

Shipyard Infrastructure Optimization Program Industry Day (Part 1)

Think Different, Build Better

Program Executive: Mr. Mark Edelson, PEO Industrial Infrastructure
Program Manager: CAPT Luke Greene, PMO 555 (SIOP)
Briefer: CAPT Luke Greene

05 June 2024





Agenda



- **Opening Remarks**
- **Mr. Mark Edelson, PEO Industrial Infrastructure**
- **The Navy and the Nuclear Fleet**
- **Naval Shipyards**
- **Shipyard Infrastructure Optimization Program**
 - Overview
 - Dry docks
 - Facilities optimization
 - Equipment
 - Digital transformation
- **Pearl Harbor Naval Shipyard (PHNS)**
 - Current state (virtual site visit)
 - Plan
 - Future state (modeled time-lapse)
- **RADM Dean VanderLey, Commander, Naval Facilities Engineering Systems Command**
- **Next Steps**

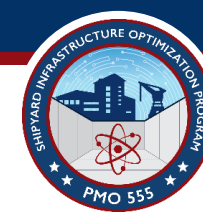


The U.S. Navy

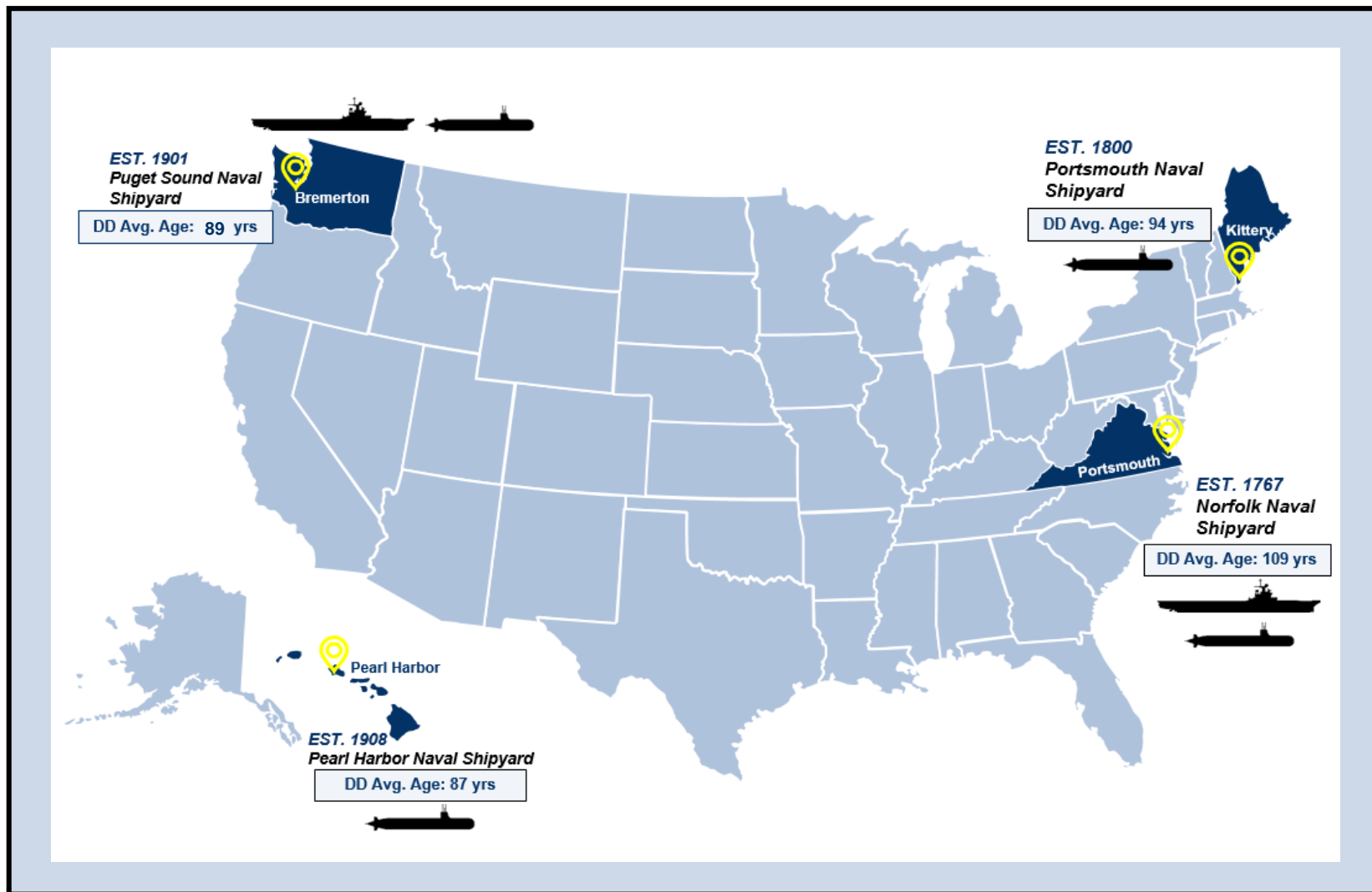


- **A Fleet of 296 hulls including a nuclear fleet of**
 - 11 aircraft carriers
 - 68 submarines
- **Red Sea conflict**
 - Fifteen percent of global trade flows through the Red Sea
 - “Our forces are engaged in the Red Sea right now [at a pace] we’ve not seen since probably World War II...those ships are operating inside weapon engagement zones. They have to be prepared on a moment’s notice to conduct engagements, and they have to get it right every single time.” – Rear Admiral Fred Pyle, Director, Navy Surface Warfare Division (May 2024)
- **The need to stay at pace with China**
 - “China in particular signaled a clear intention to modernize their force at the fastest pace that we've seen since World War II” – Admiral John C. Aquilino, former Commander, US INDOPACOM (Jan 2024)
