PROJECT MANAGER FORCE PROJECTION

Robotics & Autonomous Systems – Ground Interoperability Profile (RAS-G IOP) NDIA GRCCE 2016

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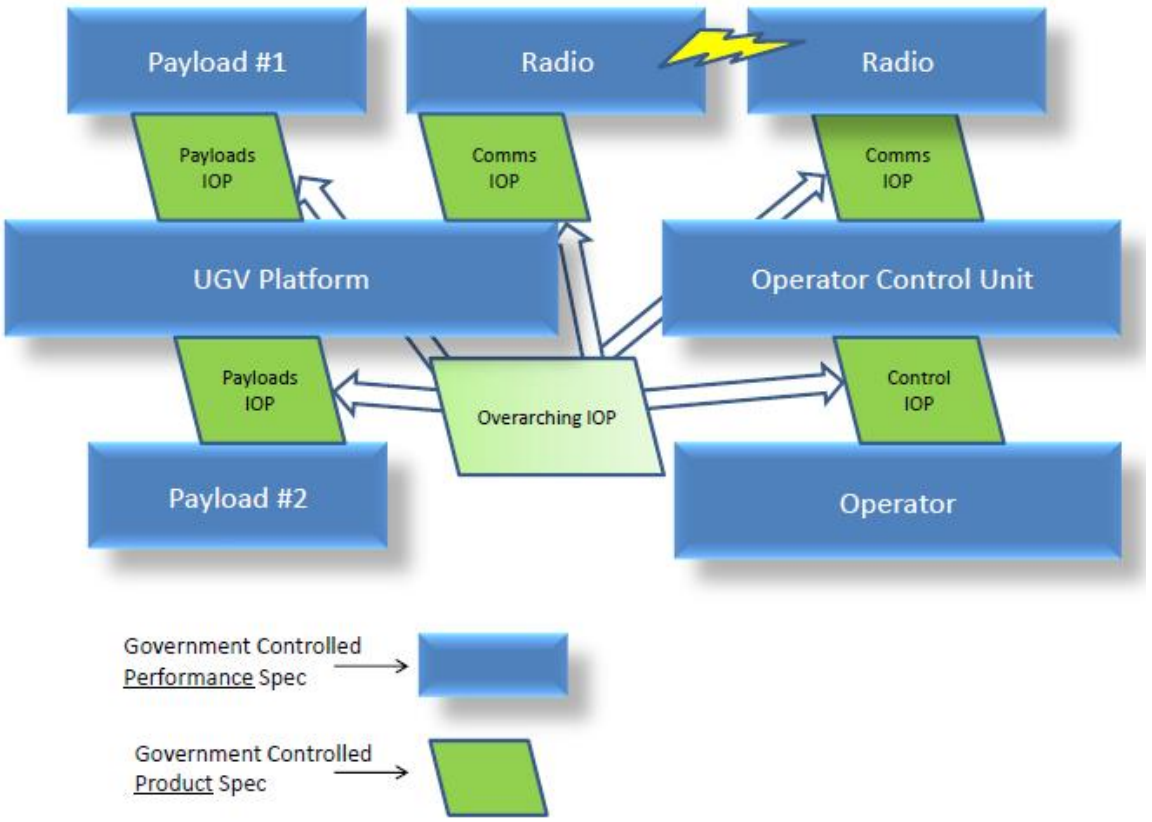
RAS-G IOPs Basic Overview

- Robotics & Autonomous Systems, Ground (RAS-G) Interoperability Profiles (IOPs)
- Defines software messaging & hardware interfaces between major subsystems of unmanned ground systems



Software messages primarily based on SAE AS-4 – Joint Architecture for Unmanned Systems (JAUS)

IOP V2.0 Released February 2016

IOP Conformance Validation Process

Similar to VICTORY Process

IOP Instantiation Document developed for program

PM Lead

RDEC Support

Compliance Evaluated IAW Instantiation Doc

IOP Compliance Certification

RDEC Lead

PM Support

IOP Instantiation Document included in RFP as technical requirement

PM Lead

RDEC Support

Test Report

IOP Compliance Testing prior to OT

Test Plan

RDEC Lead

PM Support

Test Report

KTR can utilize TARDEC CVL for DT – PM should factor in approximately $20K per test

Test Plan

RDEC Lead

PM Support

$20K includes test plan development, execution of tests, and report development

Test Report

Initial IOP Compliance Testing prior to MS C

(and prior to any pre-MS-C OT)

