



**Legal Issues Relating to
Unmanned Maritime Systems
Monograph**

2013

Captain Andrew Norris

i

The opinions shared in this paper are those of the author and do not necessarily reflect the views and opinions of the U.S. Naval War College, the Department of the Navy, or Department of Defense.

Table of Contents

Title Page	i
Table of Contents	ii
Introduction	1
Part I: Current and Future Capabilities	5
<i>A. UUVs</i>	<i>7</i>
<i>B. USVs</i>	<i>10</i>
<i>C. UAVs</i>	<i>13</i>
<i>D. Final Points to UMS Technology</i>	<i>18</i>
<i>E. Illustration of the Issues</i>	<i>18</i>
Part II: The Legal Status of UMSs	21
<i>A. UMS Status Alternatives</i>	<i>22</i>
<i>B. Legal Status Determination</i>	<i>30</i>
<i>C. Final Conclusions</i>	<i>60</i>
Part III: Weaponization Issues Related to UMSs	65
<i>A. What makes UMSs different from Other Weapons?</i>	<i>66</i>
<i>B. Legal Issues Related to Weaponized UMSs</i>	<i>70</i>
<i>C. Conclusions</i>	<i>80</i>
Appendix I: Glossary	81
Appendix II: NAVSAC	83
Appendix III: Workshop Participants	85

Introduction

"I cannot conceive of any use that the fleet will ever have for aircraft. The Navy doesn't need airplanes. Aviation is just a lot of noise."

- Admiral William S. Benson
Chief of Naval Operations
05/11/1915 – 09/25/1919

Admiral Benson, the first Chief of Naval Operations, led the U.S. Navy's rapid expansion during World War I, oversaw the operations of more than a half million sailors and two thousand ships, took the lead in countering German submarine warfare, and managed the successful waterborne transport of millions of members of the American Expeditionary Force to France during the course of that conflict. Yet despite his heroic role in that contest and the obvious competence and skill he possessed, he was unable to change his paradigm regarding the future of naval war-fighting; specifically, his understanding about the vital role naval aviation would play in all future maritime conflicts.

A similar paradigm shift is necessary in the coming years regarding the role of unmanned maritime systems (UMS) in future combat operations. To some extent, such a conceptual shift is already underway, as the U.S. Navy, as well as many other navies throughout the world, already employ unmanned systems to perform the "dirty, dull, and dangerous" missions for

which traditional manned systems may not be best suited or employed.¹ The role of unmanned systems is continuing to grow, not just in terms of total number of systems being employed worldwide, but also in the level of complexity of the missions they are conducting. In the not-too-distant future, fully autonomous maritime systems may engage in the full spectrum of naval activities, up to and including detection and engagement of hostile forces.

Developing such advanced systems (“seabots”, as some call them) presents obvious challenges to the engineers (“technologists”) tasked with their design and construction. But they also raise a number of legal issues that have not been comprehensively addressed. To identify and explore such issues, the International Law Department at the U.S. Naval War College brought together 25 technologists and leading international law scholars from the United States, England, Germany, and Canada for a 2-day workshop (20-21 March 2012). This monograph reflects and expands upon the discussions and conclusions reached at the workshop.

Following introductory remarks by Professor Robert C. Rubel, Dean of the Center for Naval Warfare Studies, day one of the workshop began with two presentations by technologists regarding the current state of unmanned system technology, and the technological developments they foresee in the future. The purpose behind these presentations was to ensure that all workshop participants were using common terminology and had a common factual understanding of the legal issues. The two technical presenters were Captain Paul Siegrist, U.S. Navy, Special Assistant to the Director of the ISR Capabilities Division (N2N6F2); and Mr. Thomas Choinski, Deputy Director for Undersea Warfare, Naval Undersea Warfare Center.

Once the technical presentations were complete, a discussion of the legal issues began, and occupied the remainder of the first day of the workshop. Four issue categories (“topics”) had been identified prior to the workshop, and a leading legal practitioner was “assigned” to each topic to make a short presentation regarding the issues, and then to foster a free-flowing group discussion of those issues. The four topics of discussion are set out below:

Topic 1 – Status of Unmanned Maritime Systems (e.g. Are they “vessels?” Are they mines? Does the status depend on where, how, and in what

1. For example, the LA Times reported on July 11, 2012, that the U.S. Navy was “rushing” dozens of unmanned underwater craft to the Persian Gulf to engage in mine-clearing operations in the event of a crisis with Iran that might threaten passage through the Straits of Hormuz. *U.S. Deploys Sea Drones to Persian Gulf to Clear Iranian Mines*, LOS ANGELES TIMES, July 11, 2012.

manner they operate (e.g. independently propelled, tethered, or immobile)? What is the consequence of the status determination (e.g. sovereign immunity, applicability of various legal regimes)? Discussion leader: Dr. Myron H. Nordquist, Professor, Center for Oceans Law and Policy, University of Virginia.

Topic 2 – Rules of the Road issues related to unmanned maritime systems (e.g. How do the navigational rules of the road impact UMSs, both in the design and the operations realms)? Discussion leader: Captain J. Ashley Roach, JAGC, U.S. Navy (Ret.).

Topic 3 – Maritime Zone Issues related to Unmanned Maritime Systems (e.g. What legal issues are raised by the operation of UMSs in various maritime zones? Examples of issues include where they can lawfully go; in what mode they are supposed to be operated; whether or not particular doctrines such as innocent passage and constructive presence apply; varying interpretation of the law (e.g. prior notice for innocent passage; extent of freedom of navigation)). Discussion leader: Craig H. Allen, Judson Falknor Professor of Law and of Marine Affairs, University of Washington.

Topic 4 – Law of Armed Conflict Issues related to Unmanned Maritime Systems (e.g. To what extent may UUVs be armed, and what level of operational control in the use of their armaments is necessary to comply with LOAC? How far down the “kill chain” can we allow autonomous decision-making to occur? Are there LOAC issues unique to UMSs that do not exist with UAVs)? Discussion leader: Professor Dr. Wolff Heintschel von Heinegg, Vice-President, Europa-Universität Viadrina, Frankfurt (Oder), Germany.²

On day 2 of the workshop the participants analyzed the legal issues raised in two scenarios involving unmanned maritime systems. The first simply involved transit by USVs and UUVs through various maritime zones; the second involved both transit and combat operations in different maritime zones.

This monograph captures and reflects the substance of the discussion during this two-day workshop. It will begin with a glossary of terms to ensure that the issues associated with use and employment of UMSs will not be clouded by inconsistent understandings of key terminology. Following the clarification of key terms Part I discusses the current and projected capabilities of unmanned maritime systems. Part II examines the status of unmanned

2. Current Charles H. Stockton Professor of International Law at the U.S. Naval War College.

systems and the consequences of that status determination. The final Part contains a discussion of issues raised by the weaponization of unmanned maritime systems. Appendix 1 includes a biography of the workshop participants. Appendix II is the text of the Navy Safety Advisory Council Resolution 11-02 (recommendations to the Coast Guard for changes to the navigational rules to accommodate UMSs).

It is worth keeping several key points in mind while reading the monograph. First of all, the workshop was designed to identify and robustly discuss the central issues associated with these systems, but not necessarily to resolve them. Similarly, this monograph in many instances does not purport to provide answers; but rather intends to reflect the main points discussed and leave to future scholars and policymakers the task of resolving some of the pressing issues that exist.

Secondly, though there was robust international participation in the workshop, most of the attendees were from the U.S., and the perspective of this monograph will be predominantly that of the U.S. This should not significantly reduce the utility of this monograph for practitioners in other States, however, as, again, its main purpose is to identify and discuss the issues, not resolve them.

This workshop would not have been possible without the generous financial support of the Naval War College Foundation and Roger Williams University School of Law.

I

Current and Future Capabilities

The initial presentations at the workshop examined the U.S. Navy's doctrine with regard to the development and acquisition of unmanned maritime systems (unmanned undersea vehicles (UUVs) and unmanned surface vehicles (USVs)), as well as the systems currently existing or reasonably projected for the future. It should be noted at this point that unmanned aerial vehicles (UAVs) in the maritime realm, though not technically unmanned maritime systems (UMSs), were also discussed at the workshop; however, as the challenges presented by maritime UAVs do not greatly differ from those associated with non-maritime UAVs (extensively utilized in Afghanistan and elsewhere), UMSs were not a major focus of the workshop discussion.

The U.S. doctrine related to UMSs comes from three principal sources: The Unmanned Systems Integrated Roadmap FY2011-2036; The Navy Unmanned Undersea Vehicle Master Plan (2004); and The Navy Unmanned Surface Vehicle Master Plan (2007). The latter two in particular will be discussed in some detail below. It is important to note, however, that despite being the most recent and comprehensive public doctrine in their respective subject areas, the Navy Unmanned Undersea Vehicle Master Plan and The Navy Unmanned Surface Vehicle Master Plan are to some extent outdated, and not necessarily reflective of the latest Navy thinking.

The chart below depicts mission areas and current/projected UUV and USV systems:

Unmanned Maritime Systems		
Mission Areas	Unmanned Surface Vehicles (USV)	Unmanned Underwater Vehicles (UUV)
Mine Counter-Measures (MCM)	Mine Countermeasure (MCM) USV  Remote Mine-hunting System (RMS) AN/WLD-1 	Surface Mine Countermeasure (SMCM) User Operational Evaluation -System Increment 1 -System Increment 2  Battlespace Prep Autonomous Undersea Vehicle (BPAUV)  Surface Mine Countermeasure (SMCM) UUV 
Anti-Submarine Warfare (ASW)	ASW USV 	Sea Stalker  Sea Maverick  Semi-Autonomous Hydrographic Recon Vehicle  Mk18 Mod1 Swordfish UUV Sys Mk18 Mod 2 Kingfish UUV Sys Hull Underwater Vehicle / Hull Underwater Localization Sys (HULS)  Littoral Battlespace Sensing AUV Littoral Battlespace Sensing Glider  ECHO Ranger 
Maritime Security <ul style="list-style-type: none"> • ISR • Port Surveillance • Special Operations Forces (SOF) Support • Electronic Warfare 	SeaFox  Modular Unmanned Scouting Craft Littoral (MUSCL) Use Operational Evaluation 	

Source: The Unmanned Systems Integrated Roadmap FY2011-2036, p. 26: Approved for Open Publication, Reference Number: 11-S-3613.

These UUV and USV systems are designed to effectuate the Navy’s intent “to produce a family of capable, effective, and interoperable unmanned systems that integrate with manned platforms and ships to provide situational awareness and warfighting advantage to commanders at all levels.”¹ Unmanned systems are increasingly attractive to war-fighters for three distinct reasons: (1) Endurance – they can remain on station unfettered by crew and platform limitations; (2) Far Forward - they can expand the area of operations into those areas inaccessible or hazardous to manned platforms; and (3) Complementarity – they can augment manned platforms to fill capacity gaps and reduce costs.

1. Remarks of Captain Paul Siegrist, U.S. Navy, Special Assistant to the Director of the ISR Capabilities Division (N2N6F2), Unmanned System Workshop, March 20, 2012.

A. UUVs

UUV usage by the U.S. Navy is nothing new; such systems have been used for relatively low-tech purposes for decades. For example, mobile target UUVs that move along a pre-programmed route and emit noise for training purposes are commonly employed in the fleet. One such type, the MK 39 EMATT (Expendable Mobile Anti-Submarine Training Target) is shown below:



Source: ASW Mobile Training Targets Tri-Fold, UUV Center of Excellence, Naval Undersea Warfare Center, Newport, Rhode Island. Approved for Public Release.

UUVs have also been in commercial service for decades. For example, companies have long employed large UUVs to lay submarine cable. However, in recent years there has been an exponential expansion in UUV use, particularly small ones, in both the military and the commercial sectors. Another significant recent development has been the advancement in technology pertaining to larger UUVs, which will permit the creation and deployment of systems with increasing endurance, range, payload, and overall capabilities.

The UUV master plan recommends the development of four UUV classes by the Navy. From smallest to largest, these are:

- The *Man-Portable* class, which includes vehicles from about 25 to 100 pounds displacement, with an endurance of 10 - 20 hours. There is no specific hull shape for this class.
- The *Light Weight Vehicle (LWV)* class, which is nominally 12.75 inches in diameter and displaces about 500 pounds. The payload of these vehicles will increase 6- to 12-fold over the man-portable class; and endurance is doubled.
- The *Heavy Weight Vehicle (HWV)* class, which is 21 inches in diameter and displaces about 3000 pounds. This class provides another factor-of-two improvement in capability, and includes submarine compatible vehicles.
- The *Large Vehicle* class will be approximately 10 long-tons displacement and compatible with both surface ship (Littoral Combat Ship (LCS)) and submarine (SSNs with hanger or “plug,” and SSGN) use.

These four classes are summarized in the chart below:

Class	Diameter (inches)	Displacement (lbs.)	Endurance High Hotel Load (hours)	Endurance Low Hotel Load (hours)	Payload (ft ³)
Man-Portable	3 - 9	< 100	< 10	10 - 20	< 0.25
LWV	12.75	~ 500	10 - 20	20 - 40	1 - 3
HWV	21	< 3,000	20 - 50	40 - 80	4 - 6
Large	> 36	~ 20,000	100 - 300	>> 400	15 - 30 + External Stores

Source: Department of the Navy, "The Navy Unmanned Undersea Vehicle (UUV) Master Plan," U.S. Navy Web site, November 2004 [Online], Available: <https://www.navy.mil>. p. 67.

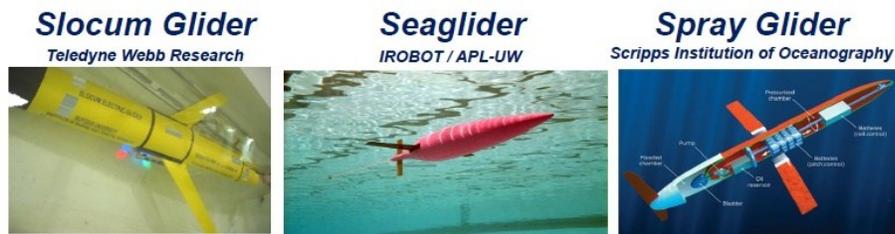
The Navy has examples of each class either in service or in development. For example, a large diameter UUV currently in development at the Office of Naval Research will be capable of autonomously operating for more than 60 days in the littoral zone. It will not carry a kinetic payload, but will have sensors capable of gathering data both above and below the water to further missions such as anti-submarine warfare and mine counter-measures. Also, the DARPA ACTUV (ACTUV stands for ASW continuous trail unmanned vehicle) is a large unmanned vehicle that is currently in source selection. This system will be optimized for continuous overt trail of quiet diesel-electric submarines, and will have the capacity to operate at 27 knots maximum speed with a 3,000 km on station mission radius (unfueled) with a 30 day liter capability, followed by a 30 day maximum energy trail mission (un-refueled).² The UUV Master Plan identifies nine missions for UUVs, in priority order. These missions are:

- (1) Intelligence, Surveillance, and Reconnaissance (ISR);
- (2) Mine Countermeasures;
- (3) Anti-Submarine Warfare;

2. ACTUV ASW Continuous Trail Unmanned Vessel Industry Day Briefing, Rob McHenry, DARPA, 16 February 2010, DARPA-BAA-10-43@darpa.mil, Distribution Statement A: Approved for Public Release: Distribution Unlimited. DISTAR Cases 14990 & 15051, p. 5.

- (4) Inspection/Identification (e.g. performing a rapid search function with object investigation and localization in confined areas such as ship hulls, in and around pier pilings, and the bottoms of berthing areas) ;
- (5) Oceanography;
- (6) Communication/Navigation Network Node (e.g. providing networked connectivity across multiple platforms and the ability to provide navigation aids on demand);
- (7) Payload Delivery (“payload” meaning supplies, etc., in support of other missions);
- (8) Information Operations; and
- (9) Time Critical Strike (i.e. kinetic strike capability).

UUVs, due to the submerged nature of their operation, have to be more autonomous than air or surface vehicles. Communications – whether command and control data to UUVs, or status from UUVs – are much more difficult through the water than on the surface or in the air. As a result, one may not know where UUVs are for an extended period of time.



Examples of commercial, scientific and academic UUV gliders. Source: Ken Grembowicz, Ocean Sciences Division, NAVOCEANO, 2011 European Glider Observatory (EGO) Meeting, <http://ego2011.eu/doc/PDF-EGO/Thursday%2017th/EGO%202011%20%20Kenneth%20Grembowics.pdf>, p. 6.

B. USVs

USV doctrine and system development is not as advanced as in the UAV or UUV communities. However, USVs have been deployed in the fleet, and the USV Master Plan does provide a roadmap for further developments in this arena.

According to the master plan, 5 USV craft types are envisioned that will serve in one of four vessel classes to accomplish one or more of seven priority missions. The vessel types are:

- (1) Semi-submersible Craft;
- (2) Conventional Planing Hull Craft;
- (3) Semi-planing Hull Craft;
- (4) Hydrofoils; and
- (5) Other Craft types

According to the technologists at the workshop, there are efficiencies that can be gained from hull design. However, advanced technology systems and demonstrations developed over the last decade have leveraged existing hull designs to experiment with a variety of mission modules. USVs in the U.S. Navy have been tested with some of the following capabilities, either alone or in some combination with each other:

- Force protection package (with a bushmaster gun);
- ASW package (using an off-the-shelf dipping sonar);
- Anti-surface warfare (ASUW package); and/or
- Intelligence, Surveillance, Reconnaissance (ISR) package.

The seven missions identified in the USV Master Plan, in priority order, are:

- (1) Mine Countermeasures (MCM);
- (2) Anti-Submarine Warfare (ASW);
- (3) Maritime Security (MS);
- (4) Surface Warfare (SUW);
- (5) Special Operations Forces (SOF) Support;
- (6) Electronic Warfare (EW); and
- (7) Maritime Interdiction Operations (MIO) Support.