- **The four naval shipyards generate readiness and enable the Fleet to meet mission**
 - Naval Sea Systems Command (NAVSEA) operates the four shipyards
 - Naval Facilities Engineering Systems Command (NAVFAC) executes planning, contracting, design and construction for Shipyard Infrastructure Optimization Program (SIOP)

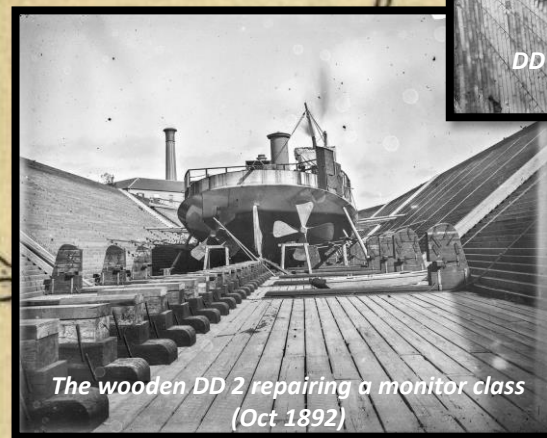
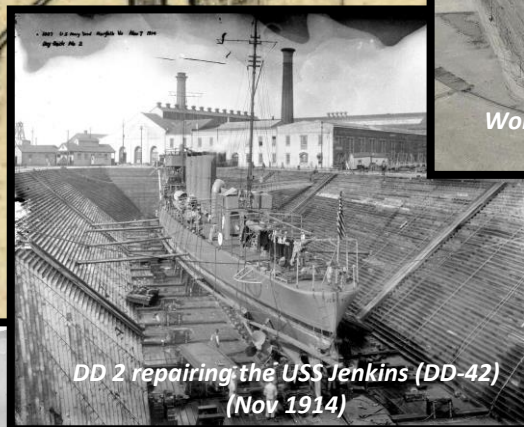
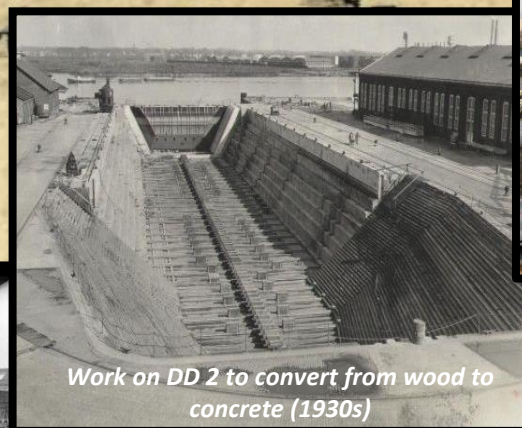
It is our Navy’s duty to underwrite our nation’s security and uphold the international order that has guaranteed the world’s security and prosperity since the end of World War II. No other Navy in the world operates at this scale...no other Navy in the world could build, train, deploy and sustain such a force. – Adm Lisa Franchetti (CNO)



The Nation's Four Public Shipyards



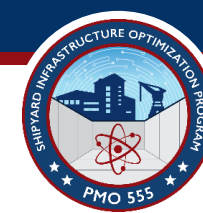
From Sails to Atoms



Revolutionary War-era French scouting
map of Norfolk Naval Shipyard area



Shipyard Scale



Portsmouth Naval Shipyard



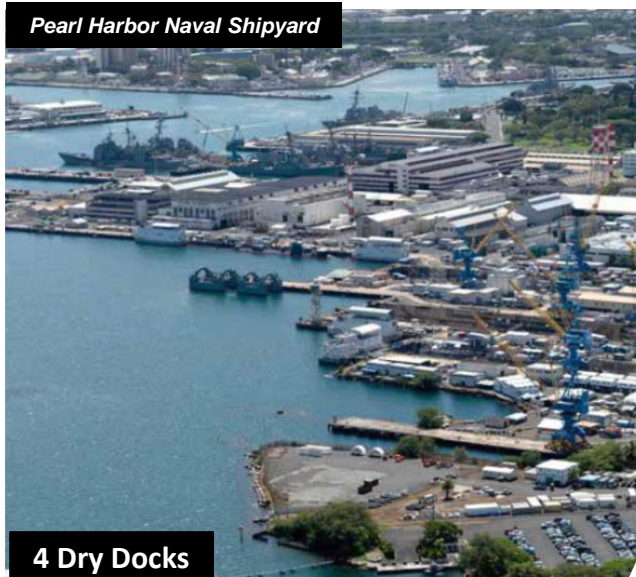
3 Dry Docks

Norfolk Naval Shipyard



5 Dry Docks

Pearl Harbor Naval Shipyard



4 Dry Docks

**18 Dry Docks (2 million sq ft)
26 Piers/Wharves
360 facilities
583 Acres**

Puget Sound Naval Shipyard



6 Dry Docks

37,000 shipyard workforce



Shipyard Infrastructure Optimization Program



Problem Statement

- Condition, capacity, and configuration of facilities, dry docks, and equipment at the four public shipyards contribute to inadequate throughput and loss of fleet operational availability.
- Shipyards designed for construction of conventional ships are not optimized for repair of nuclear fleet.

