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OCT. 26-30, 2020 | **MARITIME**  
**RISK**  
**SYMPOSIUM**

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Welcome to the

# MARITIME RISK SYMPOSIUM 2020

The Critical Infrastructure Resilience Institute (CIRI), a Department of Homeland Security Center of Excellence, is host of the 11th Annual Maritime Risk Symposium (MRS 2020) in collaboration with the National Academy of Sciences.

The theme of MRS 2020 is “Maritime Resilience in Black Swan Events.” DHS defines resilient infrastructure systems as the *“ability of systems, infrastructures, government, business, communities, and individuals to resist, tolerate, absorb, recover from, prepare for, or adapt to an adverse occurrence that causes harm, destruction, or loss of national significance.”* Through presentations, panels and open forums, the symposium will focus on the attributes of resilience to adversarial events of national significance in the maritime domain, using our experience with COVID-19 as a driver for the discussion. The objective is less about the specific impacts COVID-19 had and is having, and more on how that event informs us on resiliency for future global upsets, in terms of what works, what gaps have been exposed, and what research questions ought to be studied as a first step towards enhancing Maritime Resilience.



*The National Academies of*  
SCIENCES • ENGINEERING • MEDICINE



# AGENDA

All times are in Central Time.

TIME	EVENT	SPEAKERS
9:45AM	Day 1 Introduction	David Nicol
10:00AM	Keynote*	Dr. Stephen Flynn
11:00AM-12:30PM	Panel**	<i>Resilience in Maritime Infrastructure</i> Moderator/Chair: Captain Todd Bonnar
1:30-3:00PM	Panel**	<i>Maritime Resilience and the Human Element</i> Moderator/Chair: Captain David Moskoff

TIME	EVENT	SPEAKERS
9:30AM	Day 2 Introduction	David Nicol
9:40AM	Welcome	Provost Andreas Cangellaris
10:00AM	Keynote*	Rear Admiral Donna Cottrell
11:00-12:30AM	Panel**	<i>Resilience of the Maritime Supply Chain</i> Moderator/Chair: Joan Mileski
1:30-3:00PM	Panel**	<i>Maritime Resilience and Cybersecurity</i> Moderator/Chair: Kim Young-McLear

TIME	EVENT	SPEAKERS
9:55AM	Day 3 Introduction	David Nicol
10:00-11:00AM	Keynote*	Rear Admiral Michael Fossum
11:00-12:30PM	Panel**	<i>Inland Waterways and the Great Lakes Resiliency</i> Moderator/Poster Chair: Craig Phillip
1:30-3:00PM	Panel**	<i>Lessons from Recent Disasters</i> Moderator/Chair: Henry Willis
3:30-5:30PM	Student Poster Session	

MONDAY

TUESDAY

WEDNESDAY

TIME	EVENT	SPEAKERS
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10:25AM	Day 4 Introduction	David Nicol
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10:30AM–12:00PM	Panel**	<i>Energy Resilience in the Maritime Sector</i> Moderator/Chair: Kristin Lewis
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1:00–4:00PM	Evergreen Kick-off/Small Groups	
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TIME	EVENT	SPEAKERS
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9:55AM	Day 5 Introduction	David Nicol
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10:00AM–12:00PM	Evergreen Concludes	
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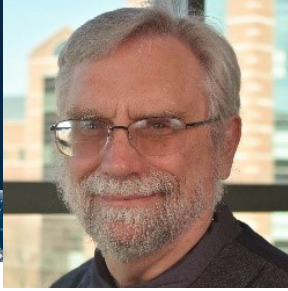
1:00-2:00PM	Student Poster Presentations	Moderator/Chair: Kevin Clement Winning students 30 minutes recorded presentations and 30 minutes of questions.
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2:00–3:30PM	Panel	<i>Wrap-Up: Panel Chairs (Live)</i> Moderator/Chair: Chris Doane
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**All times are in Central Standard Time.**

\* Each keynote will be a recorded talk of 30 minutes with a live Q&A after for 30 minutes.

\*\* Each panel will be a recorded discussion for 30 minutes with a live panel discussion for 60 minutes.



## Symposium Chair

### **PROFESSOR DAVID NICOL**

*Director, Critical Infrastructure Resilience Institute  
University of Illinois at Urbana-Champaign (UIUC)*

Prof David M. Nicol is the Herman M. Dieckamp Endowed Chair of Engineering at the University of Illinois at Urbana-Champaign, and a member of the Department of Electrical and Computer Engineering. He also serves as the Director of the Information Trust Institute ([iti.illinois.edu](http://iti.illinois.edu)), and the Director of the Advanced Digital Sciences Center (Singapore). He is PI for two national centers for infrastructure resilience: the DHS-funded Critical Infrastructure Resilience Institute ([ciri.illinois.edu](http://ciri.illinois.edu)), and the DoE funded Cyber Resilient Energy Delivery Consortium ([cred-c.org](http://cred-c.org)); he is also PI for the Boeing Trusted Software Center, and co-PI for the NSA-funded Science of Security lablet.

Prior to joining UIUC in 2003 he served on the faculties of the computer science departments at Dartmouth College (1996-2003), and before that the College of William and Mary (1987-1996). He has won recognition for excellence in teaching at all three universities. His research interests include trust analysis of networks and software, analytic modeling, and parallelized discrete-event simulation, research which has led to the founding of startup company Network Perception, and election as Fellow of the IEEE and Fellow of the ACM. He is the inaugural recipient of the ACM SIGSIM Outstanding Contributions award, and co-author of the widely used undergraduate textbook “Discrete-Event Systems Simulation”.

## **ABOUT CIRI**

*Critical Infrastructure Resilience Institute*

The Critical Infrastructure Resilience Institute (CIRI) conducts research and education that enhances the resiliency of the nation’s critical infrastructures and the businesses and public entities that own and operate those assets and systems.

CIRI is funded by a \$20 million five-year grant from the Department of Homeland Security. It is led by the University of Illinois at Urbana-Champaign with collaborators from other U.S. universities and national labs.

With an emphasis on outputs-oriented research, education and workforce development, and early and continuous engagement with end users and homeland security practitioners, CIRI will explore the organizational, policy, business, and technical dimensions of critical infrastructure’s dependence on cyber assets. CIRI will examine how computer hardware and software both contribute to and threaten resiliency and how industry makes decisions about cyber assets which contribute to resilience.

A significant focus of the CIRI will be on transitioning research outputs for use by DHS operational components, other homeland security end users, policymakers, decision makers across all levels of industry and government, and community leaders.

**CIRI** | CRITICAL INFRASTRUCTURE  
RESILIENCE INSTITUTE

A DEPARTMENT OF HOMELAND SECURITY CENTER OF EXCELLENCE



## Symposium Co-Chair

### **DR. JOE DIRENZO III**

*Director of Research Partnerships*

*U.S. Coast Guard Research and Development Center*

Dr. DiRenzo is a retired Coast Guard officer, who spent nine years in the Navy, in both the submarine and surface warfare communities. In 1991 he transitioned to the United States Coast Guard and was assigned to several cutters including command of USCGC JEFFERSON ISLAND. In 1999, Dr. DiRenzo was detailed as the inaugural Coast Guard Liaison Officer assigned to the CONSTELLATION Strike Group deployed to the Arabian Gulf. In 2000 he was assigned to Atlantic Area, held seven different positions including Division Chief before rising to the Senior Advisor to the Commander for Science, Technology, Innovation and Research position. In October 2015 he moved to New London Connecticut and assumed his current position at the USCG Research and Development Center. Dr. DiRenzo is one of the most published authors in Coast Guard history. A five-time winner of the service's prestigious JOC Alex Haley award he has published over 300 articles on various maritime terrorism and port security topics. He is currently on the Board of Directors of the Department of Homeland Security Center of Excellence Critical Infrastructure Resilience Institute at the University of Illinois Champaign Urbana. He is also on the board of the Federal Lab Consortium New England Region. He is a eleven time national Co-Chair of the Maritime Risk Symposium and was the co-editor of the first ever textbook focused on maritime cyber security – Issues In Maritime Cybersecurity (Westphalia). Dr. DiRenzo is a 1982 graduate of the United States Naval Academy, holds a Master's in Business Administration from California Coast University, and is a graduate of both the Naval War College and Marine Corps Command and Staff College. He completed his Doctor of Philosophy in Business Administration (Homeland Security Specialization) in 2007 at Northcentral University in Prescott AZ. He teaches for American Military University and Northcentral University. Dr. DiRenzo is married to retired Navy Nurse Corps Captain and Operation Iraqi Freedom veteran Karen DiRenzo. They have two children Joe IV, a graduate student and Lauren an Intermediate School teacher.

