

Q&A

Mark Edelson

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Mark Edelson serves as the program executive officer (PEO) for Industrial Infrastructure, responsible for cost, schedule and performance of the Shipyard Infrastructure Optimization Program (SIOP). SIOP is a holistic investment plan to optimize the four naval public shipyards located in Portsmouth, Virginia; Kittery, Maine; Puget Sound, Bremerton, Washington; and Pearl Harbor, Hawaii. Prior to his current assignment, Edelson was the deputy assistant administrator for Design and Construction at the Department of Energy's National Nuclear Security Administration. Edelson served on active duty for 30 years in the U.S. Navy as a member of the Civil Engineer Corps and held several high-level assignments in the Naval Facilities Engineering Systems Command.

Edelson discussed the SIOP with Senior Editor Richard R. Burgess. Excerpts follow:

What SIOP is and why was it instituted?

EDELSON: The Navy has four public shipyards that form the organic industrial base in the United States for maintenance of nuclear-powered ships. Until recently, there was no private industry for the in-service maintenance of our nuclear ships. We have contractors who build them initially — Huntington Ingalls Industries and General Dynamics — but almost all the maintenance happens in these public shipyards, the youngest of which was established in 1908, long before the nuclear ship age.

The SIOP is to transform the shipyards of today into what the Navy needs for the future because they're really the shipyards of 1940s and '50s, the last time these facilities were touched wholesale. At that time, we were building World War II ships then maintaining that inventory once the fleet returned from the war. The shipyards served their purpose but for a different era. They have been fantastic assets to the U.S. but like the rest of the shore infrastructure, have outlived their purpose and are due for a big upgrade.

That's what we're doing with SIOP. We are at the beginning stages, but there's already \$6.5 billion in construction underway. We finished around \$900 million of work already.

With the growing capability of our nuclear ships, we need to retool the shipyards for the current mission. Historically, the Navy spends the marginal dollar on weapons systems. Eventually, facilities need to catch up, and it is not just maintenance need, it is wholesale reconfiguring. We're investing in the future of the Navy which heavily is nuclear ships.

What drove SIOP to be established as a separate program?

EDELSON: Typically, we do one-off projects in the Navy. A roof needs to be replaced, a fitness center needs to be built. Works perfectly fine, but an internal Navy look and a seminal GAO [Government Accountability Office] study done in 2018 said we are losing readiness because of the state of the shore infrastructure. We want to utilize the learning across the shipyards, we want to maintain the momentum, and we want to do this programmatically.

This is the first ACAT-like [Acquisition Category-like] facilities program. Large infrastructure programs don't happen very often. In the '80s, we built Kings Bay, Georgia and Bangor, Washington as homes for the Ohio-class ballistic-missile submarines. Those were each 10-year programs. We had a Naval Training Center at Great Lakes, Illinois, for decades, but eventually it needed to be rebuilt. The CNO set that up so it would happen through the administrations. That was the model that we used here. We had weapons ACAT programs to hold the requirements steady, to keep the funding flowing steady. The only way to attack this massive infrastructure challenge is to set it up as a program. This way, a dry dock in one site looks a lot like a dry dock in another site. A waterfront production facility builds on its predecessors, and we get that benefit from a learning curve that normally doesn't happen on construction projects.

What do you focus on as the PEO of this program?

EDELSON: We've got a program office (PMO-555) which is responsible for the SIOP program, just like there's a program manager for Constellation [frigate], for Joint Strike Fighter. Above that is the program executive

officer. While the program manager is focused on executing the program of record — cost and schedule adherence to deliver the capabilities — the PEO is looking out a little bit further for the non-program of record. I spend a lot of my time interacting with the secretariat, members of Congress and their staffs to help them understand the importance and why the SIOP is going to be a long-term investment.

I'm looking for a non-standard way of doing things. Military construction — a separate appropriation — is funded project by project, and is certainly one way to attack this, but SIOP is a different scale than normal. We need to save money and time by learning across projects, standardizing designs, standardizing equipment and utilizing different contracting methods. A billion-dollar dry dock requires a different approach than a hundred-million-dollar barracks requires. We are at the far edge of what U.S. constructors are capable of. A project that takes six or seven years versus two years involves very different economic risks for the federal government and the contractor. We must change our acquisition approach to share that risk and not drive a huge contingency on the contractor's part. My job is to bring a different technical and contracting approach to fulfil the Navy's requirement.

