5th Cretan Energy Conference

Wk1: Energy Security in the Mediterranean basin through the Interconnection and market Integration

The H2020 Cyber-MAR project: Cyber preparedness actions for a holistic approach and awareness raising in the MARitime logistics supply chain and beyond

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9 July 2021, Heraklion, Crete

About | Project Facts

Title: Cyber preparedness actions for a holistic approach and awareness raising in the MARitime logistics supply chain.

Topic: SU-DS-2018: Cybersecurity preparedness-cyber range, simulation and economics

Contracting Authority: European Commission H2020

Project ID: 833389

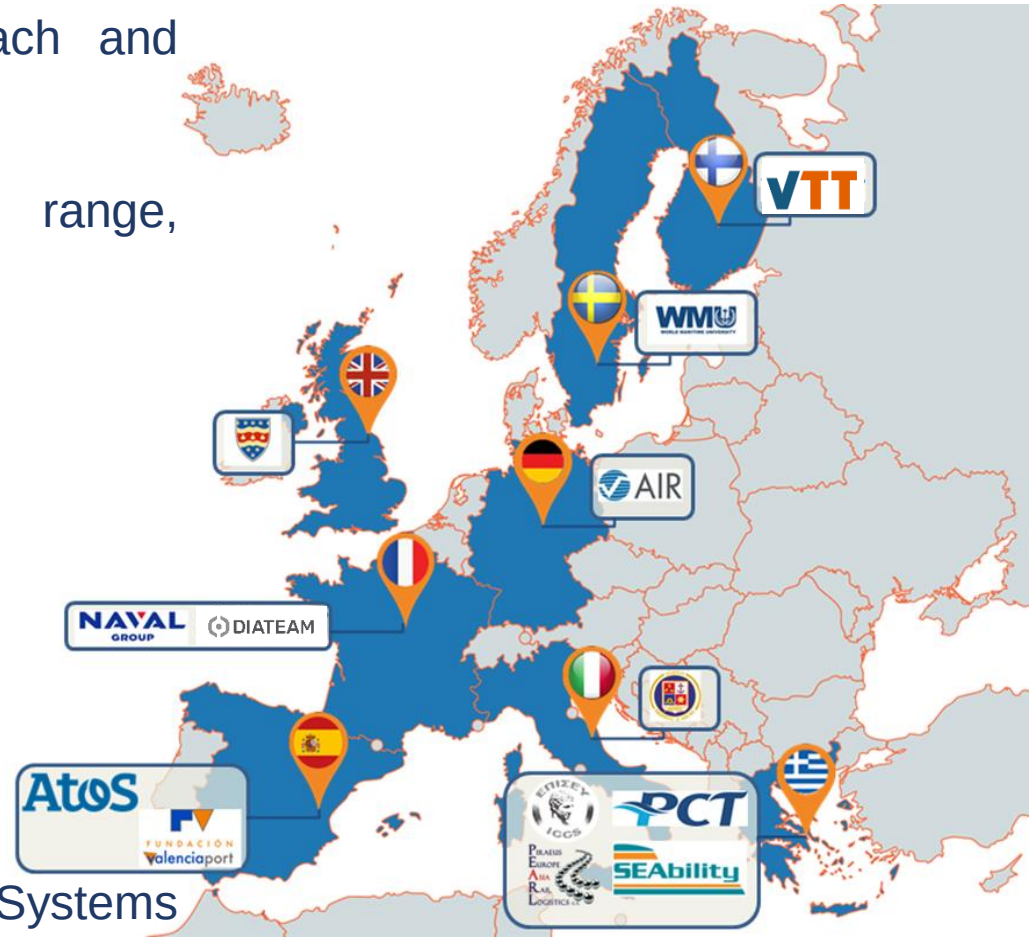
Funded scheme: IA – Innovation Action

Duration: From 2019-09-01 to 2022-08-31

Total cost: EUR 7 154 505.00

EU contribution: EUR 6 018 367.507

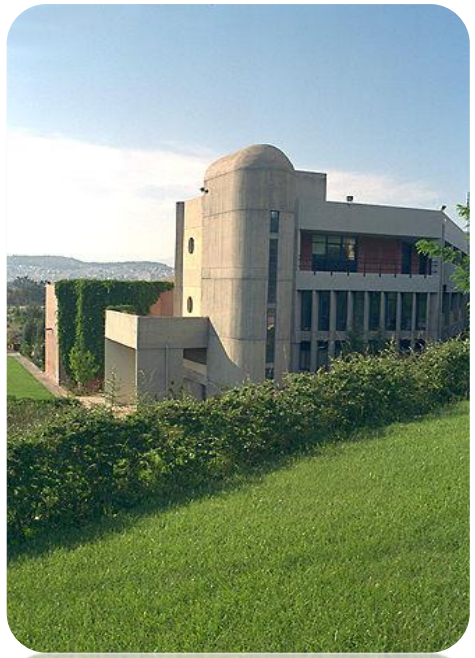
Coordinator: Institute of Communication and Computer Systems (ICCS), Greece

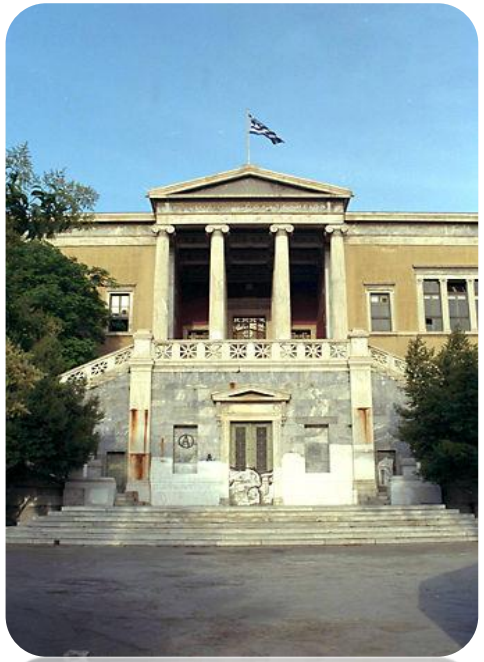


Institute of Communication and Computer Systems

ICCS stands for the Institute of Communication & Computer Systems, Athens, Greece.

A public scientific & technological institute which undertakes advanced research in the field of electrical, electronic and computer engineering & technologies.





- Electrical engineering
- Fusion and Perception Tools
- Signal and image processing
- Intelligent Transportation Systems
- E-mobility
- Electric vehicles
- Human-machine interactions
- Virtual Reality
- Simulation and modeling
- H/W, digital and analog electronics
- S/W engineering and computer technologies
- Control and robotics
- Bioengineering
- Microwave and optical sensors
- Telecom

I-SENSE Group

- **I-SENSE Group** (Intelligent system Engineering and Novel simulation Environments):
  - A Research Group with **more than 100 members** (Professors, Researchers, Communication Managers and Administrative Staff)
