PM PNT
POSITIONING
NAVIGATION
TIMING

PNT Modernization
OIL Open House
and
Industry Update

December 07, 2021

PNT Modernization Industry Update Agenda

- Welcome / Opening Remarks
- PNT CMOSS PlugFest Overview / Winners
- Open Innovation Lab (OIL) Accomplishments
- Future Opportunities and Efforts
- Closing Remarks
- Networking

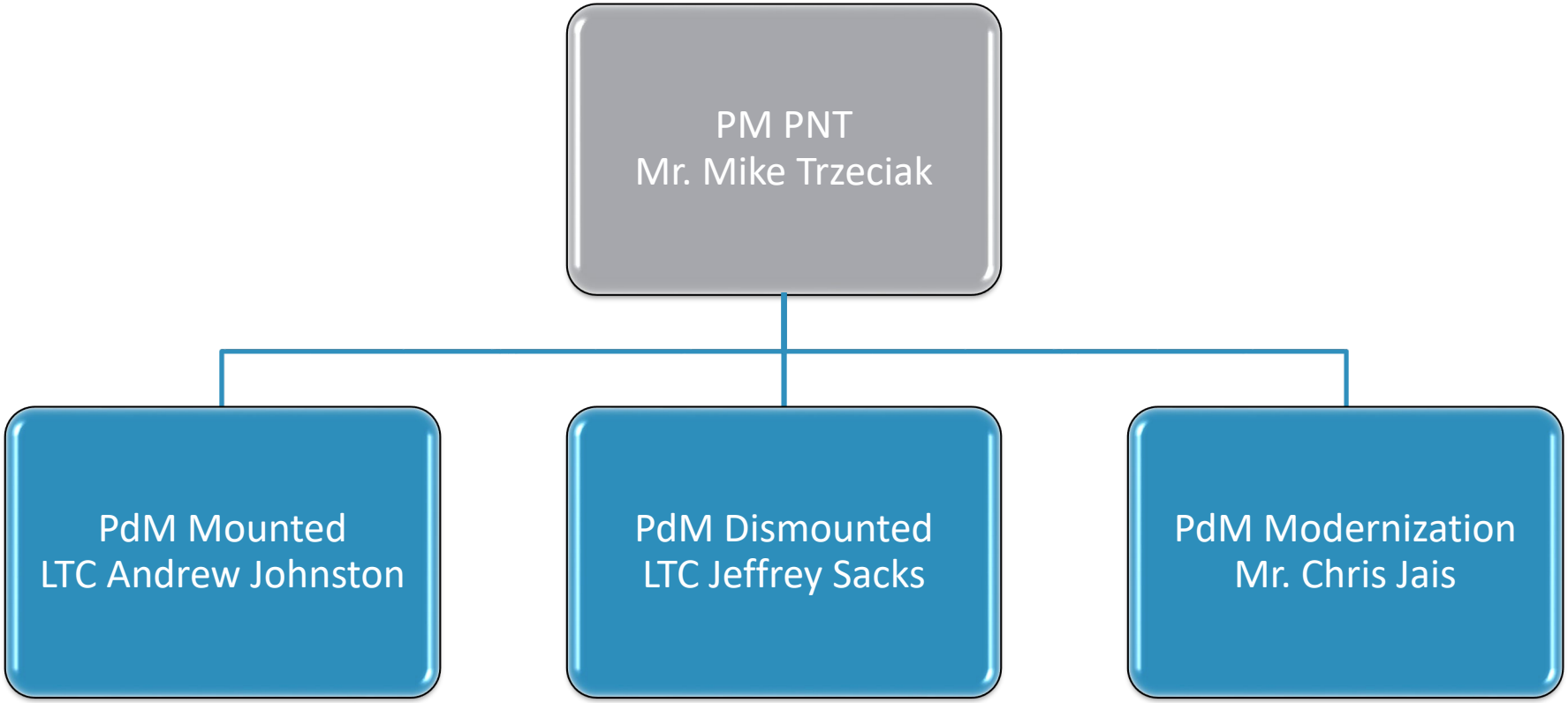
Welcome / Opening Remarks

Chris Jais

Product Manager

PNT Modernization
Positioning, Navigation & Timing (PM PNT)

PM PNT Org Chart



PNT C5ISR/EW Modular Open Suite of Standards (CMOSS) PlugFest

PNT CMOSS PlugFest Overview

Dates: 8 – 19 November 2021

Purpose: Market Research for CMOSS compliant PNT Cards, Chassis and Network Switch Cards

Government Participants: PM Positioning, Navigation, Timing (PNT), PM Mission Command (MC), PEO Ground Combat Systems (GCS), C5ISR

Industry Participants: Annapolis Micro Systems, Spectranetix, Elma Electronic, Curtiss-Wright, Herrick Technology Laboratories, Abaco Systems, Orolia

Scope:

- CMOSS compliance verification and validation testing
- Direct engagement and feedback with vendors
- Partnership with xTech to incentivize competition and build comprehensive grading rubrics
    - The xTech Program, led by ASA(ALT), manages the Army's prize competitions to award and accelerate transformative technology solutions that can help solve Army problems.

