

<b>MONDAY, AUGUST 20</b>		<b>CRESTONE A</b>
		<b>RESILIENCE ENGINEERING ASSOCIATION</b> Chair: Elizabeth Lay
	1:30-5:00	Invited Speakers
		<b>CRESTONE FOYER</b>
	5:30-7:00	Registration and Sponsored Reception

<b>TUESDAY, AUGUST 21</b>		<b>CRYSTAL B/C</b>		
	7:30	Registration and Full Breakfast		
	8:00	<b>Sponsor Welcome and Governor/Plenary Introduction</b>		
	8:10	<b>Resilience Week Welcome</b>		
	8:30-9:30	<b>Plenary:</b> Vilas Mujumdar, ASCE Board of Direction and Northeastern Global Research Institute		
		<b>CRYSTAL B/C</b>		<b>CRESTONE B</b>
		<b>COOPERATIVE RESEARCH IN THE 21ST CENTURY</b> Chair: David Manz, PNNL	<b>CYBER NEEDS AND CURRENT TECHNOLOGIES</b> Chairs: Nadia Carlsten, DHS S&T; Craig Rieger, INL	<b>INFRASTRUCTURE</b> Chairs: David Alderson, NPS; Cherrie Black, INL
	9:30-10:30	<b>Keynote:</b> Doug Maughan, Director, DHS S&T		<b>Panel:</b> Sandia City Planning Methodology Implementation Results at U.S. Cities <b>Moderator:</b> Bobby Jeffers, SNL
	10:30	<b>Morning Break</b>		
		<b>CRYSTAL A</b>	<b>CRESTONE A</b>	<b>CRESTONE B</b>
	11:00-12:00	<b>Discussion:</b> Cooperative Research <b>Facilitator:</b> David Manz, PNNL <b>Participants:</b> Dan Massey, CU Boulder TBA	TBA	Lightning Talks
	12:00	<b>No-host Lunch</b>		
		<b>AVOIDING SKYNET</b> Chairs: Julie Marble, JHUAPL; David Scheidt, Weather Gage Tech.	<b>NEW CYBER TECHNOLOGIES</b> Chairs: Nadia Carlsten, DHS S&T; Craig Rieger, INL	<b>INFRASTRUCTURE</b> Chairs: David Alderson, NPS; Cherrie Black, INL
	1:30-3:30	<ul style="list-style-type: none"> <li>• Ariel Greenberg, JHUAPL, "Moral-Scene Assessment by Intelligent Systems"</li> <li>• Andrew Crawford, Victor Walker, and Ron Boring, INL, "Integrating Physiological Hand Resilience into Human Machine Interfaces"</li> <li>• Bill Lawless, "Resilience, teamwork and context: Preventing Skynet 2018"</li> <li>• Julie Marble, JHUAPL, "Platform Assessing Risk and Trust in Non-Economic Relationships"</li> <li>• Mollie McGuire, NPS, "Integrity Based Trust in Autonomy"</li> </ul>	<ul style="list-style-type: none"> <li>• <i>SilentAlarm: Detecting Abnormal Network Traffic</i>, Pacific Northwest National Lab</li> <li>• <i>CPAD: Real-Time Cyber Physical Attack Detection</i>, Oak Ridge National Lab</li> <li>• <i>QUASAR: Strategic Decision Support for Cyber Defense Planning</i>, Massachusetts Institute of Technology – Lincoln Lab</li> <li>• <i>DDNR: Dynamic Defense &amp; Network Randomization for Proactively Protecting Network Control Systems</i>, Sandia National Labs</li> <li>• <i>Dynamic Flow Isolation: Adaptive Access Control To Protect Networks</i>,</li> </ul>	<div style="display: flex; flex-direction: column;"> <div style="margin-bottom: 10px;"> <p style="text-align: center;">1:30-2:30</p> <p style="text-align: center;"><b>Panel:</b> Resilience in Urban Planning</p> </div> <div> <p style="text-align: center;">2:30-3:30</p> <p style="text-align: center;">Lightning Talks: Student Competition</p> </div> </div>

		Massachusetts Institute of Technology – Lincoln Lab	
	<ul style="list-style-type: none"> <li>• <i>Cynash: Protecting Critical Systems with Nature-Inspired Cybersecurity Solutions</i>, Cynash Inc.</li> </ul>		
	<b>CRESTONE FOYER</b>		
	<b>POSTER PRESENTATION</b>	<b>TRANSITION TO PRACTICE DEMONSTRATION</b> Chairs: Nadia Carlsen, DHS S&T	<b>GAMING COMPETITION</b> Chairs: Amanda Joyce, ANL Tim McJunkin, INL
3:30-6:00	Reception with multiple parallel activities		
	Papers accepted for poster only Infrastructure Abstracts	Multiple technologies presented in previous sessions	Capture the Flag Maze Game Grid Game