## **MRS 2020 PLANNING COMMITTEE**

Eric Brine,  
*University of CT*

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*National Academy of Science*

Don Brutzman,  
*Naval Postgraduate School*

Kevin Clement, MRS 2021  
*University of Houston*

Christopher Doane,  
*US Coast Guard, Atlantic Area*

Jacqueline Earle,  
*US Coast Guard, Atlantic Area*

Michael Edgerton,  
*Port Authority of NY & NJ*

Kate Higgins-Bloom,  
*US Coast Guard, DCO-X*

John Hummel, MRS 2022  
*Argonne National Lab*

Eric Johansson,  
*SUNY Maritime*

Kristin Lewis, *VOLPE*

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*California Miramar University*

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Robert Parker, *RAND*

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*Campbell University*

Michael Plumley,  
*US Coast Guard Academy*

Fred Roberts, *Rutgers*  
Jason Roe, *ADAC*

Fred Rosa,  
*Johns Hopkins University APL*

Randy Sandone, *UIUC/CIRI*

Scott Savitz, *RAND*

Scott Tait, *UCSD*

Greg Trauthwein, *Marine Link*

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*Seebald & Associates*

Sheil Van Cuyk, *LANL*

Michael White,  
*PNNL (MRS 2021)*

Henry Willis, *RAND*

Kimberly Young-McLear,  
*US Coast Guard (CISA)*

Allison Bennet Irion,  
*Argonne National Lab*

Craig Philip,  
*Vanderbilt University*



## **Master Of Ceremonies**

### **REAR ADMIRAL MICHAEL PARKS**

*Regional CEO of the American Red Cross of Northern Ohio*

Rear Admiral Michael N. Parks, United States Coast Guard, Retired, assumed the responsibilities in April 2015 as Regional Executive of the Northern Ohio Region of the American Red Cross. In this capacity he oversees five American Red Cross Chapters covering 31 Northern Ohio counties serving 5.3 million people.

From 2010 to 2013, Parks was based in Cleveland and served as Commander, Ninth Coast Guard District, responsible for leading and directing all Coast Guard operations throughout the eight-state Great Lakes region, including the 1,500-mile international border with Canada. In that capacity he led more than 6,000 active, reserve, civilian and auxiliary (volunteer) personnel at 75 operational units.

During his 35-year Coast Guard career, Parks was deployed in 2010 in support of the U.S. Southern Command to help direct emergency response following the devastating earthquake in Haiti, working directly with the Joint Chiefs of Staff. He also deployed in response to Hurricane Katrina in 2005, providing port security, search and rescue, and support for recovery efforts.

Other significant assignments over the past decade included Deputy Director of Operations, U.S. Northern Command in Colorado Springs; Chief of Staff, Coast Guard Atlantic Area in Portsmouth, Virginia; and Chief of Staff/Chief of Operations Response, Ninth Coast Guard District in Cleveland. Parks also completed tours of duty on six different Coast Guard cutters, commanding four of them.

Parks is a 1982 graduate of the United States Coast Guard Academy in New London, Connecticut, where he received a Bachelor of Science degree in Government. He later earned a Master of Public Administration degree from George Washington University and was selected and attended the National War College in Washington, D.C., where he received a Master of Science in National Security Strategy and Policy. Parks is also a graduate of Leadership Cleveland, Class of 2017.

He and his wife Cynthia have two daughters and live in Bay Village.



## Keynote Speaker

### STEPHEN E. FLYNN, PH.D.

*Founding Director, Global Resilience Institute*

*Professor of Political Science, Northeastern University*

Dr. Stephen Flynn is Founding Director of the Global Resilience Institute at Northeastern University where he leads a major university-wide research initiative to inform and advance societal resilience in the face of growing human-made and naturally-occurring turbulence. He is a Professor of Political Science with affiliated faculty appointments in the College of Engineering and the School of Public Policy and Urban Affairs. Professor Flynn has previously served as President of the Center for National Policy and spent a decade as a senior fellow for National Security Studies at the Council on Foreign Relations. He has presented expert congressional testimony before the U.S. Senate and U.S. House of Representatives on 31 occasions. Dr. Flynn was an active duty commissioned officer in the U.S. Coast Guard for 20 years, including two tours as commanding officer at sea. He is co-author of the textbook, *Critical Infrastructures Resilience: Policy and Engineering Principles* (2018), and author of *The Edge of Disaster: Rebuilding a Resilient Nation* (Random House, 2007), and the national bestseller, *America the Vulnerable* (HarperCollins 2004). In September 2014, he was appointed by Secretary of Homeland Security to serve a member of the Homeland Security Science and Technology Advisory Council (HSSTAC). He also serves as chair of the Massachusetts Port Authority Security Advisory Committee. Prof. Flynn holds the M.A.L.D. and Ph.D. degrees from the Fletcher School of Law and Diplomacy, Tufts University and B.S. from the U.S. Coast Guard Academy.

## KEYNOTE

### **Title:** *The Resilience Imperative*

**Abstract:** Even prior to the catastrophic COVID-19 crisis, the World Bank had been estimated that economic losses due to major disasters had been reaching \$500 billion annually. Efforts to bolster societal resilience are urgently needed and yet there are major barriers to advancing the widespread adoption of resilient design and engineering best practices in critical lifeline systems generally, and with maritime infrastructure specifically. In his keynote address, Professor Flynn will outline the factors that are animating the resilience imperative and what can and should be done prior to and following disasters to advance critical infrastructure resilience.





## Keynote Speaker

### REAR ADMIRAL DONNA COTTRELL

*Ninth Coast Guard District Commander*

Rear Admiral Cottrell assumed duty as the Ninth District Commander in June 2019. She is the senior Coast Guard Commander for the Great Lakes and Saint Lawrence Seaway, an area that encompasses eight states, a 1,500 mile international border, and a workforce of over 6,000 Coast Guard active duty, reserve, civilian and auxiliary men and women.

Rear Admiral Cottrell previously served as the Director, Joint Interagency Task Force (JIATF West), the U.S. Pacific Command's executive agent for executing Department of Defense counter-drug activities in order to shape the theater and disrupt transnational criminal organizations that threaten U.S. interests in the INDOPACIFIC Command's area of responsibility.

She has also served as the Deputy to the Assistant Commandant for Capability. She was responsible for identifying and sourcing new and extended capabilities, competencies and capacity to meet Coast Guard mission requirements. She also assisted in the development of service-wide policy for Coast Guard staffing, training and equipping.

From 2014 to 2016, Rear Admiral Cottrell served as the Thirteenth Coast Guard District Chief of Staff where she directed Coast Guard field and staff activities in Washington, Oregon, Idaho and Montana in support of the District Commander's vision and strategy. From 2011 to 2014, Rear Admiral Cottrell commanded Coast Guard Helicopter Interdiction Tactical Squadron (HITRON) in Jacksonville, FL.

Other past assignments include Commanding Officer of Air Station Savannah, Executive Officer at Air Station Detroit, Air Operations Officer at Group-Air Station Atlantic City, Administration Officer at Air Station Chicago, and Chief of the Information Systems Division at Aircraft Repair and Supply Center in Elizabeth City, NC. Rear Admiral Cottrell was also assigned to the Navy Helicopter Training Squadron Eight at NAS Whiting Field, FL where she served as a TH-57 helicopter flight instructor. Rear Admiral Cottrell acquired over 3500 flight hours in four different models of the HH-65 and MH-65 Dolphin helicopter.

Prior to Officer Candidate School in 1987, Rear Admiral Cottrell served as a Boatswain's Mate and Aviation Electronics Technician. After her commission, Rear Admiral Cottrell served as a Deck Watch Officer aboard the USCGC STEADFAST.

A native of Wellington, Ohio, Rear Admiral Cottrell (née Perry) graduated from Ohio University with a Bachelor's Degree in Education in 1982; from Embry-Riddle Aeronautical University in 1997 with a Master of Science degree in Aeronautical Science; from The Air Force Institute of Technology in 2004 with a Master of Science degree in Information Resource Management; and from the U.S. Naval War College in 2011 with a Master of Arts degree in National Security and Strategic Studies.

Rear Admiral Cottrell's personal awards include Defense Superior Service Medal, two Legion of Merits, two Meritorious Service Medals, three Coast Guard Commendation Medals, the Global War on Terrorism Medal, and the Navy Achievement Medal.

## KEYNOTE

### **Title:** *Coast Guard Resilience and Mission Readiness in the Great Lakes Region*

**Abstract:** As the United States' primary maritime responder and authority for a wide variety of national security, environmental, maritime commerce incidents and natural disasters, the Coast Guard's workforce, capital resources, infrastructure and C5I systems must be capable of adapting and overcoming impediments to maintaining readiness and mission execution. The keynote address will review how three key elements of the Coast Guard's culture helped the Ninth Coast Guard District remain remarkably resilient during the ongoing COVID-19 pandemic. Those cultural elements of Clarity of Purpose, Organizational Agility, and Partnerships have been instrumental to allowing the Great Lakes region's 2,600 Coast Guard Active Duty, Reserve, and civilian personnel to continue to deliver effective maritime safety, security, and environmental stewardship in this dynamic environment.



## Keynote Speaker

### REAR ADMIRAL MICHAEL FOSSUM

*Chief Operating Officer, Vice President, Texas A&M University at Galveston*

*Executive Professor of Maritime Administration, Texas A&M University at Galveston*

Michael E. Fossom '80 currently serves as a Vice President of Texas A&M University, the Chief Operating Officer of the Galveston Campus, and the Superintendent of the Texas A&M Maritime Academy. Fossom joined Texas A&M following his retirement from the National Aeronautics and Space Administration (NASA) – Johnson Space Center in 2017.

Fossom is a veteran of three space flights with more than 194 days in space and more than 48 hours in seven spacewalks during his 19 years as an astronaut. During his last mission in 2011, Fossom served as the Commander of the International Space Station. He has logged over 2,000 hours in 35 different aircraft throughout the course of his career. Fossom earned a Bachelor of Science degree in Mechanical Engineering from Texas A&M University and was commissioned as an officer in the U.S. Air Force in 1980. He is also a graduate of the US Air Force Test Pilot School and has earned Master of Science degrees in Systems Engineering and Physical Science/Space Science.