Baseline Performance (2018)

- Inadequate facilities and equipment led to maintenance delays that contributed to >1,300 lost operational days for carriers and >12,500 lost operational days for submarines
- Dry dock capability/survivability gaps: insufficient dry docks for VIRGINIA Blk V and FORD Class
- Average facility condition rating: 66 (poor) and 82-years average age; dry docks average 94-years
- Average age of equipment: 24 years (industry standard = 7-10 years)
- Repairs in dry dock routinely take longer than planned increasing time burden on sailors

Solution

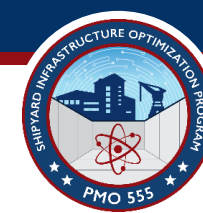
- SIOP is a holistic investment plan that integrates all infrastructure and industrial plant equipment investments at the Navy's four public shipyards to meet nuclear fleet maintenance requirements and improve Navy maintenance capabilities by expanding shipyard capacity and optimizing shipyard configuration.

SIOP North Star

Enable increased submarine and carrier maintenance throughput by recapitalizing shipyard infrastructure and equipment required to conduct scheduled depot maintenance and by reconfiguring infrastructure layout to deliver reductions in availability durations.



Support for SIOP



"...the SIOP Program has been absolutely critical." –
Sen. Susan Collins (Vice Chair of SAC-D)

"The Navy's four public shipyards—including Pearl Harbor—are critical to maintaining the readiness of the fleet around the world." – *Sen. Mazie Hirono (Chair of SASC-R)*

"Without the crucial investments laid out in the SIOP, the naval shipyards will be unable to meet future maintenance needs for our nuclear assets." - *Reps. Derek Kilmer (WA-06), Chellie Pingree (ME-01), Bobby Scott (VA-03), Elaine Luria (VA-02), Chris Pappas (NH-01), and Ed Case (HI-01) in Letter to Administration*

"[W]hat needs to happen with the public yards fits in perfectly within an infrastructure agenda and also a workforce agenda. Because to the extent that we're really going to get the productivity of the public yards up, this is really about investing in people and in American infrastructure." – *Rep. Joe Courtney (Ranking Member, HASC Seapower)*

"Our dry docks are over 100 years old. Our shipyards in many cases, the infrastructure in those shipyards hasn't been upgraded in 65 years. If we're going to get better as a Navy, as a military, as a nation, we've got to get real about the infrastructure problems that we face."

– *Secretary of the Navy Carlos del Toro*

"SIOP is essential to supporting the future needs of the Navy's nuclear submarine and aircraft carrier force." –

CNO Admiral Lisa Franchetti

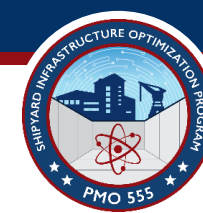
"The investments we're making here will have a critically important impact on our future fleet...The future of our submarine force relies on the key infrastructure provided by Pearl Harbor Naval Shipyard."

– *CNO Admiral Lisa Franchetti*

"...the SIOP program is critical to the national defense of our Nation. Increasing the efficiency of getting those platforms out of maintenance in a quicker time frame to get more players on the field." – *VADM Jeffrey Jablon, Deputy CNO for Installations and Logistics*



SIOP Headlines



\$6B of SIOP construction under contract

How a 221-year-old shipyard is leading a US Navy modernization effort – DefenseNews

\$520 million in construction at Norfolk Naval Shipyard aims to meet needs of high-tech warships – The Virginian Pilot

Lawmakers say Navy's shipyard revitalization needs help from industry, public — and Congress – Breaking Defense

Shaheen: Billions to help fund Portsmouth Naval Shipyard's 'most critical piece' – Seacoast Online

PSNS Dry Dock 4, Pier 3 upgraded as part of Navy SIOP program – Kitsap Sun

'Show me the money': Congress calls for Navy to spend more on shipyards – DefenseNews

Navy's new \$3.4 billion dry dock in Hawaii is most expensive project in service's history – Stars and Stripes



Dry Dock Modernization



Puget Sound Naval Shipyard – New Multi-Mission Dry Dock
In development for both aircraft carriers and submarines



Norfolk Naval Shipyard – Dry Dock 8 Upgrades
Five projects including \$486M DD all in support of Ford class aircraft carriers



Portsmouth Naval Shipyard – New Multi-Mission Dry Docks
\$2.5BB project underway in support of Virginia class submarines



Pearl Harbor Naval Shipyard – New Dry Dock 5
\$4.47B project underway in support of Virginia class submarines



Dry Dock Scale Comparison

PNSY M2D2 #1 (P381)



- 378,000 tons of concrete
- 50,000 tons of steel
- 1½ Empire State Buildings



PHNS Dry Dock 5 (P209)