Test Plan

RDEC Lead

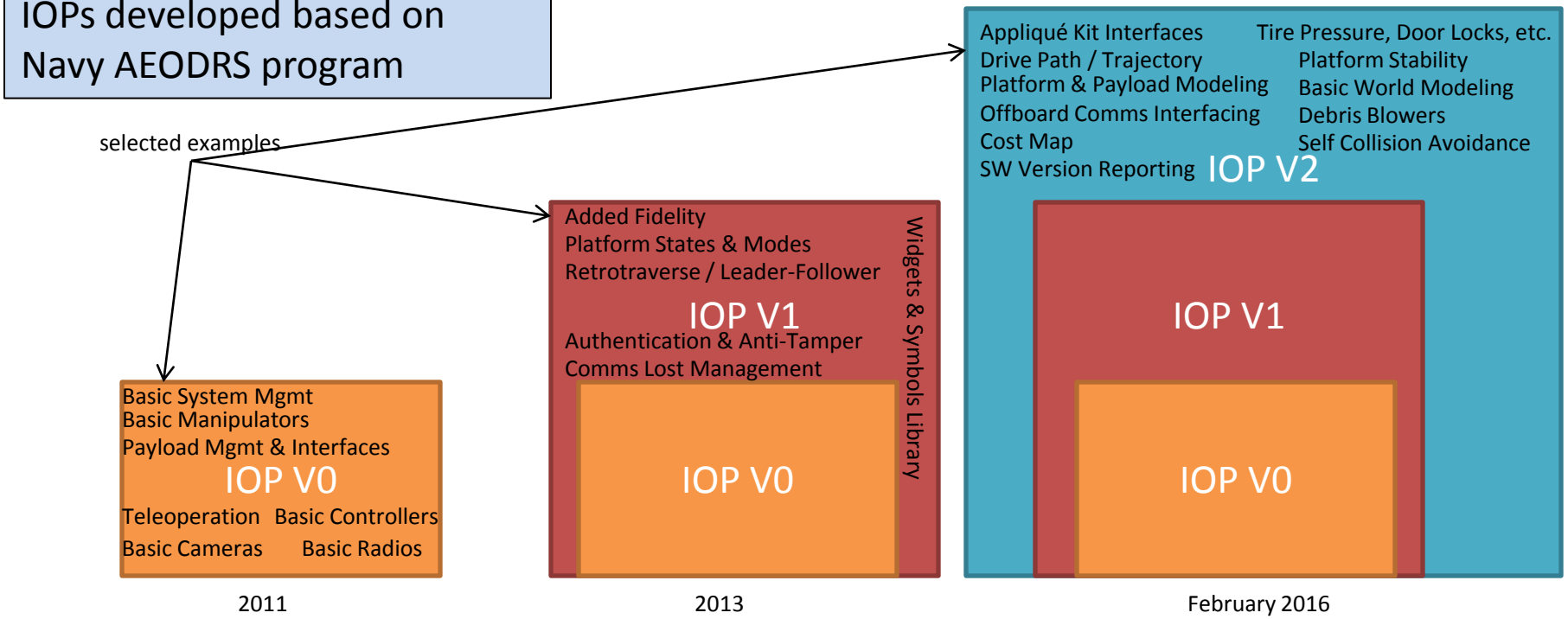
PM Support

Acronyms:
CVL = Conformance Verification Lab
DT = Developmental Testing
IOP = Interoperability Profile
MS C = Milestone C
OT = Operational Testing
PM = Project Manager
RFP = Request for Proposal

