Panel 9, PHM Society Conference 2023

General Dave Bryan (US Army Ret.) Chairman of E3S' Board

Panelist

Mark Walker, E3S' Director of AI & Autonomous Operations

Moderator

Karl Reichard Associate Research Professor Penn State College of Engineering

Panelist

Dr. Bruno P Leao, Senior Researcher with Siemens Technology

Panelist

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ENTERPRISE SOLUTIONS

Moving Towards Cybersecurity and PHM Synchronicity

Panel 9: Moving Towards Cybersecurity and PHM Synchronicity

Objective

To initiate discussion on the synchronous roles of Cybersecurity and PHM, and the value they add together with proactive and practical inputs. To discuss how coordinated action can lead to greater precision and higher efficiency in resolution, thus impacting the final service output for the customer.

Panel 9: Moving Towards Cybersecurity and PHM Synchronicity

E3S' Perspective

We must be aware of the heightened risks of connectivity; these risks are even more acute in some of the industries served by PHM such as the nuclear plants, gas industries, power plants, food, and pharmaceutical manufacturing. Cybersecurity practices policies and compliances, when carefully coordinated and synchronized so that they become an integrated or critical component of PHM actions, can work to assure the PHM capabilities are appropriately secure. Whether there are system gaps in the connectivity or susceptibility to kinetic warfare similar that which what emerged from Russia during the Ukraine war, we need to be technically vigilant and proactive by innovating to mitigate the risks.

Deliberate actions to combine Cyber and PHM solutions have the power to play a critical role in securing our nation's critical infrastructures.

Panel 9: Moving Towards Cybersecurity and PHM Synchronicity

E3S' Perspective

E3S believes that emphasis should be placed on that increased importance of Cybersecurity Posture that PHM's target industries, (as well as other industries in general) need to be thinking about and implementing for their plants and systems. Similarly, PHM is looking at the data and the fault tolerances to detect or predict some type of maintenance failure that may happen, efficiency in this area can be improved with 'Advanced Cybersecurity' systems, platforms, monitoring, policies, and actions. We note that the systems and things that they're trying to predict around are the same type of systems that would be attacked in kinetic warfare to give an organization or another country the advantage.

Panel 9: Moving Towards Cybersecurity and PHM Synchronicity

Discussion Points

1. Nexus between the two disciplines & systems that are involved:- Cyber + PHM aware system design & Analytics.

2. Importance of Cyber-secure practices given the critical infrastructure that PHM services- how should even start to consider/incorporate Cyberhealth of components to be a part of the overall health of a system.

3. How the failure to optimize a synergy of Cyber-PHM could impact locally and internationally in wartime considering the higher probability incidences of cyberwarfare being an active part of the tactics – from infrastructure to 'cloud'.

4. How a data heavy discipline like PHM can benefit from the protective barrier guaranteed by Cybersecurity's rigorous data architecture that drives PHM's detailed data monitoring and proactive processes that protect that data.

5. The Heavy PHM data ingestions for analysis can be even more efficient if it can use the same data sets and build on top of them to find trend analyses that point to Cybersecurity problems/intrusions.

6. With use case development and knowing – leveraging a SIEM tool like Splunk to increase the security posture, in addition leveraging and integrating the data with a workflow; leveraging ITSI, knowing the KPIs that you should be monitoring. Add to that the Mitre Attack Framework that would be included in a notable event.

Mark Walker,
E3S' Director of AI & Autonomous Operations
Moderator

Mark Walker's experience in Artificial Intelligence began in 1989 as a DOE Undergraduate Fellow at the Center for Engineering and Science Advanced Research Lab at Oak Ridge National Laboratory where he developed image processing and perception software for autonomous robots.

Mr. Walker's work with AI continued in the application of Health and Usage Monitoring Systems, (HUMS) and Prognostic Health Management (PHM). Mark pioneered work in this field beginning in 1996 with BF Goodrich Aerospace, Vergennes, VT, where he developed onboard health and state estimation algorithms for the Joint Strike Fighter and co-authored four patents in applied artificial intelligence. He also spent six (6) years as Senior Consulting Engineer for expert system manufacturer Gensym Corporation, applying artificial intelligence and data analytics solutions to U.S. Government and commercial industrial mission critical situation awareness (SA) applications.