  - Participated in **more than 100 research projects** and coordinated several of them
  - 3 Research Teams (Intelligent Transportation Systems, Smart Integrated Systems, **Crisis Management and Secure Societies - CMSS**)
  - Technology and Innovation Department (software and hardware development)
  - **Crisis Management and Secure Societies Team**
    - Active in the Civil Protection/Disaster Resilience, Border Management, Critical Infrastructure Protection, Cyber-Security)
    - Participating and Coordinating numerous EC-funded Projects
    - Coordinator of GSRI innovation cluster on Disaster Resilience

Coordinator (CMSS)

Tech. Manager (CMSS)

Participant (CMSS)

Challenges & Goal

- **Maritime information systems** in many cases designed without accounting for the **cyber risk**
- **Digital infrastructure** has become essential & critical to the **safety** and **security** of shipping and ports
- Importance of **handling cyber preparedness** as a highly prioritized aspect is paramount
- Estimation of accurately cybersecurity investments based on valid risk and econometric models

Cyber-MAR ultimate goal unfolds in **two main directions**:

Establishing a "**cyber ecosystem for preparing of cyber attacks**"

Estimating the **impact of cyber-attack** from a financial perspective and supporting the **undertaking of prompt decisions**

Cyber-MAR Key Objectives (1/2)

O1. Enhance the **capabilities** of cybersecurity professionals and **raise awareness** on cyber-risks

Deploy Cyber-MAR Range, training modules through LMS, improvement in response times in specific resilience metrics

O2. Assess cyber-risks for operational technologies (OT)

Maritime Cyber-Risk Assessment deployment and integration in Cyber-MAR platform

O3. Quantify the **economic impact** of cyber-attacks across different industries with focus on **port disruption**

Quantify economic risk in terms of Time-to-Recover or Product Value at Risk, integration in Cyber-MAR platform

