ENERGYTECH 2015

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SECURING OUR ENERGY FUTURE
November 30 - December 2
Wolstein Center Conference Pavilion
at Cleveland State University
2000 Prospect Avenue
Cleveland, OH 44115

Sponsored by INCOSE, IEEE, NASA GRC, and PTC
in collaboration with InfraGard, the Cleveland Engineering Society
and CSU Washekewicz School of Engineering
with additional support from IBM and 3SL

Distinguished Presenters and Collaborators

Mike Ahern, Worcester Polytechnic Institute
Dr. Charles Alexander, Washkewicz School of Engineering at CSU Dr. Dr.
Anuradha Annaswamy, MIT
Irv Badr, IBM
Dr. George Baker, James Madison University
Loyd Baker, 3SL
Raymond Beach, NASA
Meyer Benzakein, OSU
The Honorable Andrea Boland
Don Brown, NASA
Stewart Cedres, US Department of Energy
Susan Davis, Cleveland Engineering Society
Gordhan Das Valasai
Mike DeLamare, Bechtel
Dr. Gareth Digby, Vitech
Patrick Doherty, Strategic Innovation Lab at CWRU
James Felder, NASA
Flora Flygt, American Transmission Co.
Robert Garrett, PSG Inc
Neil Garrigan, GE Oil and Gas
Eric Gebhardt, GE Oil and Gas
Dr. Don Gelosh, WPI
Dr. Bradley Glenn, Gridquant Technologies
Dr. William Good, Cameron Group
Kevin Goodman, BlueBridge Networks
Virginia Greiman, Boston University
Asim Haque, PUCO
Matthew Hause, PTC
Michael Heil, Ohio Aerospace Institute
Oliver Hoehne, WSP|Parsons Brinckerhoff
Marija Ilic, Carnegie Mellon
Branndon Kelley, American Municipal Power
Neil Kirby, Alstom
David Long, Vitech
Josh Long, Bechtel
Benjamin Loop, PCKA
Chuck Manto, Instant Access Networks
Jenita McGowan, Sustainable Cleveland
Anne McNelis, NASA
Mark Minnucci, Schneider Electric
Dr. Allen Morinec, First Energy
Jeff Murphy, Dominion East Ohio
John Nairus, Air Force Research Lab
John Ostrich, Department of Energy
Andrew Ott, PJM
Brian Patterson, EMerge Alliance
Thomas Pearce, PUCO
Andrew Ritch, Duke Energy
David J Sadey, NASA
Patrick Shaw, Department Homeland Security
Todd Snitchler, McDonald Hopkins
James Soeder, NASA
Josh Sparber, Defense Contract Management Agency
Zach Summerford, Schweizer Engineering Labs
Beth Trombold, PUCO
Neil Tyrrell, GE
Loren Mark Walker, BCT
Bob Wargo, Reliability First
Joe Weiss, RCS

Letter from the Chair

Welcome to EnergyTech2015, the annual conference in Cleveland, Ohio focused on "Securing our Energy Future". The EnergyTech conference series, now is its 5th year, seeks the convergence of the best minds in public policy, systems engineering, and applied technology to address some of the critical issues of our time.

In the aftermath of the recent hostile events in Paris and the Middle East, we are reminded once again that the enemies of civilized societies are relentless in their pursuit of their radical objectives. In addition to outright terror attacks, there have been numerous, documented efforts to exploit vulnerabilities in our infrastructure, including energy systems. Multiple hostile threat scenarios, including cyber, physical, and electromagnetic sources are now considered possible against our critical infrastructure. Further, the recent release from the White House of a National Space Weather Strategy plan speaks to the continuing risks to our grid from devastating solar flares.

EnergyTech2015 presenters and panelists will take account of the full spectrum of these risk factors on the interconnected grid and the dependent, complex infrastructure systems. With support of our core sponsors INCOSE, NASA, PTC, InfraGard and others, this year's conference elevates the importance of a comprehensive systems approach in dealing with complexity and technology solutions. It also expands the footprint in geographical reach, with attendees from Holland, Spain, Africa, and South America.

We are confident that the broad energy focus and value of this annual conference will help reduce risk to our national grid, our critical infrastructure and to society. On behalf of the planning commmittee and conference Co-Chairs Ray Beach and Dr. Charles Alexander, Thank you for your attendance, we look forward to your participation and engaging with these experts on securing our energy future.

Sincerely,

John Juhasz
Conference Chair, EnergyTech2015
CEO/President, Telepath Systems Inc

ENERGYTECH2015

TRACK ONE - Ballroom D+E
Changing Dynamics of the Global Energy Landscape

What are the major forces driving the sea-changes occurring in all phases of Energy Systems i.e., Exploration, Generation, Distribution, Consumption, etc; Systems Support to Policy & Decision Makers; Energy Economics and Politics; how will Systems Engineering facilitate decision making?