<b>WEDNESDAY, AUGUST 22</b>	<b>CRYSTAL B/C</b>			
	7:30	Registration and Full Breakfast		
	8:15	Student Competition Winners		
	8:20	<b>Plenary Panelists Introduction:</b> Andy Bochman, Chief Grid Strategist, Idaho National Laboratory-Facilitator		
	8:30-9:30	<b>Plenary Panel:</b> <i>Industry Leader Perspectives on Lifeline Sector Interdependencies and Threat</i> Panelists: Kent Kildow, Director of Business Continuity and Emergency Management, Verizon Ryan Frillman, Chief Information Security Officer, Spire Energy		
		<b>CRYSTAL A</b>	<b>CRESTONE A</b>	<b>CRESTONE B</b>
		<b>CONTROL R&amp;D</b> Chairs: Frank Ferrese, NAVSEA; David Scheidt, Weather Gage Tech.	<b>CYBER R&amp;D</b> Chairs: David Manz, PNNL; Michael Haney, UI	<b>INFRASTRUCTURE</b> Chairs: David Alderson, NPS; Cherrie Black, INL
	9:30-10:30	<ul style="list-style-type: none"> <li>• <i>*C. Birk Jones, SNL, "Intrusion Detection &amp; Response using an Unsupervised Artificial Neural Network on a Single Board Computer for Building Control Resilience"</i></li> <li>• Nicholas Jacobs, SNL, "Measurement and Analysis of Cyber Resilience for Control Systems: An Illustrative Example"</li> <li>• Kateryna Savchenko, INL, "Trouble in Paradise: Mutual Awareness, Teamwork, and Hawaii False Ballistic Missile Alert"</li> </ul>	<ul style="list-style-type: none"> <li>• <i>*Joseph L. Loof, UND, "Unsupervised Classification of Frequency Hopped Signals in Frequency-Selective Channels"</i></li> <li>• Md Sharif Ullah, ODU "Towards Modeling Attacker's Opportunity for Improving Cyber Resilience in Energy Delivery Systems"</li> <li>• Leonardo De La Rosa, UDel, "Efficient Characterization and Classification of Malware Using Deep Learning"</li> </ul>	Lightning Talks
	10:30	Morning Break		
	11:00-12:00	<b>INFRASTRUCTURE R&amp;D</b> Chair: Nii Attoh-Okine, University of Delaware	<b>CYBER R&amp;D</b> Chairs: David Manz, PNNL; Michael Haney, UI	<b>INFRASTRUCTURE</b> Chairs: David Alderson, NPS; Cherrie Black, INL
	<ul style="list-style-type: none"> <li>• <i>*Bjorn Vaagensmith, INL, "An Integrated Approach to Improving Power Grid Reliability: Merging of Probabilistic Risk Assessment with Resilience Metrics"</i></li> <li>• Abdulaziz Alqahtani, UPitt, "Locating Microgrids to Improve Smart City Resilience"</li> </ul>	<ul style="list-style-type: none"> <li>• Reynaldo Nuqui, ABB, "A Collaborative Defense for Securing Protective Relay Settings in Electrical Cyber Physical Systems"</li> <li>• Vivek Kumar Singh, ISU, "A Hierarchical Multi-Agent Based Anomaly Detection for Wide-Area Protection in Smart Grid"</li> <li>• Sri Nikhil Gupta Gouriseti, PNNL, "A Cyber Secure Communication Architecture for Multi-Site Hardware-in-the-Loop Co-Simulation of DER Control"</li> </ul>	<b>Panel:</b> <i>FEMA Virtual Technical Assistance to Communities and States</i> <b>Moderator:</b> <b>Panelists</b> Kyle Pfeiffer, ANL Carol Freeman, ANL Karen March, FEMA	