Cyber-MAR Key Objectives (2/2)

O4. Promote **cyber-insurance market maturity** in the maritime logistics sector (adaptable to other sectors as well)

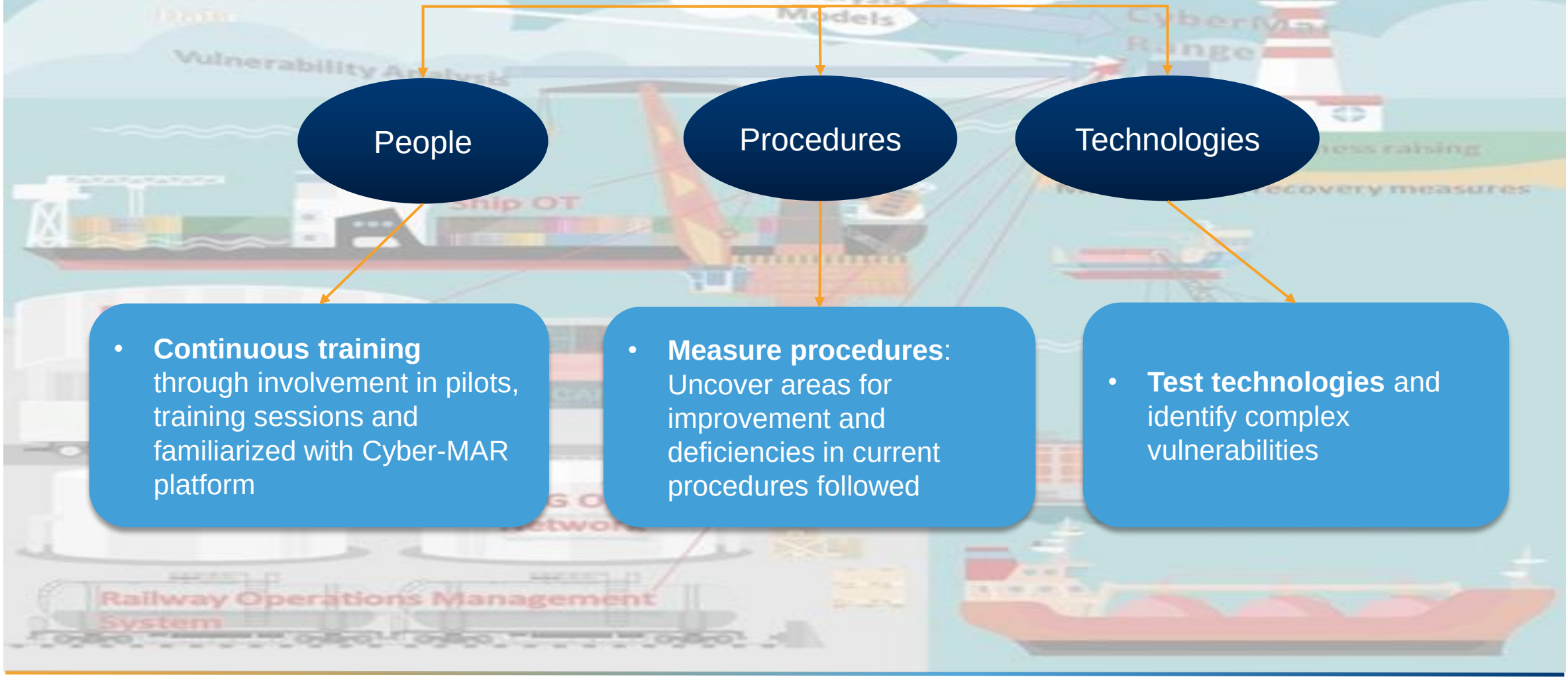
Develop recommendations based on findings and outcomes from Cyber-MAR pilots and simulations

O5. Establish and **extend** CERT/CSIRTs, competent authorities and relevant actors **collaboration** and **engagement**

