Welcome to the: OIIE Australia Working Group
Formative Webinar
Presented by NERA and MIMOSA

Francis Norman: NERA
Don Sands: MIMOSA and Synengco
Markus Stumptner: MIMOSA, UniSA, FEnEx CRC
Alan Johnston: MIMOSA, ISO, ISA95 and Assetricity

April 21, 2020
What is Critical Infrastructure?

• **Critical infrastructure** (or **critical national infrastructure** (CNI) in the UK) is a term used by **governments** to describe **assets** that are essential for the functioning of a society and economy – the **infrastructure**. – Wikipedia

• Government led efforts have addressed key aspects of **Security** (physical and cyber) and **Resilience** (usually focused on disaster and emergency preparedness).

• A key aspect of Critical Infrastructure is that it is **Highly Interdependent**.

• Since the consequences of failure of the key sectoral activities is potentially catastrophic (no matter the cause of the failure), we propose a more inclusive approach to **Model**, **Monitor** and **Manage** the associated **risks**.
Critical Infrastructure: Key Sectors

- Manufacturing
- Transportation
- Government
- Energy
- ICT
- Food and Agriculture
- Water
- Banking
- Health
- Defense
Critical Infrastructure Sectors – From US PPD 21-2013

➢ Chemical
  • Commercial facilities
  • Communications
➢ Critical manufacturing
➢ Dams
➢ Defense industrial base
  • Emergency services
➢ Energy

➢ Financial services
➢ Food and agriculture
  • Government facilities
  • Healthcare and public health
➢ Information technology
➢ Nuclear reactors, materials, and waste
➢ Transportation systems
➢ Water and wastewater systems

➢ Asset Intensive Industries
Critical Infrastructure Interdependencies

IEEE Journal - Dec 2001
Identifying, Understanding, and Analyzing Critical Infrastructure Interdependencies
Steven M. Rinaldi
James P. Peerenboom
Terrence K. Kelly
Critical Infrastructure Interdependencies

Identifying, Understanding, and Analyzing Critical Infrastructure Interdependencies

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Critical Infrastructure Interdependencies-2

NIST Special Publication 1190
Community Resilience Planning Guide
For Buildings and Infrastructure Systems
Volume II
October 2015
State Energy Resilience Framework
Global Security Sciences Division
December 2016

J. Philips, M. Finster, J. Pillon, F. Petit and J. Trail
Incorporating Prioritization in Critical Infrastructure Security and Resilience Programs

Homeland Security Affairs 13, Article 7 (https://www.hsaj.org/articles/14091)
October 2017

Duane Verner, Frederic Petit, and Kibaek Kim
Critical Infrastructure Interdependencies

NSW Critical Infrastructure Resilience Strategy
Partner, Prepare, Provide
NSW Department of Justice | Office of Emergency Management
2018

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The Critical Five was established in 2012 to enhance information sharing and work on issues of mutual interest between Australia, Canada, New Zealand, the United Kingdom and the United States.

One of the first efforts was to understand how each country addresses critical infrastructure as a basis for clearly articulating and communicating a common message on the value, meaning, and importance of critical infrastructure.


“The Role of Critical Infrastructure in National Prosperity” published October 2015
Australia, Japan and United States Trilateral Partnership

• Announced July 31, 2018
  • Australia: Minister for Foreign Affairs-The Hon Julie Bishop MP
  • Japan: Japanese Bank for International Cooperation
  • United States: United States Overseas Private Investment Corporation (OPIC)

• Indo-Pacific region

• Cooperation on Investment to:
  • Build infrastructure
  • Address development challenges
  • Increase connectivity
  • Promote economic growth
The Proposed Solution

• We propose a standardized approach to Model, Monitor and Manage the associated Processes, Systems, Components and Risks
• Use Supplier-neutral Standards for Digitalization and Interoperability
• Cooperation between Public and Private Sectors and Academia
• Cooperation with NIST, DOE, NERA and others
• Results flow to ISO
Critical Infrastructure Risk Management

Critical Infrastructure Management Process

- Reliability Management
- Business Process Models
- Components Models
- Systems Models
- Industrial Process Models

Risk Models

IIoT Sensors

Trusted Systems

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OIIE Australia Working Group
Purpose and Relevance