The Navy invests very little in facilities R&D — research and development — because we're not the biggest player. There are plenty of commercial people who build buildings, so the federal government is not the market maker like we would be for jet aircraft or nuclear submarines. A good example of that is seismic reinforcement of dry docks. These are massive concrete structures, with 15- to 20-foot-thick walls, and they need to stand up to earthquakes in places like Hawaii and Puget Sound. Concrete and steel are certainly one way to go after it, but might there be another way of doing that, and there's not a lot of commercial dry docks being built in the United States. That's where a PEO role differs from the day-to-day project management or program



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Dave Sweet, director, Shipyard Infrastructure Optimization Program, Program Management Office 555, leads Mark Edelson (second from left), Program Executive Officer for the U.S. Navy's Shipyard Infrastructure Optimization Program, on a tour of Dry Dock 6, May 6, 2024, during a visit to Puget Sound Naval Shipyard & Intermediate Maintenance Facility in Bremerton, Washington.

management role that the PMO is responsible for.

We're at the far edge both economically — how much risk are contractors willing to take on — and then the technical capability to do so. This is much more on the scale of the giant bridges into New York. There's a handful of contractors who are willing to do it and, right now, we're in boom time for construction. There's no shortage of projects these folks can go after, so why would they be willing to do our work? It's a very different acquisition world than what normal military construction would be worried about.

What is the ultimate end state that SIOP is working toward?

EDELSON: There are three principal goals. First, we've got to fit the ships of today and tomorrow. They're becoming more capable. So, physically several models are bigger than their predecessors: Ford [aircraft carrier]; Virginia [attack submarine]; and Columbia [ballistic-missile submarine], about the same size as the Ohio. Everything uses more electricity, hence, more cooling. We've got to make the shipyards capable of handling the current and future classes of ships.

Second, we've got to reconfigure and rebuild the infrastructure to be efficient at maintaining nuclear ships. The shipyards were created to build conventional



A heavy-lift crane arrives at Portsmouth Naval Shipyard in Kittery, Maine.

ships, and we're transforming them into maintaining nuclear ships. It's a whole different realm of work. To do this, we want to bring those things that are most important for ship maintenance right up to the waterfront: Saving the technician time getting on and off the boat, getting the supplies, getting to the machinery she or he needs to do the maintenance. The shipyards have developed organically over time, so the stuff isn't where the technician needs it to be, where that artisan can go quickly and get what they need. We'll reconfigure the shipyards. Our modeling says that we shorten availabilities by three months just due to less walking.

And then, finally, to make the shipyards more resilient and energy efficient. With sea level rise, with increase in storms, it's getting more tenuous there. With the electricity draws, the cooling draws, the whole U.S. infrastructure is losing reliability. We must make the shipyards more reliable, more resilient to the energy disruption.

Wrapped around all that, it makes for a better shipyard, right? We employ 37,000 shipyard workers across the four sites. What makes employees want to come to work? How can we attract the next generation? Hey, I

got a new shipyard, it's efficient, it's resilient. People are going to want to come to work there. They're going to want to stay to work there. We're in a competition for talent. Let's make it an inviting place. And by doing those first three, we deliver better quality-of-service place for our shipyard workers.

In addition to dry docks, what kinds of projects will the shipyards receive?

EDELSON: I call them the marquee projects. The dry docks get all the press, right? Billions of dollars. They take years to complete. We have four dry docks under construction right now, more in the design and planning phases. It's the piers also. When the ship goes in or out, you've got to have the pier infrastructure there. We're doing a lot of electrical work bringing new transmission onto the shipyards and distribution within the shipyard, both to meet the new classes

of ships and to rehab decades, century-old infrastructure. It's the new facilities for those artisans to work in: production shops, supply warehouses.

At the same time, we're replacing roofs, rehabbing spaces, replacing water lines — all those things that are needed just to keep the shipyard rolling. There is \$300 million a year of small projects going on. Eventually you've got to rip up the crane rails and replace those. We have finished a flood wall in Norfolk that protects several of the docks there from sea level rise.

SIOP also integrates all the industrial plant machinery the shipyard workers use — presses, lathes and milling machines. SIOP is recapitalizing all the industrial plant equipment. These things are half a million dollars and up, take years to manufacture themselves, so just like the buildings, we're working through replacing all the shipyard equipment with modern versions.

Right now, there is not a good material tracking system on the shipyards. Think Amazon warehouse where everything has its place and it's easy to pick. We'll be installing that throughout the four shipyards. So, you tag each piece of material, you put readers on the door, it

makes it much easier and faster for the shipyard worker to find. And we're doing that as an integrated whole as we're rebuilding the shipyards.

What is the status of new dry dock construction?

EDELSON: Pearl Harbor has a Virginia-class dry dock under construction, a brand new one. Puget Sound's is in the design phase now. Norfolk is rebuilding the carrier dry dock. Right now, it's out of commission, making it ready for the Ford class. Three and four are Virginia-class dry docks under construction up in Portsmouth shipyard located in Kittery, Maine.

Are you creating digital twins of the shipyards?