Fossom was born in Sioux Falls, South Dakota, and grew up in McAllen, Texas. He is married to his Aggie sweetheart, the former Melanie J. London '80. They have four children and six grandchildren. He enjoys family and outdoor activities. Fossom has been a lifelong supporter and volunteer in the Scouting program.

## KEYNOTE

**Title:** *The Evolution of Risk Management in Maritime — An Air & Space Analogy*

**Abstract:** There is nothing safe about using a terrain-following system to fly a supersonic jet through mountain canyons at night, or launching a rocket fueled with 4 million pounds of explosives, or maneuvering an LNG tanker around a storm into port. Since these operations cannot be made fully safe, we must understand and manage the risks in the design and construction and in the operations of any complex system whether a space craft or a large cargo vessel. The key to managing the risk is teamwork and developing a culture with the crystal-clear expectation that every member of the team must be alert to risks and free to speak up to mitigate them.

# PANEL 1: RESILIENCE IN MARITIME INFRASTRUCTURE



## Panel Chair/Moderator

### **CAPTAIN TODD BONNAR**

*Branch Head*

*Combined Joint Operations from the Sea Centre of Excellence (CJOS COE)*

Captain Todd Bonnar, MSC, CD joined the Canadian Armed Forces as a Direct Entry Officer in 1997 after completing Maritime Surface Officer classification training in HMCS VANCOUVER in 1998, he was selected to represent Canada in an exchange with the Royal Australian Navy in HMAS HOBART and HMAS ANZAC during which time he participated in the UN Peace Keeping Mission to East Timor.

He returned to Canada's West Coast fleet in 2000 and subsequently served as the CANFLTPAC Flagship's Above Water Warfare Officer in HMCS ALGONQUIN. During this time, he deployed to the Persian Gulf in support of OP APOLLO, Canada's response to the September 11th attacks earning a Task Force Commander's commendation for his Intelligence work. Captain Bonnar completed his Operations Room Officer course in 2004, returning to HMCS ALGONQUIN where he served as both the Flagship's Weapons Officer and Combat Officer. During this tour he also completed his Area Air Warfare Commanders qualification.

His sea command tour saw him assigned to HMCS PROTECTEUR in 2010-2014. During his time in PROTECTEUR, he participated in numerous deployments in support to counter narcotics efforts in Central America with Joint Inter-Agency Task Force (South), earned the Operational Support Medal (Expeditionary) as well as a Commander Canadian Joint Operations Command commendation.

In 2017 he represented Canada as Chief of Staff and Deputy Commander of NATO's high readiness maritime Task Group, Standing NATO Maritime Group One, participating in Operation REASSURANCE in the Baltic Sea and Operation SEA GUARDIAN, NATO's enduring counter-terrorism and security operation in the Mediterranean, earning the Meritorious Service Cross and NATO Secretary General's Meritorious Service Medal for his leadership of the Task Group.

Shore duties saw him employed as J3 Current Operations at Canadian Expeditionary Forces Command in Ottawa, integrally involved with full spectrum joint operations in Afghanistan. In 2014 he assumed command of the Naval Officer's Training Centre charged with developing and mentoring the future cadre the Royal Canadian Navy's commanding officers. In 2015 as part of RCN Transformation, he assumed the inaugural command of Naval Fleet School (Pacific). Upon his return from duties at sea in Europe, he was promoted and assigned the position of Warfare Analysis Branch Head at CJOS in Norfolk, VA.

He holds a Bachelor of Social Sciences Degree from the University of Ottawa and a Masters of Defense Studies with a focus on Chinese Domestic Policy, from the Royal Military College of Canada. He is a graduate of CF Joint Command and Staff Programme 36.

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## PANEL ABSTRACT

It is indisputable that the world's economy floats on seawater. It is equally indisputable that international maritime transportation and the infrastructure that supports it is the tool that keeps the global economy moving. The world economy has surged over the last half century, and that growth has been largely driven by globalization and the consequent reduction in barriers to trade. The maritime transportation sector's symbiotic relationship with the global economic system means that the risks faced by the maritime industry are often second and third order, influenced by factors often not identified as risk, and beyond its control. As Martin Luther King said, "Lightning makes no sound until it strikes."

Disruptions due to a lack of resiliency in maritime transportation infrastructure have wider consequences for society, making the management of the associated risks a priority that should transcend industry and national security boundaries. Clearly, an increasingly connected world requires a resilient maritime community able to withstand an unanticipated lightning strike from the many interconnected risks in the maritime commons. Disruptions due to a lack of resiliency in maritime transportation have wider consequences for society, making the management of the associated risks a priority that should transcend industry and national boundaries.

# PANEL 1: RESILIENCE IN MARITIME INFRASTRUCTURE

## PANELISTS



**MR. ROB CANNIZZARO**  
*Port of Virginia*

Rob Cannizzaro is currently the Vice President of Operations for the Port of Virginia's operating company; Virginia International Terminals LLC. In this role, Rob and his team are responsible for marine, rail, yard and gate operations across the Port of Virginia's deep-water facilities in the commonwealth, handling approximately 1.5M containers annually. Prior to this, Rob spent 25 years in Ocean Carrier operations, holding roles such as Vice President of Marine and Terminal Operations, Vice President of Logistics as well as management positions in Procurement, Vessel Planning, Equipment Control and Risk Management. Rob serves on the boards of the Intermodal Association of North America and the Containerization and Intermodal Institute. Rob earned a B.S. in Marine Business and Commerce from the State University of New York Maritime College at Fort Schuyler in 1994. He later returned to earn an M.S. in International Transportation Management at SUNY Maritime in 2008 and taught graduate courses there beginning in 2012. He also holds an M.B.A. from Centenary University of New Jersey. Rob lives in Virginia Beach, Virginia with his wife of 22 years and their 16 year old son.



**DR. ROB HUEBERT, PHD**  
*University of Calgary*

Rob Huebert is an associate professor in the Department of Political Science at the University of Calgary. He also served as the associate director of the Centre for Military and Strategic Studies. He was appointed as a member to the Canadian Polar Commission (now renamed Canada Polar Knowledge) for a term lasting from 2010 to 2015. He is also a research fellow with the Canadian Global Affairs Institute. Dr. Huebert has taught at Memorial University, Dalhousie University, and the University of Manitoba. He publishes on the issue of Canadian Arctic Security, Maritime Security, and Canadian Defense. His work has appeared in *International Journal*; *Canadian Foreign Policy*; *Isuma- Canadian Journal of Policy Research* and *Canadian Military Journal*. He was co-editor of *Commercial Satellite Imagery and United Nations Peacekeeping and Breaking Ice: Canadian Integrated Ocean Management in the Canadian North*. His most recent book written with Whitney Lackenbauer and Franklyn Griffiths is *Canada and the Changing Arctic: Sovereignty, Security, and Stewardship*. He also comments on Canadian security and Arctic issues in both the Canadian and international media.



**MR. RICHARD PERKS**  
*NATO Allied Command Transformation Headquarters*

Rick Perks coordinates Defense Planning Integration efforts for Supreme Allied Commander Transformation (ACT) to harmonize national and Alliance defense planning activities. To implement NATO's Military Strategy, Rick is part of the core team of strategists developing NATO's Warfighting Capstone Concept. Prior to joining ACT in 2019, Rick was acting head Defense Capabilities Section in the Defense Policy and Planning Division in NATO Headquarters, developing political-military and capability-related NATO defense policy. This included the Alliance's Strengthened Deterrence and Defense Posture and associated areas such as the NATO Readiness Initiative, the Alliance Reinforcement Concept, the adapted NATO Command Structure, the Alliance Maritime Posture, enhanced Forward Presence and the Framework for the South. Prior to joining the International Staff, Rick conceptualized Smart Defense and developed an approach to military foresight analysis in ACT.

A retired Naval Officer, Rick served in the Canadian Navy for 30 years. He served in a variety of seagoing and shore-based positions including deployed operations. His experience includes command, operations and staff

# PANEL 1: RESILIENCE IN MARITIME INFRASTRUCTURE

## MR. RICHARD PERKS (CONTINUED)

duties across several functional areas including Defense Policy, Strategic and Operational Planning, Naval Operations and Engineering, and Training and Education.

Rick is a graduate of the University of London with a MS degree in Engineering, Saint Mary's University with a MBA degree, the Royal Military College of Canada with a Master of Defense Studies degree, and Carleton University with a Bachelor of Engineering degree. He is also a graduate of the Canadian Forces Command and Staff Course 31.



## MR. CARL WREDE

*DLR Institute for Protection of Maritime Infrastructures (Germany)*

Carl Wrede heads the Strategy and Ethical, Legal and Social Aspects Research department at the Institute for the Protection of Maritime Infrastructures of the German Aerospace Center (DLR e.V.) and works at the interface between applied security research and operational security to protect technical and socio-economic infrastructures. In this context, he is particularly concerned with the legal admissibility, ethical justifiability and social acceptance of highly autonomous systems and innovative security technologies.

Before joining the renowned German research institution, he was, among other things, Head of Corporate Security of a large ship management company. In this role, he overlooked global operations of a diverse fleet of more than 100 vessels to ensure the security of several thousand seafarers. He also looks back on his personal past as a nautical officer, which gave him a very personal insight into the dangers and challenges of a highly globalized industry with very diverse security challenges. Through his involvement in the tactical training and strategic development of fire departments in the United Arab Emirates, he is familiar with the importance of social and cultural acceptance for the implementation of robust safety concepts.