The four envisioned USV vessel classes are:

- (1) The “X-Class” is a small, non-standard class of systems capable of supporting special operations forces requirements and MIO missions. It provides a “low-end” ISR capability to support manned operations and is launched from small manned craft such as the 11m Rigid Inflatable Boat (RIB) or the Combat Rubber Raiding Craft (CRRC);

- (2) The “Harbor Class” is based on the Navy Standard 7m RIB and is focused on the MS Mission, with a robust ISR capability and a mix of lethal and non-lethal armament. The “Harbor Class” USV can be supported by the majority of our Fleet, since it will use the standard 7m interfaces;
- (3) The “Snorkeler Class” is a ~7m semi-submersible vehicle (SSV) which supports MCM towing (search) missions. ASW (Maritime Shield) and is also capable of supporting special missions that can take advantage of its relatively stealthy profile; and
- (4) The “Fleet Class” will be a purpose-built USV, consistent with the handling equipment and weight limitations of the current 11m RIB. Variants of the Fleet Class will support MCM Sweep, Protected Passage ASW, and “high-end” Surface Warfare missions.

Images of USVs currently undergoing R & D/systems analysis by the U.S. Navy appear below.³



Mine Countermeasure (MCM) USV



Seafox Maritime Security USV



Anti-Submarine Warfare (ASW) USV

C. UAVs

As previously discussed, Navy-operated UAVs are technically not UMSs, and thus were not a significant focus of the workshop. However, the Navy does operate several classes of UAVs, and their use will expand in coming years. UAVs currently in U.S. naval service include:

- (1) Fire Scout. This system is deployed aboard surface ships and in land theatres of operations (e.g. Afghanistan). Unlike other armed

3. The Unmanned Systems Integrated Roadmap FY2011-2036, p. 26: Approved for Open Publication, Reference Number: 11-S-3613, available at <http://www.usnwc.edu/getattachment/4e2b8777-63dd-4bdc-b166-cd19c24dd0de/Excerpts-from-UUV-and-USV-master-plans.aspx>

force counterparts, this system takes off and lands autonomously (i.e. not under the control of a person with a joy stick).



Source: http://www.navy.mil/view_image.asp?id=108110

- (2) Scan Eagle. This platform has over 170,000 flight hours supporting deployed forces. Capabilities include identification of surface vessels; maritime domain awareness; surveillance of known smuggling and piracy areas; persistent coverage for counter-insurgency operations; route survey support; strike support; surveillance and protection of high value infrastructure; and battle damage assessment.



Source: http://www.navy.mil/view_image.asp?id=123606

- (3) BAMS-D (Broad Area Maritime Surveillance demonstrator). This system is designed to provide land-based maritime surveillance. Though related to the Global Hawk UAV, the platform and sensors are modified to take into account different requirements and the harsher maritime operating environment. Though it is only a demonstration program, its success is reflected by the fact that as of March 2012 it was in the 32nd month of a six month deployment in the CENTCOM AOR.



Source: <http://www.af.mil/shared/media/photodb/photos/090126-F-5471A-138.jpg>

- (4) UCAS-D (Unmanned Carrier Air Surveillance demonstrator). This is a carrier-based UAS that had its first carrier landing with a surrogate F/A-18 on July 2011, and its first wheels-up flight Oct 2011.



Source: http://www.navy.mil/view_image.asp?id=141119

The Navy plans to increase development and deployment of UAVs over the course of the next ten years.

This increase mirrors recent trends within the Department of Defense (DoD). Between 2000 and 2008, the number of unmanned aerial systems in the DoD inventory jumped from under fifty to over six thousand. By March 2010, the number had increased to over seven thousand. In the fiscal year 2009, UAS conducted over 450,000 flight hours; the number of hours in 2010 was expected to exceed 550,000.⁴

4. Raul A. Pedrozo, *Use of Unmanned Systems to Combat Terrorism*, in U.S. NAVAL WAR COLLEGE INTERNATIONAL LAW STUDIES, vol. 87, Raul A. Pedrozo and Daria P. Wollschlaeger, eds., (Newport: U.S. Naval War College, 2011), 217.

D. Some Final Points with Respect to UMS Technology

First of all, in current Navy doctrine, UMSs are envisioned as supporting, not supplanting, war-fighters and systems in the air, surface, and sub-surface realms.

Secondly, it is important to understand that there are varying degrees of “independence” that are encompassed within the term “autonomy.” The range of autonomous operations includes the following: a device moving along a pre-programmed routing path (e.g. the MK 39 EMATT); one engaging in waypoint navigation autonomy (i.e. following a pre-programmed path unless the operator intercedes and changes it); a semi-autonomous operation, including taking in sensor data and making decisions (e.g. maneuvering to avoid collisions) in response; and full-scale autonomy with a weaponized UMS (this would include mission decisions from identification to classification to firing, based on programmed parameters), and at the extreme end of the “autonomous” spectrum are systems with programmed ethics. The issue of degree of autonomous operation will become particularly critical in the discussion of law of armed conflict issues relating to weaponized UMSs in Part III of this document.

Finally, for the foreseeable future, U.S. policy is to maintain a man in the loop with regard to utilization of weapons from or by a UMS. As stated in the DoD Roadmap,

“For a significant period into the future, the decision to pull the trigger or launch a missile from an unmanned system will not be fully automated, but it will remain under the full control of a human operator. Many aspects of the firing sequence will be fully automated but the decision to fire will not likely be fully automated until legal, rules of engagement, and safety concerns have all been thoroughly examined and resolved.”⁵

E. Illustration of the Issues

The italicized language in the phase I solicitation request for the Anti-Submarine Warfare (ASW) Continuous Trail Unmanned Vessel (ACTUV) program (excerpts quoted below) illustrates some of the technological devel-

5. U.S. Department of Defense, FY2009–2034 Roadmap, 24

opments that will occur in the near term as such systems are increasingly developed and deployed:

“[The ACTUV program] seeks to develop and demonstrate an independently deploying unmanned surface vessel optimized to provide continuous overt trail of threat submarines. The program is architected to achieve three primary objectives. The first program objective is to design, build, and demonstrate an X-ship based on clean sheet design approaches founded on the assumption that *no person steps aboard at any point in its operating cycle*, enabling beyond state-of-the-art platform performance characteristics. The second program objective is to demonstrate the technical viability of an *independently deploying unmanned naval vessel under sparse remote supervisory control* to enable a new class of maritime system. The third program objective is to leverage the unique platform performance and unmanned system characteristics of ACTUV, combined with a novel suite of sensors capable of robustly tracking quiet modern diesel electric submarines, to demonstrate a game changing ASW operational capability and to facilitate rapid transition of that capability to the Navy in response to critical operational demands.”

"A key program focus will be on the ability of the system to *demonstrate safe navigation at sea within the framework of maritime law and the International Regulations for Preventing Collisions at Sea (COLREGs)*. Additionally, the system will need to *autonomously employ its sensor suite consistent with situational awareness and mission objectives, and implement appropriate tactics in response* to both target behaviors and environmental factors."⁶

Some of the legal issues raised by the capabilities sought in this solicitation are as follows:

- How, and to what extent, do the COLREGs apply to unmanned systems? If they do apply, do they do so in their entirety, or are unmanned systems treated differently?
- What other maritime law would apply to such systems?
- Would such a system qualify as a warship; and if so, would that exempt it wholly or partially from compliance with COLREGs or other maritime law?

6. https://www.fbo.gov/index?s=opportunity&mode=form&id=082477444105052ba6724bad1fc0ac69&tab=core&_cview=1 (emphasis added):

- How, if at all, would an essentially fully autonomous system like ACTUV comply with legal requirements, such as the law of war, while it “autonomously employ(s) its sensor suite consistent with situational awareness and mission objectives, and implement(s) appropriate tactics in response to both target behaviors and environmental factors?”

The following sections will examine these and other issues raised by the use and employment of unmanned maritime systems.

II

The Legal Status of Unmanned Maritime Systems (UMSs)

The legal status of UMSs is currently unclear both under international law and in U.S. doctrine. This situation contrasts with UAVs, whose status, at least under U.S. doctrine, has been resolved.¹ In particular, there is not yet resolution on two key issues: can such systems be considered “ships” (“vessels”)²; and if so, which UMSs further qualify as warships – a term of art which carries with it legal significance?

This section discusses the various UMS status alternatives and the legal ramifications of each potential status determination. Recommendations will be made as to what factors might be taken into consideration when deciding whether all or some UMSs should be accorded the status of a “ship/vessel.”

-
1. There are two main questions in relation to the status of UAVs: (1) Are unmanned aircraft and remotely piloted vehicles “aircraft”?; and (2) If so, are they “military aircraft,” a term of art in international law that carries with it both obligations and rights? These issues have been resolved under U.S. doctrine. Per DOD Directive 4540.1, Use of International Airspace by U.S. Military Aircraft and for Missile/Projectile Firings (2007), all DOD manned and unmanned aircraft and remotely piloted vehicles are considered to be “military aircraft.” Thus, in one fell swoop, DOD answered both questions with respect to UAVs in the affirmative. With regard to the first question of whether or not unmanned aircraft and remotely piloted vehicles can be considered “aircraft” – UK doctrine reaches the same conclusion, referring to UAVs as “unmanned aircraft.” Joint Doctrine Note 3/10, “Unmanned Aircraft Systems: Terminology, Definitions and Classification,” May 2010.
 2. As will be established, the terms “ship” and “vessel” are essentially interchangeable.

*A. UMS Status Alternatives*³

U.S. Navy doctrine currently refers to UMSs as “craft.”⁴ The NWP and other Navy doctrine do not define what constitutes a “craft,” nor is it a term of art under international law. It is entirely possible that the use of the term “craft” is a deliberate effort to avoid a more precise status determination regarding UMSs. Such circumvention, however, leaves unanswered many important issues that are tied to a resolution of the status question. These issues include the extent to which, if at all, a UMS is entitled to exercise certain navigational rights; its entitlement to certain immunities; its eligibility to carry out certain important maritime functions; the extent to which it is subject to other international maritime legal regimes; and its entitlement to exercise belligerent rights.

To the extent that it is desirable to more precisely define UMSs’ status, the fault lines lie in the following areas:

1. Should UMSs be considered as independent entities, or as adjuncts or components of their deploying platform?
2. Which, if any, UMSs can be considered “vessels” or “ships,” and which, if any, cannot (in which case they must be considered something else, such as “devices” or “objects”).
3. For those UMSs that can be considered “vessels” or “ships,” which, if any, can further be considered “warships?”
4. For weaponized UMSs, which can be considered “launch or delivery platforms” for delivering weapons, and which can be considered “weapons or weapon systems” in and of themselves?

The latter question will be discussed in Part III of this monograph on the Weaponization Issues Related to UMSs. Questions 1-3 will be addressed in turn in the current section. The legal ramifications of the status determination will be examined in section B of this part.

3. Recall the definitions of, among other things, unmanned maritime systems, unmanned underwater vehicles, and unmanned surface vehicles in the Glossary.

4. Commander’s Handbook on the Law of Naval Operations, NWP 1-14M (2007), section 2.3.6.

1. Should UMSs be considered as independent entities, or as adjuncts or components of their deploying platform?

A threshold issue in examining the legal issues associated with UMSs is whether the UMS is to be considered as a distinct entity, with a separate and independent controlling legal regime, or as an adjunct or component of its deploying platform. It is entirely possible that some UMSs – those deployed by a warship for force protection and navigational safety purposes during passage through a narrow channel, for example – could properly be considered as an adjunct or component of the warship.⁵ As such, it may not be necessary to resolve many of the issues discussed below. For example, consider a UMS deployed by a warship engaged in transit passage. In such a scenario, it may not be necessary to resolve the issue of whether or not the UMS is a vessel possessing an independent right of transit passage; as long as the UMS can properly be considered an adjunct or component of the warship, the legal analysis would simply be whether the warship, while engaged in transit passage, is legally entitled to deploy such a system.⁶

U.S. Navy doctrine, however, does not consider UMSs to be adjuncts or components of their deploying platform (if any).⁷ According to the U.S. doctrine, “USVs and UUVs retain *independent navigation rights* and may be deployed by larger vessels *as long as their employment complies with the [applicable] navigational regime . . .*”⁸ Though not entirely clear, a reasonable understanding of some missing components of this doctrinal statement leads to this restatement: “USVs and UUVs retain independent navigation rights and may be deployed by larger vessels as long as their employment [by the larger vessel] complies with the applicable navigational regime [in which the larger vessel is engaged at the time of the deployment].” The only logical understanding of how the two italicized clauses can be read conjunctively is that the second clause is not a restriction on the UMS’s right of navigation – which, after all, is independent of that of the deploying unit – but rather a limitation on the deploying vessel itself. If the deploying unit employs the UMS in violation of the navigational regime in which it is engaged, the de-

5. For an analysis of this approach, see Jane G. Dalton, *Future Navies-Present Issues*, NAVAL WAR COLLEGE REVIEW, Winter 2006, Vol. 59, No. 1.

6. The law related to transit passage is discussed in more detail in section B.1.b. below.

7. Some UMSs may be deployed directly from shore sites.

8. NWP section 2.5.2.5 (emphasis added).

ploying unit may face possible consequences for its violation. The UMS, however, once deployed, has an independent entitlement to utilize all applicable navigational regimes; and as long as it complies with all relevant requirements for use of the regime(s), it is entitled to do so unaffected by any issues or consequences the deploying unit may face.

The analysis that follows is based upon an assumption that, in accordance with U.S. Navy doctrine, UMSs are separate entities, with a controlling legal regime that is separate and independent from that of its deploying platform.

2. Which, if any, UMSs can be considered “vessels” or “ships,” and which, if any, cannot (in which case they must be considered something else, such as “devices” or “objects”).

Whether a UMS can be considered a “vessel” or “ship” is a determination of legal significance, as craft that so qualify have certain entitlements that will be discussed in section B of this part. There is nothing in international law indicating that a UMS cannot be considered a “vessel” or a “ship.” On the other hand, there is also nothing that says they can, or must, be so considered, either. Resolution of the issue is of key significance to UMSs; but unfortunately, there are a number of complications that make this determination extremely difficult.

The terms “ship” and “vessel” appear to be synonymous in international law. For example, the 1982 U.N. Convention on the Law of the Sea (UNCLOS)⁹, although it does not define either term, uses them interchangeably. Furthermore, the International Convention for the Prevention of Pollution from Ships, 1973, as Modified by the Protocol of 1978 (MARPOL), which was negotiated under the auspices of International Maritime Organization (IMO), defines “ship” to mean “a vessel of any type whatsoever operating in the marine environment and includes hydrofoil boats, air-cushion vehicles, submersibles, floating craft and fixed or floating platforms.” The fact that the IMO, the United Nations specialized agency with responsibility for the safety and security of shipping and the prevention of marine pollution by

9. Although the United States is not a party to UNCLOS, it considers the navigation and overflight provisions therein to be reflective of customary international law, and thus acts in accordance with them, with the exception of the deep seabed mining provisions. NWP 1-14M, section 1.2. Where, in this document, UNCLOS is cited, that is shorthand for saying “customary international law, as reflected in [that section of UNCLOS]”

ships, defines one term by reference to the other supports the notion that, under international law, the two terms are essentially synonymous. They will be treated as such in this monograph.

Unfortunately, very few international conventions purport to define what a “ship” or “vessel” is; and the few that do so define the term differently than does MARPOL. For example, the Convention on the International Regulations for Preventing Collisions at Sea (1972) defines “vessel” in Rule 3 as “every description of water craft, including non-displacement craft and seaplanes, used or capable of being used as a means of transportation on water.” This very closely mirrors the definition of “vessel” in U. S. law, which includes “every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water,”¹⁰ but differs significantly from the definition of “ship” in MARPOL, set out in the preceding paragraph. In stark contrast to these definitions is that in the Convention on Registration of Ships, which defines “ship” to mean “any self-propelled sea-going vessel used in international seaborne trade for the transport of goods, passengers, or both with the exception of vessels of less than 500 gross registered tons.”¹¹

There is a school of thought that this definitional void and lack of consistency is far from lamentable; that, in fact, a single definition of “ship” or “vessel” is both undesirable and unworkable in view of the wide variety of watercraft and the functions they serve, and also the wide variety of regulatory contexts in which those terms are used.¹² Instead of a universal definition,

10. 1 U.S.C. 3. A watercraft or other artificial contrivance serves as a “means of transportation” when it transports, among other things, people, freight, or cargo from place to place. *Stewart v. Dutra Constr. Co.*, 543 U.S. 481, 493 (2005). Factors to consider in determining whether something is “used or capable of being used” as a means of transportation are ; (1) whether the craft is surrounded by a cofferdam, land or other structure, such that although floating, it is in a “moat” with no practical access to navigable water; (2) whether the craft is affixed to the shore by steel cables, I-beams or pilings, or coupled with land based utility connections for power, water, sewage and fuel; (3) whether the craft, if operated in navigation, would be thereby endangered because of its construction; (4) the purpose, function, or mission of the craft; and (5) whether the craft could get underway in less than eight (8) hours. 74 Fed. Reg. 21,814, 21,815 (April 24, 2009).

11. United Nations Convention on Conditions for Registration of Ships (1986), Article 2 (never entered into force).

12. For an excellent summary of the various viewpoints on the need or desirability of a single definition of “ship” or “vessel,” see John E. Noyes, *Interpreting the 1982 Law of the Sea Convention and Defining Its Terms*, in *Definitions for the Law of the Sea* 45, 55-61 [the specific pages on ships] (George K. Walker ed., 2012).

proponents of this viewpoint have proposed examination of a number of factors that should be considered on a case-by-case basis to determine if a particular system is a vessel or not. Such an approach might make sense in the UMS context, where there is such a great variety of systems in terms of appearance, size, mission, degree of autonomous operation, etc. See section C. below for a discussion of factors that might be of relevance in making the ship/vessel versus device/object determination.

While international law does not explicitly prohibit treating a UMS as a “vessel” or “ship,” the law is clearly designed with manned systems in mind. Take UNCLOS Article 94, for example. That article provides, in relevant part, that “[e]very State shall effectively exercise its jurisdiction and control in administrative, technical and social matters over ships flying its flag.” This includes taking “measures for ships flying its flag” relating to vessel construction, equipment, seaworthiness, manning, crew training, effective communications, and the like “as are necessary to ensure safety at sea.” These measures

“shall include those necessary to ensure (1) that each ship is in the charge of a master and officers who possess appropriate qualifications, in particular in seamanship, navigation, communications and marine engineering, and that the crew is appropriate in qualification and numbers for the type, size, machinery and equipment of the ship; and (2) that the master, officers and, to the extent appropriate, the crew are fully conversant with and required to observe the applicable international regulations concerning the safety of life at sea, the prevention of collisions, the prevention, reduction and control of marine pollution, and the maintenance of communications by radio.”¹³

As should be evident, Article 94 poses a number of challenges to UMSs being considered ships. How can an unmanned system be in the charge of a master and officers, much less those with appropriate qualifications and training? How can it satisfy the crew requirement if it does not have a crew (though it could be argued that a crew of zero is “appropriate . . . in numbers” to a maritime system that possesses sufficient sensors and control mechanisms to “ensure safety at sea”)? Governments operating such systems, even for non-commercial purposes, would not be able to avoid Article 94’s requirements; the reference to “applicable international regulations” implies that multilateral maritime conventions such as SOLAS (discussed in detail in

13. UNCLOS Article 94 4(b) and (c).

section B.4. below) would apply, and they do not exempt government non-commercial vessels (though they might exempt warships).