Track Chairs
Beth Trombold, PUCO
Maria Ilic, Carnegie Mellon University

THE PUBLIC UTILITIES COMMISSION OF OHIO

Carnegie Mellon ENGINEERING

STEWART CEDRES
KEYNOTE ABSTRACT

In 2014 the National Academy of Engineering named electrification the greatest single achievement of the 20th century. The continental United States (US) power grid crosses multiple geographical regions, throughout the US, Canada, and the northern portion of Baja California in Mexico and has provided highly reliable electricity for more than a century. An aging infrastructure system that is going through a transformation, the North American power grid is linked to a constellation of systems such as financial, societal, transportation, communications, and so on – most, complex systems on their own right, and all, critically dependent on the power grid. At the same time, growing dependence on highly reliable electricity for national and economic security and the welfare of society makes electricity resilience a top priority. This keynote provides systems engineers and systems thinkers with a description of arguably one of the most complex manmade systems ever designed, provides the challenges it faces, and illustrates why it is important to take a systemic approach when attempting to understand and technologically invest on what could now be considered a "system of complex systems" – the North American power grid.

Stewart Cedres is a systems engineer with over 20 years of federal service where he has been actively engaged in a wide range of energy activities including R&D, analytics, engineeing, field operations, policy, and advanced modeling. He serves at the Department of Energy's Office of Electricity (OE) R&D Division where his responsibilities include the identification of electric sector advanced resilience capabilities.

Certified Professional Development units will be awarded for each EnergyTech track session and tutorial by The Cleveland Engineering Society. Attendees seeking CPD hours can earn 1.25 hours per day for each track session, and 3 credits for each tutorial.

CES serves the educational and professional development needs of technical professionals and the organizations that employ them; to encourage young people to pursue careers in science and engineering; and to foster an exchange of information and ideas that will advance development and recognition of the region as a technology center.

TUTORIALS - Ballroom A

Attendees must sign in during each session they wish to receive credit for. Clipboards will circulate during each session after the sesison begins.

Monday, Nov. 30, 2015 9:00-12:00

The State of Industrial Control System (ICS) Cyber Security – What Is Happening And What Needs To Be Done

Led by Joe Weiss - ACS LLC -

3 CPD hours available

In the ICS world, reliability and safety are most important with confidentiality much less significant. This tutorial will provide an understanding of what is ICS cyber security, how it is different than IT, recent incidents of interest, a sample of actual selected case histories, and what is being done to address these problems.

Tuesday Dec 1, 2015 9:00-12

An Introduction to MBSE

Led by Gareth Digby, Vitech Corp.

3 CPD hours available

The tutorial demonstrates how the system behavior can be allocated to the (physical) architecture. The partitioning of the behavior amongst the system components is discussed along with the consideration of trial allocations.The use of interfaces and links to represent the abstract and physical aspects of the connections between the system components and external elements is shown.

Monday, Nov. 30, 2015 13:30-15:30

Standards, Tools and Technologies for Enabling MBSE Throughout the Systems Lifecycle

Led by Matthew Hause, PTC

3 CPD hours available

• Model-Based Systems Engineering at the center of Engineering • Specific domains with ontologies - Energy • Product Line Engineering • OSLC • Threat/Risk Standards • Product Line Management • Internet of Things (IoT) • Through-Life Service Costs • Producibility • Requirements Engineering at the start and throughout the lifecycle • Asset Management and Reuse

Tuesday Dec 1, 2015 1:30PM-4:30PM

Developing a Competency Model for Power and Energy Systems

Led by Don Gelosh, WPI

3 CPD hours available

Participants in this workshop will develop a draft competency model for systems engineers who work with power and energy systems, and will learn how to define roles, activities, competencies and the associated knowledge, skills, abilities and behaviors that are required by power and energy systems engineers. Participants will also learn how to develop the various proficiency level descriptions for awareness, supervised practitioners, practitioners, senior practitioners and experts.

ERIC GEBHARDT KEYNOTE ABSTRACT

The future of energy is ever changing and gaining complexity to meet the needs of higher demand balanced with reduced environmental impacts and costs. A framework that delivers cleaner, less expensive energy to more and more people will require a larger system of integrated technologies combining the best aspects of oil & gas as well as wind and solar. These increasingly complex solutions will need greater connectivity and intelligence to provide real time monitoring and decision making to optimize system performance. This will require additional technologies including industrial internet, robotics, artificial intelligence, and advanced system level simulation and analysis to provide the comparison to the digital twin necessary to facilitate decision making. This drives many more multiplex interfaces including physical, functional, and software. Layered on top of all of that complexity lies cyber and physical security to protect the assets and the systems availability. The overarching success of such an elaborate integrated solution will depend on the skills and abilities of a company's Systems Engineers to properly anticipate the systems operational needs and design the right system, the first time, in an affordable manner.

Eric Gebhardt is Chief Technology Officer and Vice President, Engineering, GE Oil & Gas; he is also an Officer of the General Electric Corporation. He leads 7,000+ engineers through a vision built on systems-level thinking, lifecycle value and customer collaboration. He is a key contributor to GE's Industrial Internet, focusing on software and analytics, and was also instrumental in launching GE's first Global Technology Center dedicated to applied research in oil and gas.