Carl Wrede is a permanent member of various working groups on maritime security, cyber security of maritime systems and ethically sound technology development in the context of the European Future Combat Air System (FCAS).

# PANEL 2: MARITIME RESILIENCE AND THE HUMAN ELEMENT



## Panel Chair/Moderator

### **CAPTAIN DAVID MOSKOFF**

*Professor and USCG Unlimited Master Mariner  
United States Merchant Marine Academy*

CAPT Moskoff is a recognized expert in maritime cyber security. He is a Senior Expert Advisor to NATO's Transport Group for Ocean Shipping, Senior Advisor to the DoD's Purposeful Interference Response Team (PIRT) under US SPACE COMMAND, serves as a DoT/MARAD representative to other federal entities, has represented US DHS abroad and made numerous presentations throughout the United States and internationally by request. He is a Professor at the United States Merchant Marine Academy and has served there as Head of the Department of Marine Transportation, Assistant Academic Dean, Faculty Forum President and on a range of committees at the Academy. CAPT Moskoff has acted as USMMA POC for the USCG, USCG National Maritime Center and DOD's Defense Threat Reduction Agency (DTRA) providing midshipmen Independent Study in Maritime Security and Counter-Terrorism venues. CAPT Moskoff has chaired panels and steering groups for various external symposia, conferences and maritime-related exercises/drills.

CAPT Moskoff is also President of MARITECH, a marine consulting and maritime services firm. He has been certified American Bureau of Shipping (ABS) Surveyor, certified ABS/QE ISO/ISM third party external Lead Auditor as well as third party auditor for the American Waterways Operators' Responsible Carrier Program. He is a certified Vessel Security Officer (VSO), Facility Security Officer (FSO) and Company Security Officer (CSO). He served as the first Mooring Master at Sea-3's LPG ship terminal in New England. He has held a USCG Unlimited Master's License for over three decades and has commanded both steam and diesel ships. He has a BS in Marine Transportation (SUNY Maritime) and MS in Information Technology (AIU).

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## PANEL ABSTRACT

Has the age of maritime discovery and exploration actually ended? Perhaps not exactly. As the history of maritime resilience and the human element shows, as far back as the 1500s, from using new navigational aids and improved ship designs, to coastal and inland route sailing, to navigating on open seas with uncertain charts, wayward icebergs, dense fog and luckily at times, clear starry nights, mariners have faced human element and maritime resiliency challenges. "Short of food and water, the sailors ate sawdust mixed with ship's biscuits and chewed the leather parts of their gear to keep themselves alive."<sup>1</sup> Not surprisingly, it has been human resilience which has almost always been the key between success and failure of maritime enterprises.

Without question, today's panel inspires us to learn about and train for dealing with the actual and

many-fathom-deep significance of human resilience in the 21st century maritime environment.

From ABS's Mr. John Jorgensen's scientific brief concentrating on active risk management techniques, based on a best practice, and interface of the human segment and cybersecurity, to Shell's Mr. James Scalli acclaimed report on their unique, successful program linking human resilience and safe maritime operations modules and accompanying video, to MIT's Dr. Michael Benjamin's scientific research and work, in global use regarding safe autonomous marine platforms in academia, industry and defense, this expert panel educates us that there is, indeed, an inexorable link between maritime resilience and the human element.

The must attend briefing from Chief Scientist-ABS Cybersecurity, Mr. John Jorgensen will speak to

# PANEL 2: MARITIME RESILIENCE AND THE HUMAN ELEMENT

## PANEL ABSTRACT, CON'T

that “(i)t is ultimately the human segment of any system that integrates security controls and processes with the technical architecture in order to bring reliability of operation in either a fault-vulnerable or hostile environment.” Mr. Jorgensen’s insights about “cybersecurity as a determining factor for the reliability and resilience of systems” spotlights that “(s)ystems are not just installed, they are connected.” His “brief will present a method by which active risk management can be accomplished within a security program. It will also address the interface between active risk management and architecture in order to illustrate the value of architectural planning as part of security and reliability.”, he further informs us. Mr. Jorgensen will concentrate on “Active risk management techniques, based on a best practice”.

Shell Trading’s Mr. James Scalli, Manager Maritime Assurance, Vessel Quality Assurance - Americas, will report on a unique program Shell developed and implemented “aimed at improving the overall safety performance of the maritime industry”, named “Maritime Partners in Safety”. The successful initiative monitored improvement trends and Mr. Scalli reports that “(i)n 2015, a focus on resilience was added.

We are all born with the capacity to deal with and bounce back from problems and challenging situations – this is known as Resilience. This ability, just like one’s ability to play a particular sport or instrument, can be improved and strengthened with practice and by learning new techniques.” Examining links between safety and human resilience, Mr. Scalli will generously educate and share their program which is “made-up of five core modules”, starting with “What is Resilience” followed by four other modules, and, “there is an accompanying video which explains what it is all about.”, Mr. Scalli reports. “Each module has a key resilience technique which is linked to safety. The modules deliver this in a variety of ways such as exercises, discussions and even some role play. All participants will bring their experiences to the table and it’s important to get the group to work together to learn from each other.” he advises.

MIT’s Dr. Michael Benjamin’s fascinating scientific research and work products reflect mergers of human resiliency factors with autonomous technology, towards ensuring safe operations in the maritime environment. He reports that “(o)ver the last 20 years, we have

designed such an autonomy system from the ground up, based on our developed mathematical model for multi-objective optimization called Interval Programming (IvP)... The IvP mathematical model supports a behavior-based architecture extendible by users for their own missions and platforms, allowing for commercial or classified extensions layered on top of the publicly available code-base. The first version of a COLREGS collision avoidance module was included in the 2017 release. MOOS-IvP has been used around the world on dozens of unmanned marine platforms in academia, industry and defense.” The title of Dr. Benjamin’s presentation is “Resilient Autonomous COLREGS Collision Avoidance with Multi-Objective Optimization”.

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<sup>1</sup> Cite. Contributor: Jean Brown Mitchell. Article Title: European exploration. Website Name: Encyclopedia Britannica. Publisher: Encyclopedia Britannica, Inc. Date Published: May 30, 2018

URL: <https://www.britannica.com/topic/European-exploration>

# PANEL 2: MARITIME RESILIENCE AND THE HUMAN ELEMENT

## PANELISTS



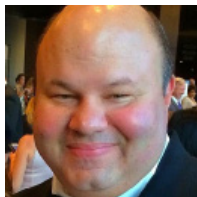
### **MR. JOHN JORGENSEN**

*Chief Scientist, ABS CyberSafety*

Mr. John Jorgensen is currently Chief Scientist for Cybersecurity and Software at American Bureau of Shipping (ABS). He is responsible for cybersecurity service development for marine and offshore customers, as well as related data integrity and software integrity methods development.

Jorgensen started his career as a Surface Warfare Officer in the US Navy, working as a seagoing combat systems officer and engineer, then as a command and control systems program manager, earning degrees in communications engineering and management information systems along the way. After working in ship systems acquisition at Naval Sea Systems Command, he retired from active duty, going to MITRE Corporation, where he worked in systems engineering and architectures, then in security engineering and architectures, in complex systems of systems environments.

Jorgensen moved to ABS to be Director of IT Security in 2013 and to build a security program for the ABS worldwide enterprise. Upon development and deployment of the new security organization, he moved to the Technology Division in 2016 to take the successful methods used in ABS into the marine community. The full integration of cybersecurity, data integrity, software assurance and system test is now the foundation for his work in the cyber domains.



### **MR. JAMES SCALLI**

*Manager Maritime Assurance, Vessel Quality Assurance – Americas, Shell Trading US Company*

Jim Scalli is a 1990 graduate of Mass Maritime. He then went to work for the Exxon Shipping as a 3rd Mate. He continued to sail for almost 15 years serving as permanent Chief Mate for many years and held a USCG Master's License. In 2004, Jim came ashore to work for Shell Trading US Company as a Marine Technical Advisor (MTA) and oversaw the marine operations from New York to Canada. While in this role, he became an accredited OCIMF Cat. 1 SIRE Inspector and an ISM auditor. In 2009, he transferred to Houston as an MTA for Shell and Motiva's Texas refineries. In 2011, he became the Regional Team Lead of Vessel Quality Assurance. In 2013, his role was expanded to Manager Maritime Assurance, Americas which included oversight of all 3rd party vessels, terminals, and MODUs used by Shell in the Americas. In 2019, the role was further expanded to include oversight of Maritime Health, Safety, Security, and Environment (HSSE) for the Americas.



### **DR. MICHAEL BENJAMIN**

*Research Scientist, MIT Computer and AI Lab  
Department of Mechanical Engineering, MIT*

Michael Benjamin is a Principal Research Scientist at MIT in the Department of Mechanical Engineering. His research focus is on autonomy algorithms and software for unmanned marine vehicles. In 2005 he founded an open source project named moos-ivp.org comprising dozens of marine autonomy applications including the IvP Helm for autonomous decision making, and COLREGS autonomy on unmanned surface vessels. His software is used on many different types of unmanned marine vehicles around the world.

He received BS and MS degrees in computer science and cognitive science from Rensselaer, and MS and PhD degrees in computer science from Brown University. Prior to coming to MIT, he was a research scientist at the Naval Undersea Warfare Center and was the 2005 NAVSEA Scientist of the Year. Since the Spring of 2012 he has developed and taught a course in unmanned marine vehicle autonomy at MIT to undergrad and graduate students, and has led the startup of a new laboratory facility for marine autonomy on the Charles River on the MIT campus.



