ASTM F41 Working Group

CAPT Duane Ashton
Unmanned Maritime Systems

August 18, 2011

Distribution A: Approved for public release; distribution is unlimited

How PEO LCS Evaluates OA

- **Methodology to Achieve Level 6:**
  - Analysis at subcomponent and sub-function level to look for opportunities for openness within systems, focusing on:

    (1) Level of documentation

    (2) Widespread use of a standard /architecture/technology/interface

    (3) Ease of making a change

    (4) Ownership to support upgrades

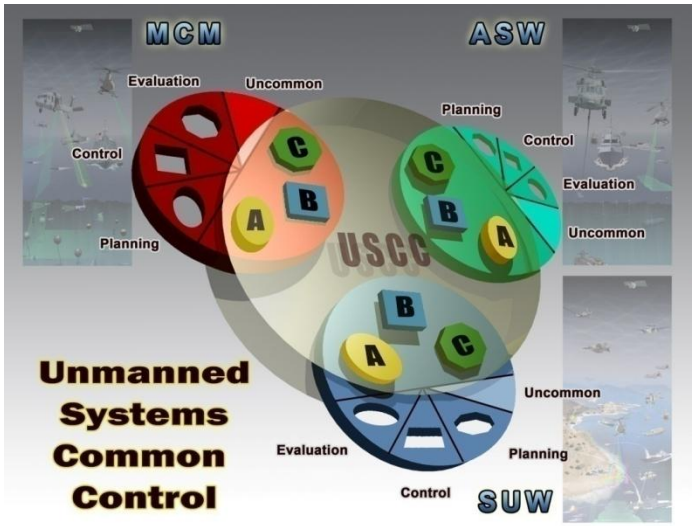
    (5) Consideration of Hardware OA (i.e., modular payloads, swappable hulls, variable sensors)

Open Architecture (OA Levels)	
OA Level	**Definition**
1	A **closed** system is a design-specific system that does not support affecting change to the system.
2	A **partially closed** system is a system with limited use of documented interfaces, which inhibits the ability to affect change.
3	A system at this level has a partial ability to enable change due to **supported interfaces**.
4	A system with **open interfaces** uses standards that are considered well-defined, governed, and supported to enable third party development.
5	A **partially open** system has a combination of both open and closed system characteristics and partially supports third party development.
6	An **open architecture** system employs open standards for key interfaces within a system to effect change with minimal development.
7	A system at this level enables **integration-focused development** in order to facilitate third party efforts.
8	System **reconfigurable** to support a change with minimal integration effort.
9	An **open system** fully supports change to enable rapid technology insertion through widespread third party development.

Open Architecture Goal for LDUUV is Level 6

Distribution A: Approved for public release; distribution is unlimited

Unmanned Systems Common Control



Description:

- Unmanned Systems Common Control Working Group stood up under the PEO-LCS S&T Working Group to evaluate the current state of the PEO effort to achieve a standard software architecture for unmanned system's C2 and identifying the path forward to gain consensus among all stakeholders on finalization and implementation.
- Stood up in June 2011 bringing together representatives from across the community of interest
- Will deliver a Gap Analysis on the current effort and a White Paper on way forward and recommended transition milestones
-UxV Combined Task Force (CTF) established to address synergy and symmetry in C2 arena

Operational Relevance:

- A standard set of software components and interface specifications for communication between components will reduce overall cost and schedule for integration of new unmanned systems and enhancement of existing systems

PEO Objectives:

- Lead the working group, conduct a requirements and solution survey, deliver the gap analysis, and recommendations on way ahead.

Major Accomplishments, Products, Deliverables, Future Milestones:

- JUN 2011 – Conducted WG Kickoff meeting in Panama City during ONR Demo event with representation from multiple PEO program/projects and industry partners
- AUG 2011 – Begin requirements and solution survey
- FEB 2012 – Deliver Requirements Gap Analysis
- APR 2012 – Deliver Way Ahead White Paper

LDUUV needs a USCC-like process to ensure success

Distribution A: Approved for public release; distribution is unlimited

Modular Open System Approach

- Interoperability
- Maintainability
- Extensibility
- Composibility
- Reusability

LDUUV goals for OA backbone

Distribution A: Approved for public release; distribution is unlimited

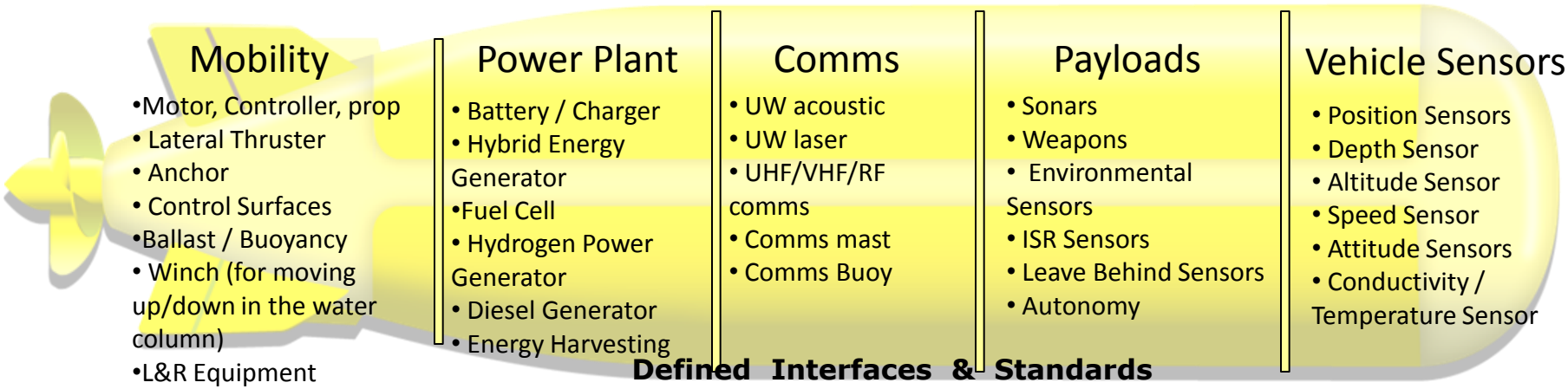
Core UUV Components

- Mission Functionality
- Vehicle Functionality
- Communications Management
- Payload Management
- Vehicle Health Management
- Power Generation Management
- Sensor Configuration Flexibility