TRACK ONE -SESSION ONE - Moderator: Commissioner Beth Trombold
INTERRUPTION IN THE UTILITY INDUSTRY?
Monday 9:00–10:20 in Ballrooms D+E
1.25 CPD hours available

Electricity markets are experiencing fundamental changes because of solar, wind, electric vehicles, energy efficiency programs, storage and other forms of distributed generation that may be intermittent or require changes/upgrades to the electric grid. There is also an increase in the availability of smart meters and other devices that can help customers control their electric demand and usage. As a result, demand is less predictable and more volatile. This change also creates challenges for transmission and distribution for all load serving entities, even with new real-time data availability and grid visibility. What technological, regulatory, and/or policy changes are needed in the short term and longer term to keep pace? What will these changes mean for reliability? How will the traditional utility model change in the coming years?

Panelists: Robert Wargo - Vice President, Reliability First Corp.
Andrew Ritch - Energy Wholesale Renewables Director, Duke Energy
Andrew Ott - Executive VP, PJM Interconnection

TRACK ONE -SESSION TWO - Moderator: Maria Ilic
U.S. EPA CLEAN POWER PLAN. HOW WILL IT AFFECT THE ELECTRIC UTILITY INDUSTRY NOW AND IN THE FUTURE?
Monday 10:40–12:00 in Ballroom D+E
1.25 CPD hours available

On June 2, 2014, the U.S. EPA, proposed a plan with the stated purpose of reducing carbon emissions from electric generating units, under Section 111(d) of the Clean Air Act. The CPP sets a CO2 emission target for each state, and utilizes four "building blocks" in devising those rates. The CPP suggests power to be dispatched based upon environmental considerations. Today, regional electric markets dispatch power based upon economic considerations and not environmental considerations. More than four million entities submitted comments on the proposed CPP and on August 3, 2015, the U.S. EPA issued their final plan. What is the overall affect on states, utilities, and ratepayers? What is the timeline for implementation of the CPP? What does the plan mean for the future electric generation mix? How will reliability and prices be impacted? What kinds of technology and regulatory policy changes will be needed?

Presenters: Commmissioner Asim Haque - PUCO
Flora Flygt, Strategy Planning & Policy Advisor, American Transmission Co.

Great Lakes Science Center is funded by the citizens of Cuyahoga County through Cuyahoga Arts and Culture, grants, funds, and corporate and individual gifts. The center's exhibits support STEM with exhibits including the BioMedTech Gallery, advanced energy, science phenomena and space.

TRACK ONE -SESSION THREE - Moderator: Commissioner Beth Trombold
THE GAS AND ELECTRIC UTILITY INDUSTRY: CARBON CONSTRAINED
Monday 13:30–14:50 in Ballrooms D+E
1.25 CPD hours available

This session will focus on the impact U.S. EPA Clean Power Plan (CPP) will play in shaping changes to the natural gas market, including the shale gas marketplace both domestically and perhaps internationally. The inter-dependency between the natural gas and electric industry is growing as there is more movement toward natural gas fired generation and away from coal fired generation. Natural gas companies are already seeing an increased need for infrastructure expansion from the growing gas-electric inter-dependency. What are the benefits and risks facing the natural gas industry? What role does the shale gas industry play? What will the changes mean for gas producers, electric utilities and technology now and in the future both in the U.S and abroad?

Panelists: Jeff Murphy - Dominion
Todd Snitchler - former PUCO Chairman Attorney, McDonald Hopkins
Anuradha Annaswamy - Professor Massachussettes Institute Technology

TRACK ONE -SESSION FOUR - Moderator: Thomas Pearce
GLOBAL ENERGY DYNAMICS - WHAT DOES THE NEXT DECADE LOOK LIKE
Monday 15:10–16:30 in Ballroom D+E
1.25 CPD hours available

Turmoil in the Middle East is changing the dominance of traditional oil cartels and producers. Coal is in a long decline as an energy source, Nuclear energy is still facing an uncertain future, yet the US is on the threshold of achieving true energy independence. Renewables are still far from cost parity, but showing significant promise. Abundant Natural Gas promises a major export opportunity, potentially changing the geo-political balance of power. And new, disruptive technologies are on the horizon which will transform the energy landscape. This session explores the various global factors and trends influencing the provision and consumption of energy, the impacts of integrating new technologies, climate implications and regulatory pressures. A panel of experts will discuss the interaction of these dynamic forces and offer perspectives and prognostications from their observations and experiences.

Panelists: Stewart Cedres - US Dept of Energy
Eric Gebhardt - GE Oil & Gas
Patrick Doherty - Strategic Innovation Lab, Case Western Reserve University

The NASA Glenn Research Center in Cleveland, Ohio, is the driving force in air and space propulsion, communications and power systems. In almost every aircraft or spacecraft you will find that Glenn technology is inside. Their work expands the reach of human and robotic explorers and inspires the next generation. More than 3,400 people form a highly skilled, diverse workforce of scientists, engineers, technicians and administrative and support personnel. They have a decades-long tradition of excellence in aeronautics and spaceflight, making significant contributions to the research, design, development and testing of technology. They partner with local and national businesses, colleges and universities.

