

Maritime Cyprus – 2015

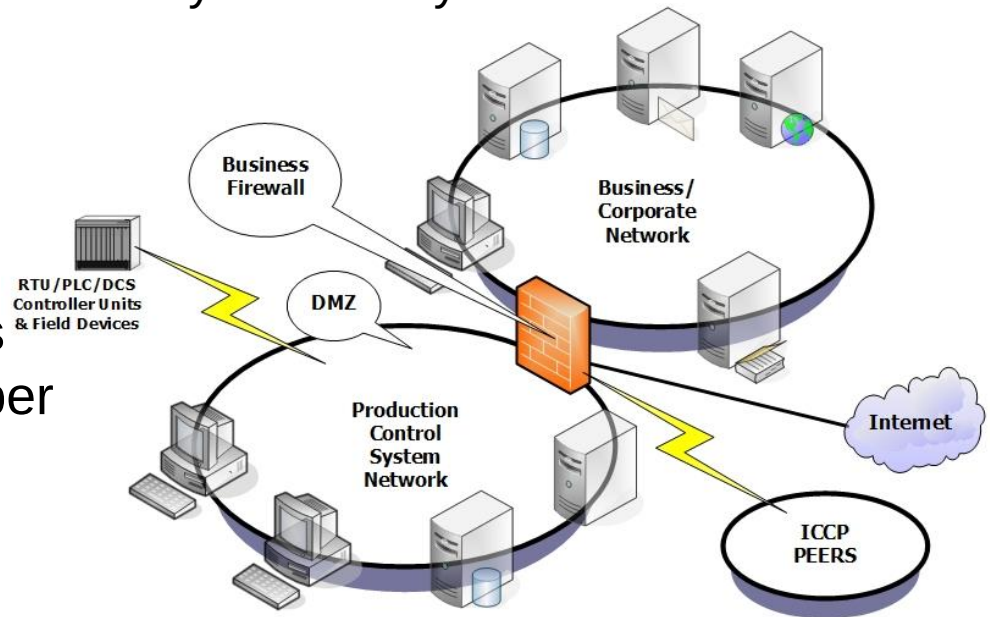
The New Shipping Environment

Game Change

- Cyber-Security and Cyber-Safety
 - The Next Safety Regime

Where We Are – and Where We Have to Go

- Control Systems Are Critical to System Safety and Human Safety
 - Cyber-physical systems are now found in every domain
 - Pervasive in process control, machinery, ship control, platform mission management (positioning, drilling, etc.)
 - Deep implications for human and system safety
 - All cyber-enabled systems must be auditable to understand modes: use, abuse, misuse
 - Human-Machine Interfaces (HMI) are important to proper function and control
 - Performance monitoring systems provide operator feedback



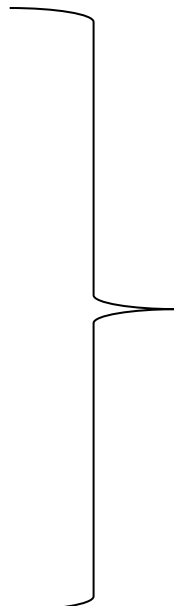
Source: <https://ics-cert.us-cert.gov/content/overview-cyber-vulnerabilities>

Moving Ahead: Building/Improving Unified Requirements/Recommendations?

- Next Step is to Address Cyber-Enabled Systems in Engineering Environment
 - Without new guidance, growth of 'smart' systems will continue to outpace current ability to assess, inspect and monitor
 - There is more to inspect than just machinery and software
- Areas to Cover in Evolved Survey and Inspection
 - Engineering analysis methods must expand functional and failure mode analyses
 - Software assurance to examine functional capability, fail-safe modes, manual backups
 - Data generation, storage, use, communications assessment
 - Cybersecurity and cyber-safety control assessments that inspect security and proper function, in combination with expected crew / user processes

UR(s)/Recommendations Must Include New Guidance

- Traditional Systems Engineering Includes
 - System diagrams
 - Process flow diagrams
 - Failure Modes & Effects Analyses
 - Risk analyses
- Expanded Systems Engineering Activities May Also Include
 - Operational sequence diagrams
 - Data architectures
 - Communications paths
 - Software assurance testing and risk assessments
- System Testing Methods
- Cybersecurity Controls Assessment

- Cyber-Enabled Systems Are Key to Maritime Systems
 - Integrated ship control
 - Navigation and charting
 - Machinery control
 - Propulsion control
 - Cargo handling
 - Environmental control (HVAC)
 - Third-party software and services
 - Environmental compliance monitoring

All include individual risk factors; interface and inter-connections add additional, often unknown, risks
- Cyber-Enabled Systems Can Affect More Than “Just” the Vessel, Platform or Vehicle
- Standards As Part of Survey Must Evolve With the Technology and Its Use in Maritime Application

THANK YOU



Safer and Cleaner Shipping