- 472,500 tons of concrete
- 63,000 tons of steel
- 2 Empire State Buildings



PSNS M2D2 (P454)



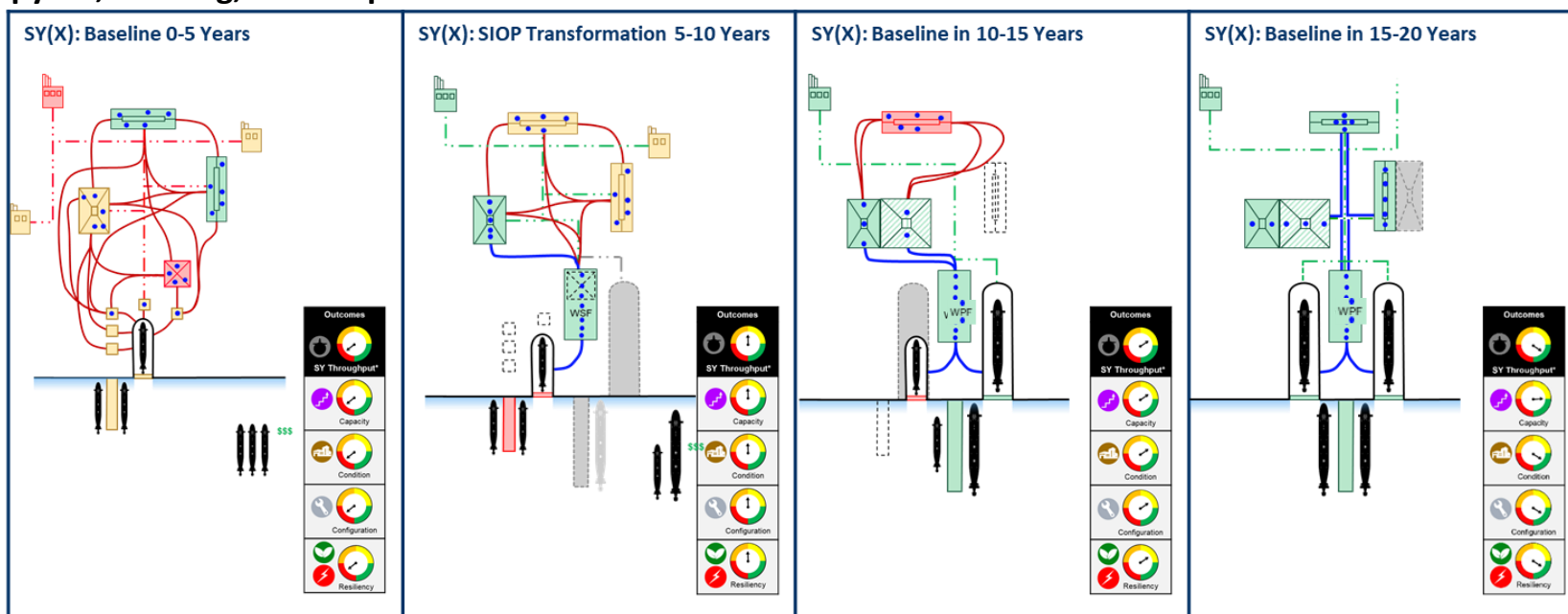
- 1,512,000 tons of concrete
- 110,000 tons of steel
- 4 2/5 Empire State Buildings



*Concrete and steel material comparison

Facilities Optimization

Shorten availability durations and reduce man-days expended by reconfiguring workflow at the shipyard, building, and shop level



Future shipyard layouts determined via modeling & simulation

- 22 availabilities (10K+ activities/avail) analyzed for location, duration, staffing, and critical path
- Relocate buildings and shops to reduce travel time
- Move quick-turn shops to waterfront adjacent to dry docks
- Move in-house shops, logistics, and administration away from docks
- Locate engineers, tool rooms, locker rooms, and training spaces near shops
- Distribute workforce support facilities (gates, parking, eating, security, clinics)

Construct or renovate facilities to modern standards and for future resiliency and agility

Rebuild utilities systems throughout shipyards for resiliency and adaptability

Industrial Equipment Recapitalization

Background

- 1,113 pieces of equipment (\$3B) across all four public shipyards. Average age: 24 years
- Private sector average age: 7-10 years
- Most equipment unsupported by original manufacturers
- Significant supply chain stressors: Chips, steel, gears, etc.
- Minimal commonality of machinery or maintenance approach across shipyards