Registration Metrics

Activity	Awarded
Registrations	15
Down-Select	9
1-on-1 Down-Select	7
Total PNT Cards	4
Total Switch Cards	5
Total Chassis	4

Award Structure

Activity	Invited	Awardees	Prize
Registration	Open	Up to 15	$5K, up to 15 ea
PlugFest Incentives	Up to 15	Up to 10	$15K, up to 5 ea, $10K, up to 5 ea
Follow-On Contract	Up to 10	Up to 5	TBD

Dr. Matt Willis

Director

Army Prize Competitions &
Army Applied SBIR Program
HQDA ASA(ALT)


TECH | PLUGFEST

Open Innovation Lab (OIL) Accomplishments

Open Innovation Lab (OIL) Value

The OIL provides direct engagement with Government stakeholders to help align and optimize capabilities for the Army

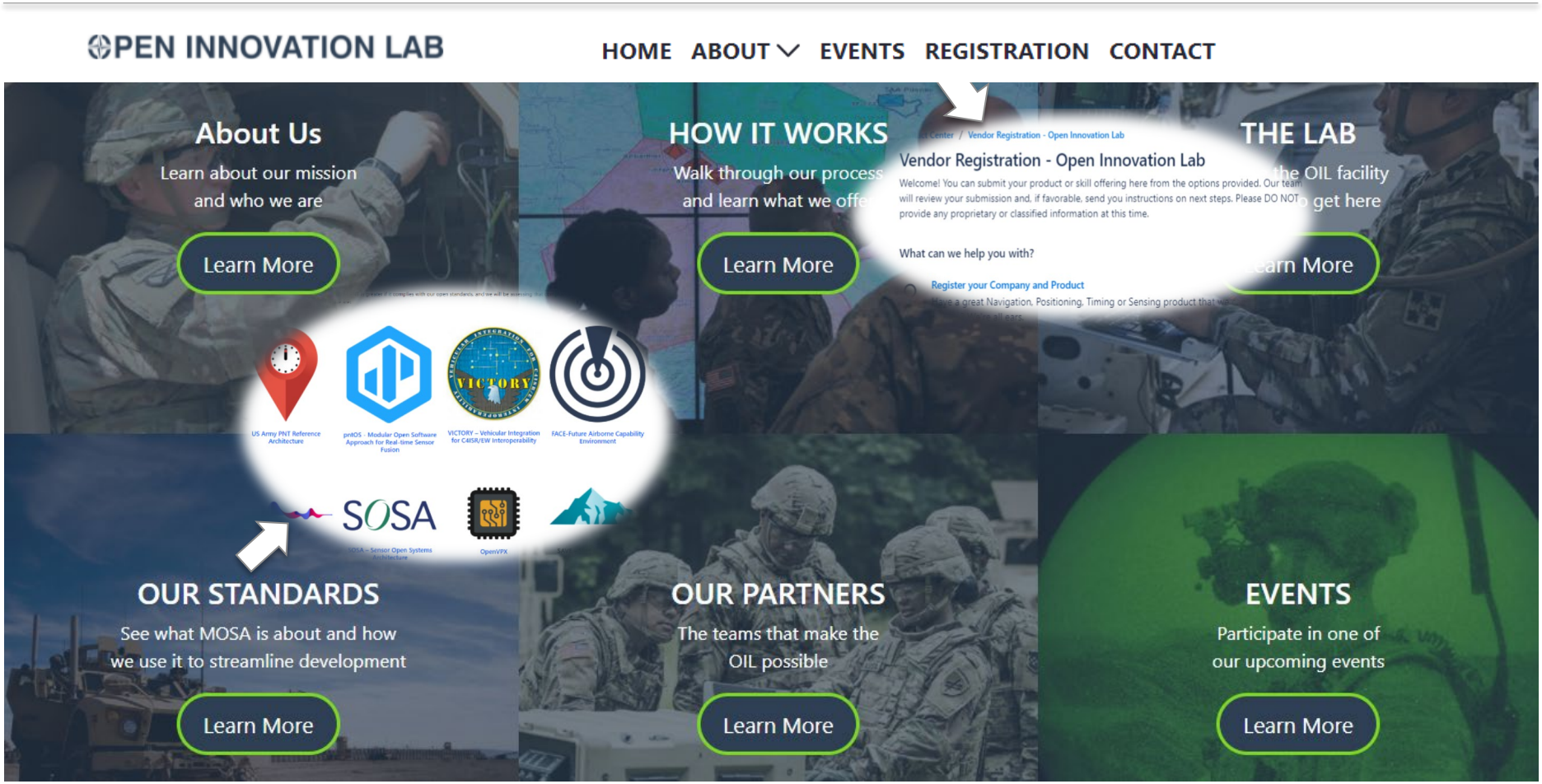
Cost Effective way to inform and engage with government stakeholders.
- Capability briefings and demonstrations
- Compliance verification and validation of standards