In short, calling UMSs “vessels” or “ships” is not without its difficulties. Changes in the law may be required, or expansive interpretations of certain existing legal provisions will have to occur in order for unmanned maritime systems to be deemed in compliance with laws and regulations applicable to vessels. For instance, Article 94’s “master and officers” requirement might be satisfied by someone not physically aboard the vessel, but by someone remotely controlling it. As will be seen in the next section, there is some precedent in the UAV realm for such expansive readings of the law. If applied to UMSs, a similar method of interpretation could possibly overcome the legal obstacles to calling UMSs “vessels” or “ships”.

3. For those UMSs that can be considered “vessels” or “ships,” which, if any, can further be considered “warships?”

Warships are a special subclass of government ships operated for noncommercial purposes, which are themselves a category of ships.¹⁴ For the purposes of this publication, it is assumed that all U.S. government-operated UMSs that rise to the level of “ship” will, at a minimum, qualify for treatment as a government ship operated for noncommercial purposes. The question addressed here is whether some of these government ships further qualify as a warship.

UNCLOS, in Article 29, defines a “warship” as: “a ship belonging to the armed forces of a State bearing the external marks distinguishing such ships of its nationality, under the command of an officer duly commissioned by the government of the State and whose name appears in the appropriate service list or its equivalent, and manned by a crew which is under regular armed forces discipline.” Under U.S. doctrine, Navy ships designated “USS” and all U.S. Coast Guard vessels designated “USCGC” under the command of a commissioned officer are “warships” under international law (certain cutters under the command of senior enlisted members would not qualify).¹⁵ Other naval craft, including auxiliary vessels, military sealift command vessels, and small craft in the Navy’s inventory, including UMSs, are not currently classified as warships.

14. Bernard H. Oxman, *The Regime of Warships Under the United Nations Convention in the Law of the Sea*, 24 VIRGINIA JOURNAL OF INTERNATIONAL LAW 4 (1984), 813.

15. NWP 1-14M section 2.2.1.

At first glance, it would appear that a UMS could never qualify as a warship since, among other issues, it would not have a crew. However, there is precedent with analogous aircraft systems that might provide the way forward in dealing with some of the problematic components for UMSs in the definition of warship.

By doctrine, as we have seen, the U.S. has designated all DOD-operated UAVs as “military aircraft.”¹⁶ Under customary international law, a “military aircraft” means any aircraft (1) operated by the armed forces of a State; (2) bearing the military markings of that State; (3) commanded by a member of the armed forces, and (4) controlled, manned, or preprogrammed by a crew subject to regular armed forces discipline. This definition was examined by a group of experts gathered to provide commentary on the HPCR Manual on International Law Applicable to Air and Missile Warfare.¹⁷ Their analysis of the components of the definition of “military aircraft” is useful as it provided a contemporary example for how to interpret the term “vessel”.

With regard to the stipulation that a military aircraft must be operated by the armed forces of a State, the experts felt that the aircraft need not “belong” to the armed forces; an aircraft leased and operated by the armed forces, though still owned by the lessor, would qualify as a military aircraft.

A military aircraft is required to bear the external markings of its State. These markings serve to both (1) clearly indicate the employment of the aircraft for military purposes, and thus distinguish it from other State aircraft, especially from police or customs aircraft, that are not used for military purposes; and (2) denote the nationality of the aircraft. A single mark may suffice to accomplish both purposes. The crux of the requirement is that there must be a marking. However, there is not a minimum threshold of discernibility; low visibility markings common with military aircraft today are satisfactory.

As for the obligation that a military aircraft must be commanded by a member of the armed forces, the experts opined that that “commander” could either be on the craft itself or controlling it remotely. In other words, as long as a member of the armed forces exercised control over the aircraft, it was immaterial whether s/he was actually aboard the aircraft.

16. Please note discussion in paragraph 1 of this part.

17. Commentary on the HPCR Manual on International Law Applicable to Air and Missile Warfare. 2010, section A.(x) (definition of “military aircraft”).

Finally, the requirement that a military aircraft must be controlled, manned, or preprogrammed by a crew subject to regular armed forces discipline is a modern version of the original rules, which simply mandated that the crew be exclusively military and wear a fixed distinctive emblem making them recognizable as such even if they were separated from their aircraft.¹⁸ According to the experts, “[t]he requirement of a crew under military discipline does not mean that all military aircraft must be manned by a crew. Today, UAVs . . . also qualify as military aircraft, if the persons remotely controlling them are subject to regular armed forces discipline. The same holds true for autonomously operating UAVs, provided that their programming has been executed by individuals subject to regular armed forces control.”

If one were to apply the above interpretations of the law applicable to military aircraft to their maritime analogs – warships, a breakdown of the components found in Article 29’s definition of “warship yields the following conclusions:

- First of all, a warship must be a ship. See the discussion in A.1. above on the issue of what constitutes a ship, and whether a UMS might qualify.
- Second, the ship must belong to the armed forces of a State. In the U.S., this would include all four of the armed forces within DOD, plus the Coast Guard. Any ship “belonging” to any of these five forces could satisfy this requirement. The U.S. does not claim warship status for any leased vessels, and thus it is not necessary to resolve the issue of whether there is a substantive difference between UNCLOS’s “ownership” requirement for warships and the “operate” requirement for military aircraft.¹⁹
- Third, a warship is required to bear external marks indicating its nationality. It seems reasonable to apply the principles mentioned above with regard to military aircraft here. Thus, as long as the external marking denotes the ship’s nationality and military purpose, the level of its discernibility should not matter.

18. Articles 14 & 15, Rules concerning the Control of Wireless Telegraphy in Time of War and Air Warfare. Drafted by a Commission of Jurists, December 1922 - February 1923.

19. CDR Clive Dow, RN, a workshop participant, indicated that, in contrast, the UK Royal Navy does lease a number of vessels, including armed patrol corvettes and hydrographic survey ships, and takes the position that by operating them and complying with all other conditions (command, crew status, markings, etc.), such leased vessels are properly classified as ‘warships.’

- Fourth, a warship has to be under the command of an officer duly commissioned by the government of the State and whose name appears on the appropriate service list. If the aircraft rules hold true with warships, the essence of the requirement here is that someone – specifically, a duly commissioned and listed officer – must actually exercise control over the ship. That person does not have to be physically present aboard the ship to exercise the necessary degree of control.
- Finally, a warship must be manned by a crew which is under regular armed forces discipline. Again, assuming the military aircraft rules hold true here, the “crew” does not have to be physically aboard a warship; the “manning” requirement is met with respect to unmanned ships if the remote controllers or programmers are individuals subject to regular armed forces control.

Assuming the conclusions reached with regard to military aircraft apply equally in the maritime realm, there is no absolute bar to a UMS meeting the “warship” requirements as set out in UNCLOS Article 29.

B. Legal Ramifications of the Status Determination

A UMS’s status has important legal ramifications. Resolution of the vessel/non-vessel/warship issue will determine the extent to which, if at all, a UMS will be: 1) entitled to exercise certain navigational rights; 2) allowed particular immunities; 3) eligible to carry out a number of important maritime functions; 4) subject to other international maritime legal regimes; and 5) entitled to exercise belligerent rights. Each of these will be discussed in turn.

1. Navigational Rights

Three vital navigational regimes available to “ships” will be discussed here: innocent passage, transit passage, and archipelagic sea lane passage. The key question here is whether all, some, or none of the UMSs will be entitled to exercise the navigational rights inherent in each regime. As will be seen, the central issue is whether or not a UMS is a ship, as opposed to an object or device; the warship versus government non-commercial vessel distinction is not of significance to the navigational rights determination.

a. Innocent passage

A coastal state is entitled to declare a territorial sea up to 12 nautical miles in breadth, beginning at its baseline (typically, the low-water line along its shores). The coastal state exercises sovereignty over these waters; its international boundary is the outer edge of the territorial sea, not its shoreline. Innocent passage is a right available to “ships of all States” to navigate within the territorial sea of a coastal state.²⁰ The right of innocent passage is an exception, or limitation, to the otherwise plenary legislative and enforcement jurisdiction a coastal state exercises within its territorial sea. The United States’ understanding of the right of innocent passage under UNCLOS is that “all ships, including warships, regardless of, for example, cargo, armament, means of propulsion, flag, origin, destination, or purpose, enjoy the right of innocent passage.”²¹

Both the terms “passage” and “innocent” are defined in UNCLOS. “Passage” is defined as continuous and expeditious (with certain non-relevant exceptions) navigation through the territorial sea for the purpose of either passing through without entering internal waters, or heading to or from the internal waters of the coastal state.²² The principal significance of “passage” is that ships are not allowed to linger in a coastal state’s territorial sea. Instead, with very limited exceptions, they are required to move continuously and expeditiously through the area.

Passage is “innocent” so long as it is not prejudicial to the peace, good order or security of the coastal State.²³ The following activities are considered to be prejudicial to the peace, good order or security of the coastal State if engaged in in the territorial sea:

- (a) any threat or use of force against the sovereignty, territorial integrity or political independence of the coastal State, or in any other manner in violation of the principles of international law embodied in the Charter of the United Nations;
- (b) any exercise or practice with weapons of any kind;

20. UNCLOS Article 17.

21. Declarations and Understandings of the U.S. Senate Committee on Foreign Relations accompanying its advice and consent to U.S. accession to the United Nations Convention on the Law of the Sea, December 29, 2007, *available at* <http://thomas.loc.gov/cgi-bin/ntquery/z?trtys:103TD00039>.

22. UNCLOS Articles 17 and 18.

23. UNCLOS Article 19.

- (c) any act aimed at collecting information to the prejudice of the defense or security of the coastal State;
- (d) any act of propaganda aimed at affecting the defense or security of the coastal State;
- (e) the launching, landing or taking on board of any aircraft;
- (f) the launching, landing or taking on board of any military device;
- (g) the loading or unloading of any commodity, currency or person contrary to the customs, fiscal, immigration or sanitary laws and regulations of the coastal State;
- (h) any act of willful and serious pollution contrary to UNCLOS;
- (i) any fishing activities;
- (j) the carrying out of research or survey activities;
- (k) any act aimed at interfering with any systems of communication or any other facilities or installations of the coastal State;
- (l) any other activity not having a direct bearing on passage.²⁴

The U.S. considers this to be an exclusive list of activities that are prejudicial to the peace, good order or security of the coastal State.²⁵ The U.S. also takes the position that any determination of non-innocence of passage by a ship must be made on the basis of acts it commits while in the territorial sea, and not on the basis of, for example, cargo, armament, means of propulsion, flag, origin, destination, or purpose.²⁶ Other nations disagree, asserting that Article 19(l) gives a State discretion to consider non-listed activities as being prejudicial.

While in the territorial sea, submarines and other underwater vehicles are required to navigate on the surface and to show their flag.²⁷ UAVs have no right of overflight in the territorial sea. There is therefore is no innocent passage analog with respect to aerial vehicles.

The remedies available to a coastal state that discovers a vessel (or an object or device) in its territorial sea depend on a number of factors:

1. If it is a *vessel flagged in that State or a stateless vessel*, the coastal State could assert full legislative and enforcement jurisdiction over the vessel and all aboard it.

24. UNCLOS Article 19.

25. See 1989 United States – U.S.S.R. Uniform Interpretation of Rules of International Law Governing Innocent Passage, paragraph 3.

26. U.S. Senate Committee on Foreign Relations, *supra* note 22.

27. UNCLOS Article 20.

2. If it is a *foreign vessel, in innocent passage, operated for private purposes*, it would be immune from coastal State enforcement of certain of its laws aboard the vessel (the law here is not particularly relevant to the purposes of the discussion at hand).
3. If it is a *foreign vessel, not in innocent passage, operated for private purposes*, it would be subject to the entire legislative and enforcement jurisdiction of the coastal State.
4. If it is *foreign vessel, in innocent passage, operated by a foreign government either as a warship or for other non-commercial purposes*, the vessel is sovereign immune; it cannot be the subject of a coastal State exercise of jurisdiction. If, during its passage, it does not comply with coastal State regulations that conform to established principles of international law and disregards a request for compliance that is made to it, the coastal State may require the vessel to immediately leave the territorial sea, in which case the warship shall do so immediately.²⁸ Violation of particular laws that a coastal State may prescribe in its territorial sea could subject an immune vessel to expulsion from the territorial sea. These are discussed more fully in the following subsection on immunity.
5. If it is *foreign vessel, not in innocent passage, operated by a foreign government either as a warship or for other non-commercial purposes*, the vessel is sovereign immune; it cannot be the subject of a coastal State exercise of jurisdiction. Because its passage is not innocent (for example, if it launches a military device), the coastal State, again, may demand that the vessel immediately leave the territorial sea. All of the conclusions drawn in directly above (4.) are equally applicable here.

As the discussion to this point should make clear, the law of innocent passage as set out in UNCLOS is focused entirely on “ships.” With one intriguing possible exception examined in the following paragraph, there is no support in the law for the proposition that a non-vessel “object” or “device” is entitled to exercise the right of innocent passage. There is no other legal

28. NWP 1-14M, section 2.5.2.4.

mechanism that would entitle a non-vessel object or device to enter the sovereign waters of a foreign coastal state.²⁹ Thus, subject to possible sovereign immunity considerations that will be discussed in the following subsection, a coastal state discovering a foreign UMS in its territorial sea could respond in one of two ways. If it considered the UMS to be a ship, its rights vis-à-vis the UMS would be as set out in rules 1-5 above. If it did not consider the UMS to be a ship,³⁰ it would be entitled to assert its full legislative and enforcement jurisdiction over it.

UNCLOS Article 20 contains some language that could arguably counter the above assertion that there is no legal basis for entitling a non-vessel “object” or “device” to exercise the right of innocent passage. That article provides that submarines “and other underwater vehicles” must operate on the surface and show their flag while in a foreign territorial sea. The words “and other underwater vehicles” were inserted during the UNCLOS negotiation process into already-existing rule 14(6) of the 1958 Territorial Sea Convention; a rule that otherwise survived verbatim in UNCLOS.³¹ It can be claimed that all UUVs qualify as “other underwater vehicles,” and that the specific insertion of that term in Article 20 (in UNCLOS Part II, section 3, relating to innocent passage) implies that UUVs would be entitled to exercise that navigational regime (subject to the surfaced/flying flag requirements).

This is at best a tenuous argument. First of all, as already stated, the penultimate rule of innocent passage is that it is a right available to “ships” of all States (Article 17); the rest of the articles in Part II section 3, including Article 20, focus on defining what innocent passage is, how it is to be exercised, and the respective rights and duties of the coastal state and vessels within the territorial sea. Thus, reading Article 20 together with Article 17, even if UUVs generally qualify as “other underwater vehicles, only those UUVs that further qualify as “ships” would be entitled to exercise the right of

29. “The territorial sea is subject to the sovereignty of the coastal State, and the only right which foreign ships enjoy there, apart from any right given by a specific treaty, is the right of innocent passage.” Churchill and Lowe, *THE LAW OF THE SEA*, 3d Ed., 1999, p. 87.

30. This determination by the coastal State is subject to protest by the flag State of the UMS, with limited recourse mechanisms if those protests go unheeded (e.g. the International Court of Justice, if both involved States agree; the International Tribunal for the Law of the Sea, if both States are UNCLOS signatories; or through arbitration. *See generally* UNCLOS Part XV and Annexes VI-VIII).

31. This rule as to submarines “has been accepted for as long as submarines have been used as naval vessels.” Churchill and Lowe, *supra* note 30, at 90-91.

innocent passage. Secondly, it appears that the intent underlying insertion of the phrase “and other underwater vehicles” into Article 20 was not to recognize a right of innocent passage by UUVs, but rather to ensure that all vehicles capable of submerged operations, whether or not they technically qualify as submarines, were obligated to operate on the surface and show their flags while in a foreign territorial sea.³²

U.S. doctrine seems to take an aggressive position with respect to UMS navigational rights, though unfortunately it is vague in how it does so. Section 2.5.2.5 of the NWP states as follows (*italics added*):

Customary international law as reflected in the 1982 LOS Convention gives vessels of all nations the right to engage in innocent passage as well as transit passage and archipelagic sea lane passage. The size, purpose, or type of cargo is irrelevant. *The same rules apply to USV and UUV transit and navigation.* USVs and UUVs retain independent navigation rights.

The first and second sentences of NWP 2.5.2.5. collectively state the proposition that vessels, regardless of their size, cargo, etc., are entitled to exercise the right of innocent passage, transit passage, and archipelagic sea lane passage [“listed navigational rights”]. The third sentence is unfortunately ambiguous, particularly the phrase “the same rules apply.” One way to read it is as a blanket assertion by the Navy that all USVs and UUVs, regardless of size, cargo, etc., are entitled to engage in the listed navigational rights. The fact that this assertion occurs two sentences after the statement that as a matter of law only “vessels” are entitled to engage in those listed navigational rights supports a conclusion that, in the NWP’s eyes, USVs and UUVs are properly considered vessels, at least for navigational purposes. Furthermore, the absence of any qualifiers such as “some” or “those USVs and UUVs that qualify as vessels” warrants a further conclusion that, in the NWP’s eyes, all such systems are properly considered “vessels.”

However, those three sentences, read together, can support an entirely different conclusion. The “same [transit and navigation] rules” to which the third sentence refers logically means the collective rule stated by the first two sentences – namely, that vessels, regardless of their size, purpose or cargo –

32. UNITED NATIONS CONVENTION ON THE LAW OF THE SEA 1982—A COMMENTARY, M. Nordquist, Ed., Center for Oceans Law and Policy, University of Virginia School of Law, 1985-present, volume 2, section 20.7a, p. 182.

are entitled to exercise the listed navigational rights. Applying this “rule” to UUVs and USVs, *if UUVs and USVs are vessels*, then they too would be entitled to exercise the listed navigational rights. This assertion does not appear to be particularly controversial. However, it leaves unresolved two important questions: (1) which UUVs or USVs, if any, are, in the U.S.’s view, vessels; and (2) what navigational rights, if any, USVs and UUVs that are not vessels (and thus do not fit into the rule stated in sentences 1 and 2) are entitled to exercise.