	<b>CRYSTAL B/C</b>		
12:00	<b>Hosted Lunch</b>		
12:25	<b>Plenary Introduction</b>		
12:30	<b>Hosted Lunch with Plenary:</b> Mark Weatherford, SVP & Chief Cybersecurity Strategist, vArmour		
	<b>CRYSTAL B/C</b>		<b>CRESTONE B</b>
1:30-2:30	<b>Keynote:</b> Jeff Taft, Grid Modernization Chief Architect, PNNL		<b>Panel:</b> <i>Risk Communication for Mitigation and Resilience Implementation Efforts</i> <b>Moderator:</b> Ellie Graeden, Talus Analytics <b>Panelists</b> Shayle Nelson, Larimer County Office of Emergency Management Stephen Cauffman, NIST Hussam Mahmoud, CSU Molly O'Donnell, Disaster Recovery Project Longmont, Colorado
	<b>CRYSTAL A</b>	<b>CRESTONE A</b>	<b>CRESTONE B</b>
	<b>COGNITIVE R&amp;D</b> Chairs: Roger Lew, UI; Ron Boring, INL	<b>CYBER R&amp;D</b> Chairs: David Manz, PNNL; Michael Haney, UI	<b>INFRASTRUCTURE</b> Chairs: David Alderson, NPS; Cherrie Black, INL
2:30-3:30	<ul style="list-style-type: none"> <li>Arif Sarwat, FIT, Developing a Tri-Modular Framework to Improve Human Performance through Intelligent Visualization for Smart Grid Cybersecurity</li> <li>David A. Grimm, GTech, "Systems Level Evaluation of Resilience in Human-Autonomy Teaming under Degraded Conditions"</li> </ul>	<ul style="list-style-type: none"> <li>Will Nichols, UTul, "Methodology to Estimate Attack Graph System State from a Simulation of a Nuclear Research Reactor"</li> <li>Sri Nikhil Gupta Gouriseti, PNNL, "Blockchain: Next Generation Supply Chain Security for Energy Infrastructure and NERC Critical Infrastructure Protection (CIP) Compliance"</li> </ul>	Lightning Talks
3:30	<b>Afternoon Break</b>		
		<b>COMMUNICATIONS R&amp;D</b> Chairs: Krishna Kant, Temple U., Gurdip Singh, SU	<b>INFRASTRUCTURE</b> Chairs: David Alderson, NPS; Cherrie Black, INL
4:00-5:00		<ul style="list-style-type: none"> <li>Joe Loof, UND, "Preamble-Free Binary Polarization Shift Keying in Frequency Selective Channels"</li> <li>Daniel Sullivan, ARL, "Mission Resilience For Future Army Tactical Networks"</li> </ul>	<b>Panel:</b> <i>Owners and Operators Addressing Infrastructure Risk and Resilience (Lifeline Sectors)</i> <b>Moderator:</b> Eliza Hotchkiss, NREL <b>Panelists</b> Matt Ziska, Xcel Energy; Steve Kuhr, Colorado Springs Utilities; Becky Franco, Denver Water; Kelly Morrison, AT&T Disaster Recovery; Joseph O'Keefe, DHS Protective Security Advisor – Colorado
5:00-5:30			
5:30	Adjourn Meetings		
	<b>HENRY'S TAVERN, 500 16<sup>TH</sup> STREET</b>		
6:30-8:30	Sponsored Reception Highlighting Best Papers		

\*Best Paper in Topical Area (3)



THURSDAY, AUGUST 23		<b>CRYSTAL B/C</b>		
	7:30	Registration and Continental Breakfast		
	8:25	<b>Plenary Introduction</b>		
	8:30-9:30	<b>Plenary:</b> John Garstka, Deputy Director, Cyber, Office of the Under Secretary of Defense		
		<b>CRYSTAL A</b>	<b>CRESTONE B</b>	
		<b>COMMUNITY</b> Chair: Kathleen Tierney, UColorado	<b>INFRASTRUCTURE</b> Chairs: David Alderson, NPS; Cherrie Black, INL	
	9:30-10:30	<b>Keynote</b>	<b>Keynote:</b> David Alderson, NPS, "Attacker-Defender Models for Assessing and Improving Infrastructure Resilience"	
	10:30	<b>Morning Break</b>		
	11:00-12:30	Kathleen Tierney, UColorado TBA	<b>RRAP Session:</b> Introduction & Lightning Talks	
	12:30-1:30	<b>No-host Lunch</b>		
	1:30-2:30	Panel	DOE Multi-state Energy Assurance Effort	
		<b>COGNITIVE</b> Chair: Ron Boring, INL; Tim McJunkin, INL	<b>INFRASTRUCTURE</b> Chairs: David Alderson, NPS; Cherrie Black, INL	
	2:30-4:00	<b>Panel:</b> <i>Case Studies on the Application of Cognitive and Social Sciences to the Cyber-Physical World</i> <b>Moderator:</b> Tim McJunkin, INL <b>Panelists</b> Katya LeBlanc, INL Phil Bennett, SNL Tom Ulrich, INL Aunshul Rege, Temple David Manz, PNNL	<b>Panel:</b> <i>Region 8 Risk Forum – Earthquake (Wasatch Front)</i> <b>Moderator:</b> Kathleen Tierney, UC-Boulder <b>Panelists</b> Scott Behunin, DHS CPS, Region 8; Russ Pascua, WAPA; Kathryn McMullin, Department of Public Safety	
	4:00	Adjourn Symposium		
4:30	No-host Social			

\*Best Paper in Track

NATIONAL RENEWABLE ENERGY LABORATORY

Chair: Martha Symko-Davies  
Logistics: Heather Newell, Denise Barber

FRIDAY, AUGUST 24

9:00-  
12:00

**Tours at NREL:** The [Energy Systems Integration Facility \(ESIF\)](#) provides a unique contained and controlled platform on which our partners can identify and resolve the technical, operational, and financial risks of integrating emerging energy technologies into today's environment. [CLICK HERE TO REGISTER!](#)