Time Efficient, breaking down barriers of lengthy timelines to meet with government stakeholders.

Reduce Risk in developing and aligning capabilities to the Army's standards.

Candid Feedback is provided based on current requirements and standard compliance to ensure capabilities are aligned and optimized for the Army.

OIL Website



https://apntoil.army.mil/

OIL Engagement Metrics

Vendor Engagement Metrics

Engagements	Scheduled/Completed
Technical Overviews	60
Demonstrations Complete	9
Upcoming Demonstrations FY22	8
Total Registrations	**86**

Product Type Metrics

Product Type	GPS	Imagery	Power Mgmt.	Sensor	Timing	Other
Vendors	35	24	5	37	26	37

Note: Vendors may have multiple product types

Vendor Survey Results

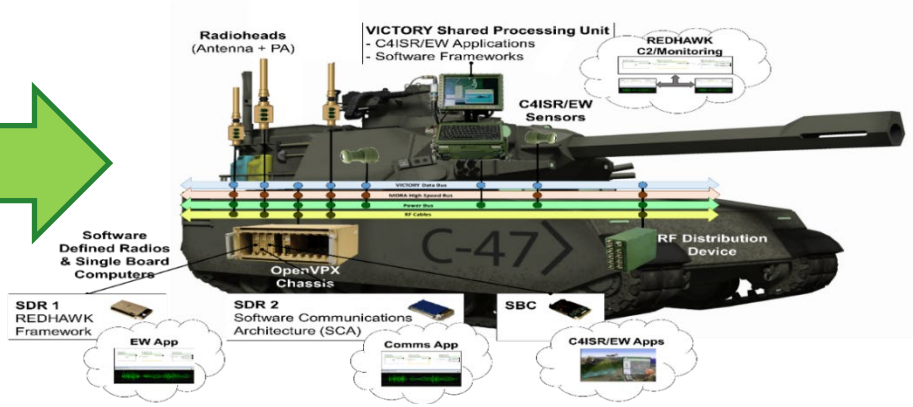
Scale	Average
Great (3)	62%
OK (2)	30%
Poor (1)	8%
Total Surveys Received	**24** (28%)

Open Architecture Efforts

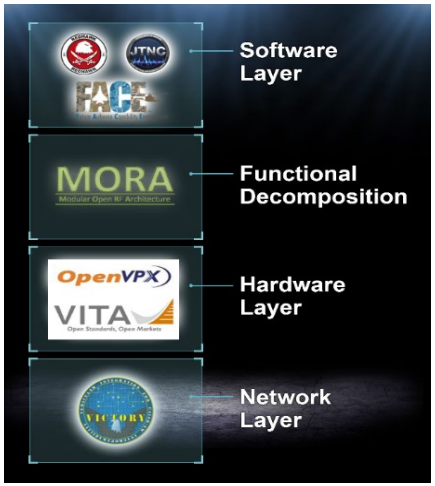
CMOSS

Why Converge?