Glenn is an integral contributor to the economy of the region and is active in the community. Located near Cleveland Hopkins International Airport, Glenn's main campus, Lewis Field, is situated on 350 acres of land and contains more than 150 buildings. The world-class facilities at Lewis Field include wind tunnels, drop towers, vacuum chambers and an aircraft hangar. Glenn's Plum Brook Station is located in Sandusky, Ohio, on 6,400 acres of land. Plum Brook Station has large, unique facilities that simulate the environment of space. NASA Glenn's decades of experience are complemented by an enthusiasm for new challenges.

The expertise of the workforce is matched by its passion and commitment. Whether pioneering the next generation of aerospace technology or educating the next generation of aerospace pioneers, NASA Glenn dreams big.

TRACK TWO - Ballroom C
New Technologies for Solving the Energy Puzzle

Where are the breakthroughs? How will new and emerging technologies provide solutions for society energy needs? How can these be effectively integrated with existing legacy systems?

Track Chairs
Dr. Allen Morinec, First Energy
James F. Soeder, NASA GRC

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ENERGYTECH2015 AT-A-GLANCE

MONDAY, NOVEMBER 30

7:15	Registration/Breakfast		
8:00	**KEYNOTE Stewart Cedres, US Department of Energy**		
	Track 1 - Changing Dynamics of the Global Energy Landscape	Track 2 - New Technologies for Solving the Energy Puzzle	Tutorials
9:00	Interruption in the Utility Industry? Moderator: Commissioner B. Trombold A. Ott, R. Wargo A. Ritch	Terrestrial Power Technology I N. Kirby: VSC HVDC Transmission + DC Grid Emerging Tech, Z. Summerford: Ultra-High Speed Relaying	The State of Industrial Control System Cyber Security: What is happening and what needs to be done? JOE WEISS, ACS LLC
10:20	Break		
10:40	The U.S. EPA Clean Power Plan, How will it Affect the Electric Utility Industry Now and in the Future? Moderator: M. Ilic Commissioner A. Haque, F. Flygt	Terrestrial Power Technology II D. Sadey on 3Phase Megawatt-Class Variable Power W. Good on Modular Nuclear Power, J. Sparber on Power Grid Protection, N. Tyrell on Combine Cycle Gas Turbines	
12:00	Boxed Lunch Provided in the Atrium		
12:30	**KEYNOTE Eric Gebhardt, GE Oil and Gas**		
1:30	The Gas and Electric Utility Industry: Carbon Constrained Moderator: Commissioner B. Trombold J. Murphy, T. Snitchler, A. Annaswamy	Hybrid Electric Power for Aeronautic Propulsion Moderator: M. Heil J. Felder, J. Nairus, N. Garrigan, M. Benzakein	Standards, Tools and Tech for Enabling MBSE Through-out the Systems Lifecycle MATTHEW HAUSE, PTC
2:50 - 3:10	Break		
3:10	Global Energy Dynamics (scheduled until 4:30) Moderator: T. Pearce Panel: S. Cedres, E. Gebhardt, P. Doherty	Space Power Systems (scheduled until 4:30) A. McNellis on NASA Intelligent Power Control, B. Loop on NASA IPC Real Time Simulation, B. Glenn on NASA IPC Helm Algorithm	
5:00 - 7:00	Light Reception in Conference Center Atrium		

TUESDAY, DECEMBER 1

7:15	Registration/Breakfast		
8:00	**KEYNOTE David Long, INCOSE and Vitech Corporation**		
	Track 3 - Leveraging the Capabilities of Model-based Systems Development for Energy	Track 4 - Managing the Risk Factors in Critical Infrastructure (Energy, Water, Food, Transport, etc.)	Tutorials
9:00	M.Walker on Process and Methods O. Hoehne on System Engineering and the Energy Future	EMP, Solar Weather and Cyber Effect G. Baker on EMP, J. Ostrich on Solar Weather Effects - Grid and Micro Grid, J. Weiss on Cyber Effects - Industrial Control System	An Introduction to MBSE DR. GARETH DIGBY, VITECH
10:20	Break		
10:40	Systems Thinking and MBSE M. Minnucci on Systems Thinking and Deployment, G. Das Valasai on AnswerTIMES model for cost prediction	Shaping Policy on Critical Infrastructure Protection and Recovery Moderator: M. DeLamare A. Boland, J. Ostrich, P. Shaw, K. Goodman C. Manto	
12:00	Boxed Lunch Provided in the Atrium		
12:30	**KEYNOTE Branndon Kelley, American Municipal Power**		
1:30	The Energy Grid and Integration of IoT M. Hause on Smart Grid and MBSE Driven IoT R. Garrett on Complex Grid Managment in a Changing and Dynamic Future	Resilient Applications J. Long on Minimum Cyber Security Requirements, B. Patterson on DC MIcrogrids and Data Centers, I.Badr on Managing Risk Factors in Critical Infrastructure	Developing a Competency Model for Power and Energy Systems DR. DON GELOSH, WPI
2:50	Break		
3:10	Energizing MBSE in Organizations (scheduled until 4:30) G. Digby on Systems-based Approach to Cyber Investigations M. Hause on What is MIssing in MBSE for Energy	Strategies for Resistance (scheduled until 4:30) Moderator: C. Manto G. Baker, J. Weiss, T. Martinson, M. Ahern, M. deLamare	
5:00 - 5:45	Happy Hour in Conference Center Atrium		
6:00 - 8:30	**BANQUET KEYNOTE Virginia Greiman, Author Managing Megaprojects Welcome by City of Cleveland Chief of Sustainability, Jenita McGowan**		