Path Forward

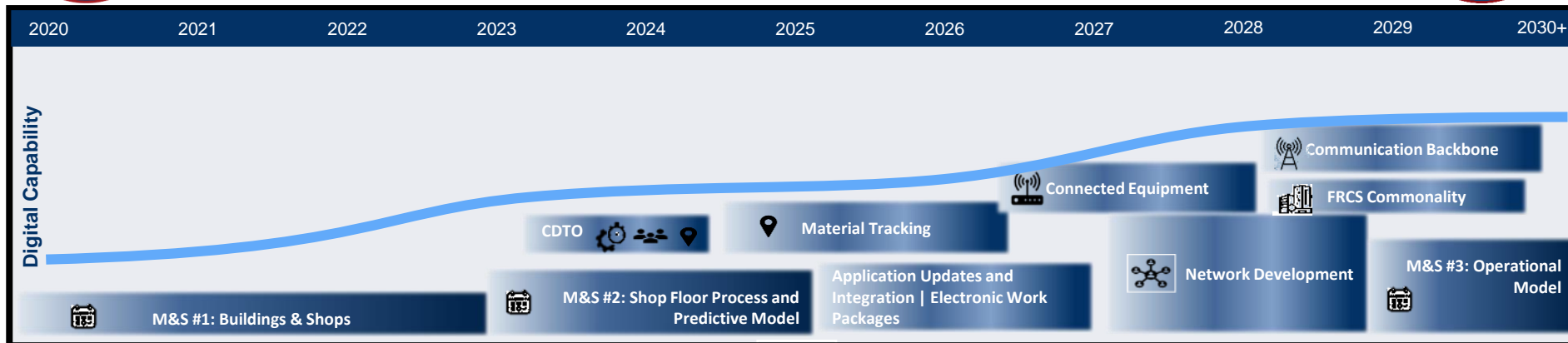
- Consistent, sufficient procurement to bring all equipment within expected service life
- Create commonality: procurement & maintenance efficiencies; workforce exchange
- Establish enterprise-wide supplemental maintenance contracts
- Connected equipment
 - Transmit designs to machines and among shipyards
 - Monitor performance and health
- Remote material tracking for geo-location
- Predictive modeling & simulation through digital model



***\$600M in equipment projects in procurement since inception of SIOP
90% domestically sourced***



Digital Roadmap



SIOP

Facilities Related Controls

- Facilities managed automatically
- Standardized across buildings for maintenance and cybersecurity

Modeling and Simulation

- Includes the inputs to production, project schedules and equipment
- Create detailed MRO process model as leave-behind for shipyard operations

Material Tracking

- On-yard tracking of rip-out and new material, shipyard equipment
- Eliminate lost material
- RFID, mesh, GPS capable

Connected Equipment

- Equipment status communicated in real time
- Machine instructions from engineering to equipment

Communication Backbone

- Integrated with construction and electrical distribution
- Fiber optic, 5G

NMMES Modernization

- More than 35 business applications that enable shipyard maintenance operations

Labor Skills

- Skills available linked to daily work assignments

Electronic Work Packages

- Digitalizing work status and progression for searchability and repeatability

Network Development

- Establishing environment to enable communication

Naval Maintenance, Repair, Overhaul

- Plan, predict, schedule, and execute maintenance

Naval Supply Chain Management

- Plan, procure, receive, store, distribute, dispose and manage material, goods and services

Naval Product Lifecycle Management

- Manage weapon system data required for life cycle support
- Workforce automation, optimization, and process standardization for program lifecycle management

Integration & Infrastructure

- Data exchange and integration among modernized, legacy, and external IT systems
- Synchronization of enterprise and edge instances of components

Logistics Integrated Data Environment

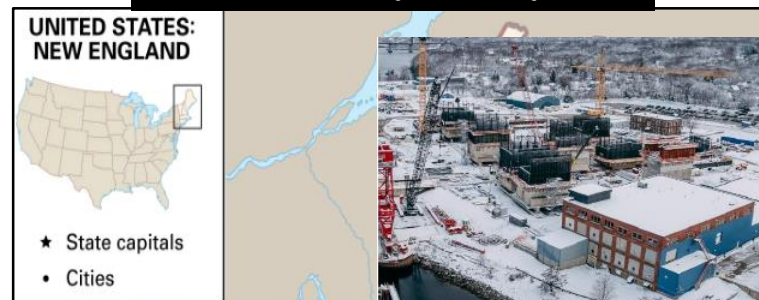
- Aligns data systems to support the other 4 pillars, enable analytics, and broader data efforts

Efforts by Others

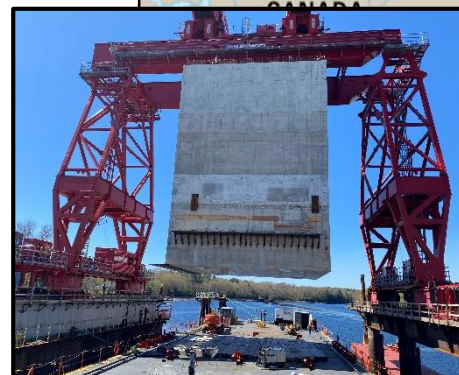
Challenges of Working in a Shipyard

- **Cannot interfere with the vital work of maintenance availabilities – have to work around**
 - Limited ingress due to security (Controlled Industrial Area)
 - Limited space for laydown. Constrained areas.
 - Aged infrastructure – some buildings uninhabitable, unsafe; tools and equipment broken or lost, etc.
 - Avg. age 82 years
- **Environment**
 - Soil contaminants
 - Flooding/natural disasters
 - Electrical power instability
 - Seismic safety considerations
 - Historic and natural resources

Portsmouth Dry Dock Project



Prefab location in Brewer, ME



Job site (PNSY)