CMOSS



C5ISR/EW Modular Open Suite of Standards (CMOSS)



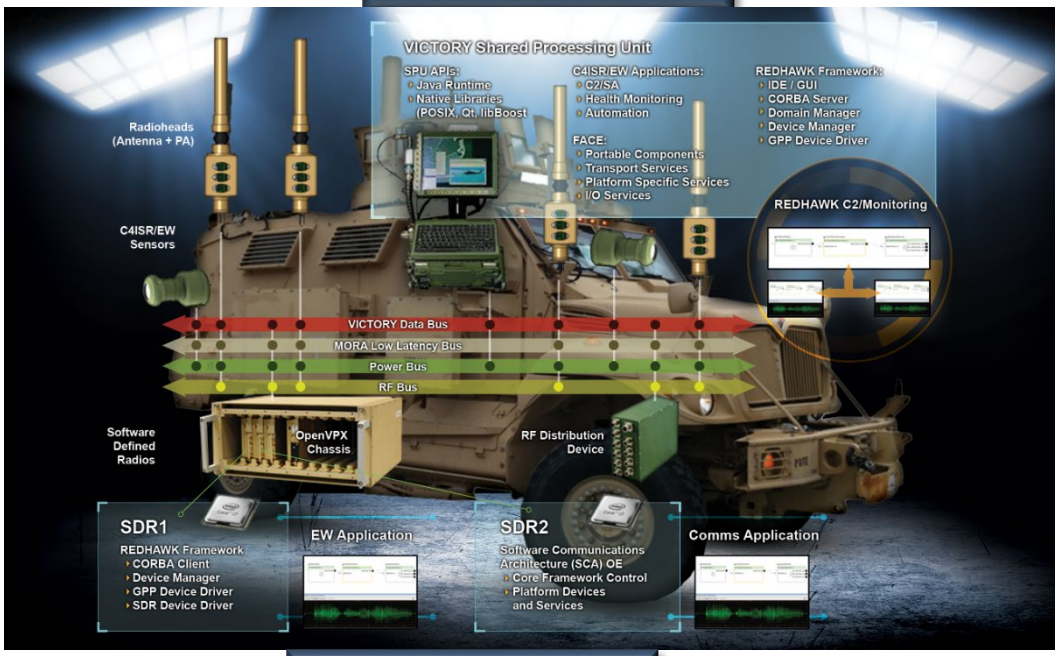
- CMOSS is a suite of standards to support the reduction of the size, weight and power of C5ISR and EW systems while increasing the flexibility and adaptability of these systems
  - Universal A-Kit – Project Managers field capabilities as cards into a common chassis
  - Pooled radio resources such as antennas and amplifiers for Communications, Electronic Warfare (EW), and Signals Intelligence (SIGINT) systems
  - Shared processing resources such as computers and displays
  - Shared data services such as Position, Navigation, and Time (PNT)
  - Foundation for enhanced interoperability and simultaneity between C5ISR systems
  - Reduced life cycle cost through increased competition, smaller logistics tails with common sparing, and upgrading to the latest hardware as parts are replaced
  - Rapid insertion of new technology/capability

Army, Air Force, and Navy collaborate under the SOSA Consortium to develop a holistic open architecture that leverages existing standards, maximizes economies of scale, and provides the flexibility to rapidly insert the latest capabilities to achieve Future Force Modernization.

CMOSS -> CMOSS Mounted Form Factor (CMFF)

PMPNT

Potential Solutions



Focus of A-CDD

CMFF Chassis Ground Platform

CMOSS will:

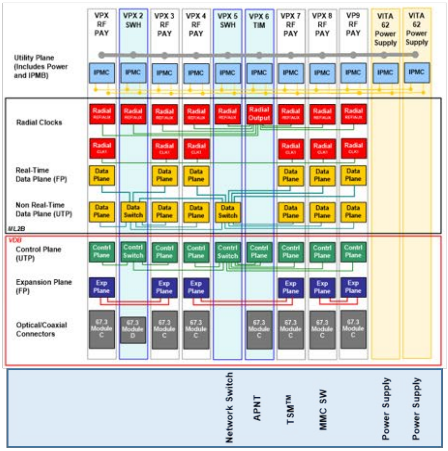
- Tailor Network Transport: Commanders and leaders engaged in full spectrum operations need information transport available to **enable timely collaboration and information sharing** which requires the ability to **tailor network transport capability with the commander's priorities and dynamically adapt network architecture** and resources (LOS and BLOS).
- Execute C2 OTM: Commanders and leaders engaged in full spectrum operations require the **capability to access, select, filter, share, display, and collaborate** on fused operations and intelligence information, while **operating away from their command post**, in air or ground platforms, and while dismounted at the tactical edge.