Without the right to exercise innocent passage, the utility of UMSs to naval services would be significantly limited. Thus, resolution of the vessel/non-vessel status issue, upon which entitlement to exercise that right depends, is critical. Possible means or forums for resolving this issue are discussed in section C of this Part.

Resolution of the vessel/non-vessel status issue, while extremely significant, would not resolve all legal issues associated with UMSs and innocent passage. Most government-operated UMS’s are likely to be designed to collect information to the prejudice of the defense or security of the coastal state, or to carry out research or survey activities; and as such, their activities would take them out of the realm of innocent passage if engaged in in the territorial sea.³³ While it is possible to turn off such functions for the period that the device is in a foreign territorial sea, this is problematic in two regards; (1) from a technical standpoint, it would seem difficult to design a system that turns its functions off when in a foreign territorial sea, and then turns them on when out of it; and (2) how would a coastal state, in a practical sense, exercise its self-help rights to verify whether a ship purportedly engaged in innocent passage is in fact doing so? When questioning the innocence of a ship’s particular passage through its territorial sea a coastal state is supposed to inform the ship of the reason why the innocent passage is doubted and provide the ship an opportunity to clarify its intentions or correct its conduct in a reasonably short period of time.³⁴ It is not clear who would be in a position to clarify the UMS’s intentions, or to correct its conduct?

These scenarios illustrate the point that even if one can intellectually conclude that, theoretically, UMSs are entitled to exercise the right of inno-

33. Such activities are per se prejudicial to the peace, good order or security of the coastal State if engaged in in the territorial sea, and thus render the passage non-innocent. UNCLOS Article 19.

34. See paragraph 4 of the 1989 United States – U.S.S.R. Uniform Interpretation of Rules of International Law Governing Innocent Passage.

cent passage or other navigational regimes available to ships, there are still some very challenging practical difficulties in effecting this right.

b. Transit passage

Turning now to transit passage, this navigational right is exercisable in “straits which are used for international navigation between one part of the high seas or an exclusive economic zone and another part of the high seas or an exclusive economic zone.”³⁵ The transit passage concept was introduced by the 1982 UNCLOS. When UNCLOS expanded the maximum breadth of the territorial sea from a customary international law limit of 3 nautical miles to 12 nautical miles, there was an expectation that many states would expand their territorial seas accordingly – as has indeed been the case in practice. With this in mind, the drafters created the doctrine of transit passage in order to deal with international straits less than 24 nautical miles in breadth, through which, with 12 nautical mile claims by the states bordering the strait, there would be no ability to traverse the strait without sailing through the territorial sea of one or both of the bordering States.

Naval powers desiring to move through vital straits that would be affected by the new 12 mile territorial sea regime, such as the Malaccas, the Strait of Hormuz, or the Strait of Gibraltar, had concerns with using the regime of innocent passage for movement through the straits. First of all, there is no right of innocent passage for aircraft; therefore, without some different navigational regime, aircraft – including combat air patrol over a carrier – could not be airborne during the strait transit. Second of all, innocent passage is suspendable; and thus, a bordering state would have the unilateral power to shut down the strait, and thereby deny or diminish the power projection capabilities of maritime powers. And, submarines and other underwater vehicles are required to navigate on the surface while in innocent passage, which is hardly optimal for carrier battle group protection or for the self-preservation of these stealthy platforms.

As a compromise between the expanded territorial sea claims of states bordering straits and the freedom of navigation of vessels not flagged in those states, the doctrine of transit passage was adopted in UNCLOS. Transit passage is a right enjoyed by “all ships and aircraft” to exercise the freedom of navigation and overflight solely for the purpose of continuous and expeditious transit of the strait between one part of the high seas or an exclu-

35. UNCLOS Article 37.

sive economic zone and another part of the high seas or an exclusive economic zone. Ships and aircraft, while exercising the right of transit passage, must proceed without delay through or over the strait (i.e. may not loiter); and must refrain from any threat or use of force against the sovereignty, territorial integrity or political independence of states bordering the strait, or in any other manner in violation of the principles of international law embodied in the Charter of the United Nations. Transit passage exists throughout the entire strait (i.e. coastline to coastline), not just through the portions of the strait with overlapping territorial seas.³⁶ Unlike with innocent passage, the right of transit passage is not suspendable. And in contrast with innocent passage, exercise of the right is in the “normal navigational mode.” The United States understands the term “normal navigational mode” to include, *inter alia*:

- a. submerged transit of submarines [and other underwater vehicles?];
- b. overflight by military aircraft, including in military formation;
- c. activities necessary for the security of surface warships, such as formation steaming and other force protection measures;
- d. underway replenishment; and
- e. the launching and recovery of aircraft.³⁷

As can be seen, the right of transit passage exists for “all ships and aircraft.” As with innocent passage, there is no support in the law or in military doctrine for the proposition that a non-vessel “device” or “object” is entitled to exercise the right of transit passage. Pursuant to U.S. doctrine, there does not appear to be much uncertainty involving DOD-operated UAVs; as military aircraft, they are entitled to exercise transit passage to the same extent and in the same manner as manned aircraft. With regard to UMSs, the same uncertainty in U.S. doctrine that was discussed in the innocent passage context applies here as well. Though by no means clear, it does appear that the U.S. is asserting an independent right for USVs and UUVs to engage in transit passage.³⁸ Likewise it appears that the U.S. takes the position that that entitlement arises from the fact that USVs and UUVs are vessels, at least for navigational purposes.

36. NWP 1-14M, 2.5.3.1.

37. U.S. Senate Committee on Foreign Relations, *supra* note 23.

38. NWP 1-14M, section 2.5.2.5.

A vessel legitimately in transit passage is entitled to exercise this right without being impeded by the coastal state. States bordering straits are entitled to adopt laws and regulations relating to transit passage in the following areas: (1) safety of navigation and regulation of traffic; (2) pollution control; (3) prevention of fishing; and (4) matters impacting the coastal state's fiscal, immigration, sanitary, and customs interests. Foreign vessels engaged in transit passage are required to comply with these laws, and are subject (if not immune) to coastal state enforcement of them.³⁹

A few more points regarding transit passage are warranted here. U.S. Navy policy, which is not universally accepted, is that sovereign immune vessels do not have to comply with traffic separation schemes within international straits while engaged in transit passage.⁴⁰ Aircraft in transit passage are required to observe the Rules of the Air established by the International Civil Aviation Organization as they apply to civil aircraft (state aircraft will normally comply with such safety measures and will at all times operate with due regard for the safety of navigation). They are also required, at all times, to monitor the radio frequency assigned by the competent internationally designated air traffic control authority or the appropriate international distress radio frequency. If UMSs are entitled to exercise the right of transit passage, there is no reason to believe that the U.S., at least, would feel that such navigational and safety rules would not apply to UMSs to the same extent that they apply to vessels and aircraft.

c. Archipelagic sea lane passage

Archipelagic states (i.e. nations comprised wholly of one or more archipelagos) are entitled to draw straight baselines in certain circumstances connecting the outer edges of qualifying islands. Waters contained within these baselines have a special status, and are known as archipelagic waters. There are two navigational regimes operative in archipelagic waters. The first is innocent passage in all waters not designated as archipelagic sea lanes. "Ships of all states" enjoy the right of innocent passage through all archipelagic waters, subject to the same rules and restrictions as apply to innocent passage elsewhere.⁴¹

39. See, e.g., UNCLOS Article 233 (relating to enforcement action by States in straits they border).

40. See NWP 1-14M section 2.5.3.1.

41. UNCLOS Article 52.

The second applicable regime is archipelagic sea lane passage (ASLP). An archipelagic state is invited to designate sea lanes and air routes through its archipelagic waters and adjoining territorial sea (the archipelagic state is permitted to declare normal maritime zones, including a territorial sea, beginning from its baseline). These lanes are supposed to include all normal passage routes used for international navigation or overflight through or over archipelagic waters; the regime of archipelagic sea lane passage exists in them. “All ships and aircraft” are entitled to exercise ASLP within designated sea lanes. ASLP is analogous to transit passage; all of the rules and restrictions (including non-suspendability and normal navigational mode) that exist with respect to transit passage apply to archipelagic sea lane passage. If an archipelagic state declines to designate archipelagic sea lanes, other states are still entitled to engage in archipelagic sea lane passage through the routes normally used for international navigation.

As with innocent passage and transit passage, there is no support in the law or in military doctrine for the proposition that a non-vessel “device” or “object” is entitled to exercise the right of ASLP. All of the interpretations and conclusions relating to NWP section 2.5.2.5 apply equally here; namely, that despite its lack of clarity, that section appears to be claiming a right of ASLP for UMSs, apparently based on a conclusion that they are vessels.

d. Navigational rights conclusions

All three of the navigational regimes that have been examined apply to “ships” or “ships and aircraft.” The aircraft issue is easy, at least under U.S. doctrine; UAVs, as aircraft, are entitled to the same navigational rights as their manned counterparts. The UMS navigational rights issue is more problematic. There is no support in UNCLOS or in customary international law for the exercise of navigational rights by non-ships (i.e. “objects” or “devices”). Yet there exists no consensus under applicable international law for determining which, if any, UMSs qualify as “vessels” for navigational purposes, and which do not. The potential certainly exists for friction between a coastal state which, being protective of its sovereign waters, takes a restrictive view of what a vessel is, and a maritime state that, aiming to maximize its operational flexibility, takes a more expansive view of the issue. Conflicts between the two may lead to an exercise of enforcement jurisdiction by the coastal state, and a protest thereof by the maritime state. As with any international dispute, resolution mechanisms are uncertain at best.

The extent to which a coastal state, as a component of its exercise of enforcement jurisdiction, could seize the “offending” UMS is in part determined by the UMS’s immunity status – a topic that will be covered next.

2. Sovereign Immunity

The second principal ramification of the status determination is the extent to which a particular UMS will be entitled to sovereign immunity. In this section, various concepts of immunity will be discussed; and the significance of the status determination as it relates to the issue of immunity will be explored.

As a preliminary matter, there appear to be two separate but complementary “types” of sovereign immunity: (1) immunity from enforcement actions by non-flag states, as found in UNCLOS Articles 32, 58(2), 95, and 96; and (2) immunity from a state exercising ownership, dominion, and/or control over the public assets of another state. These will be discussed in turn, followed by an examination of U.S. positions on immunity and the extent to which, if at all, UMSs are entitled to immunity.

a. Immunity from enforcement actions pursuant to UNCLOS

UNCLOS envisions four categories of vessels: warships; government ships operated for non-commercial purposes; government ships operated for commercial purposes; and private vessels. The former two categories are entitled to immunity (the exact parameters of which will be discussed shortly); the latter two are not.

According to UNCLOS Articles 95, 96, and 58(2), warships and ships owned or operated by a state and used only on government non-commercial service have complete immunity from the jurisdiction of any state other than the flag state when beyond the territorial seas of another state. Per Article 32, this immunity applies within the territorial sea of a foreign state as well, subject to several caveats:

- As already mentioned, a warship that fails to comply with the laws and regulations of the coastal state concerning passage through the territorial sea may be required to depart the territorial sea immediately; and
- The flag state is responsible for any loss or damage caused by a warship or other government ship operated for non-commercial purposes that results from non-compliance with: the laws and regulations of the

coastal state concerning passage through the territorial sea, or failure to abide by any other relevant rules of international law.

According to the terms of paragraph 5 the U.S.- Soviet Uniform Interpretations (“Jackson Hole Agreement”), the “laws and regulations of the coastal State concerning passage through the territorial sea” to which warships must adhere, and that subject them to being expelled from the territorial sea for non-compliance, are those adopted pursuant to UNCLOS Articles 21, 22, 23 and 25. These include the following:

- Article 21 – Laws relating to the safety of navigation and regulation of marine traffic, protection of navigational aids and similar items, protection of cables and pipelines, conservation of the living resources and protection of fisheries, environmental preservation, marine scientific research and hydrographic surveys, and prevention of fiscal, immigration, sanitary, and customs violations.
- Article 22 – Designation of sea lanes and traffic separation schemes.
- Article 23 – Special rules for nuclear-powered ships.
- Article 25 – Laws affecting the right to prevent passage which is not innocent, to impose and enforce condition of entry requirements on vessels bound for the coastal State’s internal waters, and to temporarily suspend innocent passage in certain circumstances.

This agreement remains in effect between the United States and the Russian Federation; and while it is not binding on any other nations, it is influential in shaping international understandings and practices regarding warship compliance with the laws and regulations of the coastal state during passage.

The “immunity” granted by UNCLOS in Articles 32, 58(2), 95, and 96 is understood to include immunity from arrest, attachment, or execution in the territory of any foreign state.⁴² It should also preclude officials of a non-flag state from taking measures that are inherent components of an enforcement action (e.g. stopping or boarding). This immunity would seem to apply equally to warships and ships owned or operated by a state and used only on government non-commercial service. It is not entirely resolved whether the inconsistent language of UNCLOS regarding the latter category of vessels (“ships owned or operated by a State and used only on government non-commercial service” in Article 96 and “other government ships operated for

42. American Law Institute, Restatement (Third), Foreign Relations Law of the United States, § 457, Reporter’s Note 7 (1987).

non-commercial purposes” in Article 32) is substantive in nature, denoting some sort of different immunity rules applicable to certain types of government non-commercial vessels at different times, or whether it is pure semantic carelessness.⁴³

b. Immunity from exercise of ownership, dominion, or control

A second type of immunity is immunity of warships and ships owned or operated by a state and used only on government non-commercial service from exercises of ownership, dominion, or control by non-flag states. This “type” of immunity was alluded to in the previous paragraph in the reference to officials of a non-flag state being precluded from taking measures that are inherent components of an enforcement action (e.g. stopping or boarding). However, this immunity extends further; international law recognizes that state aircraft and vessels (i.e. warships, naval auxiliaries, and other vessels owned or operated by a state on government non-commercial service) always retain immunity, with only limited exceptions: (1) capture or surrender during battle, before sinking; (2) by international agreement; and (3) by express acts of abandonment, gift, or sale by the sovereign.⁴⁴ This principle extends to sunken warships and aircraft, and also to space objects launched by a government for non-commercial purposes that fall back to earth in the territory of another country.⁴⁵

The significance of this type of immunity is in the extent to which, if at all, foreign officials will be precluded, or restricted by law, in their ability to seize or otherwise exercise dominion or control over UMSs in foreign government non-commercial service.

c. U.S. doctrine – immunity for warships and other government non-commercial vessels

U.S. doctrine does not distinguish between the two “types” of immunity; instead, it refers generally to “customary international law” as the source of

43. See also, Article 16 of the Convention on Jurisdictional Immunities of States and Their Property, U.N. Doc. A/59/38 (Dec. 2, 2004, not yet in force).

44. Section 19.2.2, Limits in the Seas 3rd ed. (draft), Roach et al (p.11.).

45. See section 2.11.5 of NWP 1-14M; see also 1968 Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched Into Outer Space.

the doctrine. U.S. doctrine does differentiate between four categories of “craft” with respect to sovereign immunity:

- (1) warships;
- (2) other naval craft, including auxiliary vessels⁴⁶, small craft (motor whaleboats and the like launched from larger vessels),⁴⁷ UMSs, and Maritime Sealift Command vessels (including United States Naval Ship (USNS), National Defense Reserve Fleet (NSDS), Ready Reserve Fleet (RRF) when activated and assigned to MSC, and Afloat Prepositioned Force (APF) vessels);⁴⁸ (3) MSC time or voyage chartered vessels not part of the APF; and
- (4) MSC foreign flagged voyage or time-chartered vessels.

For all warships and craft in category 2 above, the U.S. claims the following immunities:

- Immunity from arrest or search, whether in national or international waters. Police and port authorities may board a covered vessel warship only with the permission of the commanding officer. A covered vessel cannot be required to consent to an onboard search or inspection;
- Immunity from foreign taxation and regulation;
- Exemption from any foreign state regulation that requires the foreign state’s flag be flown, either in its ports, or while passing through its territorial sea;
- Exclusive control over persons onboard such vessels with respect to acts performed onboard. This includes protecting the identity of personnel, stores, weapons, or other property on board the vessel. It is U.S. policy that providing a list of crew members (to include military and nonmilitary personnel) or any other passengers on board a covered vessel as a condition of entry into a port or to satisfy local immigration officials upon arrival is prohibited.
- Although covered vessels are required to comply with coastal nation traffic control, sewage, health, and quarantine restrictions instituted in conformance with the 1982 LOS Convention, a failure of compliance is subject only to diplomatic complaint or to coastal nation orders to leave its territorial sea immediately.⁴⁹

46. NWP 1-14M, section 2.3.1.

47. NWP 1-14M, section 2.3.3.

48. NWP 1-14M, section 2.3.2.

49. NWP 1-14M, sections 2.1.1 and 2.2.2.

As a matter of policy, the U.S. claims only freedom from arrest and taxation for vessels in category 3 above (i.e. MSC time or voyage chartered vessels not part of the APF) and does not claim sovereign immunity for vessels in category 4 (MSC foreign flagged voyage or time-chartered vessels). U.S. Navy policy requires warships to assert the rights of sovereign immunity when appropriate.⁵⁰

d. U.S. doctrine - immunity and unmanned systems

As previously discussed, the U.S. considers all DOD-operated UAVs to be “military aircraft.” Military aircraft are “state aircraft” within the meaning of the Convention on International Civil Aviation of 1944 (the “Chicago Convention”), and, like warships, enjoy sovereign immunity from foreign search and inspection. As military aircraft, all DOD-operated UAVs retain the overflight rights under customary international law as reflected in the LOS Convention. Furthermore, by virtue of their status as “military aircraft,” all domestic and international law pertaining to “military aircraft” is applicable. This includes all conventions, treaties, and agreements relating to “military aircraft,” “auxiliary aircraft,” “civil aircraft” and “civilian airliners.”⁵¹

With respect to USVs and UUVs engaged exclusively in government, noncommercial service, these are considered to be sovereign immune craft, entitled to all of the immunities to which warships and vessels in category 2 in the previous subsection are entitled. USV/UUV status is not dependent on the status of its launch platform.

e. Status and immunity conclusions and issues

The issue here is that if a UMS is not a vessel (either a warship or one operated for government non-commercial purposes), then it may not be entitled to immunity from enforcement actions under UNCLOS. There is some precedent for inferring that a state enjoys immunity from the jurisdiction of the courts of another state with regard to its property.⁵² However, there is no

50. NWP 1-14M, section 2.2.2.

51. NWP 1-14M sections 2.4.2. and 2.4.4.

52. See, Article 5 of the Convention on Jurisdictional Immunities of States and Their Property, U.N. Doc. A/59/38 (Dec. 2, 2004, not yet in force).

consensus among international law experts that there is a general principle of public international law by which objects owned or used by a state for non-commercial governmental purposes are covered by the state's sovereignty.⁵³ Nonetheless, a government device operated for non-commercial purposes, such a UMS, would be entitled to the second form of immunity, immunity from foreign state exercise of ownership, dominion, and/or control of/over it. However, with respect to a device in the sovereign waters of a foreign state, that state would have the countervailing right to exercise enforcement jurisdiction over the device. As experience has shown⁵⁴, a coastal state would likely not feel compelled to respect any immunity assertion by the state operating the device.