Have to transport ~200 miles due to space constraints



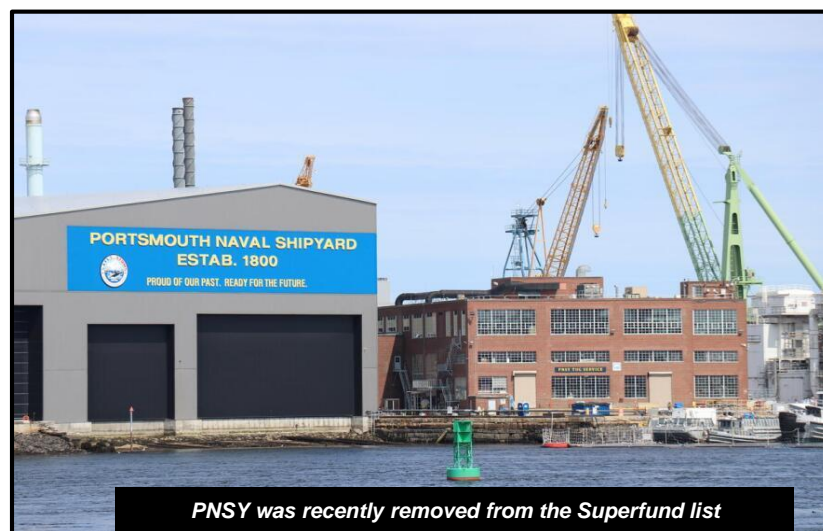
Temporary Lifting Device



Environmental Impacts



- Investing in America's four public shipyards enhances sustainability and resiliency of these major community institutions, mitigating adverse environmental conditions such as sea level rise, storm damage, and seismic events.
- SIOP has implemented a holistic approach to environmental planning, anticipating adverse environmental conditions such as rising sea level, flooding, severe storms, and seismic events.
- Water Quality Monitoring
- Habitat preservation & rehabilitation
- Contaminated soil, invasive species, etc. removed
- Sea level rise
 - Repairing structures in flooding plane
 - New builds to accommodate sea level rise
- Work with federal, state, and local agencies, indigenous tribes, and all stakeholders in the community
- National Environmental Policy Act
 - Environmental Impact Statements – Environmental consultation will occur for all SIOP projects as they progress through development.
 - The Navy will continue to host town hall meetings and seek input from diverse stakeholders to ensure public involvement through the National Environmental Policy Act process.





Community Impacts



SIOP Investments

- Decades of construction work
- Enhanced, safer, more efficient infrastructure
 - Resilient infrastructure and utilities
- Conveniently located support facilities, with a more walkable shipyard and more accessible parking and public transportation.
- Modern industrial equipment with 90% manufactured in the U.S.A.

Defense Community Infrastructure Pilot Program (DCIP)

\$275M in grants (FY20-FY23)

62 grants averaging \$4.4M

Wide-range of community/installation functions



Community Impacts

- As major employers in the community, revitalizing the public shipyards makes good business sense and requires sustained construction and material investments in the local economy
 - Robust apprenticeship programs at each shipyard: Graduates learn lifelong, marketable skills
- Sailors and shipyard workforce spanning the four yards = 37,000+
- Deliver shipyard workers and Sailors enhanced support facilities that are safer and more conveniently located, with a more walkable shipyard layout and more accessible parking and public transportation.
- Communities are strengthened by investment from the Navy but also by investments from local government, businesses, and residents – public transportation, schools, childcare all make a difference.

Communities work when we do...



...Investing in the community is a team effort!

PHNS Area Development Plan (ADP)

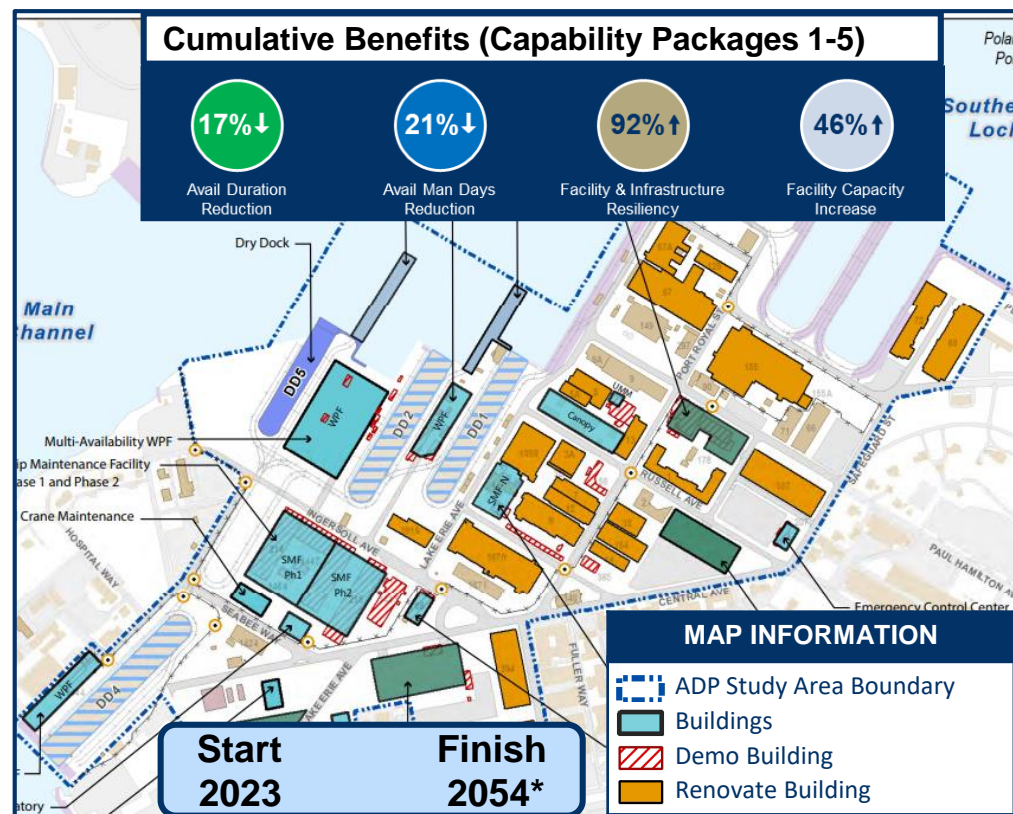
- The ADP provides a roadmap to recapitalize and modernize the shipyard and improve the maintenance throughput. The Program has 14 Key Performance Parameters (KPPs) which span capabilities (waterfront, facilities & utilities, IPE), guide designs and will be used to measure performance.