# PANEL 3: RESILIENCE OF THE MARITIME SUPPLY CHAIN



## Panel Chair/Moderator

### DR. JOAN MILESKI

*Department Head of Maritime Business Administration  
Texas A&M University at Galveston*

Dr. Joan P. Mileski is a tenured Professor in Maritime Business Administration and of Marine Science and the Head of the Maritime Business Administration Department at Texas A & M University at Galveston (TAMUG). She holds a PhD in International Management Studies from the University of Texas at Dallas, a M.S. in Taxation from Pace University and B.B.A. in Accounting from the University of Notre Dame. She has transportation experience with Union Tank Car Corporation. She has also been a Certified Public Accountant for 41 years. She has been awarded several grants including from the U.S. and

Texas Department of Transportation, has teaching and international research awards, and publishes in a variety of maritime and transportation journals including Maritime Business Review, Marine Policy, Maritime Policy and Management, Maritime Economics and Logistics, World Maritime University Journal of Maritime Affairs, and the Asian Journal of Shipping. Her research activities currently include the impact on Maritime Industry firms' competitive strategy of maritime security regulations. She is a Fulbright research scholar alumnae and past President of the Women in the Academy of International Business.

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## PANEL ABSTRACT

Maritime transport concerns the transportation of goods between two seaports by sea. Further, the roles that maritime transportation have played in maritime logistics and global supply chain have been well investigated in the past decade. There has been an increasing amount of research done describing suggestions and solutions to deal with new challenges faced by practitioners and scholars who are striving to understand the new strategic roles of maritime transportation in global supply chains. While those studies have developed necessary knowledge to understand why maritime transportation should integrate itself into the global supply chains, what stages maritime firms should go through the journey of integration, and how to make a seamless global supply chain integration happens, maritime transportation is still isolated in global supply chains. Most shippers still regard maritime transportation as a turn-key solution to their tasks of cargo moving by sea, and most carriers and terminal operators still run their business in black boxes. Resilience is the science of preparing for, dealing with, and recuperating from shocks. This panel sets out to answer the questions what causes the lack of full integration of maritime transportation into the global supply chain resulting in less resilience in the supply chain and how to help practitioners to integrate their maritime transportation services into their global supply chain? We will address information and communication systems, value-added services, multi-modal systems and operations, and supply chain integration practices.

The panel will also address disruptions and how ports are resilient to these disruptions. Ports are critical nodes of the supply chains serving important economic purposes and need to be resilient to disruptions. However, ports are complex systems and their operations are managed by multiple stakeholders that make them vulnerable to disruptions. In the United States, the Gulf and the East Coast, storm surge from hurricanes can cause major disruptions. Resilience relies on practices and processes. We will explore practices that lead to local resilience rather than global optimization. We must understand the impacts to port operations and to the extended supply chains and thereby improve their resilience.

In addition to the lack of integration of ports into the supply chain and disruptions caused by natural disasters, the panel will address other threats supply chains face such as significant commercial challenges to facilitate trade, ensure profit maximization, cost recovery, environmental sustainability and securitization against increasing disruption risks throughout all stages from producer to consumer. Significant legal, environmental, commercial, political, social and physical risks all threaten the quality of maritime trade and the supply chains. Risk management methods have prioritized disruptions, from strikes, inventory disruptions, port congestion, financial crises, terrorism to accidents and climate change. Understanding risk management methods can help provide for building resilience.

# PANEL 3: RESILIENCE OF THE MARITIME SUPPLY CHAIN

## PANELISTS



### **DR. PAULA DEWITTE**

*Associate Professor of Practice, Texas A&M at Galveston*

Paula S. deWitte, J.D., Ph.D., P.E., is an Associate Professor of Practice in Computer Science and Engineering at TAMU-College Station and Maritime Business Administration at TAMU-Galveston where she is building the maritime cybersecurity program. She is an Adjunct Professor of Law at the Texas A&M University Law School. She is a licensed attorney (Texas) and a registered patent attorney (USPTO). She holds a Bachelors and Masters from Purdue University where in 2015 she was honored as the Distinguished Alumna in the Department of Mathematics, School of Science. She obtained her Ph.D. in Computer Science from Texas A&M University (1989) and a law degree from St. Mary's University (2008). She holds a patent on drilling fluids optimization [US Patent US 8812236 B1] and has a patent pending through the European Patent Office (currently under USPTO review) on incident response to a cyber attack in industrial control environments. Her research interests are in cybersecurity risk assessment/management, cybersecurity law/policy, and maritime cybersecurity.



### **DR. CASSIA BOMER GALVAO**

*Assistant Professor, Texas A&M at Galveston*

Dr. Cassia B. Galvao is an Assistant Professor at the Department of Maritime Business Administration of Texas A&M University at Galveston. She was hired in August 2017, the same year when she completed her PhD in Social Science also at the Catholic University of Sao Paulo. Her dissertation was about port policies and development in the context of economic development. While developing her academic career, she has worked in the private sector and has 10+ years of experience in Marketing & Sales in major international container shipping liners and freight forwarders. During her PhD studies, she was selected to participate at Fulbright Foundation Scholarship Program in partnership with CAPES and carried out her research at MARA/TAMUG as Visiting Scholar. Dr. Galvao has 10+ years experience in teaching International Economics; Global Entrepreneurship; Maritime Shipping & Logistics; Port Economics & Governance; Marketing Transportation Services. In 2019, she was nominated member of the Ports and Channels Standing Committee of the Marine Group at TRB (Transportation Board, as branch of the National Academy of Sciences). Currently she serves at the IAME (International Association of Maritime Economists) Secretariat as webmaster and communications leader; and as Secretary at the TRF Board (Transportation Research Forum). In 2020, she awarded with the TAMU Montague - Center for Teaching Excellence Award for her ability and interest in the teaching undergraduates and to foster research and develop innovative teaching.



### **DR. PAUL KOOLA**

*Professor of Practice, Texas A&M University*

Paul M. Koola, Ph.D., MBA is a Professor of Practice at the Ocean Engineering Department, Texas A&M University. He has a certificate in cybersecurity from MIT and was one of the founding committee members of the Maritime Technology Society (MTS) Cybersecurity & Infrastructure Committee. Dr. Koola is a US Fulbright Scholar, German Alexander Von Humboldt Fellow, and a Danish DANIDA Scholar. He comes with a wealth of knowledge from both Academia and the Industry. His greatest strengths are his experience spanning across a significant spectrum of interdisciplinary science and engineering and the management of these technology programs. He has worked on multimillion-dollar contracts with the Department of Defense, Missile Defense, Department of Energy and NASA. His current work spans a broad range of problems in computational science and engineering specifically in the use of AI and machine learning to Engineering.

# PANEL 3: RESILIENCE OF THE MARITIME SUPPLY CHAIN

## PANELISTS, CON'T



### **PROF. LEONARD WATERWORTH**

*Executive Professor, Texas A&M at Galveston*

Colonel Len Waterworth joined Texas A&M University at Galveston as executive professor in the Department of Maritime Administration in 2014 and Associate Director for Outreach in the Center for Texas Beaches and Shores. When not in the class room he is focused on public education and project development of flooding and hurricane surge protection in Texas. Prior to joining the premier maritime campus in the United States, Colonel Waterworth served in the United States Army and retired after serving as the Galveston District Commander of the US Army Corps of Engineers. After a long and successful career in the US Army, Colonel Waterworth has had similarly successful leadership careers in both the private and governmental sectors as the President/CEO of Dannenbaum Engineering Corporation and the executive director at the Port of Houston Authority. Colonel Waterworth holds a master of strategic studies from US Army War College a Master's of Engineering Administration from George Washington University and a Bachelor's of Science degree in Civil Engineering from New Mexico State University.



### **DR. AMIR GHAREHGOZLI**

*Assistant Professor, California State University, Northridge*

Amir Gharehgozli is an Industrial Engineer with a PhD in Technology and Operations Management from Rotterdam School of Management. His research interests are the applications of Business Analytics and Decision Sciences in (Maritime) Supply Chain Management, Technology and Operations Management, Information Systems, Facility and Distribution Logistics, and Production Planning; in particular, studying recent innovations and technological advancements in these areas.

His research findings have been published in scientific journals including TS, EJOR, INFORMS Journal on Applied Analytics, IJPR, MEL, TRE, and MPM. He has been the associate editor of MPM, the flagship journal of international shipping and port research and also reviews for top tier journals such as TS, Networks, EJOR, NRL, JORS, and COR. He has had the opportunity to put theory into practice by working in ING Bank and consulting in different industry projects in close collaboration with Port Authorities and Supply Chain and Logistics companies.

He is currently an assistant professor at the David Nazarian College of Business and Economics at California State University Northridge (CSUN), where in recognition of his outstanding research, teaching and service work, he is awarded and appointed as the Carande Faculty Fellow.

# PANEL 4: MARITIME RESILIENCE AND CYBER SECURITY



## Panel Chair/Moderator

### **DR. KIM YOUNG-MCLEAR**

*Fellow, Department of Homeland Security  
Cybersecurity & Infrastructure Security Agency*

Dr. Kimberly Young-McLear is an Assistant Professor (Permanent Commissioned Teaching Staff) in the Electrical Engineering and Cyber Systems Section at the U.S. Coast Guard Academy. She is currently a fellow at the Cybersecurity and Infrastructure Security Agency (CISA) at the Department of Homeland Security. She holds engineering and technical degrees from Florida A & M University, Purdue University, and The George Washington University (Ph.D. in

Systems Engineering). Her research is focused on protecting critical infrastructure from cyber threats in the maritime domain. Dr. Young-McLear has been instrumental in advancing the Coast Guard through STEM and was selected as the 2017 Capt. Niels P. Thomsen Innovation Award for Cultural Change for her research in leveraging social media for large-scale disaster response during Hurricanes Harvey and Irma.