The point here is that the immunity issue might be somewhat of a abstract one as it relates to UMSs. Regardless of what the law says or a nation asserts, coastal states likely would not feel particularly compelled to respect the immunity of an unmanned system they discover in their sovereign waters. At the very least, they would be less apt to respect such a system's immunity than they would a comparable manned platform. This lack of adherence would likely occur with regard to both UNCLOS immunities and ownership/dominion immunity, at least until UMSs' legal status issues are resolved. Once there is some sort of universal acceptance of UMSs' status and their entitlement to utilize navigational regimes, a coastal state may be more inclined to respect the immunity of a foreign government non-commercial UMS that it discovers in its sovereign waters.

3. Entitlement to carry out certain maritime functions

A third principal consequence of the UMS status determination is in the entitlement to perform certain important maritime functions, including carrying out a seizure on account of piracy (Article 107), conducting a Right of Visit boarding (Article 110), and engaging in hot pursuit of a foreign ship or its boats (Article 111). UNCLOS restricts the ability to undertake these func-

53. Tallinn Manual on the International Law Applicable to Cyber Warfare, Commentary to Rule 4 ¶ 6.

54. An illustration of this point is the recent alleged drone "capture" by Iran. If media reports are correct, Iran, through technology manipulation or otherwise, caused a U.S. drone operating over its sovereign airspace to land intact in Iran. To date, there have been no reports that Iran has returned, or ever intends to return, the drone to the U.S. Recall that according to the U.S., the drone is a military warplane of the United States.

tions to warships, military aircraft, or other ships or aircraft clearly marked and identifiable as being on government service and authorized to that effect.

At the outset, it is important to distinguish the vessel-like components of these maritime functions from the crew-like components. It may well be feasible to use UMSs to conduct some of the vessel-like functions (carrying a boarding team, conducting surveillance, pursuing a fleeing vessel, signaling such a vessel to stop). A UMS itself would not be able to carry out the crew-like components of these functions (physically boarding a vessel, conducting inquiries, conducting searches, seizures, and arrests); either a human boarding team or, someday, robots capable of replicating human functions would have to carry out these components. So for the purpose of this analysis, the focus will be on those functions that UMSs are capable of carrying out the vessel-like functions.

It is unclear whether system designers or program managers intend for UMSs to carry out these functions independently, in support of, in concert with, or as an adjunct to eligible vessels or aircraft. Technically, an unmanned system should be able to carry out the vessel-like functions independently. An interesting scenario would be a UMS or UAV engaging in hot pursuit.⁵⁵ There do not appear to be overwhelming technical obstacles to an unmanned system independently engaging in hot pursuit. The unmanned system could easily initiate pursuit by giving a universally-recognized signal to stop. It could maintain continuous and uninterrupted pursuit, passing off the pursuit to other manned or unmanned systems as necessary until a manned unit completes the pursuit by boarding the suspect vessel or taking other enforcement action.

If there is any intent to use unmanned systems to independently carry out the maritime functions at issue, then (1) it would appear the UAVs operated by DOD would meet the requirements, as they are, by definition, military aircraft; (2) UAVs operated by other organs of the U.S. government would qualify, to the extent they can be considered military aircraft or other aircraft clearly marked and identifiable as being on government service and authorized to that effect; (3) only those UMSs that qualify as “ships” would be eligible to carry out these functions, and (4) those “ships” would have to be clearly marked and identifiable as being on government service and authorized to that effect.

55. The rules for hot pursuit are set out in UNCLOS Article 111.

If UAVs or UMSs were to carry out these maritime functions in support of, in concert with, or as an adjunct to an eligible vessel or aircraft, then the analysis in subsection A.1. of this Part applies.

4. Applicability of other maritime legal regimes

The status of UMSs will most definitely affect the extent to which generally accepted principles of vessel construction, equipment, and operation that are set out in significant IMO-sponsored conventions to which the U.S. is a signatory party are applicable. Here, both of the status issues discussed so far – whether or not UMSs are vessels, and if so, which can be considered warships or vessels operated for government non-commercial purposes – are in play. This section will examine several of the most comprehensive multi-lateral conventions in this realm, and will analyze whether and to what extent the UMS status issue impacts the applicability of their provisions to such systems.

Before launching into an analysis of particular conventions, it is important to note that these conventions have complex nuanced criteria for applicability, e.g. aspects of certain conventions may only apply to vessels over a specified tonnage involved in a particular trade or service. It is not the purpose of this publication to explore every detail of these conventions. The applicability provisions of these conventions will only be described in sufficient detail to allow this question to be answered: which parts of these conventions would apply to UMSs operated for non-commercial purposes, and which would not?

*a. Some selected IMO conventions*⁵⁶

The COLREGS – The Convention on the International Regulations for Preventing Collisions at Sea, 1972, gives effect to the rules and other annexes constituting the International Regulations for Preventing Collisions at Sea (otherwise known as COLREGS, or Rules of the Road). The COLREGS provide a useful starting point for an examination of the applicability of vari-

56. The description of each described convention can be found in Norris, A., *The Other Law of the Sea*, NAVAL WAR COLLEGE REVIEW Summer 2011. The assistance of Taylor Odom, summer intern, and Alex Weller, Esq., of the Coast Guard Office of Maritime and International Law is gratefully acknowledged with regard to the applicability provisions of these various conventions.

ous IMO conventions to UMSs because it, unlike other conventions, defines the term “vessel”.⁵⁷ COLREGS consist of five parts: Part A, general provisions, including applicability and definitions; Part B, steering and sailing rules; Part C, lights and shapes; Part D, sound and light signal rules; and Part E, exemptions.

The term “vessel” is significant, since the trigger for applicability of the COLREGS rules is whether or not the craft under consideration qualifies as a vessel. The essence of whether a water craft is a “vessel” for purposes of COLREGS is whether or not it is used, or capable of being used, as a means of transportation on water. Only if answered in the affirmative does it qualify as a vessel. Unfortunately, there is no universally-accepted understanding of “means of transportation on water”. As a consequence, the definition is not particularly helpful in resolving the UMS status issue.⁵⁸

If a UMS is a vessel, it, like all vessels, must comply with the steering and sailing rules in Part B. These rules include, *inter alia*, a requirement that a vessel at all times maintain a proper look-out by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision.⁵⁹ A UMS that qualifies as a vessel must also comply with the Part C (light and shape) and Part D (sound and light signal) rules, unless it further qualifies as a warship; “ships of war” are exempt from compliance with the Part C and D requirements.⁶⁰

While not a definitive or binding pronouncement by any means, the U.S. Navigation Safety Advisory Council, a group of experts selected and appointed to, among other things, advise and make recommendations to the U.S. Coast Guard on the Rules of the Road,⁶¹ appears to have implicitly recognized that at least some UMSs satisfy the broad COLREGS definition of “vessel.” In NAVSAC Resolution 11-02 (attached in its entirety as Appendix 2), the council made several recommendations of significance:

57. As has been seen, for COLREGS purposes, the word “vessel” includes every description of water craft, including non-displacement craft and seaplanes, used or capable of being used as a means of transportation on water. Rule 3(a). Other conventions simply use the term “ship” or “vessel” without purporting to define it.

58. See footnote 80, *infra*, for a discussion of the “means of transportation” term.

59. COLREGS Rule 5.

60. COLREGS Rule 1(c).

61. The council is established, and its functions defined, in 33 U.S. Code 2073.

- That the U.S. Coast Guard sponsor an amendment to exclude UMSs from the look-out requirement of Rule 5 by adding the qualifier “manned” before “vessel.” As amended, the rule would read as follows: “Every *manned* vessel shall at all times maintain a proper look-out by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision.”
- That the U.S. Coast Guard sponsor an amendment to the current definition of a “vessel restricted in her ability to maneuver” in Rule 3(g). That term is currently defined as “a vessel which from the nature of her work is restricted in her ability to maneuver as required by these Rules and is therefore unable to keep out of the way of another vessel.” The NAVSAC proposal would add “*a self propelled vessel while unmanned and operating autonomously*” to the definition of a vessel restricted in her ability to maneuver, thus adding UMSs to the class of vessels which *from the nature of [their] work* are restricted in their ability to maneuver as required by these Rules and are therefore *unable* to keep out of the way of another vessel” (emphasis added).
- That Rule 27 be modified by the addition of a new subsection (f), that reads as follows:
 - Whenever the size of a vessel while unmanned and operating autonomously makes it impracticable to exhibit all lights and shapes prescribed in paragraph (d) of this Rule, the following shall instead be exhibited:
 - (i) Three all-round lights in a vertical line where they can best be seen. The highest and lowest of these lights shall be red and the middle light shall be white;
 - (ii) A rigid replica of the international Code flag “D” not less than 1 meter in height. Measures shall be taken to insure its all-round visibility.

Obviously, by proposing rule changes to accommodate the unique qualities of UMSs, NAVSAC implicitly recognizes that UMSs are “vessels” for COLREGS purposes. As of this writing, the Coast Guard had not yet decided whether to adopt the NAVSAC recommendations or to carry the proposal to the International Maritime Organization, which has cognizance over the COLREGS. It is not clear whether the thinking underlying these proposals reflects any sort of international consensus on the status of UMSs. If it does, and if these, or similar, changes are adopted with respect to COLREGS, the question remains as to whether such a manifested willingness to classify some, or all, UMSs as vessels for purposes of this particular convention will

translate into a consensus to treat UMSs as vessels or ships for the purposes of other significant IMO-sponsored conventions, such as those described below.

The SOLAS Convention – The International Convention for the Safety of Life at Sea, 1974, as amended, prescribes minimum standards for the construction, equipment, and operation of ships. The genesis for the convention was the disastrous RMS Titanic sinking in 1912, which led to the first iteration of SOLAS in 1914. Since then it has been comprehensively revised several times. The most recent version entered into force on 25 May 1980. It has been adopted by 159 nations, including the United States, which collectively represent 99.04 percent of world shipping tonnage. According to the IMO, “the SOLAS Convention in its successive forms is generally regarded as the most important of all international treaties concerning the safety of merchant ships.”⁶²

The real substance of SOLAS is in the annex, which is divided into twelve chapters, as follows: chapter I, “General Provisions”; chapter II-1, “Construction Subdivision and Stability, Machinery and Electrical Installations”; chapter II-2, “Fire Protection, Fire Detection, and Fire Extinction”; chapter III, “Life-Saving Appliances and Arrangements”; chapter IV, “Radiocommunications”; chapter V, “Safety of Navigation”; chapter VI, “Carriage of Cargoes”; chapter VII, “Carriage of Dangerous Goods”; chapter VIII, “Nuclear Ships”; chapter IX, “Management for the Safe Operation of Ships”; chapter X, “Safety Measures for High-Speed Craft”; chapter XI-1, “Special Measures to Enhance Maritime Safety”; chapter XI-2, “Special Measures to Enhance Maritime Security”; and chapter XII, “Additional Safety Measures for Bulk Carriers.”

Every chapter contains detailed standards that establish minimum performance benchmarks in each area. Flag states are responsible for their vessels’ compliance with these standards and for certifying compliance through such documents as the Safety Construction Certificate, the Safety Equipment Certificate, the Safety Radio Certificate, and the Passenger Ship Safety Certificate. The convention permits port states to inspect such certificates aboard non-immune foreign vessels and to conduct further examinations, and possibly take control measures, if onboard conditions clearly do not comport with the certificates.

62. [http://www.imo.org/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-\(SOLAS\),-1974.aspx](http://www.imo.org/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-(SOLAS),-1974.aspx)

The SOLAS Convention applies to “ships” entitled to fly the flag of signatory States. The term “ship” is not defined in the convention, though many types of ships (e.g. “cargo ship,” “tanker,” “fishing vessel,” “nuclear ship,” and the like) are defined. Generally, SOLAS only applies to ships engaged in international voyages. Warships and troopships, plus cargo ships⁶³ below a certain gross tonnage (typically 500 GT; for some chapters, 300 GT) are explicitly exempt from SOLAS’s regulations unless expressly provided otherwise.⁶⁴ The warship blanket exemption does not extend to other government vessels. The only chapters of SOLAS that specifically exempt government non-commercial vessels are Chapters V, VII Part D,⁶⁵ and IX. Thus, if UMSs qualify as “ships” for purposes of this convention, are determined to engage in international voyages, and are not otherwise exempt, they would be required to comply with all of SOLAS’s design, equipage, and other standards. Such UMSs would be exempt from certain of SOLAS’s provisions (Chapters V, VII Part D, and IX) if they are operated as government non-commercial vessels, and would be entirely exempt from SOLAS if they further qualify as either a warship or a cargo ship below a threshold tonnage.

The ISM Code – The International Management Code for the Safe Operation of Ships and for Pollution Prevention (ISM Code) was adopted in 1993 in response to human errors or omissions that played causal roles in significant marine casualties during the 1980s. In 2002, IMO Resolution MSC.99(73) created a new chapter IX (Management for the Safe Operation of Ships) in SOLAS, incorporating the ISM Code into that convention. As a result, all SOLAS signatory nations are also now bound by the code. To accomplish its goal of promoting safety and environmental protection through the minimization of human error, the ISM Code requires shipowners and other persons, such as managers or bareboat charterers, who assume responsibility for operating the ship (referred to generically as “the company”) to implement Safety Management Systems. These systems (mostly in the form of checklists) must be documented and maintained in a Safety Management Manual to be kept on board the vessel.

63. SOLAS, in Chapter I (General provisions), defines a “cargo ship” as a ship, which is not a passenger ship.

64. SOLAS Chapter I, Part A, reg. 3(a)(i)-(vi).

65. Part D applies to vessels engaged in the carriage of packaged irradiated nuclear fuel, plutonium and high-level radioactive wastes carried as cargo in accordance with class 7 of the IMDG Code.

A Safety Management System should contain the following functional elements:

- A safety and environmental-protection policy
- Instructions and procedures to ensure safe operation of ships and protection of the environment in compliance with relevant international and flag-state legislation
- Defined levels of authority and lines of communication between, and among, shore and shipboard personnel
- Procedures for reporting accidents and nonconformities with the provisions of the code
- Procedures to prepare for and respond to emergency situations
- Procedures for internal audits and management reviews.

Examples of instructions and checklists required in the Safety Management Manual are those that define various tasks and assign qualified personnel to carry out key shipboard operations that impact the safety of the ship and the prevention of pollution; that institute procedures to identify, describe, and respond to potential emergency shipboard situations and establish a program for drills and exercises to prepare for emergency actions; and that create procedures to ensure that the ship is maintained in conformity with the provisions of relevant rules and regulations and with any additional requirements that may be established by the company.

Flag states are primarily responsible for ensuring their vessels' compliance with the ISM Code, since it is part of SOLAS. A signatory flag state attests to a company's compliance with ISM by issuing certificates, which include a Document of Compliance, provided to the operating company upon verification that it meets ISM requirements, and a Safety Management Certificate, issued to a company's vessels to attest their compliance with these same requirements. Again, as with SOLAS, port states are permitted to inspect such certificates, conduct further examinations, and take control measures aboard foreign vessels as warranted if a vessel clearly does not meet the minimum standards that the certificates are supposed to assure.

The ISM Code, chapter IX of SOLAS, does not apply to government-operated ships operated for non-commercial purposes.⁶⁶ Though warships are not specifically mentioned, because they are a subclass of vessels operated by a government for non-commercial purposes, it appears that this exemption would apply to them as well. This conclusion is further buttressed by

66. Chapter IX of the annex to the 1974 SOLAS Convention (ISM), reg. 2(2).

the blanket exclusion of warships from SOLAS, of which the ISM Code is a part. The significance for UMSs is that even if they do qualify as “ships,” as government-owned ships operated for non-commercial purposes, they would not be subject to the requirements of the ISM Code.

The STCW Convention – Having safety, maintenance, and equipment operation checklists in a Safety Management System is one thing; having qualified, proficient mariners to carry out important shipboard functions is quite another. The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, adopted on 7 July 1978 and entered into force on 28 April 1984, was intended to prescribe uniform international minimum standards for the training and certification of, and watchkeeping by, mariners. 154 states, which collectively flag 99.15 percent of global shipping tonnage, have adopted the convention.

The STCW Convention comprises: chapter I, “General Provisions”; chapter II, “Master and Deck Department”; chapter III, “Engine Department”; chapter IV, “Radiocommunication and Radio Personnel”; chapter V, “Special Training Requirements for Personnel on Certain Types of Ships”; chapter VI, “Emergency, Occupational Safety, Medical Care and Survival Functions”; chapter VII, “Alternative Certification”; and chapter VIII, “Watchkeeping.” The basic requirements of the convention are detailed in the STCW Code, created as part of amendments to the convention in 1995. The convention’s chapters and the code provide specific training, experience, and other requirements that a mariner must possess in order to be certified to serve in a particular capacity aboard a vessel.

Unlike with most other IMO-sponsored international agreements, the main onus for compliance with STCW rests not with the flag state but instead with the country (“administration”) certifying a particular mariner as being trained and competent in accordance with international standards. This certification is done through a statement of compliance in the credentials (licenses, certificates of documentation, etc.) that are issued to merchant mariners.