EDELSON: We're getting something close to it. First, to figure out where everything is going, we are creating a master plan called an Area Development Plan. Now, these establish just like for a ship or a plane the baseline configuration. We finished the Pearl Harbor one. That's in the digital model, not a digital twin, it's not cartoons, it's real drawings. That's one layer — where are all the facilities going, what order they're built in.

At a much more granular level, we have done the digital model for the shop processes. We analyzed 22 prior CNO availabilities [ship maintenance periods]. Each one of those have about 10,000 activities: Rebuild the pump, things like that. We overlay that with the Geographic Information System [GIS] maps of the base, so we know where everything moved to. The pump — went here, then over here, then moved again, then finally back to the boat. The savings come from less travel distance.

And now we're working where each piece of equipment should go within the building to minimize travel time. Things that you use most are at the front. Things you use least are at the back. They're lined up nicely and linearly so the part can advance between that piece and the machinery. We're getting to that level of detail. We will eventually turn that model over to the shipyards so that they can use it as a digital twin. What if I put a second piece of equipment here? Would that speed up the process? What if this piece breaks? What do I do instead? We are getting to that level, and it's amazing that something done very early in the program was that digital model and how often we come back to that to do quantitative analysis.

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- Mark Edelson, PEO, Industrial Infrastructure, SIOP

What is your cost estimate and timeframe for execution of the whole SIOP?

EDELSON: We are still working on it. Just like any ACAT program, we will eventually do a Milestone B/C that is projected for 2026 when we will have the service cost position. It is fair to say the \$21 billion over 20 years is too low an estimate. We've seen that from the competitively awarded projects. Those dry dock projects have come in much higher than what they were forecast in that 2018 report, which was done with the best data available at the time. Construction and construction escalation has been much more than inflation. We greatly expanded the scope of SIOP. It originally wasn't to renovate all those old buildings, the transportation infrastructure, the utility systems, so we've brought those into the program. When we come out with an estimate in 2026, it will be encompassing at that point.

Is the program being supported with funding by the Navy?

EDELSON: Yes. It's been fantastic. CNO and SECNAV have lots of competing priorities. The nice thing about SIOP is every time you finish something, you get an incremental improvement. You finish one dry dock, clearly, you got an improvement there. You finish one roof rehab, one water line replacement, it makes it better each and every time. Each time we finish something, life gets a little better for the shipyard worker. She turns around that boat just a little bit faster because life has gotten easier in the



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A June 2023 aerial view of the drydock #1 construction zone at Portsmouth Naval Shipyard.

shipyard. It's that continuous improvement over time that SIOP offers.

Are the current and near-future ship maintenance availabilities being slowed down by having to take a dry dock offline to renovate it?

EDELSON: We've been able to synchronize our work — and I don't say that lightly — with the ship maintenance schedule so that the construction schedules are part and parcel now of the shipyard's scheduling. Through robust and regular coordination efforts, we've identified where a given SIOP project risks redlining the shipyard, where it could risk taking too much offline, where we need to avoid causing too many delays. We can spread that work across the four shipyards and not overly impact any one. Just like when they're repaving your street at home; there are absolutely some day-to-day impacts, but not to the scale of impacting fleet readiness.

One of the great things that we've got is three-tiered governance. There's a group at the shipyard from the construction, program, and shipyard teams who typically meet weekly to deconflict day-to-day. Where do you need the crane? That sort of thing. There's a senior level that looks at project by project. When do we start this one? When does it need to end? That is integrated at the

fleet level. And then there is a higher level of governance across the Navy. Where is this [nuclear] refueling going to take place? Is there a better way to do refueling? Having that governance in place, nobody feels like they're getting authority taken from them. They know where their left and right limits are. Everybody feels much more comfortable. It's something that we used off and on, but it has gotten rave reviews. That surety of management structure has been a key component to its success.

What challenges do you see within the SIOP program?

EDELSON: There's nothing that messes up a construction program like changes in requirements or priorities. It takes a long time — it's just physics. Get something under contract and they get

it built. We can't adjust — it's not to sound negative or defensive. We start into that dry dock. It will be finished in 2027 in Pearl Harbor. Now, there's not a lot we could do to speed that up at this point, so that stability is essential and something the ACAT program allows us to have.

Normally, in construction in the federal government, you get good competition because there's plenty of people doing construction in the United States and you can award a competitive contract as a fixed price. On the scale we're on now, that just doesn't work anymore. Shortage of workers, material concerns, the length of time is the biggest thing. What will concrete cost two, three years from now? Doing different acquisition methods than typical to share that risk.

Normally, if you're doing one project — a barracks, a fire station — you're just concerned with that one project, but we're going to do multiple dry docks, multiple waterfront production facilities, multiple electrical upgrades. It's worth investing in new methods, bringing in different ideas from industry.

Giving these shipyards a rejuvenation is important to national defense. Getting them ready for — in some cases — their third century — that's how important they are to the nation. ■