Abbreviated CMFF A-CDD 4 Jan 2021

Operational Benefits:

- Addresses the overburdened platforms' size, weight, power, and cooling (SWaP-C) shortcomings.
- Enables the execution of Multi-Domain Operations (MDO) across multiple environments on ground and air platforms by Commanders, Leaders, and Soldiers.
- Provides extensive flexibility to configure platform mission needs and rapid insertion of new technology to meet emerging threat.
- Base document provides the integrating function for the capabilities provided in Annexes A-C.
- Prototyping driven by the base document and annexes will determine the feasibility and final priority of capabilities described in each to be eventually fielded.

CMFF Integration to Date

INITIAL CAPABILITIES	CMFF ALPHA PROTOTYPE (LAB SPRINT)	NETMODX & PNTAX (FIELD SPRINTS)
 MAPS  MMC SW on MFoCS HW  HMS Manpack Radio	 APNT  MMC Software  TSM™   CMOSS Chassis	Radiohead  CMOSS Chassis

- Demonstrated successful standards implementation in a multi-card (PNT, Compute, Radio) prototype CMOSS chassis, integrated on Stryker during Network Modernization Experiment (NetModX) 2021
- PNTAX 2021 demonstrated improved integration under austere conditions.
- CMFF Transitions to PM Mission Command in FY24

Mike Caporellie

Chief, Emerging Technologies Branch, PNT Division

U.S. Army Combat Capabilities Development Command (DEVCOM)

pntOS

- Fully government-owned open architecture for PNT with pluggable components
- Architecture defines and standardizes the interfaces to PNT system components
- Plugins are designed to be individually swappable, without modifying other plugins
- Allows for tightly-coupled integration approaches that are still modular and independent
- Comes with government-provided set of example plugins (with source code)
- Designed so that others (vendors, government) can write their own plugins
- Designed so vendor developed plugins can remain proprietary

PNT Reference Architecture (RA)

Future version (RA V.2) in development and will expand on version 1.0

Input Standards

- Standardization of information exchanges via an All Source Positioning and Navigation (ASPN) specification

Integrity and PNT Situational Awareness (SA) content guidance

- Integrity - guidance to constrain integrity scores calculations without limiting innovations
- PNT SA – guidance to provide consistent outputs of SA data related to Position, Velocity, Time and Orientation (PVTO) and Integrity score calculations

Update GPS-153 with new "PNT-153" message structure

- Documented as an Army Standard
- PVTO solution
- Quantification of the PVTO solution's integrity via Integrity scores
- PNT SA information relevant to the PVTO solution and its integrity calculation

RA V.2 will not be publically releasable

Future Opportunities and Efforts

MOSA Hand Held Concept

PMPNT

Mission Roles

Unsupported Hand Held	Ground Soldier Systems Support	Mounted MVMT Support	Unmanned System Support	Miscellaneous Army Systems Support

Signals from Space

- M-Code
- ALTNAV
- GNSS

- AJ Antenna
- M-Code Antenna
- ALTNAV Antenna
- GNSS Antenna

Signals from Local Env.

- USB
- LE Bluetooth
- Tactical Wifi
- Signal of Opportunity
- DAPS-UWB

Sensors/ Receiver

- M-Code
- ALTNAV
- Inertial
- LE Bluetooth
- Camera
- Ultra Wide Band
- Intra Soldier Wireless

Non GPS PNT Sources

- IMU
- Clock
- Terrain Mapping
- Vision Aided
- Hot Start
- Ultra Wide Band Ranging

PNT Fusion Engine (pntOS)

User Interface

- ATAK
- DAPS Interface
- STUB
- USB/BT/ISW

User Way Point Confirmation

Backplane

Power Source

- CWB
- Tactical Vehicle Mounting Adapter
- 110 AC
- 12v AC

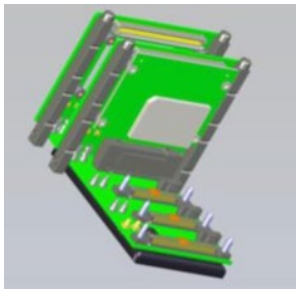
PNT Output

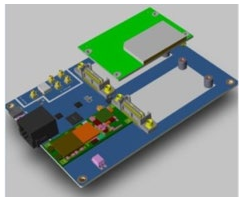
- NW
- IVAS
- ATAC Watch
- IS-GPS-153 compliant systems
- Hot Start-DAPS
- Hot Start-MAPS
- Hot Start-Other

- Focus on core open architecture design
- Establish HW/SW standard ICD.
- Integrate best available components, but set conditions for future tech insertions.