The STCW Convention applies to seafarers serving on board seagoing ships entitled to fly the flag of a Party. Exempted are those serving on board, *inter alia*, warships, naval auxiliaries, or other ships owned or operated by a state and engaged only in government non-commercial service.⁶⁷ Since UMSs are, by their very nature, unmanned, it seems obvious that the STCW Convention should not apply to them. Even if it did, the fact that they are

67. International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, art III(a)-(d) (1978).

operated by a state and engaged only in government non-commercial service would exempt them from the convention's provisions.

The MARPOL Convention – The International Convention for the Prevention of Pollution from Ships “is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes.”⁶⁸ It antedates UNCLOS, being a combination of two treaties adopted in 1973 and 1978, respectively. The convention contains five technical annexes; a sixth annex was adopted via a protocol of 1997. These annexes prescribe, in significant detail, standards to minimize or prevent pollution from ships, whether from accidental discharges or routine ship operations. Adherence to annex I (“Prevention of Oil Pollution”) and annex II (“Prevention of Pollution by Noxious Liquid Substances in Bulk”) is mandatory for all MARPOL signatory states; compliance with the remaining annexes, III–VI (respectively, “Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form,” “Prevention of Pollution of the Sea by Sewage,” “Prevention of Pollution from Garbage,” and “Prevention of Air Pollution from Ships”) is discretionary. 150 states (including the U.S.),⁶⁹ representing 99.14 percent of global shipping tonnage, have signed on to annexes I and II; somewhat fewer, but still more than 82 percent of global shipping tonnage, have signed the other annexes.

As with other such conventions, signatory flag states bear the principal onus of ensuring that their vessels comply with MARPOL's requirements, demonstrating their vessels' compliance by issuing certificates. These include, as appropriate, an International Oil Pollution Prevention (IOPP) Certificate; an IMO Certificate of Fitness for Ships Carrying Liquefied Gases in Bulk; an IMO Certificate of Fitness for Carriage of Dangerous Chemicals in Bulk; and an International Air Pollution Prevention Certificate. Such certificates are required to be carried by vessels of signatory flag states.

The term “ship” is not defined in MARPOL. Each of the convention's annexes contains its own applicability provisions, discussion of which is beyond the scope of this writing; however, being a “ship” is a threshold requirement for applicability of each annex. Warships, naval auxiliaries, or other ships owned or operated by a state and used by a state for governmental

68. [http://www.imo.org/about/conventions/listofconventions/pages/international-convention-for-the-prevention-of-pollution-from-ships-\(marpol\).aspx](http://www.imo.org/about/conventions/listofconventions/pages/international-convention-for-the-prevention-of-pollution-from-ships-(marpol).aspx)

69. The United States has codified MARPOL in its domestic law through the Act to Prevent Pollution from Ships (Title 33, United States Code, arts. 1901–15) and associated regulations.

non-commercial service are specifically exempted from compliance with any of MARPOL's provisions.⁷⁰ As with the ISM Code, the significance for UMSs is that even if they do qualify as "ships," as government-owned ships operated for non-commercial purposes they would not be subject to the requirements of MARPOL.

b. Analysis and conclusions

As seen, the status of UMSs will most definitely affect the extent to which significant IMO-sponsored multilateral conventions to which the U.S. is a signatory party are applicable. Further, it should be evident that these conventions have significant impact on how covered vessels must be designed, constructed, equipped, and operated. Those UMSs that qualify as vessels and that meet other applicability thresholds (such as minimum tonnage, etc.) will have to be designed, constructed, equipped, and operated as required by those conventions, unless the convention (or component of it) contains a specific exemption. To summarize:

COLREGS: Part B, the steering and sailing rules, applies to all vessels; Parts C (light and shape) and D (sound and light signal) applies to government non-commercial vessels, but not to "ships of war."

SOLAS: SOLAS applies to all ships except (*inter alia*) warships and troopships, as well as cargo ships (i.e. all non-passenger vessels) above a tonnage threshold. Government non-commercial vessels that qualify as passenger vessels or that exceed the tonnage threshold would have to comply with all applicable SOLAS requirements except those in chapters V, VII Part D, and IX.

ISM: The ISM Code, chapter IX of SOLAS, exempts vessels operated by a government for non-commercial purposes, including warships.

STWC: The STCW Convention does not apply aboard warships or other ships owned or operated by a state and engaged only in government non-commercial service.

MARPOL: The MARPOL Convention does not apply aboard warships or other ships owned or operated by a state and engaged only in government non-commercial service.

70. See MARPOL 73, art. 3(3).

5. Ability to exercise belligerent rights⁷¹

The general international view is that only warships may exercise belligerent rights. However, this principle is not universally accepted. It is unclear whether the practice of states, with regard to auxiliaries and other craft not exercising belligerent rights, is a reflection of acceptance of this principle, or simply a practical consequence of the nature of the platform, the civilian crew, and a lack of offensive weapons. This section will discuss the genesis and contours of this rule, and its potential impact on UMSs.

The rule that only warships may exercise belligerent rights derives from the Declaration Respecting Maritime Law, signed on 16 April 1856 by representatives of United Kingdom, Austria-Hungary, France, Prussia, Russia, Sardinia and the Ottoman Empire⁷² as a component of the Treaty of Paris ending the Crimean War. This Declaration “was the first and remains the most important international instrument regulating the rights of belligerents and neutrals at sea which received something like universal acceptance.”⁷³ Of special importance to UMSs is the Declaration’s first principle that “[p]rivateering is, and remains, abolished.” Privateering vessels are private vessels that are “deputized,” as it were, through letters of marque or other means, to carry out belligerent operations on behalf of the government that deputized it during periods of war. This agreement to abolish privateering was, in essence, an agreement that only public vessels could engage in belligerent operations on behalf of the sovereign whose flag they flew. Though this principle was only binding on signatory nations, it has achieved customary international law status in the intervening years.⁷⁴

The Hague Convention (VII) relating to the Conversion of Merchant Ships into War-Ships of 18 October 1907 re-examined and expanded upon this principle of the Declaration. This convention made it clear that a mer-

71. Though this is squarely a law of armed conflict (LOAC) issue, it is considered here in the “Status” discussion (Part II of this publication) instead of the “Weaponization” discussion (Part III) because the determinative factor – whether or not the system is a warship – is a central focus of the “Status” discussion.

72. Many other nations, with the noteworthy exception of the United States, acceded to the Declaration. See Schindler D. and Toman J., *THE LAWS OF ARMED CONFLICT* (2004), pp. 1057-1058.

73. H. W. Malkin, *The Inner History of the Declaration of Paris*, *BRITISH YEARBOOK OF INTERNATIONAL LAW*, Vol. 8, 1927, p. 2.

74. The rules set forth in the Declaration have become accepted as customary international law, and the U.S. recognizes them as such. Schindler and Toman, *supra* note 71, at 1055.

chant vessel converted into a warship must clearly possess the characteristics of the latter before it can exercise the rights and duties attributed to warships (including, significantly, the exercise of belligerent rights). For example, the converted warship must be under the direct authority, immediate control, and responsibility of the power whose flag it flies (Article 1); must bear the external marks which distinguish the warships of their nationality (Article 2); must be under the command of a duly commissioned officer in the service of the state, whose name appears on the list of the officers of the fighting fleet (Article 3); must have a crew that is subject to military discipline (Article 4); and must operate and abide by the laws and customs of naval warfare (Article 5). Finally, pursuant to Article 6, the state that has converted a merchant ship to a warship must, as soon as possible, announce this conversion in the list of warships.

The most definitive statement of the principle that only a warship is entitled to exercise belligerent rights is the Manual of the Laws of Naval War, Oxford. The Second International Peace Conference at the Hague expressed a desire that “the preparation of regulations relative to the laws and customs of naval war should figure in the programme of the next Conference.”⁷⁵ Acting upon this expressed desire, the Institute of International Law (IIL) appointed a special committee that prepared the Oxford Manual, adopted by the IIL on August 9, 1913. Although this manual is not a treaty its provisions are considered to be largely reflective of customary international law.

The principal focus of the Oxford Manual is on the right of capture of private property during war. However, the manual is quite expansive in many areas of the law of naval warfare, and of particular interest to issues involving UMSs are its pronouncements relating to the exercise of belligerent rights. Article 2 states that warships constitute part of the armed force of a belligerent state and, as such, are subject to the laws of naval warfare. ‘Warships’ include all ships belonging to the state which, under the direction of a military commander and manned by a military crew, carry legally the ensign and the pendant of the national navy; and also all ships converted by the state into warships in conformity with articles 3-6 of the manual. A warship, including one converted as such, must observe in its operations the laws and customs of war (Article 7). Only a vessel which upon its conversion to a warship is placed under the direct authority, immediate control, and responsibility of the power whose flag it flies is entitled to the rights and duties of a warship (Article 3). Only warships or vessels so converted may commit acts

75. *Id.* at 1123.

of hostility against the enemy (Article 12). These acts (belligerent rights) exercisable by a warship include the right to attack, capture, or destroy enemy warships (Article 31); to stop, visit, and search all other vessels not in naval service (Article 32); to capture public and private vessels of enemy nationality, and seize enemy goods on board (Article 33); and to exercise passage rights reserved to a warship during armed conflict.

These rules of naval warfare have been adopted and applied in the aviation realm as well. Specifically, Article 13 of the Rules Concerning the Control of Wireless Telegraphy in Time of War and Air Warfare⁷⁶ provides that only military aircraft may exercise the rights of belligerents. Article 16 further provides that no aircraft other than a belligerent military aircraft may take part in hostilities in any form whatsoever. Included within the term "hostilities" is the transmission of military information during a flight for the immediate use of a belligerent.

The U.S. position regarding the entitlement of vessels to engage in belligerent rights is equivocal. The Navy's Code 10 (Office of International and Operational Law) has previously expressed the view that only warships may exercise belligerent rights under international law; however, the Commander's Handbook on the Law of Naval Operations (NWP 1-14M) is silent on the issue. Of like-minded States, only the German Naval Manual expressly states the proposition that belligerent rights may only be exercised by warships as a matter of law.

Assuming the validity of the principle that only warships may exercise belligerent rights, then it follows that only UMSs that qualify as warships would be able to exercise such rights. It further follows that only UMSs that are warships could be directly targetable by opposing belligerent forces; otherwise, according to Articles 32 and 33 of the Oxford Manual, as a non-warship, it may be stopped, visited, searched, and seized if of enemy nationality, but not attacked as a measure of first resort. This limitation on attack of a non-warship does not preclude such a vessel/craft from defending itself if attacked (Article 12). However, any participation in hostilities in any manner whatsoever by a non-warship subjects it to attack by a belligerent warship (Article 49). If the interpretation of the term "hostilities" in the aviation realm carries over to the maritime realm, even the collection of information by a UMS could subject it to attack by an enemy warship. Either way, pursuant to Article 33, a UMS in naval service, as a public vessel of the operating state, is liable to capture at any time during hostilities (Article 33).

76. Drafted by a Commission of Jurists at the Hague, December 1922 - February 1923.

C. Final conclusions

Summarizing all of the various status possibilities with their ramifications leads to the following results.

	UMS is <i>not a vessel</i>	UMS is a vessel* not a warship	UMS is a warship
Navigational rights (section B.1.)	No entitlement	Entitled	Entitled
Immunity (section B.2.)	Entitled to owner-	Entitled ship immunity, not UNCLOS immunities	Entitled
Certain Navigational functions (section B.3.)	No entitlement	Entitled	Entitled
IMO Convention applicability navigational provisions (section B.4.)	None	Varied	Only COLREG
Ability to exercise belligerent rights (section B.5.)	No	No	Yes

* As was done throughout, for the purposes of this analysis, all UMSs that qualify as vessels are considered to be operated for government non-commercial purposes. Some may further qualify as warships.

As can be seen, characterizing a UMS as a warship is optimal for the operating state, in terms of entitlement to rights and exemption from obligations. Such a characterization is dependent on two things: (1) satisfaction of the definition of “warship” in UNCLOS Article 29, and (2) acceptance of the fact that the UMS being so characterized can be considered a “vessel.”

The options available to the U.S. and other states for dealing with the UMS status issue seem to be as follows:

1. Resolving the issue of UMS status through a uni- or multilateral determination that they are vessels and qualify as warships, with all of the consequences that follow. An active approach to responding could therefore include the following means and forums for action: (1) U.S. state practice in conformance with a revised NWP that more clearly asserts the U.S. position with regard to UMS status and rights⁷⁷; (2) Practice by like-minded states, in conformance with manuals; (3) Other U.S. unilateral assertions, such as understandings of the Senate Foreign Relations Committee with regard to UMS status; (4) Actions of U.S. domestic agencies such as the Coast Guard, which has rulemaking authority over the Inland Rules of the Road and can publish interpretive rules; and (5) Actions of international bodies such as the International Maritime Organization, which has oversight over the International Rules of the Road, various multilateral treaties that define the term “vessel,” etc.⁷⁸

A disadvantage of this approach is that the benefits the U.S. and like-minded states would gain would be shared equally by other states, some of which might have interests inimical to those of the U.S. The U.S. would be hard-pressed to argue that its UMSs are warships while those of another country are not. Thus, the U.S. would have to be prepared to accept the presence of foreign UMSs, possibly from unfriendly states, exercising the right of innocent passage in its waters, and otherwise being entitled to all the rights and privileges that go along with warship status.

2. An alternative approach would be to leave the vessel/non-vessel, warship/non-warship issues unresolved. This option has certain advantages, the most significant of which is preserving operational and doctrinal flexibility that might be lost by directly addressing

77. Such a revision should also address the fact that NWP 1-14M does not currently classify UMSs as warships, but rather, as previously discussed, as “Other Naval Craft” – a category that applies to Navy-owned or operated vessels that do not rise to the level of “warship;” and also the fact that, according to NWP 1-14M, only vessels designated as “USS” or “USCGC” are warships under international law.

78. Comments of Professor Craig Allen, workshop participant, June 4, 2012.

the issues.⁷⁹ Through this approach, law and custom would develop – hopefully in a desirable manner – through state practice as these systems proliferate and mature. Such a “wait-and-see” approach reflects the reality that UMS design and employment is in its infancy; no one knows how such systems will evolve in the future, nor the extent to which decisions made today might hamper navies in the future.

There are a several disadvantages to this approach. First of all, instead of the law staying ahead of, or at least keeping pace with, military operations, the opposite would occur; the law would lag behind operations in the UMS realm. Secondly, the U.S. and like-minded states would lose the opportunity to shape the development of the law. With such a new technology, the U.S. has the chance to influence the development of law in an arena where gaps currently exists. As a major maritime power and a leading user of such systems, whatever solution the U.S. comes up with will undoubtedly be extremely influential in the rest of the world. By waiting, the U.S. runs the risk that foreign State practice and/or doctrine would develop in an unfavorable manner. Were this to occur, the U.S. and like-minded states would have to convince the rest of the world to reject the developments already undertaken and to follow our lead.

3. Deciding on a case-by-case, system-by-system, class-by-class, or other basis how to characterize these systems as a matter of law. This approach would have the benefit of resolving the difficult status issues, while at the same time recognizing that the wide variety of UMSs that are, and will continue to be, fielded precludes a “one-size-fits-all” approach. The U.S. could take this approach unilaterally, or could do it in conjunction with like-minded states.

Should this approach be utilized, the following characteristics should be considered:

Function: From a functionality standpoint, most UMSs should qualify as “vessels.” Despite the lack of a universally accepted definition for a “vessel”,

79. For example, navigational rights entitlements would be lost by classifying certain UMSs as non-vessels; certain vessel construction, equipment, and operation exemptions would be lost by classifying certain UMSs as non-warships.

the fact remains that existing definitions are very expansive. The MARPOL definition of “ship” is “a vessel of any type whatsoever operating in the marine environment;” the COLREGS definition, which closely mirrors the U.S. domestic definition, is “every description of water craft, including non-displacement craft and seaplanes, used or capable of being used as a means of transportation on water.” Though COLREGS add the “means of transportation” qualifier to its definition, this does not significantly limit the reach of the definition or the number of craft encompassed by it.⁸⁰

Unless a more stringent definition is applied, it would appear that most of UMSs should constitute as vessels. Even if the “means of transportation” qualifier is used, it would not serve to prevent many systems from being deemed vessels, as most UMSs are designed to carry something (supplies, weapons, sensors) beyond that which is “necessary and appropriate for the navigation, operation or maintenance of a vessel” (see discussion in footnote 80).

Propulsion: The propulsion mode should not be a significant determinative “status” factor, since all UMSs are, by definition, self-propelled.

Degree of autonomous operation: By definition, UUVs are not tethered to other vessels except, possibly, through data links such as a fiber optic cable. USV doctrine on this point is not clear. A freely operating UMS is more likely to be considered a vessel than one that is physically connected in some way to another vessel.

80. Captain Rob McLaughlin, RAN, *Unmanned Naval Vehicles at Sea: USVs, UUVs, and the Adequacy of the Law*, JOURNAL OF LAW, INFORMATION, AND SCIENCE (June 2011) p. EAP 13. Under U.S. law, the Jones Act generally prohibits foreign vessels from transporting “merchandise” (as that term is defined in 46 U.S.C. § 55102(a) and 19 U.S.C. § 1401(c)) between U.S. coastwise points. According to the U.S. Customs and Border Protection Agency, which administers the Jones Act, equipment of the transporting vessel is not considered merchandise, nor is the baggage or personal effects of crew or passengers. Vessel equipment includes items which are “necessary and appropriate for the navigation, operation or maintenance of a vessel and for the comfort and safety of the persons on board.” See Treasury Decision (T.D.) 49815(4) (1939). Similarly, sea stores, i.e., supplies for the consumption, sustenance, and medical needs of the crew and passengers during the voyage are not considered merchandise. See T.D. 40934 (1925). Everything else carried aboard the vessel would, presumably, constitute “merchandise” sufficient to satisfy the “means of transportation” qualifier.

Armament: Carriage of weapons is not a requirement for qualifying as a warship (see the discussion in section A.3. of this Part for the legal requirements for warship status).

Size. Size may be a, if not the, critical feature of a UMS when making differential determinations about how the law should apply to them. UMSs that are small enough not to pose a realistic risk of causing damage to other vessels should a collision occur between them need not necessarily be subject to the COLREGS. SOLAS already has tonnage thresholds for applicability of many of its provisions (typically 500 GT, sometimes 300 GT). As a result, many UMSs in operation or development would be already exempt from many of SOLAS's provisions (beyond those from which they are already disqualified by virtue of being in government non-commercial service). The point is that the law can be shaped to reflect functional, practical realities; and the reality is that many UMSs, due to their small size, do not call for the degree of regulation appropriate to larger vessels.