Mark also served for 10 years as Lead Engineer, Intelligent Systems for General Atomics, where he led GA in the development of AI projects and reusable AI-powered Prognostics and Health Management systems applied to various industries, including U.S. Army UAV's and U.S. Navy's Aircraft Launch and Recovery Equipment. He also serves as a PHM and Autonomous Operations SME for NASA, with active projects at SSC and JSC.

Mark is currently the Director of AI and Autonomous Operations at End to End Enterprise Solutions, leading both their AI and R&D Divisions. He holds a BSEE from Cal Poly University, Pomona (1990), and a MSc CompEng from the University of Southern California, Los Angeles, CA (1994), where he specialized in machine intelligence.

General Dave Bryan (US Army Ret.) Chairman of E3S' Board
Panelist

General Dave Bryan is the Strategic Advisor and Chairman of the Board of End to End Enterprise Solutions (E3S), and President and CEO of Bryan Business Management and Technology. He is a Master Parachutist, Ranger, and Special Forces officer. During his almost 35 years of military service, he served 16 years in Airborne, Special Operations and classified special mission units, as well as numerous other assignments in Asia and Europe.

Selected for Brigadier General, he served as the J-6 and CIO of the US Pacific Command for two years, and then, as a newly selected Major General, was assigned a dual hat role as the Vice Director of the Defense Information Systems Agency (DISA), and the first Commander of the DOD Joint Task Force for Computer/Global Network Operations, the predecessor to today's US Cyber Command.

He authored and initiated a Joint Staff program called "C4I for the Warrior" and coined the terms Network-centricity and Knowledge/Decision- centricity. As the first DOD Title 10 Cyberwarfare Commander, he pioneered cyber operations policy, programs, and operational doctrine.

Upon military retirement, he served initially as the Northrop Grumman Sector Vice President for C4ISR and Space, then moving to Mantech International he served as the President of the Defense Systems Group and Corporate Executive Vice President. After six (6) years in the corporate world, he started his own consulting company, Bryan Business Management and Technology (BBMT) where he assists growth oriented, advanced technology small businesses with successful strategies for aggressive, rapid growth.

General Bryan has a well earned reputation as a futurist and pioneer.

Karl Reichard
Associate Research Professor
Penn State College of Engineering
Panelist

Affiliation(s):

- Applied Research Laboratory

- Acoustics

- Center for Acoustics and Vibration

Interest Areas:

- Active noise and vibration control, Signal processing and pattern recognition, Electro-optics, Machinery condition monitoring, Intelligent sensor development.

Dr. Bruno P Leao,
Senior Researcher with Siemens Technology
Panelist

Dr. Bruno P. Leao is a Senior Researcher with Siemens Technology in Princeton, NJ, USA.

He has over 16 years of experience in R&D of data analytics methods and their application to various industrial domains including power system, manufacturing, rail and aerospace. His topics of interest include equipment/system health monitoring, cybersecurity analytics and the application of data analytics for solving industrial problems in general.

Dr. Leao has over 40 publications and 5 US patents on these topics. He is/has been PI/co-PI of US DOE-funded R&D projects and developed solutions which are employed for continuously monitoring of worldwide fleets of industrial equipment both from the PHM and cybersecurity perspectives.

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Panelist, General Dave Bryan (US Army Ret.)
Chairman of E3S' Board

"My angle will provide some historical context for cybersecurity, prognostics, and network and systems modelling, a perspective of the current scenario, and most importantly, where we are headed in an integrated future."

Moderator, Mark Walker
E3S' Director of AI & Autonomous Operations

"I have been a PHM Society member since inception, and these panel discussions add to knowledge and challenge us to consider and reconsider what we know about PHM. They help to construct the future thought around the topics. I am looking forward to the exchange of ideas.

Panelist, Dr. Bruno P Leao
Senior Researcher with Siemens Technology

"My angle for the discussion is focused on that of Systems and Analytics for Cyber and PHM Integration.

Panelist, Karl Reichard
Penn State College of Engineering

Karl brings a research perspective to the panel

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