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## PANEL ABSTRACT

The 11th Maritime Risk Symposium is primed and positioned well to discuss the emerging challenges and opportunities to mitigate threats and vulnerabilities in the MTS. Across the world, 2020 has been challenged with COVID-19, and we have observed that no sector or industry is immune to disruptions. Whether disruptions are artificial or natural, or a combination, we have seen transportation sectors, maritime included, particularly susceptible. Given the global dependency of the MTS and the new combined risks of cybersecurity and COVID-19, this moderated panel will feature three experts who will share their experiences, research, and thought leadership on a range of emerging issues facing the MTS.

In terms of both national security and economic prosperity, having a resilient Maritime Transportation System is vital. Maritime commerce accounts for more than \$4.5 trillion annually in economic activity. It is the lifeline for the global supply chain, yet it is a vast network of operations that is virtually hidden from the general population. According to the U.S. Coast Guard, approximately 90 percent of American imports and exports occur by commercial vessels. In fact, it is estimated that within the next five years, the global demand for maritime commerce in critical sectors will double. Due to the unique threats and challenges, new MTS research, regulations, and legislation continues to

expand to address the ever-increasing complexities in this domain.

Cybersecurity threats facing the maritime transportation system will have a cascading impact to the domestic and global supply chain. Although it is not well known to the general public, the Coast Guard plays a vital role in mitigating cybersecurity threats in the MTS. The U.S. Coast Guard is the lead federal agency designated to protect the MTS. As the primary regulator of the maritime industry, the Coast Guard is focused on managing risks to critical infrastructure. The Coast Guard accomplishes this through promoting unity of effort among stakeholders in the MTS. The Coast Guard also coordinates efforts with the newly established Cybersecurity and Infrastructure and Security Agency (CISA) at the Department of Homeland Security.

Emerging technologies and an expanding cyber threat landscape pose unique challenges to the MTS and port systems are fast becoming more digitized. This digitalization significantly increases operational risk because it can be exploited intentionally, or be disrupted unintentionally resulting in serious harm, injury, death, or vital disruption to trade. And given the COVID-19 pandemic, we can see even more clearly the direct links to the importance of a resilient supply chain in times or emergencies. From a commercial and regulatory

# PANEL 4: MARITIME RESILIENCE AND CYBER SECURITY

## PANEL ABSTRACT, CON'T

perspective, it is no longer feasible to assume or rely on IT cyber solutions as adequate risk mitigation for cyber incidents to operational systems. Vessels. The U.S. Coast Guard, however, continues to aim toward driving the modernize to manage risk in the MTS, optimize navigation systems, and enhance regulatory frameworks.

To solve the complexity of cybersecurity challenges facing the MTS, a transformation of thinking, collaboration, workforce capacity, and traditional partnerships is needed. Even though the U.S. Coast Guard has published new guidelines for addressing risks in the MTS, there must continue to be solutions that collectively provide a robust range of risk management against different types of cyber incidents. These innovative solutions from the Coast Guard and maritime partners are being developed, evaluated, tested each day through research, testbeds, and policy. Highlighted examples of such solutions and potential solutions are featured by the panelists.

Professor Kevin Jones, University of Plymouth, is fully immersed in exploring the full range of cyber-related risk factors in maritime environments and the trade-offs with different assessment tools and frameworks. His research charts a new course for enhanced maritime cybersecurity. Professor Jagruti Sahoo, South Carolina State University, is a senior member of IEEE whose publications in cybersecurity and its nexus to transportation systems, smart technology, and disaster response offers a richness to the maritime risk discussion. Zac Staples, CEO of Fathom5 and former

Navy officer, understands the importance of securing our digital future. Whether developing cyberphysical testbeds or rapid prototyping, he is on the leading edge of “industry 4.0” solutions. Lastly, future research questions are proposed and will be explored during and after the panel.

1. Are there any implications of the COVID-19 pandemic on cyber incident response in the MTS?
2. Is there applicability of cybersecurity research in non-maritime fields to address maritime cyber risk?
3. Is there a relationship between access to research testbeds and career interests amongst under served populations?

This panel is moderated by Dr. Kimberly Young-McLear, who is dual serving in the U.S. Coast Guard and detailed to the Cybersecurity and Infrastructure Security Agency (CISA). She will draw upon her enterprise-level experience in cybersecurity, disaster response management, and systems engineering to generate thought-provoking dialogue with each of the panelists. This interactive panel will explore new ways to increase and strengthen partnerships across academia, government, and private sector, to include sharing best practices and drawing upon the experiences of audience members in attendance.

# PANEL 4: MARITIME RESILIENCE AND CYBER SECURITY

## PANELISTS



### **MR. ZAC STAPLES**

*Founder & CEO, Fathom5*

Zac Staples is the CEO of Fathom5. Prior to creating Fathom5 Zac spent 22-years in the United States Navy as a surface officer specializing in electronic warfare. Zac's final tour was Director of the Center for Cyber Warfare at the Naval Postgraduate School where he led interdisciplinary research teams that explored cyber capability development and invented maritime artificial intelligence tools and methodologies for understanding shipboard electronic security. While at the Naval Postgraduate School, Zac also created HACKtheMACHINE, nicknamed the "Blue Angels for Geeks", which seeks to inspire a new generation of technical talent to apply their skills to national security challenges. Zac holds a B.S. in engineering from the U.S. Naval Academy, a Masters in National Security Affairs from the Naval Postgraduate School, and is a distinguished graduate of the Naval War College.



### **PROF. KEVIN JONES**

*Executive Dean, Faculty of Science and Engineering  
University of Plymouth*

Professor Kevin Jones is the Executive Dean of Science and Engineering at the University of Plymouth, and the head of the Cyber-SHIP lab. Prior to joining Plymouth, he was Head of Computer Science at City University London and had previously spent a number of years in the Silicon Valley. His research and teaching interests cover the Trustworthiness of Complex Systems, including Cyber Security, with a focus on the Maritime domain. Kevin is a Fellow of the IMARest, IET and the BCS, and a Liveryman of the WCIT.



### **DR. JAGRUTI SAHOO**

*Assistant Professor  
South Carolina State University*

Dr. Jagruti Sahoo is an Assistant Professor of Computer Science in South Carolina State University, South Carolina, USA. She received her Ph.D. degree in computer science and information engineering from National Central University, Taiwan, in 2013. She was a Post-Doctoral Fellow with University of Sherbrooke, Canada, and Concordia University, Canada. Her research interests include internet of things, cyber security, vehicular networks, content delivery networks, cloud computing, and network functions virtualization. Dr. Sahoo served as a member of the technical program committee in many conferences and as a reviewer for many journals and conferences. She is a senior member of IEEE.

# PANEL 5: INLAND WATERWAYS – GREAT LAKES RESILIENCY



## **Panel Chair/Moderator**

### **DR. CRAIG PHILIP**

*Research Professor and VECTOR Director  
Vanderbilt University*

Dr. Craig Philip is Research Professor of Civil and Environmental Engineering at Vanderbilt University, and Director of Vanderbilt's Transportation Center (VECTOR).

Dr. Philip's research focus is on Maritime Systems including infrastructure sustainability, and the application of risk management tools to transportation systems, carrier safety management, and transport policy. Prior to joining Vanderbilt he was President/CEO of Ingram Barge Company, the largest US marine transport carrier. In addition to Ingram, Philip's career included work in the rail and intermodal sectors for Conrail and Southern Pacific Railroad.

He is currently Vice Chairman of the National Academy of Science's Marine Board, and on the Boards of the

National Waterways Foundation and the Seamen's Church Institute. He has served as Chairman of multiple maritime groups including the AWO, NWC and NWF, was a US Commissioner of PIANC, Chaired the US Chamber of Commerce's Transportation and Infrastructure Committee and was a founding member of USDOT's National Freight Advisory Committee and the Marine Transportation System National Advisory Committee.

Dr. Philip earned his doctorate in Civil Engineering from MIT and his bachelor's degree from Princeton. He is a Board Certified member of the American Academy of Environmental Engineers and Scientists, and a member of the National Academy of Engineering.

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## **PANEL ABSTRACT**

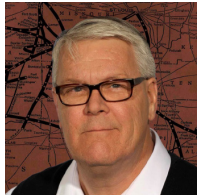
Inland networks differ in many ways from other maritime systems, but particularly when viewed through a maritime lens two key characteristics are crucial: inland systems are often characterized by a linear topography and exhibit non-redundant functionality. Additionally, in the United States, ownership and management is both centralized and de-centralized. The inland system is primarily owner centric in ownership and management of the infrastructure (locks, dams, dikes and levees) by large governmental and quasi-governmental agencies. Meanwhile, the ownership and operation of the ports and terminals are often decentralized and privately managed, with some ports

simply being a collection of independent terminals and other facilities.

This panel will engage with three prominent researchers who have been deeply involved in recent projects that have explored various aspects of inland maritime system resilience. The first will look at inland resilience in the context of a broad examination of supply chain disruptions, the second will compare resilience analysis approaches that have been applied to inland maritime systems around the world, and the final contributor will look specifically at the Illinois waterway and particularly issues of modal competitiveness.

