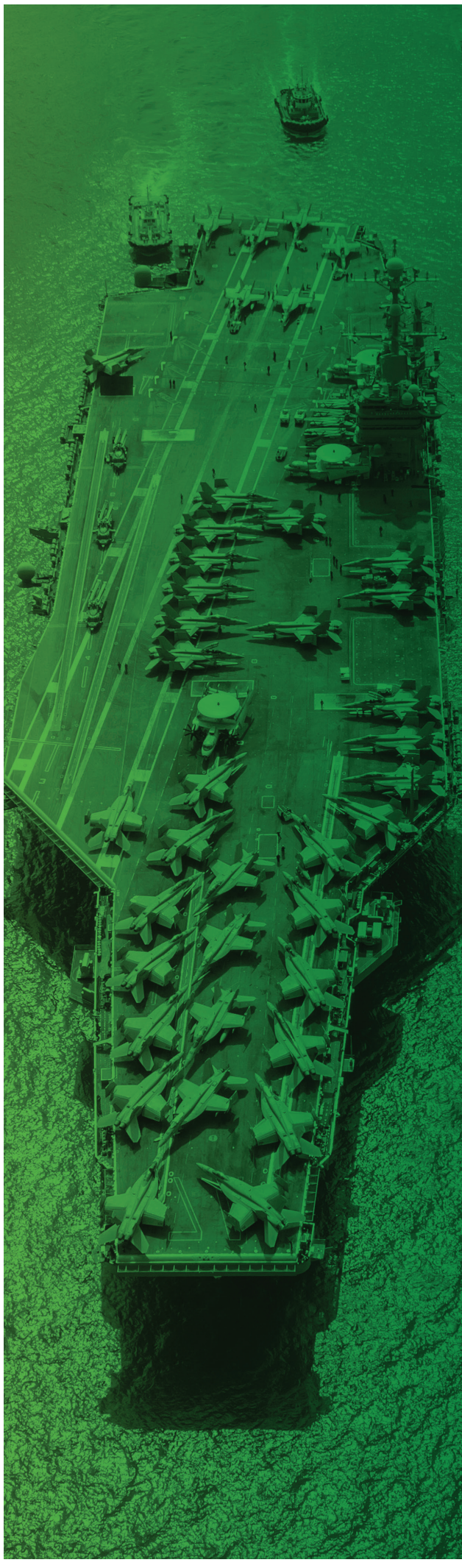
Naval Systems



WHITE PAPER

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At PTC, we view industry and government stakeholders in FA&D as being in the same boat. The near-term challenges may be different, but longer term, they're identical...mission success within budget. Since 1985, the most powerful firms in global A&D have partnered with PTC to establish and maintain a winning advantage. The U.S. government also works closely with PTC on priorities that range from managing acquisition programs and tracking how fleets are configured, to synchronizing maintenance with technology insertion and strategic planning, all within the supply-chain operations reference, or "SCOR," framework. PTC has the system-wide insight, proven technology and best practices to help the naval systems sector lower risk while connecting the present to the future.

Business Challenge: Ingesting Contractor Data for Digital Twins –
The fundamental challenge of any government program manager is effectively acquiring/using product data from the contractor community.

- Our vision is to have a digital twin top down for all fleet assets, including everything that has a product model associated with it – weapons systems to the power plant and everything in between. Do we have a means for models and drawings to be loaded into an interface and unpacked automatically into the respective product structure to support each individual system?

- The shipbuilder's view of the product is significantly different than the sailor's view. How can we pull data from industry, ingest it into the product structure, then push it to the fleet in the context it needs? Can this flow be bi-directional, so we are constantly enriching the digital twin with fresh data?

- How can we enable contractors to either populate data directly through CDRL packages or with staged deliveries?

- Can we source CAD data from different vendor formats without needing to convert it (STEP, PLCS DEX, DEX1, UGNX, Catia, Creo, etc)? Would achieving neutrality on tools help to accelerate our goals for the program?

Business Challenge: Operations Utilizing AR – If a government program manager acquires product models from industry, he/she can use them in multiple new ways.

- If we can use CAD data as the basis of creating an AR experience, could we make interactive job performance aids, training guides or maintenance instructions for diagnosing/repairing issues?
- Could AR capabilities help us to additively manufacture a part while in theater in order to complete the mission?
- Could we capture field experiences using AR to report back specific issues to our industry partners?

Business Challenge: Managing Cloud Environments – With cloud platforms being adopted at an ever-increasing rate, the task of choosing a path forward is daunting for government and industry stakeholders.