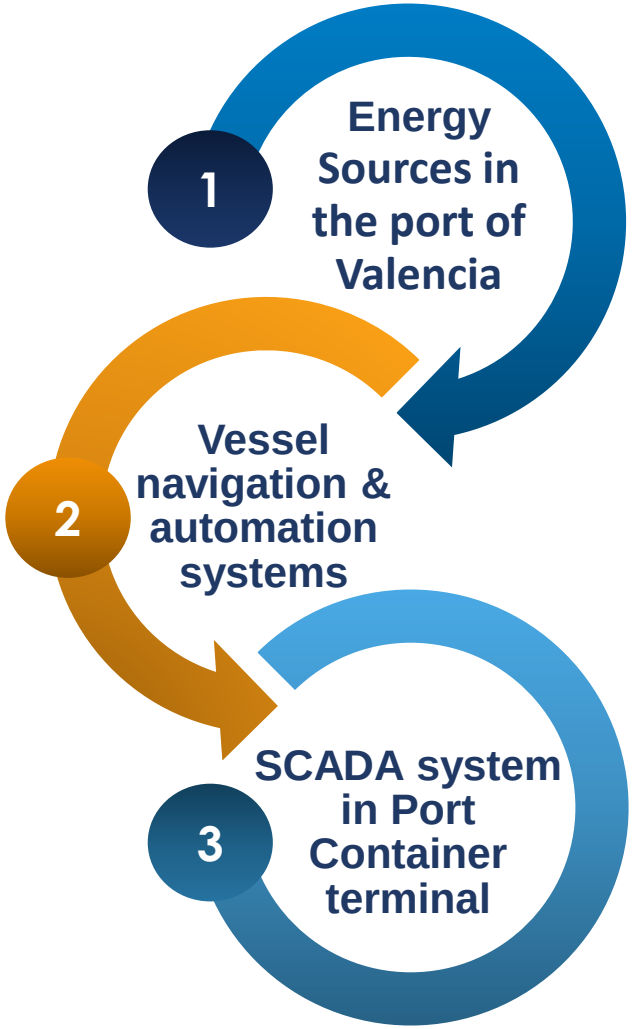
Create a maritime Malware Information Sharing Platform (MISP) community, engage at least 2 CERT/CSIRTs in pilot activities

Cyber-MAR Concept & Methodology

Cyber-MAR takes advantage of cyber range environment and adopts a three-tiered approach in:



Pilot Scenarios



The Cyber-MAR platform will be applied to simulate **the port electrical grid of the port of Valencia**, including protocols for protecting the grid and crisis management after attack.

The Cyber-MAR platform will be applied to simulate **a ship bridge cyber-attack**, including potential attacks to navigation, communication and control systems.

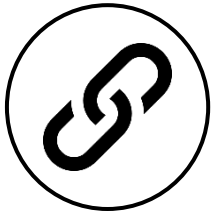
The Cyber-MAR platform will be applied to simulate **a SCADA attack to the Port Container Terminal of Piraeus Port**. In particular, the consequences of a cascade effect extending the attack to the railway operator network.

Expected Impacts

Impact on Resilience to Cyber-Threats & Data Privacy Breaches

Enhancement of the **resilience of target organizations** to new and emerging threats through the **identification of recurring or emerging patterns of cyber-attacks** and **privacy breaches** with a decent degree of accuracy.

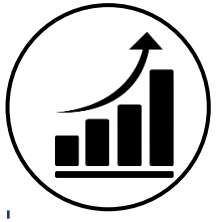
Impact on Supply Chain Efficiency



Cyber-MAR aims to offer the potential to **big players of logistics domain** to **join forces on estimating cyber-risk** and **mitigate** such **threats**, while **fostering open tools** that will improve the internal processes within each organization.

Impact on Appropriate Investments for Cyber-Security

Cyber-MAR focuses on the provision of a fully customizable and tailored view on the trade-offs, aims to **increase the available open tools** in number and variety, while offering an **intuitive integration to all** (physical and virtual) **IT components**.



Societal Impact

Cyber-MAR overemphasizes the importance of **accessible training infrastructures for cyber-defense**, in OT, transport and logistics domains and at the same time aims to contribute to the **standardization efforts** to make such issues prominent in the society.