# PANEL 5: INLAND WATERWAYS – GREAT LAKES RESILIENCY

## PANELISTS



### **DR. MARK BURTON**

*Interim Director, Appalachian Transportation Institute  
Marshall University*

Mark Burton was awarded a Ph.D. in economics from the University of Tennessee in 1991. His professional career has included both academic and consulting research in the areas of regional, transportation, and telecommunications economics. In addition to authoring numerous articles and monographs, Dr. Burton has provided testimony in connection with a variety of judicial and regulatory proceedings. After a 15-year term at the University of Tennessee's Center for Transportation Research, Professor Burton has recently renewed his association with Marshall University's Appalachian Transportation Institute where he currently serves as Interim Director.



### **DR. MICHAEL MEYER**

*WSP Consultant and Study PI*

Dr. Michael Meyer is a strategic advisor for WSP, Inc. and has held executive positions in state government and academia. He has conducted over \$40 million in research primarily in transportation policy and planning. He has written 31 books/book chapters and published over 300 articles on these topics. Over the last 10 years, he has focused his research and studies on transportation system resilience with particular attention on extreme weather impacts on system performance, and over the long-term potential implications of climate change on the nation's transportation system. He has received numerous professional awards for his service to the profession and research community. In 2006, he was chairman of the Executive Committee of the Transportation Research Board.



### **MS. KATHERINE CHAMBERS**

*Research Scientist, ERDC  
US Army Corps of Engineers*

Katherine Chambers is a research scientist with expertise in analytical approaches to resilience and the marine transportation system. For the past 6 years, she has focused on studying the concepts of resilience as they pertain to the marine transportation and emergency response business lines of the U.S. Army Corps of Engineers. She is an active member of several international working groups on the marine and inland transportation system and a young member of the Transportation Research Board Ports and Harbors Committee, and co-leads an interagency team entitled the Resilience Integrated Action Team as a part of the U.S. Committee on the Marine Transportation System. Katherine has an MS from Purdue University's Ecological Science and Engineering Interdisciplinary Program and a BS from Wittenberg University.



# PANEL 6: LESSONS FROM RECENT DISASTERS



## Panel Chair/Moderator

### DR. HENRY WILLIS

*Director, Homeland Security Operational Analysis Center  
RAND, Corp.*

Henry H. Willis is director of the Homeland Security Operational Analysis Center (HSOAC) Strategy, Policy, and Operations Program; a senior policy researcher at the RAND Corporation; and a professor of policy analysis at the Pardee RAND Graduate School. He is a recognized expert in homeland security risk management. Recent work analyzes terrorism warning indicators; border security efforts; critical infrastructure resilience; and national preparedness to chemical, biological, nuclear, and radiological attacks.

Willis is an active contributor to policy research having served as the risk management research theme leader at the DHS Center for Risk and Economic Analysis of Terrorist Events at the University of Southern California and as a principal investigator at the DHS National Center for Border Security and Immigration at the University of Arizona. Through his work he testified

before Congress; served on several committees of the National Academy of Sciences; advised government agencies across the United States, Europe, Australia, and the United Arab Emirates; and published dozens of journal articles, reports, and op-eds on applying risk analysis to homeland security policy. Willis is the treasurer of the Society for Risk Analysis and has served on the editorial board of the international journal Risk Analysis.

His work in homeland security policy evolved from his work on program evaluation at the White House Office of Management and Budget and infrastructure design as a water and wastewater engineer. He earned his Ph.D. in engineering and public policy at Carnegie Mellon University.

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## PANEL ABSTRACT

The maritime sector is challenged to remain resilient against numerous disasters, attacks, and accidents. The last several years demonstrate the variety of events that could challenge the sector. Whether it is hurricanes (e.g. Harvey, Irma, and Maria), cyber-attacks (e.g., the NotPetya disruption to Maersk); oil spills (e.g., Deepwater Horizon), or even the disruptions from the on-going COVID-19 pandemic; the maritime sector must respond, adapt, and recover to maintain resilience when confronted with extreme events. As challenging as the events of the last few years have been, geologic history tells us that worse events could happen. National-level exercises have tested response and recovery to extreme events that we have been fortunate enough to not experience in modern time such as the New Madrid earthquake or a solar storm affecting a wide area of the U.S. These are just a few events among countless disaster scenarios that the maritime sector must be

resilient to. Fortunately, we can learn from experience and if there is a silver lining, the last few years provide lessons on how disasters challenge the maritime sector, what promising steps the sector can take in response, and what questions the sector should answer as it seeks to be more resilient. This session of the 2020 Maritime Risk Symposium will focus on these issues by drawing on lessons from research, the private sector, and the USCG. Our speakers; Aaron Davenport (senior policy researcher, RAND), Jennifer Carpenter (President and CEO, The American Waterways Operators), and Captain Jason Smith (Sector Commander, Sector Houston — Galveston; USCG) will share insights from their work and experiences with recent natural disasters to improve resilience of the maritime sector.

# PANEL 6: LESSONS FROM RECENT DISASTERS

## PANELISTS



### **MS. JENNIFER CARPENTER**

*President and CEO, American Waterways Operations*

Jennifer A. Carpenter serves as President & CEO of The American Waterways Operators (AWO), the national trade association representing the inland and coastal tugboat, towboat, and barge industry.

Ms. Carpenter joined AWO in August 1990 and became President & CEO in January 2020. Before assuming her current position, she worked her way up the hawsepipe from Government Affairs Assistant to Executive Vice President & Chief Operating Officer, holding a series of progressively responsible positions including Manager-Regulatory Issues, Director-Government Affairs, Vice President-Government Affairs, Senior Vice President-Government Affairs & Policy Analysis, Senior Vice President-National Advocacy, and Executive Vice President. She served for 13 years as a member of the congressionally authorized Towing Safety Advisory Committee. She has received two Meritorious Public Service Awards and a Public Service Commendation from the U.S. Coast Guard for her contributions to the Towing Safety Advisory Committee and the Coast Guard-AWO Safety Partnership.

Ms. Carpenter holds a B.S. in international relations, law and organization from Georgetown University, an M.S. in conflict analysis and resolution from George Mason University, and was a Georgetown University China Studies Fellow at National Chengchi University in Taipei, Taiwan. A native of St. Louis, Missouri, Ms. Carpenter resides in Alexandria, Virginia, with her family.



### **CAPT. JASON SMITH**

*Sector Commander, Sector Houston – Galveston, US Coast Guard*

Captain Jason Smith assumed the duties of Commander, Coast Guard Sector Houston - Galveston in 2020. As Sector Commander, CAPT Smith serves as Captain of the Port, Officer-in-Charge of Marine Inspection, Federal Maritime Security Coordinator, and Federal On-Scene Coordinator and coordinates maritime safety and security, environmental protection, search and rescue, waterways management, and contingency planning operations for the navigable waterways from the east bank of the Colorado River in southwest Texas to 60 miles east of Lake Charles, Louisiana and 200 miles offshore to the seaward extent of the U.S. This area responsibility encompasses 5 of the nation's 20 busiest ports including Houston, Beaumont, Lake Charles, Texas City, Port Arthur, Freeport and Galveston.

CAPT Smith has held numerous field and staff assignments specializing in marine safety, security, and environmental compliance. He received his active duty commission with the Coast Guard in 1996 after serving as an enlisted reservist for 3 years.

CAPT Smith is a 1996 graduate of Maine Maritime Academy with a B.S. in Marine Transportation and a 2007 graduate of the University of Maryland with a M.S. in Systems Engineering and Reliability/Risk Engineering. He is a certified Project Management Professional (PMP) and Type 1 Incident Commander. His personal awards include four Coast Guard Meritorious Service Medals, four Coast Guard Commendation Medals, Military Outstanding Volunteer Service Medal, and other unit and team awards.

# PANEL 6: LESSONS FROM RECENT DISASTERS

## PANELISTS, CON'T



### **MR. AARON DAVENPORT**

*Senior Policy Researcher  
RAND, Corp.*

Aaron Davenport is a senior policy researcher at the RAND Corporation. He served as White House Special Advisor for Homeland Security and Counter-Terrorism, serving Vice Presidents Cheney and Biden, and Executive Officer, Counterdrug Operations, US Southern Command. He retired as a senior officer in the US Coast Guard, where he served at sea aboard six ships including command of two large cutters, enforcing international drug trafficking treaties, performing cooperative security assistance, homeland security, maritime law enforcement and joint counterdrug operations throughout the Eastern Pacific, Atlantic, Caribbean and Bering Seas. He possesses decades of experience working cooperatively with several countries addressing security operations, illegal migration, maritime law enforcement and drug interdiction, including Colombia, Central American and Caribbean nations. Davenport completed senior executive fellowships at RAND National Defense Research Institute and Chief of Naval Operations Strategic Studies Group. He holds a Bachelors in Marine Sciences from the USCG Academy, and a Masters in Science in Environmental Sciences, with a certificate in Industrial Hygiene and a Minor in Hazardous Materials from UCLA. He recently served as an international expert panel member and paper presenter at the 2019 NATO Science for Peace and Security Programme, Advanced Research Workshop on Counterterrorism. Earlier research and analysis includes assessing border security efficacy in Northern Africa, the Caucasus, and an assessment of the USCG counterdrug program strategy, policy and metrics. He has written for several publications within the national and homeland security arena and is an expert on maritime and border security.