WEDNESDAY, DECEMBER 2

8:30	Registration/Breakfast
9:30 - 12:30	**SPECIAL InfraGard led strategy event with Chuck Manto, Facilitated by Steve Pappas**

TRACK TWO -SESSION ONE - Moderator: Allen Morinec
TERRESTRIAL POWER TECHNOLOGY I
Monday 9:00–10:20 in Ballrooms B+C
1.25 CPD hours available

This session will explore technologies developed to improve the terrestrial power utility grid including; fast protection system methods to find and clear faults and dc protection system devices to enable dc distribution systems.

Neil Kirby: VSC HVDC Transmission and Emerging Technologies In DC Grids
Zach Summerford: Ultra-High Speed Relaying for Transmission Lines.

TRACK TWO -SESSION TWO - Moderator: Don Brown
TERRESTRIAL POWER TECHNOLOGY II
Monday 10:40–12:00 in Ballrooms B+C
1.25 CPD hours available

This session continues the exploration of technologies to improve terrestrial power systems including; power systems for building and industrial power, advanced generation, energy storage and smart grid developments.

David J. Sadey: Operation and Control of a Three-Phase Megawatt-Class Variable Frequency Power Generation and Distribution System
William Good: Modular Nuclear Power
Josh Sparber: Effective Measures for Protection of US Power Grid
Neil Tyrrell: Fast and flexible combined cycle gas turbines

Home to several major universities, a key NASA center, and various top-level utilities and enterprises dealing with critical infrastructure, Cleveland is well established as a pivotal hub for scientific research and development.

TRACK TWO -SESSION THREE - Moderator: Mike Heil
HYBRID ELECTRIC POWER FOR AERONAUTIC PROPULSION PANEL
Monday 13:30–14:50 in Ballrooms B+C
1.25 CPD hours available

This panel will explore benefits and technology challenges associated with distributed, hybrid electric propulsion for future subsonic aeronautic vehicles. Panel members will include aeronautics propulsion industry, NASA, and the DoD.

Mr James Felder, NASA Glenn Research Center
Mr John Nairus, Air Force Research Lab, Chief Engineer Power & Controls Division
Neil Garrigan, GE Aviation
Meyer Benzakein, OSU - Aeronautic

TRACK TWO-SESSION FOUR - Moderator: James Soeder
SPACE POWER SYSTEMS
Monday 15:10–16:30 in Ballrooms B+C
1.25 CPD hours available

This session will explore power technologies being developed to enable more advanced deep space missions including; unique power systems, autonomous and intelligent control and real time simulation

Ms Anne McNellis: NASA Intelligent Power Control (IPC)
Dr Benjamin Loop: Real Time Simulation for NASA IPCDevelopment
Dr Brad Glenn: Helm Algorithm Development for NASA IPC

TUESDAY, DEC 1 0800

Ballroom D+E

DAVID LONG KEYNOTE

For almost ten years, the systems engineering community has been focused on the transformation from document-centric to model-based techniques. While most systems engineering organizations have completed pilot efforts, established appropriate communities of practice, and are plotting their path forward, this transformation is far from complete. In terms of the Roger's innovation adoption lifecycle, we are beyond the early adopters, in the early majority, and moving towards the tipping point where model-based systems engineering becomes the expected framework and approach for systems engineering. Systems engineering remains a young discipline – one that must continue to learn and evolve, one where transitions should be viewed as waypoints along a journey rather than destinations themselves. As we make the journey to model-based, how must we also adapt and evolve the greater practice of systems engineering in a world dominated by cyber-physical systems with the inherent opportunities, risks, and vulnerabilities they bring? What is the next evolution required to address next generation problems and deliver the organizational value required? What can we begin doing today, even in the continued implementation and adoption of MBSE, to prepare ourselves and our organizations to make that transition? Looking at the journey to date and the opportunities in the future, how can we characterize the next leg of the journey and plot a path forward for ourselves, our organizations, and the greater systems engineering practice?