Cyber-MAR Target Audience

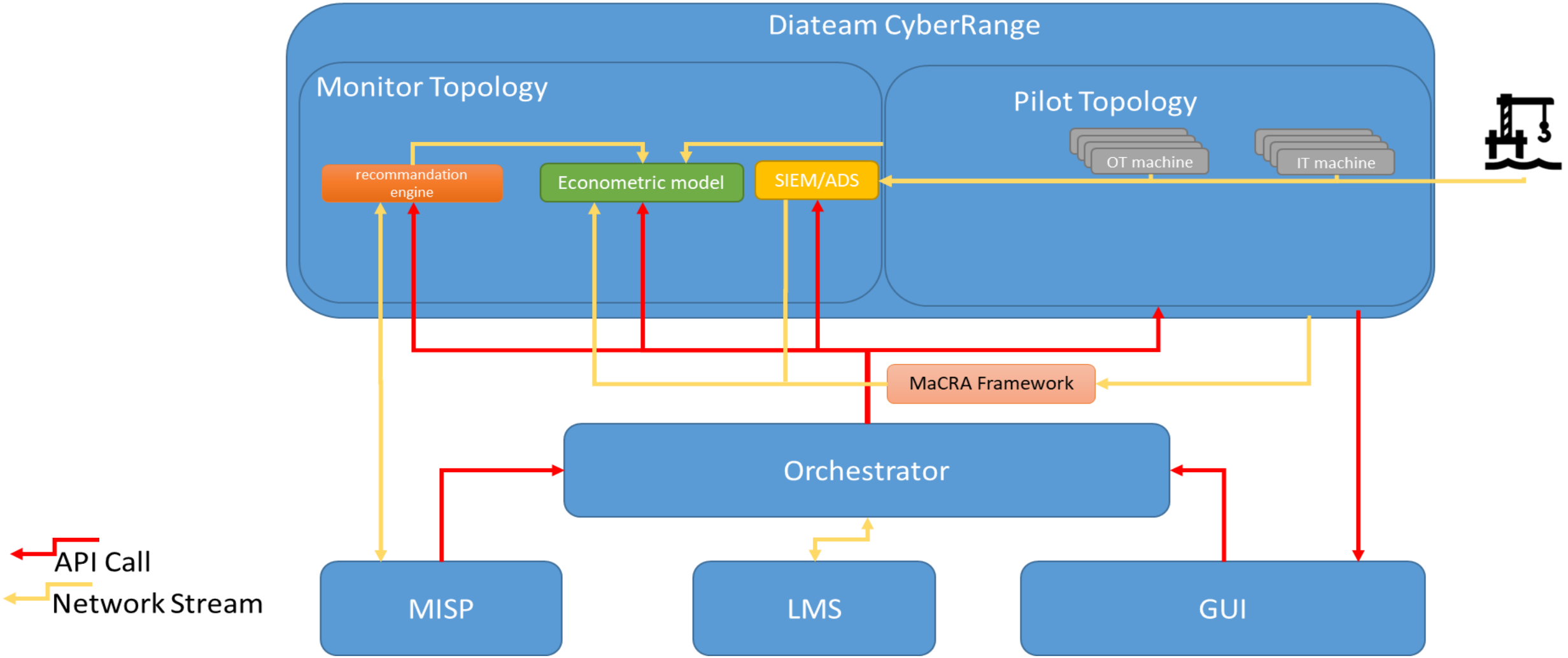
- Decision Makers, Public Authorities and International Organizations
- Academia
- Port authorities, operators and associations
- Freight transport and Logistics actors
- CERT/CSIRTs network
- Insurance, Shipping and Cybersecurity companies/enterprises
- European and International organizations & networks for cybersecurity

Benefits of using Cyber-MAR

- Adopting a platform like Cyber-MAR can have multiple benefits for an organization, at multiple levels of operation and for different categories of members.

- **Employees**:
  - Experiencing real-world threats in a safe environment
  - Learn how to recognize threats
  - Develop and expand cybersecurity skills
- **Security Operator**:
  - Transfer information from the cyber range for immediate use
  - Measure knowledge and capabilities of internal or external cyber security teams
  - Raise awareness (technical/high level)
  - Penetration Testing exercises
  - Simulate real threat actor (Tactics, Techniques, and Procedures)TTPs and learn from them
- **Management**:
  - Keep your employees trained
  - Improve overall cybersecurity education
  - Security Assessments in general
  - Test processes and technologies
  - Evaluate Cyber-Risk based also on its economic impact and take cost-effective decisions
- **Research and Development**:
  - Design and Build Prototypes, Testbeds technologies and experimental environments (e.g. IoT, ICS, robotics, smart grids, BigData, VR/AR etc.) and test them against cyber-attacks
  - Design, Develop and Test new tools and methods for Cyber-Security