Delivery

- Combination of ~80 repair and construction projects
- Turnkey and lifecycle replacement of industrial equipment
- Grouped and phased into Capability Packages (CP) that encompass production, logistic, admin, and utilities facilities
 - CP 1: DD2 and DD5
 - CP 2: DD1
 - CP 3: DD4 and relocation of surface maintenance
 - CP 4: Heavy Machinery Shops build-out
 - CP 5: Nuclear Shops build-out
- Cost analysis and schedule encompass totality of planning, environmental, design, equipment, construction, and management

Operational Improvements

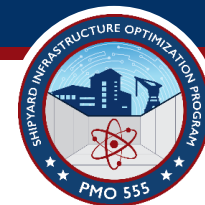
- 46% (+2MSF) capacity increase
- 92% resiliency improvement
- 85-day avg avail reduction (17%)
- \$68M savings per SSN avail



Combination of ~80 repair and construction projects



PHNS Projects



42 Modernize Existing Facilities

including:

Roofing
Bldg Renovation
HVAC Upgrades



12 New Construction

including:

Transportation
Parking
Workforce Support and Security



10 Shipyard Infrastructure

including:

Water and sewage
Electrical and telecommunications
Environmental compliance



7 Wet Berths

including:

Wharves
Piers

3 Waterfront Production Facilities

3 Ship Maintenance Facilities



1 New Dry Dock

SIOP Projects at PHNS

- **~80 distinct projects spanning decades**
 - A *VARIETY*: both refurbishment and new construction for dry docks, piers, Waterfront Production Facilities (light industrial capability) and Ship Maintenance Facilities (heavy industrial capability), utility systems, administrative buildings, transportation, and logistics complexes.
- **Representative of work required at three other shipyards**

6 Primary Disciplines

1. Waterfront & Equipment
2. Foundation & Structural
3. Building Envelope & Finishes
4. HVAC, Plumbing, Electrical, Building Controls & Cybersecurity
5. Energy, Utilities, & Environment
6. Design, Acquisition & Contracting



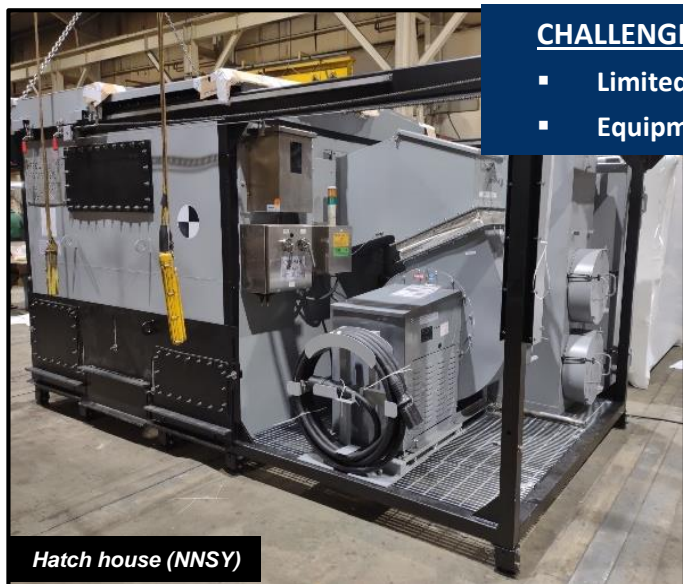
Waterfront & Equipment

OPPORTUNITIES FOR INPUTS

- Dry dock equipment
- Ship stability systems
- Ship lifts
- Waterfront connections
- Portal cranes and mobile cranes
- Weight handling equipment and material handling equipment
- Industrial plant equipment (lathes, mills, benders, welders, 3D printers, etc.)