LDUUV OA focus is on achieving functionality that provides maximum flexibility

Distribution A: Approved for public release; distribution is unlimited

UUV System Elements



- Open Architecture necessary to permit flexible information exchange between hardware/software elements
- LDUUV design permits integration of multiple configurations of hardware elements
- Interface Control Documents (ICDs) help control configuration & information exchange between Host Platform, LDUUV, and the various HW/SW elements
- OA focus on functionality for core components provides the design flexibility required

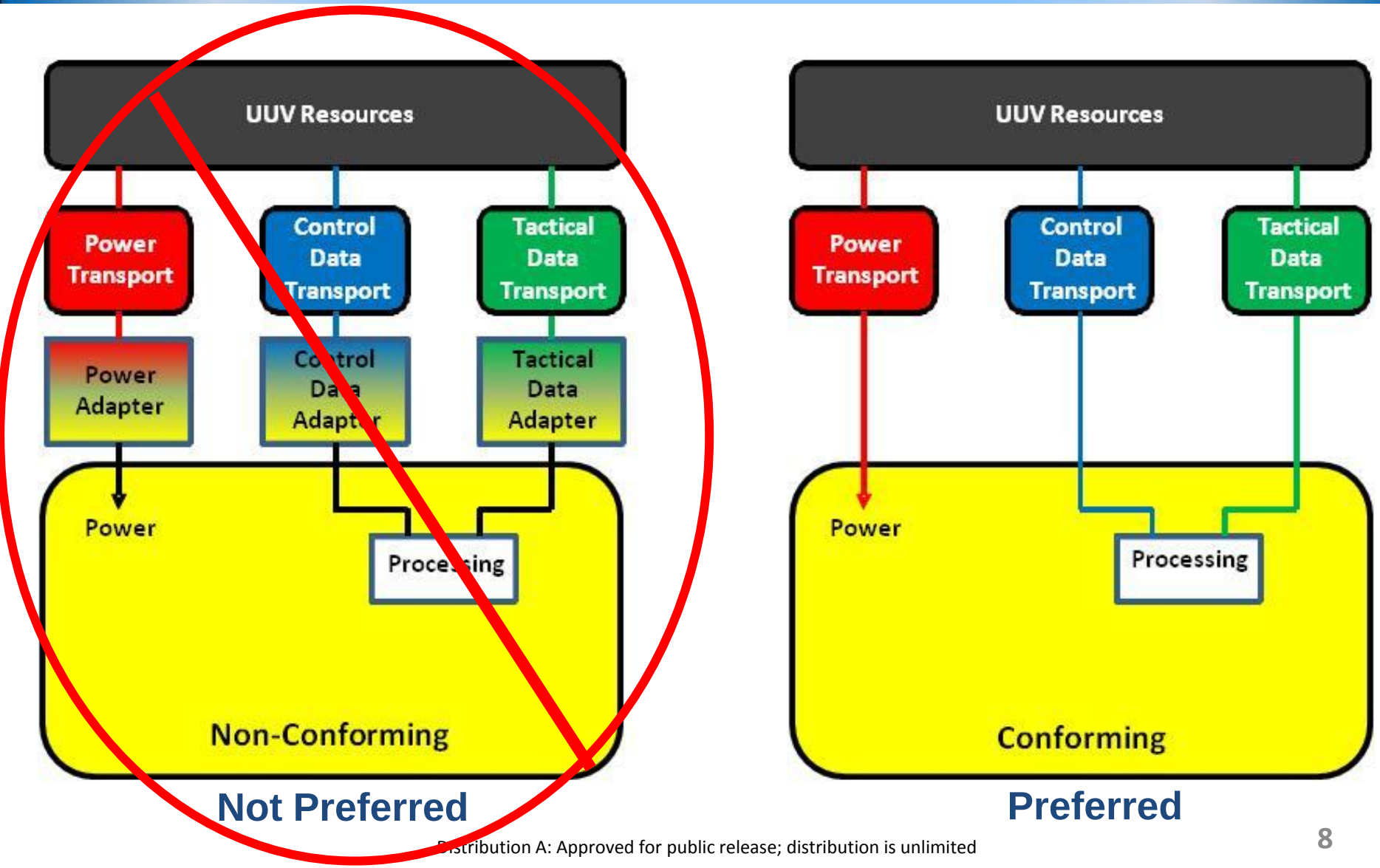
Distribution A: Approved for public release; distribution is unlimited

Interfaces

- Components that do not meet the interface standard will implement an adapter to conform to the standard.
  - Government Total Ownership Cost significantly higher
  - Not preferred approach
- Common power and data interface for all subsystems.
  - Preferred approach

Distribution A: Approved for public release; distribution is unlimited

Interface Example



Challenges

- Interface definitions
- Electronic specifications
- Control and Tactical Data Transportation specifications

Distribution A: Approved for public release; distribution is unlimited

SUMMARY

- PEO LCS a strong advocate for OA framework
- Ability to perform multiple missions using the same platform/weapons system requires an OA structure
- Looking to ASTM F41 Group to provide the insight and guidance as to how best to achieve that objective

Distribution A: Approved for public release; distribution is unlimited