III

Weaponization Issues Related to UMSs

The widespread use of drones to prosecute the war on Al Qaeda and affiliated groups has generated intense debate about the use of unmanned systems in a combat role in general.¹ This monograph will not purport to wade into that debate. Nor will it attempt to serve as a general primer on all issues related to the law of armed conflict. For the purposes of this monograph, it will be assumed that weaponized unmanned maritime systems of increasing complexity and degree of autonomous operation will be deployed in the future. The focus of the following analysis will be on legal issues uniquely related to the employment of weaponized UMSs. Many of the very difficult matters raised by the use of drones against individual or small groups of terrorists who operate in and amongst the civilian populace without distinguishing themselves in any manner do not exist to a significant degree, if at all, in the maritime context.

This Part has two sections. Section A explores the issues of whether UMSs are inherently different from other lawful weapon systems, thus warranting an entirely new legal paradigm to deal with them; or whether, conversely, they are subject to already-existing rules. Section B examines the main law of armed conflict issues that arise with regard to these systems

1. For an excellent analysis of these issues, see Raul A. Pedrozo, *Use of Unmanned Systems to Combat Terrorism*, in U.S. NAVAL WAR COLLEGE INTERNATIONAL LAW STUDIES, vol. 87, Raul A. Pedrozo and Daria P. Wollschlaeger, eds., (Newport: U.S. Naval War College, 2011), 217.

(weapons reviews, precautions in attack, proportionality, command responsibility and the duty to rescue and/or accept surrender).

It should be pointed out at the onset that the analysis that follows is focused on all weaponized UMSs; it does not separately analyze semi-autonomous UMSs and fully autonomous UMSs.² However, in many cases the legal conclusions derived may be different for a semi-autonomous than they are for a fully autonomous one.

A. What, if anything, about UMSs makes them inherently different from other lawful weapons and weapons systems?

Neither international treaty nor customary law specifically prohibits the development and use of unmanned systems in military operations. In fact, there is no international law particular to unmanned systems at all.

This section will examine the issue of whether fully autonomous armed UMSs could ever be operated in accordance with LOAC, or whether the very nature of such systems renders them incapable of being used in compliance with existing LOAC principles, thus warranting either the creation of a new set of rules, or a conclusion that such systems are illegal as a matter of law. Central to this analysis will be a comparison between armed UMSs and two analogous systems already in the U.S.'s inventory: the Phalanx Close-In Weapons System, and the Submarine Launched Mobile Mine MK 67.

The Phalanx Close-In Weapons System (CIWS) was first deployed in 1980, and is currently installed on practically all U.S. combatant ships and on those of 22 allied nations. According to Raytheon, the system's designer and manufacturer, the CIWS "is a rapid-fire, computer-controlled, radar-guided gun system designed to defeat anti-ship missiles and other close-in air and surface threats. A self-contained package, Phalanx *automatically* carries out functions usually performed by multiple systems -- including search, detection, *threat evaluation*, tracking, *engagement*, and kill assessment (italics added)."³ These automatic threat evaluation and engagement decision func-

-
2. As discussed in part I, "semi-autonomous" means that the decision to pull the trigger or launch a missile from an unmanned system will not be fully automated, but will remain under the control of a human operator. "Fully autonomous" signifies full-scale autonomy, with a weaponized UMS making mission decisions from identification to classification to firing, based on programmed parameters.
 3. <http://www.raytheon.com/capabilities/products/phalanx/>

tions are performed in accordance with algorithms built into the system's computer operating system.

The Submarine Launched Mobile Mine (SLMM) has been in the U.S. inventory since 1983. This system employs a modified Mk 37 Torpedo as the propulsion vehicle, an Mk 57 Target Detection Device (TDD) that utilizes magnetic and seismic sensors to detect stimuli generated by enemy vessels, and a warhead that contains the PBXN-103 explosive mixture. After being deployed by a submarine, the SLMM propels itself to a designated spot, where it shuts down and plants itself until detonation, recovery, or self-neutralization. In short, after being launched, this system is able to drive itself, detect potential targets, classify targets, make the attack decision, and conduct the attack in a fully autonomous manner, in accordance with pre-programmed algorithms. All other mine systems in the U.S. inventory operate in the same manner, though their delivery method (air drop, etc.) may differ from the clandestine launch of the SLMM.⁴

Are there inherent differences between an autonomous weaponized UMS and a non-UMS with the same capabilities (such as the CIWS or SLMM), such that the former systems should be illegal as a matter of law, while the latter are not?

One potential difference, at least between the CIWS and autonomous weaponized UMSs, is that the CIWS is a weapons system physically located on a manned platform, with human operators in close proximity who can override or disable any of the CIWS' automatic functions. Close human proximity to autonomous weapons systems may be desirable as a matter of policy and comfort; but the real question here is whether the lack of close proximity of a human with override capability to an autonomous weapon system, by itself, renders such a system illegal, or requires it to be treated differently as a matter of law. The answer to this, as illustrated by the SLMM, must be no. There is no direct human interface with a SLMM once it is deployed, yet such a system has undergone weapons review, been determined to comply with existing international law, and has not caused the development of a new body of law in response to its unique characteristics. In short, as illustrated by the SLMM, the absence of a human with override capability in close proximity to an autonomous weaponized UMS, by itself,

4. <http://www.public.navy.mil/surfor/comomag/Pages/mines.aspx> (All information in this paragraph confirmed in phone conversation with Ron Swart, Senior Systems Engineer for Navy Mine Systems, Systems Engineering Division, Navy Surface Warfare Center Panama City Division, on June 7, 2012)

is not a basis to treat it differently as a matter of law from other lawfully deployed and employed autonomous weapons systems.

Another potential ground for treating autonomous weaponized UMSs differently as a matter of law from other lawful systems capable of automatic/autonomous target detection, evaluation, and attack is the length of time UMSs are able to carry out similar functions without human intervention. As we have seen, systems currently in the design/solicitation phase will be able to operate up to 90 days without refueling; undoubtedly, this endurance will increase in the coming years as these systems mature. In contrast, the CIWS only operates in automatic mode for the period of time permitted by the operator. However, mines like the SLMM MK 67 have the theoretical capability to remain active for up to one year, though for technical, policy, and other reasons, in reality their period of activity (before self-neutralization) is typically much less. So it is possible that the length of time a UMS could operate without direct human interface is a unique factor with such systems warranting special concern. However, the SLMM MK 67 capabilities, particularly its duration, may point to a contrary conclusion.

Another potential issue with weaponized UMSs, particularly UUVs, is the difficulty in communicating with them while they are submerged. Thus, particularly if there is a human in the engagement loop (which, as discussed in the Introduction, will be the case in the U.S. for the foreseeable future), coordination of the detect-to-engage sequence might prove difficult. However, this is more of a technical than a legal issue. While this issue does not arise with the CIWS (which is on a manned vessel), the matter may surface with regard to the SLMM. It is possible that such communication issues may cause the unintentional targeting of a protected person or object (e.g. the human in the loop makes a bad decision based on scrambled, garbled, or incomplete data sent from the UMS). It is also possible that the human in the loop might desire to call off an attack that he/she ordered, but is unable to do so because of the communications issue. These latter scenarios may well pose legal issues, but does not make the system itself illegal.

Another issue potentially warranting different treatment of weaponized autonomous UMSs under the law than is afforded other systems that automatically detect, classify, and engage targets is the fact the UMSs can be both a weapon or weapon system and the launch and delivery platform for weapons or weapon systems. In the latter capacity, the UMS would serve in a role traditionally reserved to vessels; specifically, warships. In this regard a UMS differs from both the CIWS (a weapon) and the SLMM (a system built

around a weapon). However, this distinction does not in of itself render the UMS illegal. If the UMS is a weapon or weapons system in its own right, then that would trigger the requirement for a weapons review. This subject is examined in the following section.

In conclusion, this section has examined the question of whether features of weaponized UMSs warrant different treatment of such systems under than law than is afforded analogous non-UMS weapon systems. By using a comparison with these two existing weapons systems, this analysis provides an example of why is no real reason to treat UMSs differently. There is no *per se* prohibition on autonomous weaponized UMSs. Rather, as with all other weapon systems, the use of UMSs must be in accordance with the laws of armed conflict. This conclusion accords with that reached by the legal advisor to the U.S. State department on drones: “[t]here is no prohibition under the laws of war on the use of technologically advanced weapons system in armed conflict – such as pilotless aircraft or smart bombs – so long as they are employed in conformity with applicable laws of war.”⁵ The question then is whether or not *the way* in which the systems are used challenges their legality. The possible legal issues presented by weaponized UMSs will now be discussed.⁶

-
5. Remarks of Harold Koh, Legal Advisor, U.S. Department of State, Annual Meeting of the American Society of International Law, March 25, 2010 (hereinafter Koh remarks). *See also* M. N. Schmitt et al. (eds), *Yearbook of International Humanitarian Law*, volume 13, 2010, Chapter 9, p. 321 (The law applicable to the employment of armed UAVs is “precisely the same law which applies to all attacks”); Report of the Special Rapporteur on Extrajudicial, Summary or Arbitrary Executions, Study on Targeted Killings, 28 May 2010, UN Doc. A/HRC/14/24/Add. 6, at para 79 (As with drones the “critical legal question is . . . whether [the] specific use complies with IHL.”).
 6. For a detailed analysis of the legal issues pertaining to autonomous weapons generally, *see* Jeffrey S. Thurnher *The Law That Applies to Autonomous Weapon Systems*, American Society of International Law Insight Jan 18, 2012, *available at* <http://www.asil.org/insights130118.cfm> and Michael N. Schmitt and Jeffrey S. Thurnher ‘*Out of the Loop: Autonomous Weapon Systems and the Law of Armed Conflict*, Forthcoming in *Harvard National Security Journal*, *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2184826.

B. Possible Legal Issues Related to Weaponized UMSs

1. Weapons Reviews

As just discussed, one of the factors that may set UMSs apart from other lawful systems that have autonomous detect-to-engage capabilities is the potential for a UMS to be not just a weapon or weapon system, but also a launch or delivery platform. If the former, a weapons review is required before the system may be procured and fielded. If the latter, no weapons review is necessary.

Article 36 of Additional Protocol I to the Geneva Conventions of 1949 (hereinafter AP I)⁷ provides that

[i]n the study, development, acquisition or adoption of a new weapon, means or method of warfare, a High Contracting Party is under an obligation to determine whether its employment would, in some or all circumstances, be prohibited by this Protocol or by any other rule of international law applicable to the High Contracting Party.

The United States, unlike 171 other nations, is not a party to AP I and thus is only bound to its provisions to the extent that they reflect customary international law. In any case, each service in the Department of Defense has a weapons review policy that is consistent with the requirements of AP I, Article 36 with regard to a new weapon or means of warfare.⁸ These policies ensure that

[t]he acquisition and procurement of DoD weapons and weapon systems shall be consistent with all applicable domestic law and treaties and interna-

7. Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts (Protocol I) Dec. 12 1977, June 8, 1977, 1125 U.N.T.S. 3 [hereinafter AP I].

8. U.S. Department of Defense Rules governing legal review of weapons and weapon systems are contained in Department of Defense Directive 5000.01, "The Defense Acquisition System," 12 May 2003; Department of Defense Directive 3000.09 "Autonomy in Weapon Systems", 21 November 2012; Department of the Air Force Instruction 51-402, "Legal Review of Weapons and Cyber Capabilities," 27 Jul 2011; Department of the Army Regulation 27-53, "Review of the Legality of Weapons Under International Law," 1 Jan 1979; and Secretary of the Navy Instruction 5000.2E, "Implementation and Operation of the Defense Acquisition System and the Joint Capabilities Integration and Development System," 01 Sep 2011.

tional agreements . . . , customary international law, and the law of armed conflict (also known as the laws and customs of war). An attorney authorized to conduct such legal reviews in the Department shall conduct the legal review of the intended acquisition of weapons or weapons systems.⁹

The Navy's weapons review program is set out in SECNAVINST 5000.2E of September 1, 2011. That instruction provides in relevant part as follows (*italics added*):

- (2) No *weapon or weapon system* may be acquired or fielded without a legal review. The following Law of Armed Conflict (LOAC) issues must be addressed when any *weapon or weapon system* is being reviewed:
 - (a) whether the system causes unnecessary suffering that is disproportionate to the military advantage reasonably expected to be gained from its use;
 - (b) whether the system may be controlled in such a manner that it is capable of being directed against a lawful target (i.e., it is not indiscriminate in its effect); and
 - (c) whether there is a specific rule of law or treaty prohibiting the use of the system.¹⁰

To provide the information required to address these LOAC issues, the command requesting the initiation of the legal review shall prepare and forward to Navy Office of JAG Code 10 (International and Operational Law) a memorandum containing the following in commonly understood language:

- (1) A complete description of the weapon or weapon system to include: a list of all its parts, how it functions, what it does, the manning level required for its use, and whether it is self-propelled, mounted or attached to a platform, or portable.
- (2) The concept or method of employment planned for the use of the weapon or weapon system. This should include detailed infor-

9. Department of Defense Directive 5000.01, Enclosure 1 section E.1.1.15

10. SECNAVINST 5000.2E, Section 1.6.1(a)(2) (*emphasis added*).

mation from the final approved concept of operation or method of employment that describes exactly how the system will be used.

- (3) Information regarding the ability of the weapon and/or weapon system to be directed at a specific target (accuracy), including a comparison of the accuracy of the new weapon or weapon system to similar weapons or weapons systems (or munition) that have already been acquired or developed and have received a legal review.
- (4) Information regarding the impact of the weapon and/or weapon system on the human body and on material objects.
- (5) Any additional information or testing data and pertinent conclusions arising from these tests.¹¹

As can be seen from the reproduced sections of SECNAVINST 5000.2E, the trigger for applicability of the weapons review provisions is whether or not the item/system at issue is a weapon or weapon system. For the purposes of the instruction, the term “weapon or weapon system” means “all arms, munitions, materiel, instruments, mechanisms, devices, and those components required for their operation, that are intended to have an effect of injuring, damaging, destroying, or disabling personnel or property, to include non-lethal weapons.”¹² The term “weapon” does not include launch or delivery platforms including, but not limited to, ships or aircraft, but rather the weapons or weapon systems contained on those platforms.

Applying these standards to UMSs, a weapons review will only be required if the UMS is, itself, a weapon or weapons platform. More specifically, such a review would only be required if the UMS itself could be considered an arm, munition, materiel, instrument, mechanism, device, or component required for their operation, that is intended to have an effect of injuring, damaging, destroying, or disabling personnel or property. If the UMS is merely a platform for launching or delivering weapons or weapons systems, then the UMS itself would not have to undergo weapons review, though the weapon or weapon system the UMS is designed to launch or deliver would have to be so reviewed.

11. *Id.*

12. SECNAVINST 5000.2E, Section 2.6.1(c)

2. Precautions in Attack

AP I, Article 57 (Precautions in attack) “operationalizes” the core LOAC principles of necessity, proportionality, distinction, and unnecessary suffering¹³ by providing standards for the conduct of military operations. Specifically, Article 57(2) requires those who plan or decide upon an attack to, *inter alia*, take all feasible precautions in the choice of means and methods of attack with a view to avoiding, and in any event to minimizing, incidental loss of civilian life, injury to civilians and damage to civilian objects (emphasis added). Also, Article 57(4) provides that “[i]n the conduct of military operations at sea or in the air, each Party to the conflict shall, in conformity with its rights and duties under the rules of international law applicable in armed conflict, take all reasonable precautions to avoid losses of civilian lives and damage to civilian objects (emphasis added).”

AP I does not define the term “feasible.” The Certain Conventional Weapons Convention (CCW) of 1980, to which the United States is a party, defines ‘feasible precautions’ as “those precautions which are practicable or practically possible taking into account all circumstances ruling at the time, including humanitarian and military considerations.”¹⁴ Significantly, this definition of ‘feasible’ mirrors the understanding that allied States such as Germany and the United Kingdom have of API Article 57.¹⁵ Since the CCW post-dates API, “it would appear that States used the CCW as an opportunity to define “feasible” in a manner that reflect the exigencies of military operations” and conforms to their understandings in relation to API Article 57.¹⁶ The CCW definition is also consistent with the U.S. position that the proper

13. AP I, *supra* note 6, Article 57. For U.S. military purposes, these principles are defined and discussed in Joint Publication 1-04, “Legal Support of Military Operations,” 17 August 2011, section II-2.

14. The definition is found in the amended Protocol II and deals with precautions to be taken when employing mines, booby-traps, and similar devices. Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects, Oct. 10, 1980, 1342 U.N.T.S. 137 [hereinafter CCW], Article 10.

15. See Schindler D. and Toman J., THE LAWS OF ARMED CONFLICT (Leiden/Boston: Martinus Nijhoff Publishers 2004), pp. 802 and 816, respectively. See also UK MANUAL OF THE LAW OF ARMED CONFLICT, Oxford, 2004, at para. 5.32

16. George Cadwalader (2011). *The Rules Governing the Conduct of Hostilities in Additional Protocol I to the Geneva Conventions of 1949: A Review of Relevant United States References*. YEARBOOK OF INTERNATIONAL HUMANITARIAN LAW, 14, pp 133171 doi:10.1007/9789067048552_5, p. 28.

standard is “practicable” precautions as opposed to “feasible” or “reasonable” precautions.¹⁷

Therefore, war-fighters have an international legal obligation, when choosing means and methods of attack, to take all precautions that are practicable or practically possible in the circumstances ruling at the time to ensure incidental civilian death, injury, or destruction is avoided or minimized. This is by no means a bar to using a UMS, even one that is fully autonomous,¹⁸ as a “means” of attack. A UMS is not indiscriminate *per se*. However, a warfighter contemplating the combat use of a UMS is obliged – as he or she is with all other combat systems – to take all practicable or practicably possible precautions to ensure that incidental civilian death, injury, or property destruction resulting from use of a UMS is minimized. Logical factors for a commander to consider before employing a weaponized UMS would include the system’s known parameters, performance and foibles, and any strategies for risk mitigation.¹⁹ If the practicable or practicably possible precautions permit the use of a UMS to conduct an attack, then it can be used and the Article 57 obligation will be satisfied.