David Long has spent over 20 years focused on enabling, applying, and advancing model-based systems engineering (MBSE) to help transform the state of the systems engineering practice. David is the founder and president of Vitech Corporation where he developed and commercialized CORE®, a leading systems engineering software environment used around the world. David is president-elect of the International Council on Systems Engineering (INCOSE),

TRACK THREE - Ballroom D+E
Leveraging the Capabilities of Model-based Systems Development for Energy

What is the current state of applied MBSE in the Energy Sector, and how will model-based methods provide decision support for the future; examples of actual models applied for life-cycle management

Track Chairs
Matthew Hause, PTC
Loren Mark Walker, BCT LLC

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TRACK THREE-SESSION ONE - Moderator: Matthew Hause
PROCESS AND METHODS
Tuesday 9:00-10:20 in Ballrooms B+C
1.25 CPD hours available

Capturing stakeholder needs with MBSE and using the System of Systems VEE™ model for evaluating control, communications, and threat and vulnerability assessment.

Mark Walker: Process and Methods
Oliver Hoehne: System Engineering and Energy Future

TRACK THREE -SESSION TWO - Moderator: Mark Walker
SYSTEMS THINKING & MBSE
Tuesday 10:40-12:00 in Ballroom B+C
1.25 CPD hours available

Deployment of MBSE and Systems Thinking in an energy technology company and an evaluation of interfaces in a system of systems development.

Mark Minnucci: Systems Thinking, Deployment of MBSE and Systems
Gordhan Das Valasai: Finding the least cost future fuel mix with the AnswerTIMES modelling framework

TRACK THREE - SESSION THREE - Moderator: Mark Walker
THE ENERGY GRID & INTEGRATION OF IoT
Tuesday 13:30-14:50 in Ballroom B+C
1.25 CPD hours available

The integration of the Internet of Things (IoT) and MBSE in an Energy System and Complex energy grid management in a changing and dynamic future.

Matthew Hause: Making the Smart Grid Smarter, MBSE Driven IoT
Robert Garrett: Complex Energy Grid Mgmt in a Changing and Dynamic Future

TRACK THREE - SESSION FOUR - Moderator: Matthew Hause
ENERGIZING MBSE IN ORGANIZATIONS
Tuesday 15:10-16:30 in Ballroom B+C
1.25 CPD hours available

Implementing System Engineering disciplines and practices in an energy company and a panel discussion of how to promote the use of MBSE in the energy systems..

Dr. Gareth Digby: A Systems-based Approach To Cyber Investigations
Matthew Hause: What is Missing for MBSE for Energy?

BRANNDON KELLEY
KEYNOTE ABSTRACT

In an effort to make a Utility more "Smart" the business units within are requiring additional data for business intelligence, predictive and data analytics and asset optimization. To acquire the necessary data points the once "disconnected" power plants, electric grid, and the consumer now have to be connected. Utilizing sensor technology, advanced metering, and automated controls the systems within the power plant, transmission & distribution grid, and even a home or business now become vulnerable.

In addition to this business-enabling concept the threat of a full-fledged cyber-attack or at the minimum cyber espionage is real. Utilities are now faced with these threats and must spend enormous amounts of capital and operational dollars to protect their assets utilizing a "not if, but when" mentality.

The two competing concepts create a paradox – the more we connect the utility, the more vulnerable it becomes -however, without connecting the utility, the less "Smart" we can be. Branndon Kelley (Chief Information Officer @ American Municipal Power) will walk us through a discussion on these two topics and how the two competing efforts can co-exist.

Branndon Kelley, CIO American Municipal Power, brings a diverse background leading the development & deployment of enterprise-level IT infrastructure & applications in a wide variety of business environments including technology, education, government, financial services, energy, healthcare & manufacturing. His experience spans IT operations, infrastructure, application development, project management, executive leadership, strategy, & business development.

TRACK FOUR - Ballroom C
Managing the Risk Factors in Critical Infrastructure

Safe, cheap, clean, available energy and vital services is critical to our civilization. Protection from natural and man-made threats is a national security issue of the highest order.

Track Chairs
Charles “Chuck” Manto, Instant Access Networks
Michael deLamare, Bechtel

ENERGYTECH2015

TUESDAY, DEC 1 1930

GLASSCOCK BALLROOM

VIRGINIA GREIMAN KEYNOTE ABSTRACT

Building Boston's Big Dig: Navigating the Challenges of America's Most Ambitious Urban Megaproject

Boston's $14.9 billion dollar Central Artery/Tunnel Project, commonly known as the Big Dig, was the largest, most complex, and technically challenging highway tunneling project in American history. Larger than the Panama Canal, the Hoover Dam and the Alaska Pipeline Projects, it was built through the heart of one of the nation's oldest cities and off of the Colonial shoreline.

The Big Dig's former risk manager and deputy chief counsel will describe the extreme engineering and political challenges faced by the Project and the major lessons learned from this epic undertaking. The Big Dig's story is an invaluable lesson: How can America invest in infrastructure—and do it smart so that these lessons can be systemically pursued in the megaprojects of the future?