Cranes at the waterfront (PNSY)



Hatch house (NNSY)

CHALLENGES

- Limited industrial base for portal cranes
- Equipment connectivity



5 Axis Router (PHNS)

OPPORTUNITIES FOR INPUTS

- Seismic performance and base isolation
- Soil improvements
- Site investigation techniques
- Recycled steel
- Low carbon concrete
- Pre-fabrication
- Precast concrete
- Laminated timber
- Concrete recycling
- Anti-terrorism/force-protection



PNSY



Bldg. 431 seismic resiliency upgrades (PSNS)

CHALLENGES

- Limited laydown area presents logistical obstacles
- Closure of Dry Docks to support future construction
- New construction must be coordinated with ongoing shipyard operations



Wall pinning for seismic resiliency (PSNS)

Building Envelope & Finishes

OPPORTUNITIES FOR INPUTS

- Exterior Insulation and Finish Systems (EIFS)
- Tension fabric
- Insulated concrete forms
- Vertical transportation systems
- Cladding and roofing systems
- Day lighting
- Secure rooms
- Systems furniture and interior partitions

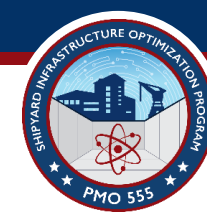
CHALLENGES

- Need resilient materials – buildings and structures must last decades





HVAC, Plumbing, Electrical, Building Controls, Cybersecurity



OPPORTUNITIES FOR INPUTS

- Geothermal heat pump
- Passive cooling
- Fire detection and suppression
- Lighting
- Digital transformation

CHALLENGES

- Cybersecurity policy and regulation
- Safety



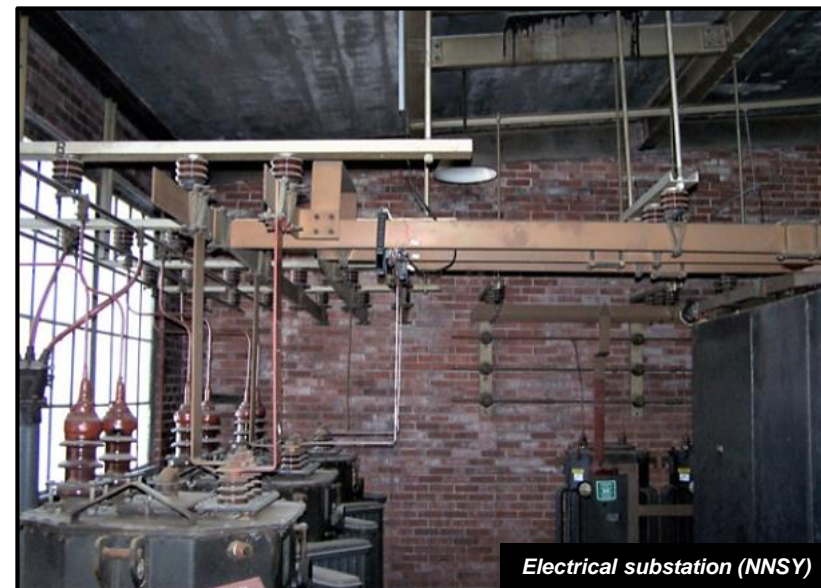
Energy, Utilities, Environment

OPPORTUNITIES FOR INPUTS

- Generation, storage, conservation
- Utility (including communication) transmission and distribution
- Dredging and drying spoil
- Material reclamation, reuse, and recycling
- Water savings and reuse

CHALLENGES

- Constraints inherent to existing power/water grid – need survivability off grid
- Contaminated soil



CVN 70 sailors connect ship to shore power



Design, Contracting, Acquisition

OPPORTUNITIES FOR INPUTS

- Use of AI to develop design concepts, estimates, and bills of material
- Building Information Modeling
- Best contracting methods to encourage competition
- Contracting methods for allocation of risk
- Achieving small business inclusion
- Source selection criteria

CHALLENGES

- SIOP Acquisition Strategy is a first-of-kind approach to procuring facilities as the primary program deliverable
- Transition from standard “project-based” approach to “capability package” approach will need to be mapped out and managed
- Focuses on delivery of “turn-key” facilities (all equipment and systems installed and tested prior to turnover to the shipyard)
- Decision points as Acquisition Strategy is expanded in 2024



ASN Berger (Energy, Environment, and Installations) and ASN Guertin (Research, Development, and Acquisition) visiting PNSY



DD8 Groundbreaking (NNSY)



SIOP Prize Challenge: AI in Design

An additional industry engagement to help improve our design and planning processes.

How can we leverage AI to rapidly generate and evaluate multiple design options, allowing for iterative changes throughout development while ensuring compliance with relevant standards and regulations?

SUBMIT: IdeaScale (Registration Required to View): DIU-NSIN Challenges, search: *AI Infrastructure Challenge* (ideascalegov.com)

Challenge.gov Posting: Challenge.Gov, search: *AI Infrastructure Challenge*

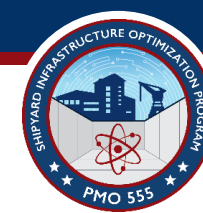
\$250k prize

If you can help – hurry! Solicitation closes 19 June.





Industry Day Part 2



****We want to hear from you!****

***Due date for submissions is July 2nd**

August 13-15 Downtown Washington, D.C.

Submit your innovative ideas to a government panel

***Any follow-up questions? E-mail my team:**

siopcommunications@us.navy.mil*

**To
submit /
register
and for
more
information**