3. Proportionality

Though operations, including those conducted by unmanned systems, may result in incidental death or injury to civilians or damage to civilian objects, they are not necessarily prohibited for that reason. Only collateral damage that is excessive to the anticipated concrete and direct military advantage is prohibited. The term ‘excessive’ is not defined in international law. However, as stated in the Manual on International Law Applicable to Air and Missile Warfare, excessiveness “is not a matter of counting civilian casualties and comparing them to the number of enemy combatants that have

17. *Id.*

18. It is important to keep in mind that a fully automated weaponized UMS that is available to military commanders will have undergone weapons review and been “cleared” for service. Presumably, before such clearance is granted, the system will have been rigorously tested and would have demonstrated a satisfactory ability to discriminate between lawful targets and protected persons, places, and objects. If not, it would not pass a weapons review.

19. Captain Rob McLaughlin, RAN, *Unmanned Naval Vehicles at Sea: USVs, UUVs, and the Adequacy of the Law*, JOURNAL OF LAW, INFORMATION, AND SCIENCE (June 2011): p. EAP 6.

been put out of action”.²⁰ The amount of harm done to civilians and their property in the abstract is not the primary issue. Instead, the question is whether the harm that may be expected is excessive relative to the anticipated military advantage given the circumstances prevailing at the time. Extensive collateral damage may be legal if the anticipated concrete and direct military advantage is sufficiently high.²¹ Conversely, even slight damage may be unlawful when viewed in light of a negligible military advantage.²²

This “excessiveness” analysis, otherwise referred to as the principle of proportionality, is set out both in API Articles 51 and 57. The difference is in the phase of operations: Article 51 pertains to assessing proportionality in the planning phase, whereas Article 57 imposes a requirement to assess proportionality in the execution phase of an engagement. It is in this latter phase that a fully autonomous weaponized system may run into difficulty complying with the proportionality component of the law of armed conflict.

Article 57’s proportionality requirement imposes a personal obligation on those who plan or decide upon an attack to assess proportionality *throughout the entire process, including the execution of the attack*. With an autonomous weaponized UMS, the involvement of people ends when the algorithms are entered and the system is deployed. Presumably, the algorithms and decision to deploy the system are the product of planning that, among other things, involves a proportionality assessment under API Article 51. Once the system is deployed, absent some artificial intelligence that would allow deviation from the programmed algorithms, or that could adapt

20. Program on Humanitarian Policy and Conflict Research, Manual on International Law Applicable to Air and Missile Warfare (2009), *available at* <http://ihlresearch.org/amw/HPCR%20Manual.pdf>: commentary accompanying Rule 14.

21. In its Commentary to Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I), 8 June 1977, *available at* <http://www.icrc.org/ihl.nsf/1a13044f3bbb5b8ec12563fb0066f226/5e5142b6ba102b45c12563cd00434741!OpenDocument>, the ICRC, in Part IV., paragraph 1979, states that “the disproportion between losses and damages caused and the military advantages anticipated raises a delicate problem; in some situations there will be no room for doubt, while in other situations there may be reason for hesitation. In such situations, the interests of the civilian population should prevail, as stated above”.

22. This rule must be clearly distinguished from the obligation to take precautions in attack (discussed in the previous section), which requires an attacker to take all feasible precautions to minimize civilian harm, regardless of whether expected collateral damage is excessive in relation to the military advantage anticipated.

to changing circumstances, the system will presumably attack anything that meets its algorithm trigger points, *regardless of the then-existent circumstances*.

It is this latter point that might be problematic for fully autonomous weaponized UMSs. It is difficult to envision how those who plan or decide upon an attack can fulfill their personal obligation to assess proportionality through and including the execution of the attack without some means of communicating with or controlling the system. A change in the nature of the military objective could lessen the anticipated concrete and direct military advantage to be gained by attacking an object, thus affecting the “excessiveness” calculation as to the collateral damage that may result from the attack. Either those who plan or decide upon an attack must have some ability to be able to monitor the situation in the vicinity of the attack, or the UMS must have a built-in ability to make the proportionality assessment in the circumstances ruling at the time it executes the attack. Therefore, Article 57’s proportionality requirement may pose a difficult legal challenge for the deployment and use of fully autonomous weaponized UMSs.²³

It is worth commenting here on the different operating environments between drones in the war against Al Qaeda and those likely encountered by weaponized UMSs. Drones are being employed to conduct strikes against individual or small groups of terrorists who operate in and amongst the civilian populace without distinguishing themselves in any manner.²⁴ In contrast, a UMS’s targeting environment is likely to be much more legally benign. Unless they are used to bombard shore targets or maritime facilities (e.g. oil platforms), UMSs are only likely to interact with civilians who are aboard vessels targeted by the UMS during a combat operation. A weaponized UMS will have to discriminate amongst fewer potential targets at sea, i.e. only the vessels it encounters. The objective of a UAV strike against a suspected terrorist is to kill him, whereas the objective of a UMS strike against a

23. I assume, for the purposes of this discussion, that an autonomous UMS would not have any real-time means by which a remote operator could communicate with or control the system, whereas a semi-autonomous system would have such a capability.

24. The U.S. considers these strikes to comply with the law of war. The State Department Legal Adviser, Harold Koh, has defended the Obama administration’s use of UAVs to engage terrorist targets in Pakistan and elsewhere, indicating that “U.S. targeting practices, including lethal operations conducted with the use of unmanned aerial vehicles, comply with all applicable law, including the laws of war.” Koh remarks, *supra* note 5. In addition, as required by DoD instruction, the weapon systems used in these strikes have received a weapons review and been deemed lawful.

vessel is to defeat it, but not necessarily kill all aboard (the issue of a duty to rescue survivors is discussed in the next section below). All this could serve to simplify the proportionality assessment since, generally, the number of civilians aboard a vessel should be relatively easily calculated or estimated, and is unlikely to change frequently, if at all, due to the solitary nature of vessel operations. In short, while the legal standard that must be satisfied by a weaponized UMS carrying out an attack is the same as that which must be met by any other weapons system operating over land, the targeting environment in which that standard is to be met by a UMS is likely to be significantly more legally benign.

4. Command responsibility and war crimes

Article 49 of Geneva Convention I provides that ratifying parties must enact domestic legislation that provides “effective penal sanctions for persons committing, or ordering to be committed, any of the grave breaches” of the Convention. It further obligates parties to search for persons alleged to have committed such offenses and either bring them before their own courts, or hand them over to another party for prosecution when that party has ‘made out a *prima facie* case’ as to the matter. Such responsibility extends down through the chain of command or control. Thus, both a commander who orders an unlawful attack, and any subordinate who complies with such an order, would be individually responsible and criminally liable for those attacks.

Commanders may also be criminally responsible if they knew, or should have known, their subordinates were committing, were about to commit, or had committed war crimes and failed to take all reasonable and available measures to prevent their commission or to punish those responsible.²⁵ This

25. Department of the Army Field Manual 27-10, *The Law of Land Warfare*, Department of the Army July 1956, section 501. Although the U.S. has not ratified the Rome Statute to the International Criminal Court, Article 28(a) of the Rome Statute sets forth a contemporary articulation of this principle: a “military commander or person effectively acting as a military commander shall be criminally responsible for crimes . . . committed by forces under his or her effective command and control, or effective authority and control as the case may be, as a result of his or her failure to exercise control properly over such forces, where: (i) That military commander or person either knew or, owing to the circumstances at the time, should have known that the forces were committing or about to commit such crimes; and (ii) That military commander or person failed to take all necessary and reasonable measures within his or her power to prevent or repress their commission or to submit the matter to the competent authorities for investigation and prosecution.”

is known as the principle of command responsibility. Central to this principle is the exercise of, or the ability to exercise, effective control over those who have committed the actual offenses.

In the context of UMS use and employment, this rule imposes criminal responsibility on any military commander or civilian superior who utilizes such systems in a manner that amounts to a war crime. A clear example would be using a UMS in an intentional attack against civilians. Those who ordered such usage, and all those further down the chain of command who complied with the order, would face criminal liability for their actions.

In addition, military commanders and other superiors face criminal liability for past, present, or future use of a UMS to commit a war crime in circumstances where that commander should have known of the use or contemplated use, but failed to take all necessary and reasonable measures within his or her power to prevent or repress it. The fact that UMSs are novel and complex is not in itself a defense. As a matter of law, commanders will be assumed to have the same degree of understanding as a 'reasonable' commander at a comparable level of command in a similar operational context; and in all cases, must possess sufficient knowledge to allow them to fulfill their legal duty to act reasonably to identify, prevent, or stop the commission of war crimes.²⁶

This issue is complicated by fully autonomous weaponized UMSs. Such systems available to a commander will have been subject to a weapons review, and thus will have been "cleared" for use as a means of warfare. This does not relieve a commander of the obligation to ensure that the system is not altered or misused in any manner that violates LOAC.²⁷ A commander must carefully consider the risk associated with such systems before deciding to deploy them, and if so, for how long and in what manner.

One particularly interesting command responsibility issue in the UMS realm is the question of potential war crimes liability of system designers and programmers, particularly those who program the algorithms that might ultimately cause or result in commission of a war crime. In this context, it is important to distinguish between issues involved in the design and programming of UMSs, and those raised by the manner in which they were employed. If the system is designed and programmed correctly, but misused by

26. Tallinn Manual on the International Law Applicable to Cyber Warfare, Rule 24.

27. NWP 1-14M section 5.3.4.

its operator to commit a war crime, there would be no issue of war crime liability for the designer or programmer²⁸.

If the system was used lawfully but a war crime was committed due to a flaw in the design or programming, this would trigger two things: (1) an investigation to determine what went wrong to cause the war crime to occur, and (2) a further weapons review. Only if the investigation revealed intentional actions on the part of programmers (e.g. deliberately inserting bugs in the system to allow it to deviate from programmed parameters in certain circumstances) is it conceivable that a war crime prosecution would occur, both of the designer/programmer him- or herself, plus, potentially, supervisors in that chain of command.

5. Duty to rescue and/or accept surrender

Following naval engagements at sea, belligerents are required to take all possible measures, consistent with the security of their forces, to search for and rescue the shipwrecked.²⁹ “The shipwrecked” means all persons in peril at sea, and would include survivors of an attack.³⁰ It is generally recognized that certain platforms, due to their design or nature of their operations, may not feasibly be able to comply with these requirements.³¹ It is not clear how these rules apply to UMSs.

Additionally, it is well established under international law that there is a duty not to attack a person who is recognized to be, or who in the circum-

28. A related but separate issue is whether and to what extent civilian designers and programmers could lawfully be targeted by an adversary as a result of their design/programming activities. In general, civilians may not lawfully be attacked “unless and for such time as they take a direct part in hostilities.” AP I Articles 51(2) and (3). Though the term “direct participation” is not precisely defined in U.S. doctrine, it is hard to see how the designing/programming activities of civilians would rise to the level of “direct participation” sufficient to cause them to lose their protection against attack. Such a conclusion is supported by that of the majority of the Group of Experts who drafted the Tallinn Manual (*supra* note 25), which concluded that civilians would retain their protected status even if they directly participated in cyber hostilities. Tallinn Manual, Rule 29.

29. Convention (X) for the Adaptation to Maritime Warfare of the Principles of the Geneva Convention. The Hague, 18 October 1907, Article 18.

30. NWP 1-14M section 11-6.

31. *See, e.g.*, U.S. Naval War College International Law Studies, vol. 73, A. R. Thomas and James C. Duncan, eds., (Newport: U.S. Naval War College, 1999), 486 footnote 27, which cites favorably the proposition that it is frequently operationally hazardous and infeasible for a submarine to comply with this requirement.

stances should be recognized to be, *hors de combat*.³² A person is *hors de combat* if, among other things, he clearly indicates an intention to surrender. This rule applies to warships as well. It is unlawful to attack a warship that is clearly indicating an intent to surrender by, *inter alia*, hauling down her flag, hoisting a white flag, surfacing (by submarines), stopping engines in response to a signal, or the crew taking to lifeboats.³³

These requirements apply to the belligerent parties. Fully automated weaponized unmanned system may have difficulty in complying with these obligations. How will such a system know when a warship is attempting to surrender? Will it be able to determine that the naval engagement has ended, triggering a requirement that it go to the aid of “shipwrecked” mariners? These aspects may pose challenges for the employment of certain UMSs in a manner that complies with LOAC.

E. Conclusions

The existing provisions of the law of war are adequate to regulate the legality and use of weaponized UMSs. Fully autonomous weaponized UMSs do raise some problematic legal issues, principal among them the API Article 57 proportionality issue. It is difficult to envision how such systems could comply with this legal requirement, absent some sort of built-in artificial intelligence or some capability for human intervention. However, as technology develops some of these potential issues may be resolved. The main challenge is and will remain ensuring that the use of the weapons system in each case complies with LOAC.

32. API, Article 41; see also Hague Regulations of 1899 and 1907.

33. NWP 1-14M, section 8.6.1.

Appendix I

Glossary

Unmanned maritime systems (UMS) — unmanned vehicles that displace water at rest and can be categorized into two subcategories: unmanned underwater vehicles (UUV), and unmanned surface vehicles (USV). (Source: Unmanned Systems Integrated Roadmap FY2011-2036).

Unmanned — Capable of unmanned operation. Has varying degrees of autonomy. (Source: The Navy Unmanned Surface Vehicle (USV) Master Plan (2007)).

Surface Vehicle — Displaces water at rest. Operates with near continuous contact with the surface of the water. Interface of the vehicle with the surface is a major design driver. (Source: The Navy Unmanned Surface Vehicle (USV) Master Plan (2007)).

Unmanned surface vehicles (USVs) — UMS that is self-propelled and operates with near-continuous contact with the surface of the water, including conventional hull crafts, hydrofoils, and semi-submersibles. (Source: Unmanned Systems Integrated Roadmap FY2011-2036). Though “self-propelled” is not a component of the Roadmap’s definition, two workshop participants confirmed that self-propulsion is an essential feature of a USV. This is necessary to avoid confusion with the many scientific buoys, etc. that are currently floating. Although not specifically spelled out in the USV master plan, is implicitly assumed as a component of it.

Unmanned undersea vehicle (UUV) — A self-propelled submersible whose operation is either fully autonomous (pre-programmed or real-time adaptive mission control) or under minimal supervisory control and is untethered except, possibly, for data links such as a fiber optic cable.

Excluded from this definition are towed systems, hard-tethered devices such as remotely operated vehicles, systems not capable of fully submerging such as Unmanned Surface Vehicles (USV), semi-submersible vehicles, or bottom crawlers. (Source: The Navy Unmanned Undersea Vehicle (UUV) Master Plan (2004)).

Manual — Man is in the loop, continuously or near-continuously. (Source: The Navy Unmanned Surface Vehicle (USV) Master Plan (2007)).

Semi-autonomous — Some vehicle behaviors are completely autonomous (e. g., transit to station, activate sensors). Vehicle refers to its operator when directed by the operator or by its own awareness of the situation (e.g., for permission to fire). (Source: The Navy Unmanned Surface Vehicle (USV) Master Plan (2007)).

Autonomous or Fully Autonomous — The vehicle makes its own decisions from launch point to recovery point. (Source: The Navy Unmanned Surface Vehicle (USV) Master Plan (2007)).

Appendix II

NAVSAC

NAVSAC Task 08-07

Resolution 11-02

NAVSAC recommends to the Coast Guard:

I. Unmanned Underwater Vehicles:

- A. Promulgate a requirement that all Unmanned Underwater Vehicles must, if practicable, be equipped with AIS.
- B. Amend Navigation Rule 23, both Inland and COLREGs, to add a new paragraph (e) to read:
 - (e) An inconspicuous, partly submerged vessel or object while unmanned and operating autonomously shall exhibit the lights specified in Rule 24 (g).
- C. Amend Navigation Rule 24 (g), both Inland and COLREGs, to require that all inconspicuous, partly submerged vessels or objects, or combination of such vessels or objects, exhibit the specified lights at night and by day.

II. Unmanned Surface Vessels:

- A. Promulgate a requirement that all Unmanned Surface Vessels must, if practicable, be equipped with AIS.
- B. Amend Rule 3(g), both inland and COLREGs, to add a new subparagraph (vii) to read:
 - (vii) a self propelled vessel while unmanned and operating autonomously.
- C. Amend Rule 5, both Inland and COLREGs to read:

Every manned vessel shall at all times maintain a proper look-out by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and risk of collision.

- D. Amend Rule 27, both Inland and COLREGs, to add a new paragraph (f), amend existing paragraph (g), and renumber existing paragraphs (f), (g), and (h), to read:
- (f) Whenever the size of a vessel while unmanned and operating autonomously makes it impracticable to exhibit all lights and shapes prescribed in paragraph (d) of this Rule, the following shall instead be exhibited:
 - (i) Three all-round lights in a vertical line where they can best be seen. The highest and lowest of these lights shall be red and the middle light shall be white;
 - (ii) A rigid replica of the international Code flag “D” not less than 1 meter in height. Measures shall be taken to insure its all-round visibility.
(Note: International Code Flag “D” means: “I am maneuvering with difficulty; keep clear”)
 - ~~(g)~~ (f) [minesweeping – renumbered but no other change]
 - ~~(h)~~ (g) Vessels of less than 12 meters in length, except those engaged in diving operations and those unmanned and operating autonomously, shall not be required to exhibit the lights and shapes prescribed in this Rule.
 - ~~(i)~~ (h) [not distress signals – renumbered but not otherwise changed]
- E. Consider whether additional regulations are required based on length and speed.

III. Remotely Operated Vessels /Remotely Manned Vessels

Promulgate an interpretive rule under 33 C.F.R. Parts 82 and 90 to provide that a vessel being operated remotely is considered to be manned and must comply with the applicable Navigation Rules and annexes.

Appendix III

Workshop Participation

Workshop Participants

Craig H. Allen
Jorge Arroyo
William F. Bundy
Thomas Choinski
Martin L. Cook
Clive Dow
Lynn Ewart
Susan Farady
William Glenney
Wolfgang Heintschel von Heinegg
John E. Jackson
Andrew Jameson
James Kraska
William Kuebler
Dennis Mandsager
Myron H. Nordquist
Andrew J. Norris
Greg J. O'Brien
Benjamin J. Pearson III
Raul (Pete) Pedrozo
J. Ashley Roach
Robert C. (Barney) Rubel
Michael N. Schmitt
Paul Siegrist
Raymond Smith
Kenneth W. Watkin
