Imagine you’re a third class Fire Control technician learning how to maintain a new radar system on one of the Navy’s guided missile destroyers. Now imagine you’re the instructor teaching the technician how to maintain that radar system.

Both are tasked with ensuring the radar system’s readiness so it performs the way it was designed to at all times. But it’s increasingly challenging for instructors, Instructional Systems Design (ISD) and fleet technicians to know when there’s a new maintenance or support procedure available to learn, or a new part to understand, at a time when technology changes at rapid-fire pace.

Enter ARTT, or the Acquisition Requirements for Training Transformation, Project, an initiative the Navy is reviewing which could fundamentally transform how it develops and maintains technical training curriculum by using 21st century technology and resources.

The potential scope is significant, says Wayne Gafford, ARTT Program Manager for OPNAV N12 and Naval Surface Warfare Center, Port Hueneme Division, because 60 percent to 65 percent of the overall training the Navy does and manages is technical and deals with the operating, maintaining and troubleshooting of systems, subsystems and equipment used by the Navy and Allied Nations.

“The Navy has a lot of readiness issues due to out-of-date and inefficient tracking and linking of technical curriculum to original product design,” Gafford said. “And the fact that our systems are getting so much more complex—it puts a burden on sailors to obtain the knowledge, skills and abilities, and on instructors, to teach these very complete and complicated procedures in the most efficient way possible.”

As the Navy’s combat systems become increasingly complex, new and revised technical data appear constantly, and need to be updated and incorporated into technical training curriculum immediately to train sailors and other technicians on those systems in real time to ensure readiness, Gafford said.

“However, that has not been the case,” he added. “There are hundreds of systems and thousands of applications operating across the Navy. Curriculum can fall several updates behind the technical data revisions and technical manuals.”

So, Gafford teamed up with Jeanne Kitchens of Credential Engine, a nonprofit organization in Washington, D.C., and Fritz Ray of Eduworks in Portland, Ore. to form ARTT. ARTT’s software design piggybacks on semantic web software developed by Credential Engine through a Cooperative Research and Development Agreement (CRADA) that the Navy and Credential Engine signed in 2018. The team created natural language processing software, a form of artificial intelligence, to extract technical learning objectives directly from maintenance task analyses structured in industry data standards, such as GEIA 0007 and S3000L. The process links maintenance tasks and the corresponding learning objectives.

“We can now bind learning data to system data,” Gafford said.

The idea to link all this data together is based in Product Life Cycle Management, or PLM, a process for managing all product data in the lifecycle of a system by “linking engineering and readiness models to maintenance task analysis, technical manuals and curriculum,” Gafford said, so that “when something changes in one data source, a positive domino effect occurs, and all relatable elements are tagged with notifications that a change has happened.”

That occurs in ARTT because all related system elements share metadata in the training data, Gafford said.

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ARTT Aims to Transform Tech Curriculum and Training

"We are now able to name a piece of curriculum according to what components and procedures are being taught," he added. "It’s managing curriculum like a part in a warehouse. (In that analogy) all parts have numbers, and that forms your inventory."

The key significance of that, Gafford added, is "if you go through a Ship Change Document (SCD) or Engineering Change Proposal (ECP), and you know what components in the system are going to be redesigned, we can now identify every piece of product data that will need to be reviewed because of that design change. The metadata are the same."

Bob Massell, the A50 weapons systems integration division supportability manager at NSWC PHD, learned about ARTT through a training support continual process improvement session focused on the future competencies that the Manpower, Personnel, and Training integrated product support element leads responsible for the development of combat systems training materials will need to use in ARTT.

Benefits he foresees from ARTT include saving time and money.

"Prior to ARTT, our training materials traditionally have lagged behind the technical documentation," Massell said. "With ARTT, as the technical manual is developed, revised or updated, we’ll be able to update training materials simultaneously. That will save time and money. So, all that being said, ARTT will enable us to develop the technical documentation and training materials simultaneously, and enable us to deliver our manpower, personnel and training products and services to the fleet more rapidly and effectively."

Paul Koester, NAVSEA 06L’s IT acquisition PAPM for the Navy’s new logistics environment, which is Model Based Product Support (MBPS), said ARTT is only one element of a much larger Navy digital transformation effort that includes digital thread linkages within product data design models.

The key is to set up the overall data ecosystem to maintain product design models for every ship and unit integrated with a dedicated system performance feedback loop, which includes training.

Overall, ARTT will operate within this ecosystem to ensure the fleet sailor is provided with the most up-to-date training tied directly to the correct configuration of the equipment he or she will be supporting, he explained.

"We’ve got to have an integrated data environment with which to do business," Koester said. "If we integrate things and do it all within a holistic MBPS data environment, we can deliver capability to the warfighter at much faster speeds."

ARTT also aligns with the Navy’s next-gen training delivery system and new, overall digital strategy, known as STAVE, or Surface Training Advanced Virtual Environment.

Under STAVE, virtual reality training environments and interactive 3D computer models are modernizing the Navy’s traditional stand-up teacher training methods, and ARTT compliments STAVE because it belongs to the Navy’s model-based product support, Massell said.

Koester added the Navy’s digital transformation is on the horizon.

"We will have the digital infrastructure in place for the sailor to do digital training and augmented reality training by 2022," he said. "It’s aggressive, but it’s where the Navy needs to go."