Capture Australian Industry Requirements and Priorities for OIIE
The Open Industrial Interoperability Ecosystem (OIIE) and ISO 18101
Australia Energy Sector OIIE Network (Subnet of AU Critical Infrastructure)
OIIE Australia Working Group
Purpose and Relevance

Structure and Relationship to NERA Priorities,
FEnEx CRC, and MIMOSA Ecosystems
NERA Knowledge Priorities and OIIE Alignment

✓ Develop new markets and business models
✓ Enhance skills and business capability to support automation and digitisation
✓ Build talent and enable effective collaboration and innovation
  • Pursue a sustainable and low carbon energy future
  • Understand and unlock Australia's resource base
✓ Commercialise technology and research
✓ Enhance efficiency in operations and maintenance
✓ Optimise the regulatory framework and reputation
Critical Infrastructure Risk Management & Regulatory Framework

- Regulatory Framework should leverage the same IT/IM Framework as other risks.
- Integrated approach for risk management should require fewer regulations and be easier to implement, monitor and manage.
- OIIE will provide a consistent framework to model, monitor and manage all industrial risks.
Future Energy Exports CRC: Vision & Objectives

1. Innovation for higher levels of efficiency in the LNG industry
2. Grow Australia’s hydrogen export industry
3. Unlock value with interoperable digital technologies
Current Partner Organisations:

**Australian-Based Global Companies**

- Chevron
- ITM Power
- Hyundai Heavy Industries Co., Ltd.
- Wood
- Samsung Heavy Industries

**Australian Companies**

- ANERGY
- Australian Gas Infrastructure Group
- CO2CRC
- ETP
- Horizon Power
- Origin
- Beach

**Government, Regulatory & Peak Bodies**

- Government of Western Australia
- Government of South Australia
- Queensland Government
- Appea
- Asset Institute
- MIMOSA

**Australian Research Capabilities**

- QUT
- Curtin University
- University of South Australia

**International Collaborators**

- Tohoku University (Japan)
- ANSTEEL
- Katoonga

**Funding**

- Total partner contributions: $127M
- Committed partner cash: $39M
- Committed in-kind FTEs: 183
- Federal Funding Approved: 3/2020
Unique Infrastructure: Industry 4.0 Testlab
Digital Interoperability for the Energy & Resources Sector

**November 2017:** UWA, UniSA, Swinburne receive *Siemens* software grant ($450 million value) to support I4.0 Testlabs

**December 2018:** UWA, UniSA, Swinburne each awarded $1 million from Dept of Industry to establish I4.0 Testlabs.

*UWA TestLab for Digital Interoperability* integrated with LNGFF

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**Current DCS architecture**

Proprietary hardware, interfaces and networks
Vendor-controlled software access
Security not intrinsic: bolted-on, not built in

**OPA reference architecture**

Industry standard interfaces and networks
Interoperable hardware
Open software access
Designed-in security

*Images courtesy of ExxonMobil*
Structure

RP1: Efficient LNG Value Chains
RP2: Hydrogen Exports & Value Chains
RP3: Digital Technologies & Interoperability
RP4: Market & Sector Development
Digital technologies have tremendous potential but need validation and must be interoperable if they are to deliver value. Successful deployment of interoperable digital technologies will:

- Increase throughput & efficiency from advanced sensors, data and digital twin validation
- Reduce maintenance & inventory costs through reliable predictions of equipment failure
- Reduce costs of DCS upgrades & inefficient decision processes via interoperable systems

**PROSPECTIVE PROJECTS**

- Interoperability standards for I4.0 systems
- Self-tuning advanced process control
- Reliable remote operations
- Digital twins for asset management & robotic infrastructure monitoring
- Reduced spares inventories and downtime
THANK YOU
The Open Industrial Interoperability Ecosystem (OIIIE) and ISO 18101
Australia Energy Sector OIIIE Network (Subnet of AU Critical Infrastructure)
The Open Industrial Interoperability Ecosystem (OIIE) and ISO 18101
MIMOSA Members connecting with the OIIE

Global Upstream OIIE Industrial Digital Ecosystem
OIIE Australia Working Group

BREAK TIME