Virginia A. Greiman is Professor of Megaprojects and Planning, Boston University and holds academic appointments at Harvard University Law School and Kennedy School of Government. She is the former Risk Manager and Deputy Chief Counsel, for Boston's Big Dig, and Author of the definitive book on Megaproject Management: Lessons on Risk and Project Management from the Big Dig. She serves as advisor to several of the world's largest megaprojects and formerly served as a diplomatic official to the U.S. Department of State in Eastern Europe, Asia and Africa and has held several high level appointments with the U.S. Department of Justice.

TRACK FOUR-SESSION ONE - Moderator: Chuck Manto
EMP, SOLAR WEATHER AND CYBER EFFECT
Tuesday 9:00-10:20 in Ballrooms D+E
1.25 CPD hours available

George Baker: EMP Effects on electrical and communications systems
John Ostrich: Speaking on the Solar Weather Effects on grids and micro-grids.
Joe Weiss: Cyber Effects on industrial control systems

TRACK FOUR -SESSION TWO - Moderator: Mike deLamare
SHAPING CRITICAL INFRASTRUCTURE PROTECTION + RECOVERY POLICY
Tuesday 10:40-12:00 in Ballroom D+E
1.25 CPD hours available

Panelists: Andrea Boland - current and pending Legislation for the State of Maine as compared to other States: /Maine
John Ostrich - Speaking on the Space Weather Policy and Action Plan
Patrick Shaw - Addressing the business continuity and the emergency management consequences of long-term power outages
Kevin Goodman - Policy effects on Power and Data Centers
Chuck Manto - Policy as a catalyst for technical innovations

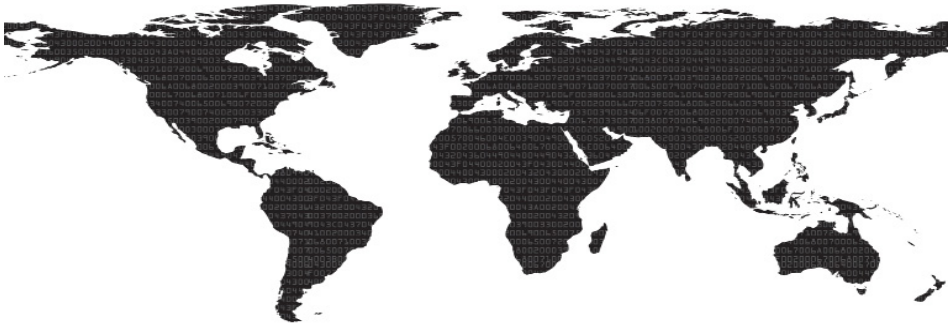
TRACK FOUR -SESSION THREE - Moderator: Mike deLamare
RESILIENT APPLICATIONS
Tuesday 13:30-14:50 in Ballroom D+E
1.25 CPD hours available

Josh Long: Cyber Security Requirements for a 20 MW Photo Voltaic Field
Tim Martinson: The role of Direct Current micro-grids and data centers for efficiency and resilience
Irv Badr: Managing Risk Factors in Critical Infrastructure

TRACK FOUR -SESSION FOUR - Moderator: Chuck Manto
ENERGIZING MBSE IN ORGANIZATIONS
Tuesday 15:10-16:30 in Ballroom D+E
1.25 CPD hours available

Panelists will briefly present perspectives on Risk Mitigation for Critical Infrastructure. This will be followed by Q&A from the audience.

George Baker: Minimizing cascading effects on power and communication systems from high-impact events such as EMP and Space Weather
Joe Weiss: Strategies for Industrial Control System resilience
Tim Martinson: Microgrids as a resilient strategy
Mike Ahern: Topic 4 Education as a strategy for resilience
Mike deLamare: INCOSE CIPR Working Group as an Integrating Factor for Business and Government to Address High Impact Threats



ET2015 BANQUET

Tuesday, December 1st at 6:15pm
CSU GLASSCOCK BALLROOM
2121 Euclid Avenue, 3rd Floor

18:00	Doors and welcome beverage
18:30	Dinner is served
19:30	Welcome Remarks City of Cleveland Chief of Sustainability, Jenita McGowan
19:45	Introduction to Keynote Cleveland Engineering Society Executiy Director, Susan Davis
19:50	Keynote Author "Megaproject Management: Lessons on Risk and Project Management from the Big Dig", Virginia Greiman
20:25	Closing remarks and thank yous

Banquet tickets are available to conference participants for $50 and $75 for non-conference participants. Please RSVP by purchasing a ticket at www.energytech2015.com/registration, or you may RSVP to info@energytech2015.com and bring cash or a check made payable to Telepath Systems Inc.

INFRAGARD SPECIAL EVENT

Hosted by the EnergyTech organizers and the InfraGard EMP-SIG. Attendance is free for all InfraGard members, CES members, EnergyTech participants, invited public officials and law enforcement personnel, as well as Utility company management and professionals.

