Advanced Marine Vehicles
Opportunities in Unmanned Maritime Systems

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Advanced Marine Vehicles especially surface alternative hullforms & powering
Sizable Transitions to Commercial
AMVs for U.S. Navy Department....

- Lots of experimentation and prototypes....

- Some ‘almost solid transitions’....

- And just a few solid, enduring transitions....

LCS-2 (and LCS-1, & JHSV)
A new, impending military revolution.....
Unmanned Systems
Four basic categories

- UAV/UAS (air)  
  Current star category

- UGV/UGS (ground)

- USV/UMS (surface maritime)

- UUV/UMS (underwater maritime)
Strengths of each maritime type

• Air
  – Elevation, altitude
  – Comms for distant remote
  – Speed

• Surface
  – Payload
  – Endurance, power density
  – At interface of Air and Undersea

• Subsurface
  – Stealth
  – Survivability
  – Delivery parent (nuclear sub) imperative
Hindrances to Surface UMS development

• Simpler control systems not so useful....
  – Aviation distant remote control and waypoint nav
  – Subsurface waypoint nav and programmed pattern

• Initially ‘only boat-sized’ often created dependence on mother ships....
  – Unmanned boats but significant manning on ships to turn-around USVs
  – Sea state issues for launch and recovery
Potential missions for Surface UMS’

- Targets
- Surveillance
- Mine Warfare
- Offensive Mining
- Decoy/Deception
- Asymmetric advantage / turnaround
- Logistics
- Support of UAS, UUVs (lend endurance, interface)
WAM-V, Ghost, ballast glider, ACTUV

WAM-V of Marine Adv. Research Inc

16ft USV

Underwater ballasting gliders

WAM-V of Marine Adv. Research Inc

GHOST

DARPA ACTUV

Micro-UAVs....maritime equivalent?

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length Overall</td>
<td>132 ft</td>
</tr>
<tr>
<td>Beam Overall</td>
<td>46.9 ft</td>
</tr>
<tr>
<td>Draft Full Load</td>
<td>15.5 ft</td>
</tr>
<tr>
<td>Displacement, Full Load</td>
<td>129.0 LT</td>
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</tbody>
</table>
Proposed ACTUV baseline CONOPS

ACTUV is operated under a sparse remote supervisory control model. Command, control, and sensor data are relayed through a BLOS comms link.

1. ACTUV deploys from a shore base and transits to a forward operating location.
2. ACTUV loiters forward awaiting tasking.
3. Other US ASW assets detect a submarine target of interest.
4. ACTUV is cued to commence track/trail of the target of interest.
5. ACTUV employs its sensors to assume a close trail position.
6. ACTUV trails the submarine over its entire deployment and then returns to port.

Derived requirements:
- Propulsive overmatch
  - 24- to 27- knot top speed
- 70+ day mission endurance
- Global reach — self-deploy from U.S. territory
- Sea State 5 full mission capability; survivable in SS 7
- ~ $20M series production cost

Distribution Statement “A” (Approved for Public Release, Distribution Unlimited)
Development & Transition

• Modest UMS sizes helpful for SYSTEM development within modest-sized, available S&T venues (notably....SBIR)

• Note: “SYSTEM”...not ‘just’ a vehicle, will require clever cooperation of varied technology skills

• MISSION: needed, how it blends with overall fleet

• Think TRANSITION early.....how deployed, how fits with legacy, how it’s better for a vital mission, how it’s affordable in full system cost.
Discussion

- Submersible
- Semi-sub
- SWATH/SWASH
- Planing
- High speed cat
- Hydrofoil
- Surface Effect Ship
- Hovercraft
- Wing-in-Ground Effect
- Amphibian Aircraft