# PANEL 7: ENERGY RESILIENCE IN THE MARITIME SECTOR



## **Panel Chair/Moderator**

### **DR. KRISTIN LEWIS**

*Principal Technical Advisor for Energy Analysis & Sustainability  
US Department of Transportation Volpe Center*

Dr. Kristin Lewis is the principal technical advisor for energy analysis and sustainability at the U.S. DOT Volpe Center. Her work focuses on resilience in transportation; alternative fuel transportation, availability, and sustainability analyses; and environmental risk assessments. Dr. Lewis serves the head research and technical advisor to the FAA-sponsored Commercial Aviation Alternative Fuels Initiative and provides technical expertise to the FAA as a member of the U.N. International Civil Aviation Organization Committee for Aviation Environmental Protection Fuels Task Group and as co-rapporteur of the Sustainability Certification

Scheme Evaluation Group. She leads the development of the Freight and Fuel Transportation Optimization Tool, a national model for assessing optimal transport of commodities in a supply chain, which has been sponsored by the FAA, the Office of Naval Research, the Department of Energy (DOE), and the Federal Highway Administration (FHWA). Dr. Lewis also leads the Tools to Augment Transportation Infrastructure Resilience and Disaster Recovery project for FHWA and the Office of the Secretary of Transportation.

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## **PANEL ABSTRACT**

For centuries, the maritime sector has supported critical supply chains around the globe. Since the industrial revolution, the vast majority of maritime shipping has been undertaken using fossil fuel energy sources. More recently, the maritime sector has begun exploring energy resilience options, including reintroduction of wind power as well as alternative fuels and other options. Energy options are becoming more diverse, and traditional fossil-based energy options are experiencing volatile availability and price issues. And as various climate change and/or carbon cost measures are implemented globally, shipping needs to think proactively about how to position the industry to be

responsive to those changes. Furthermore, the recent pandemic has highlighted the criticality of maritime supply chains and the importance of resilience in maintaining flow of goods and people. This session will focus on the vision for energy resilience in the maritime sector and the importance of energy resilience in contributing to preparedness for black swan events, as well as the challenges and opportunities for investing in energy resilience.

# PANEL 7: ENERGY RESILIENCE IN THE MARITIME SECTOR

## PANELISTS



### **MR. ANDREW STEPHENS**

*Executive Director, Sustainable Shipping Initiative*

Andrew has a truly international background in the maritime industry, working for leading maritime service providers, in the position of Chief Operating Officer, such as Wilhelmsen Ships Service and Wallem Group, in a career which has seen him working in the UK, UAE, USA, Norway and Hong Kong. He was responsible to lead and manage business transformation, continuous improvement, integration and change management programmes, drive strategic planning and implementation consequently delivering on improved customer satisfaction, business performance and efficiency.

After a successful period in both international groups he joined The Sustainable Shipping Initiative in August 2018, where he is responsible for leadership of the Secretariat.



### **MR. ANUJ CHOPRA**

*VP Americans, RightShip*

Anuj leads the RightShip team for the Americas region, focused on providing consistent service managing Safety, operational risk and sustainability of the maritime supply chain for our customers and stakeholders. Passionate to improve maritime “Safety + ESG” for the maritime industry to maintain social equity and social license. He began his seafaring career as a deck cadet working his way up to Captain and holds a Commonwealth Extra Masters Certificate of Competency, and Shipping Management from the Indian Institute of Management, Ahmedabad. Anuj is a Fellow of The Nautical Institute and chairperson of the US Gulf Branch, an active supporter of seafarer welfare as an Ambassador for the Sailor Society, and sits on the Board of Directors of the Houston International Seafarers Center. He was elected President of the Industry Advisory Board for the Supply Chain & Logistics Technology Degree at University of Houston, and on the Board (and Treasurer) of NAMEPA – North American Marine Environment Protection Association. Anuj became a member of NOAA’s Hydrographic Services Review Panel at the beginning of 2019.



### **CDR KATE HIGGINS-BLOOM**

*Director of the Coast Guard’s Strategic Foresight Initiative - “Project Evergreen”  
US Coast Guard*

Commander Kate Higgins-Bloom is the Director of Project Evergreen, the U.S. Coast Guard’s strategic foresight initiative. Kate’s previous staff tours include White House Fellow and Acting Chief of Staff DHS Office of Legislative Affairs. She has held a variety of operational leadership roles, including Command Center Chief and SAR Mission Coordinator for Sector Hampton Roads, Incident Management Chief for Sector Boston, and Commanding Officer of USCGC BARANOF. Over the course of those tours, Kate specialized in leading complex security, inter-agency crisis response, and search and rescue operations. She has deployed throughout the Caribbean, Eastern Pacific, the Arabian Gulf; and to numerous domestic responses, including Hurricane Katrina.

Kate holds a Bachelor of Science in Civil Engineering from the U.S. Coast Guard Academy and a Master of Public Administration from the Harvard Kennedy School of Government. She also served as a Federal Executive Fellow at the Brookings Institution and is a member of the 2020-2021 cohort of MIT Seminar XXI.

# PANEL 7: ENERGY RESILIENCE IN THE MARITIME SECTOR

## PANELISTS, CON'T



### **MR. DANIEL GENT**

*Energy & Sustainability Manager, United European Car Carriers*

Joining the merchant marine at 16, Daniel Gent has been involved in shipping for nearly 20 years. First employed as a deck cadet with Maersk before entering the bunker industry with Miami-based World Fuel Services as a Bunker Broker and physical supplier. In 2008, Daniel moved to Norwegian shipping company United European Car Carriers as their Bunker Purchaser. Since the start of 2020, he has worked as the Energy and Sustainability Manager, heading up projects relating to new fuels and taking overall responsibility for the fleet energy mix.

# PANEL 8: WRAP UP



## Panel Chair/Moderator

### **MR. CHRISTOPHER DOANE**

*Strategic Planning Officer, Assistant Division Chief  
US Coast Guard Atlantic Area*

Mr. Doane serves as the Senior Strategic Planner and Assistant Division Chief for Resources at U.S. Coast Guard Atlantic Area in Portsmouth, VA. Atlantic Area has operational responsibility for the execution of Coast Guard missions across a hemispheric area of responsibility from the Rockies to the Arabian Gulf. As the command's Deputy Chief Financial Officer and strategist, Mr. Doane's work includes the development and implementation of the Area Commander's various strategic plans and using these plans as he participates in building and executing the Coast Guard's current and future budgets. He also serves as the U.S. Coast Guard

Chair at the Joint Forces Staff College, Norfolk, VA. He has been with the Coast Guard for over 38 years as a military officer and civil servant.

Mr. Doane holds a Master of Arts in National Security and Strategic Studies from the U.S. Naval War College, a Master of Science in Ocean Engineering from the University of New Hampshire, and a Bachelor of Science in Biological Technology from the University of Maine at Machias. He has written extensively on maritime security topics providing articles for a variety of national and international periodicals and text books.

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## PANELISTS

MRS CHAIR:

### **PROF. DAVID NICOL**

*Director, ITI, University of Illinois*

PANEL 1:

### **CAPT. TODD BONNAR**

*Branch Head, Combined Joint Operations from the Sea Centre of Excellence (CJOS COE)*

PANEL 2:

### **CAPT. DAVID MOSKOFF**

*Professor and USCG Unlimited Master Mariner  
United States Merchant Marine Academy*

PANEL 3:

### **DR. JOAN MILESKI**

*Dept. Head of Maritime Business  
Administration  
Texas A&M University at Galveston*

PANEL 4:

### **DR. KIM YOUNG-MCLEAR**

*DHS CISA*

PANEL 5:

### **DR. CRAIG PHILIP**

*Research Professor and VECTOR Director  
Vanderbilt University*

PANEL 6:

### **DR. HENRY WILLIS**

*Director,  
Homeland Security Operational Analysis Center  
RAND, Corp.*

PANEL 7:

### **DR. KRISTIN LEWIS**

*Principal Technical Advisor for Energy Analysis  
& Sustainability  
US Department of Transportation Volpe Center*

Introducing

# PROJECT EVERGREEN

The Evergreen Program is the Coast Guard's Strategic Foresight Initiative, tasked with looking over-the-horizon to inform current planning and better prepare the Coast Guard for an uncertain and unpredictable future. Using scenario-based exercises and workshops involving a diverse group of stakeholders, common strategic needs or key success factors can be identified across multiple plausible scenarios to better inform long-term strategic planning efforts.

Evergreen@MRS2020 is a joint venture that combines strategy and foresight with the greater maritime community of seasoned industry professionals, academic centers and national labs, maritime students, and government/NGO regulatory bodies. This year's event, hosted virtually, participants examine one of four future scenarios and identify tomorrow's maritime infrastructure vulnerabilities and their implications to prosperity and security.

The teams are a balance of diversity of experience, combining students and professionals in an interactive workshop designed to drive multi-disciplinary perspectives and strategic thinking.

Evergreen will be held Thursday, October 29 from 1:00 p.m. – 4:00 p.m. Central Time and concluding on Friday, October 30 from 10:00 a.m. – 12:00 p.m. Central Time.

For information regarding Evergreen and future workshops please contact Ryan Hawn at [Ryan.D.Hawn@uscg.mil](mailto:Ryan.D.Hawn@uscg.mil).



About

# MRS 2021

The 2021 Maritime Risk Symposium will be held November 2-4, 2021 at the Hilton University Houston. The Symposium will be hosted by the University of Houston. For information regarding MRS 2021, please contact Kevin Clement ([kclement@Central.UH.EDU](mailto:kclement@Central.UH.EDU)).