The purpose of this special event is to provide an introduction and orientation on the nature of the "Triple-Threat" scenarios which confront the electrical grid, and essentially all critical infrastructure. Risk management and response improvement strategies will be presented along with community / government planning exercises for preparedness efforts.

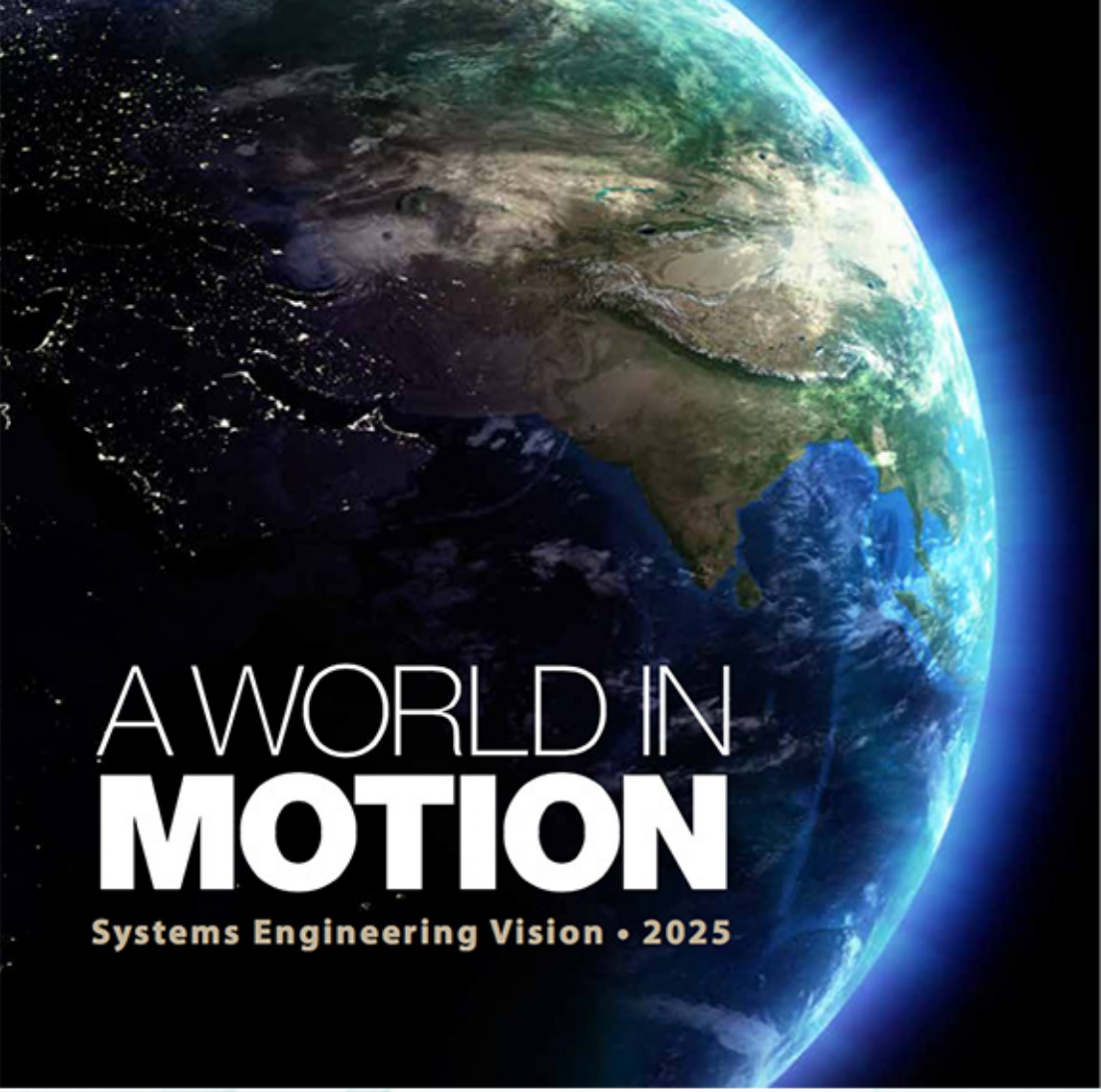
We are especially pleased to welcome Charles Manto, founder and chair of the Infragard EMP-SIG, and co-Author of the newly released book "Triple-Threat Power Grid Exercise", a guidebook for conducting workshops and table-top exercise discussions in preparing for catastrophic events.

REGISTRATION is essential for participation. go to www.energytech2015.com/registration and select InfraGard Session in our Ticket Tailor window, or sign up onsite at the registration table on Monday or Tuesday when you arrive.

PRELIMINARY AGENDA Dec 2, 9:30 AM - 12:30 PM)

Welcome & Introductions
Short orientation on EMP-SIG: History & Significance
Critical Infrastructure - Threat Scenarios
Breakout sessions (6-8) + Summary reports
TTX planning process, Q&A
Conclusions, Wrapup, Membership info

Session Facilitation by Chief Executive Officer of the Indiana InfraGard Members Alliance Corporation, Steve Pappas.



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