- Do we have the needed expertise on staff to complete a cloud deployment for product data in the program?
- The accreditations seem especially convoluted. Can we accelerate our program goals by choosing a partner who already has a FedRAMP/DISA Authorized IL-5 cloud environment in active use by the DoD?
- Can a chosen partner supply us with the expertise to layer on top of those accreditations in order to obtain an ATO for our specific program(s)?
- Will this environment connect to several DoD networks, such that anyone with a CAC card and proper credentials can access it?

Business Challenge: Product Development in Cloud – There are several problems plaguing product development currently. Modern design teams are spread out, geographically or functionally, which has the potential to cause delays and confusion. Outsourcing is another issue, in which multiple people work on the same task but across different companies and organizations, again causing issues. Velocity is another issue, in an age in which people don't want Gannt chart-driven workflows anymore. Onshape, by PTC, is currently the only software capability that was born in the cloud to directly address these issues. Eventually, capabilities for CAD, PLM, SPM, IIoT and AR will all be accessed through cloud environments like Onshape.

- Our complex program schedule is getting bogged down with shockingly 'simple' things like user code mismatches, upgrade delays, and problems sharing data. Is there a way to manage this complexity in a more effective way?

- Could we accelerate our program goals by putting the CAD system itself in the cloud, and not just the CAD data?
- Would doing so help us to eliminate confusion caused by new releases? Could we get all our users on the same upgrade simultaneously, every few weeks vs. once per year?

Business Challenge: Government Program Management – There aren't many new program starts in the naval systems world. Instead, the focus is to keep the programs that are already in flight upgraded and running efficiently.

- How can we enable naval commanders to make more battle space decisions on strategy and less on ship and combat system constraints?
- How can we track cost impact of engineering changes on a per hull basis, then across the entire fleet as each hull is uniquely configuration managed?
- What is our most optimal means to track different capability prototypes such as mission bays that might carry rescue packages in one configuration and underwater vehicles in another configuration?
- How can we accelerate our learning curve by examining PLM systems already in use by the U.S. Navy?

Business Challenge: Win Programs – In the rare case of new naval programs, successful bidders will need to not only develop a compelling capability but also communicate that in a meaningful way to the customer. Having an excellent command of product data is necessary for accomplishing this.

- As we examine the supplier ecosystem across the key domains – hull platform, combat management system, training, sensors, undersea warfare – how can we demonstrate a PLM capability for product data that is optimized for supplier collaboration? Could this be a win theme onto itself?
- Our ship platform is a new design and not currently in active use. How can we use PLM to quickly put our hand on product data and flip that negative into a positive by emphasizing advanced production techniques with Digital Shipyard? Could we demonstrate that with AR?
- Many partners on our industry team have worked closely to deliver on the legacy program the new acquisition will be replacing. How can our PLM capability help to translate that shared lineage of partnership such that the government ultimately benefits?

Business Challenge: Digital Engineering Policy – The Department Defense Digital Engineering Strategy requires the use of digital models to inform program decision making as well as a single 'authoritative source of truth' to sync documents and engineering artifacts to digital models for improved collaboration across government and industry. PLM is the centerpiece of this strategy and will have a profound impact on the way naval systems data is organized and distributed. Many NATO partners will be following suit with similar policies.

- Could an MBE approach to product data quicken the process for RCAs after a ship system failure based on intuitive, model-based views into key component data and processes?
- How are we truly enabling MBE for collaboration across geographically dispersed teams?

Business Challenge: Innovation in Product Development – No matter what our legacy CAD tool is, given the constantly changing requirements of ship platforms, PLM offers a means to improve development processes across mechanical, structural, and electrical systems as well as environmental testing. IoT/AR are already ushering in major changes in the Digital Shipyard. These areas can be a fundamental platform for innovation.

- Should we utilize an AR capability for manufacturing process and could we quantify the lifecycle cost savings to the government?
- In the lead up to SSR, PDR and CDR, could our Digital Engineering collaboration processes be optimized to use an MBE approach?

Business Challenge: Knowledge Retention – Governments and the industrial contractor base are still suffering from the effects of a workforce nearing retirement age. This creates a major knowledge retention continuity issue for ground vehicle systems development and operation in the U.S. and globally.

- Do we have an adequate, trackable repository of ship testing data and associated processes such that the knowledge from those tests is transferrable to new employees?
- How can we leverage PLM and CAD systems to accelerate our existing plans for knowledge management (KM)? Could we use AR technology to quicken training time for maintainers?
- As we proceed through tech development, how can we track different prototype data for system performance, reliability and maintainability?

Business Challenge: Innovation vs. Accountability – With greater funding comes more accountability across the board – both inside government itself and in the industrial contractor base.

- While delivering on contractual requirements, how can we break the mold of the traditional financial model and put investment dollars to work in anticipation of new capabilities the government will need?
- With IoT and AR, how can we smartly build out multiple, simultaneous pilot programs securely, fail the non-performing ones quickly, and scale what is working across multiple OODA loops?

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