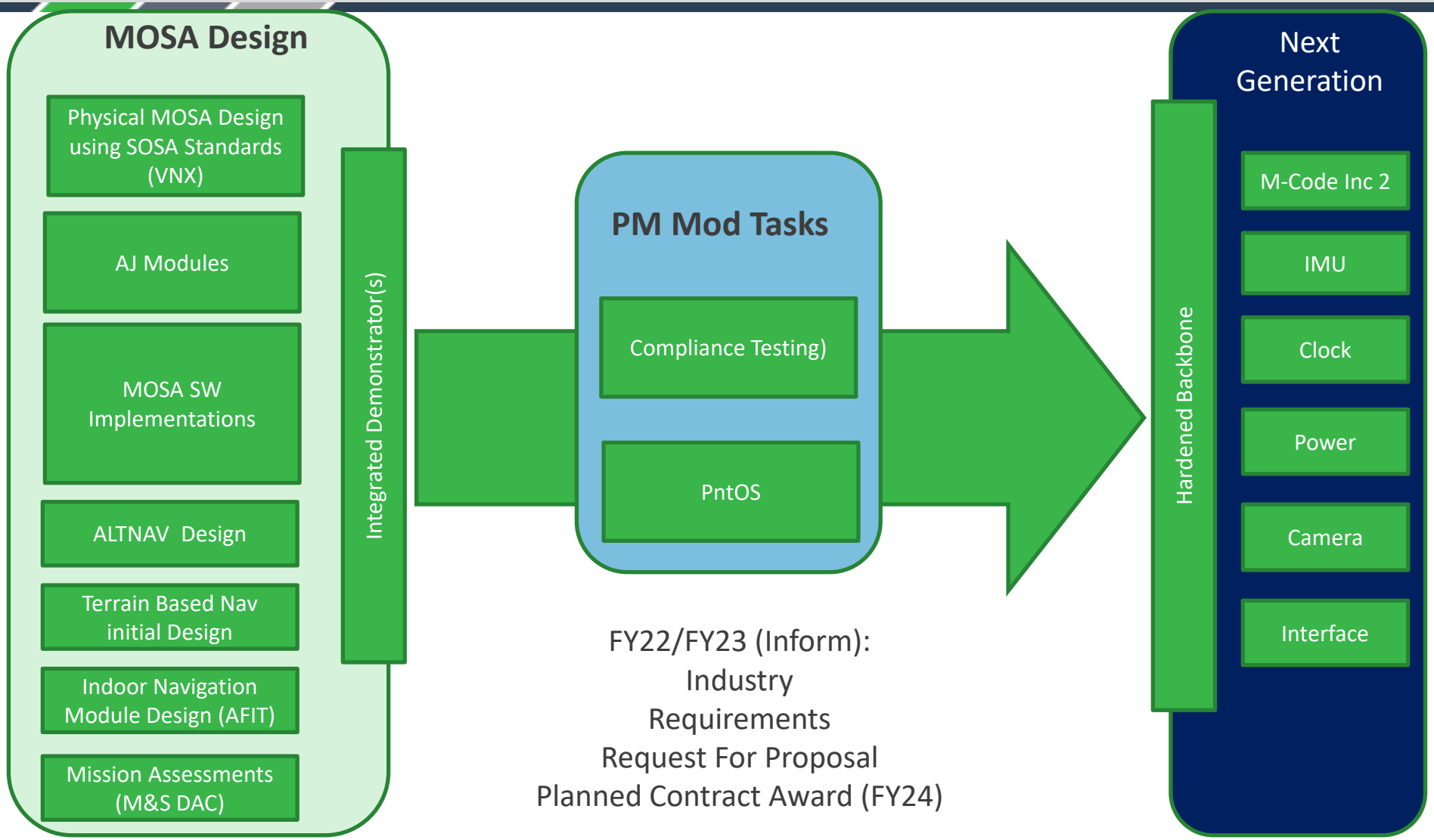
Key

- Mod Tasks
- DPNT Tasks
- External





MOSA Initial Components (FY22 & FY23)



Future Opportunities and Efforts

Expand the OIL Footprint

- Transition to a C5ISR Lab
- Introduction to Sensor CE
- Introduction to JPADS

Future Competitions

- Upcoming future competitions in FY22 and beyond

Closing Remarks

- Register at our website with PNT technologies or interest in JPADS and Sensor CE
- Registered Vendors – Fill out OIL Registration Survey
- All Attendees – Fill out OIL Open House Survey
- Our website: https://apntoil.army.mil/

Questions?

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After the event, we will capture all questions and post responses to the OIL Website. All attendees will be notified when live.