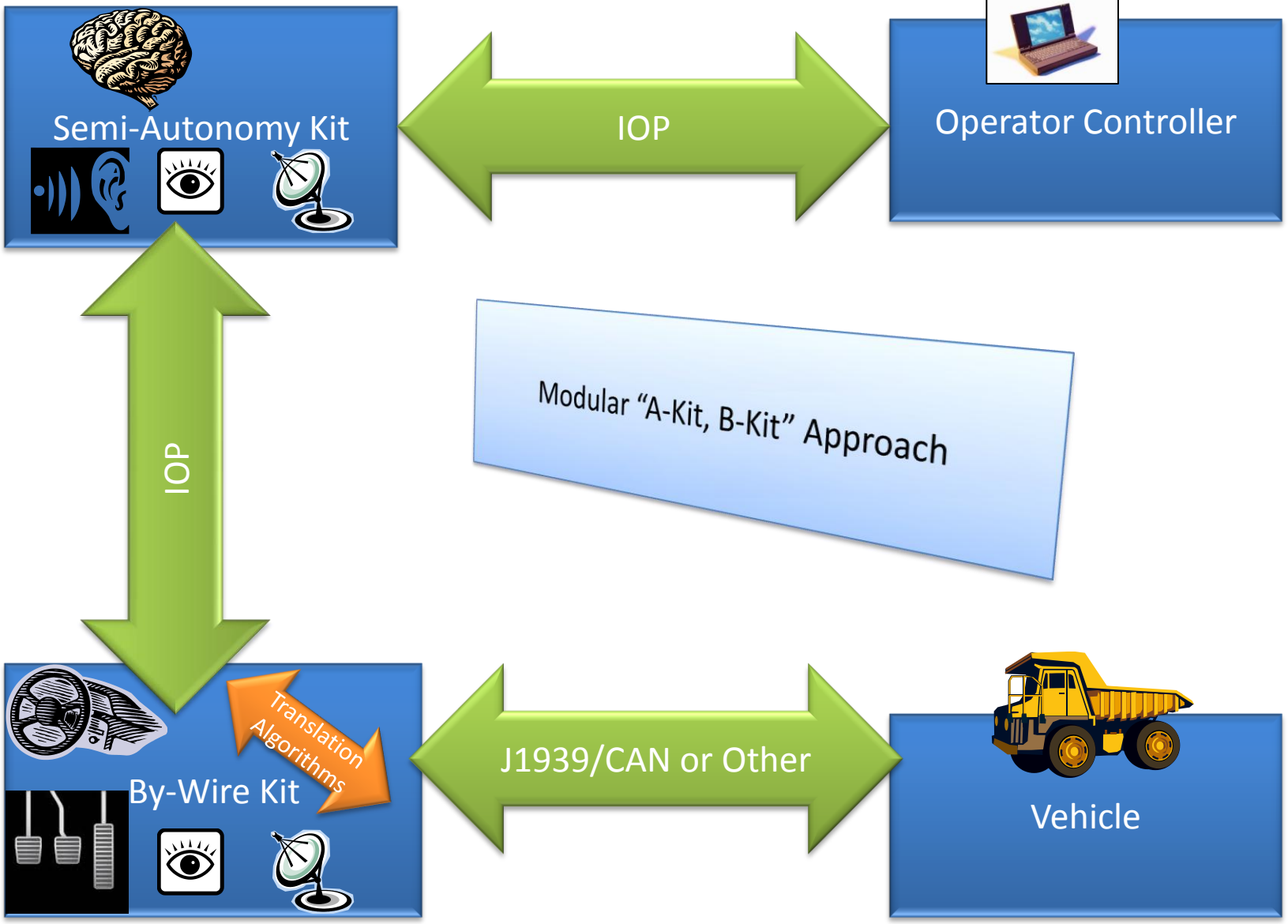
RAS-G IOP Capability Coverage

- IOP V0 provided interfaces for capabilities already fielded
- IOP V1 provides interfaces for MTRS Inc II, CRS-I
- IOP V2 provides interfaces for RCIS & HMDS
- **IOP V3 priority – Tactical Wheeled Vehicle Applique Kits** & other emerging requirements

IOPs developed based on Navy AEODRS program



General Unmanned Appliqué System Approach to Open Architecture



Example of Possible IOP Data Exchanges Between By-Wire Kit & Semi-Autonomy Kit

These services are currently defined by IOP as JAUS messages. IOP V3 may want to profile in SAE J1939.

What types of exchanges between the 2 kits are missing?

Power Plant Management
Render Useless
Odometry
Physical Specification
Pose & Attitude
Advanced Global Position & Attitude
Advanced Local Position & Attitude
Preset Pose
Tamper Detection
Health Reporter
Obstacle Reporting
Software Version Reporting
Advanced Automated Behaviors
Digital Resource Discovery
Advanced Platform Management
Mission Configuration
Maintenance

IOP

Enhanced Access Control
Stability Control
Velocity State Driver
Ackerman Steering
Gear
Remote Control
Platform Specification
Local Vector Driver
Global Vector Driver
Video
Guarded Teleoperation
Lost Comms Management
Local Enhanced Navigation
Global Enhanced Navigation
Local Path Segment Driver
Global Path Segment Driver

Leader
Follower
Digital Video Pull
H264 Video Encoding
Range Finder
Tire Pressure Sensor
Acceleration State Sensor
Force/Torque Sensor
Velocity State Sensor
Illumination
Camera Lights
Windshield Wiper
Door Lock System
Self Collision Avoidance
Communicator

Universal Controller

Puma

RQ-11B Raven

PM UAS

PM UAS

PM UAS

Short Range Micro (SRM) UAS

PEO M&S

LMAMS

Universal Controller

PEO Soldier

PD-100 / Soldier Borne Sensor (SBS)

RAS-G IOP

MTRS Inc II

RAS-G IOP

RAS-G IOP

UGV IOP

SMET

CRS-I

Small Throwable Robot

UGV Interoperability Planning

Near Term (0-5 yrs)

Standardized interfaces must be enforced between UGV platforms, payloads, controllers, and wireless communication devices. This will enable interoperability and modularity within systems and will lay the foundation for an affordable and sustainable lifecycle management model.

Mid Term (5-10 yrs)

UGVs must begin interfacing with authorized external systems and domains, such as other unmanned systems, manned ground vehicles, remote video terminals, and mobile/hand-held devices. This will enable a variety of new capabilities for Warfighters in different domains, as well as for UGVs themselves. This activity will be coordinated through the Army Common Operating Environment and other joint activities. Additionally, joint and multinational interoperability with key allies must be established through the use of shared interface requirements.

Far Term (10-20 yrs)

The ability to interface with UGVs will be widely achievable by authorized external systems. Higher level interoperable message types will facilitate increases in system autonomy and distributed computing will be enabled via interoperable offloading of computing-intensive functions to appropriate systems. UGVs will be capable of sharing a variety of collected and processed information to a variety of consumers, which will enable enhanced situational awareness and decision making capability in both manned and unmanned consumers.

Enabled by RAS-G IOP