Architecture



Technical Modules

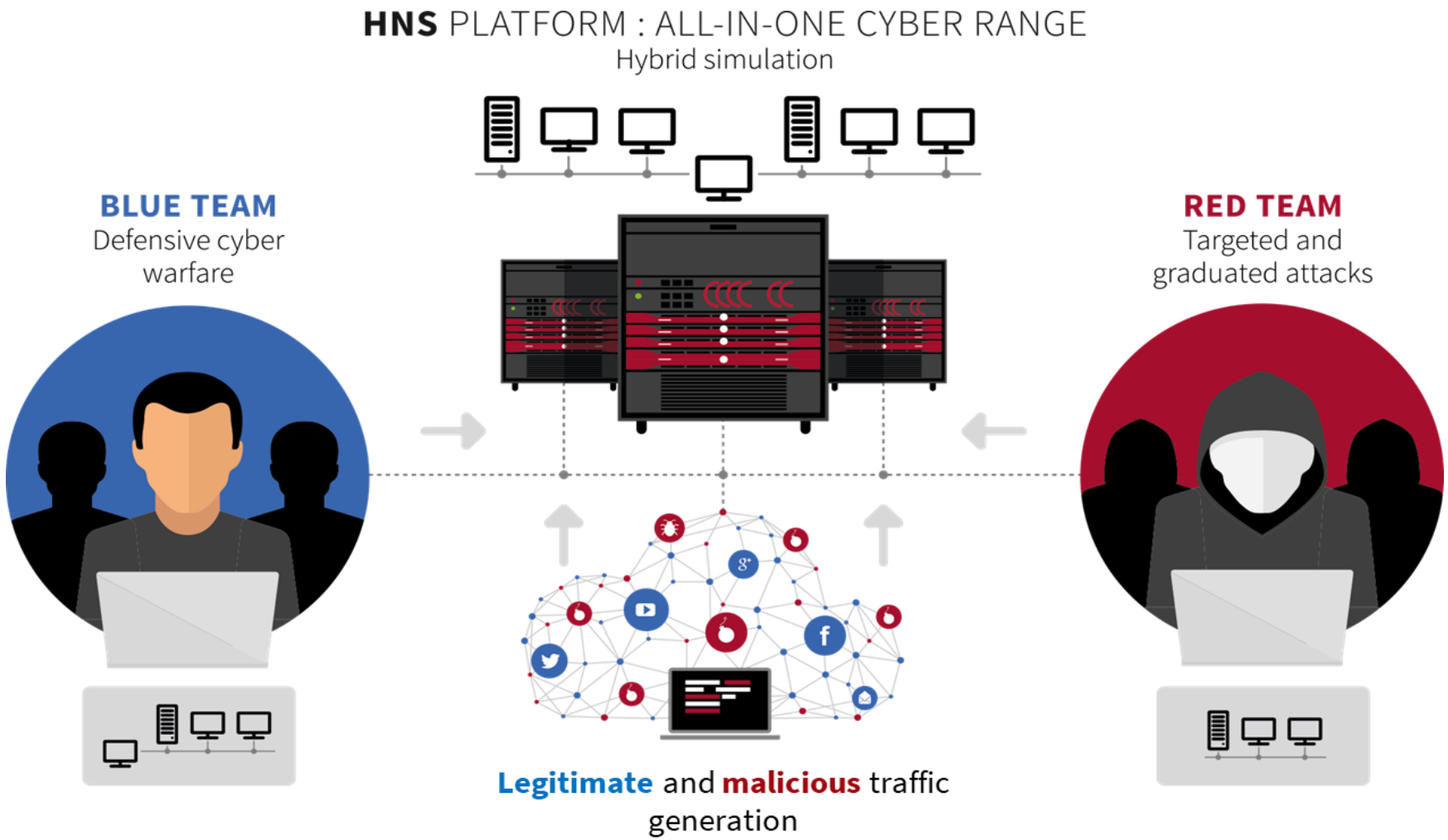
Orchestrator	CyberRange	Recommendation Engine	Econometric Model	Tools

• Main controller
• Synchronise all components
• Create any topology
• Drive any scenario
• Common API
	• Produce & manage VE
	• Inter-Connection with real IT/OT
	• Create, view and interact with all VMs
		• Concentrate a lot of data
		• Evaluate risk and econometric
		• Near real-time evaluation
			• Evaluate economical impact of an attack scenario
			• Raise Awareness
				• Intrusion Detections System (Host/Network)
				• SIEM
				  • Event correlation
				  • Behavioural Analysis
				• MISP
				• MaCRA framework

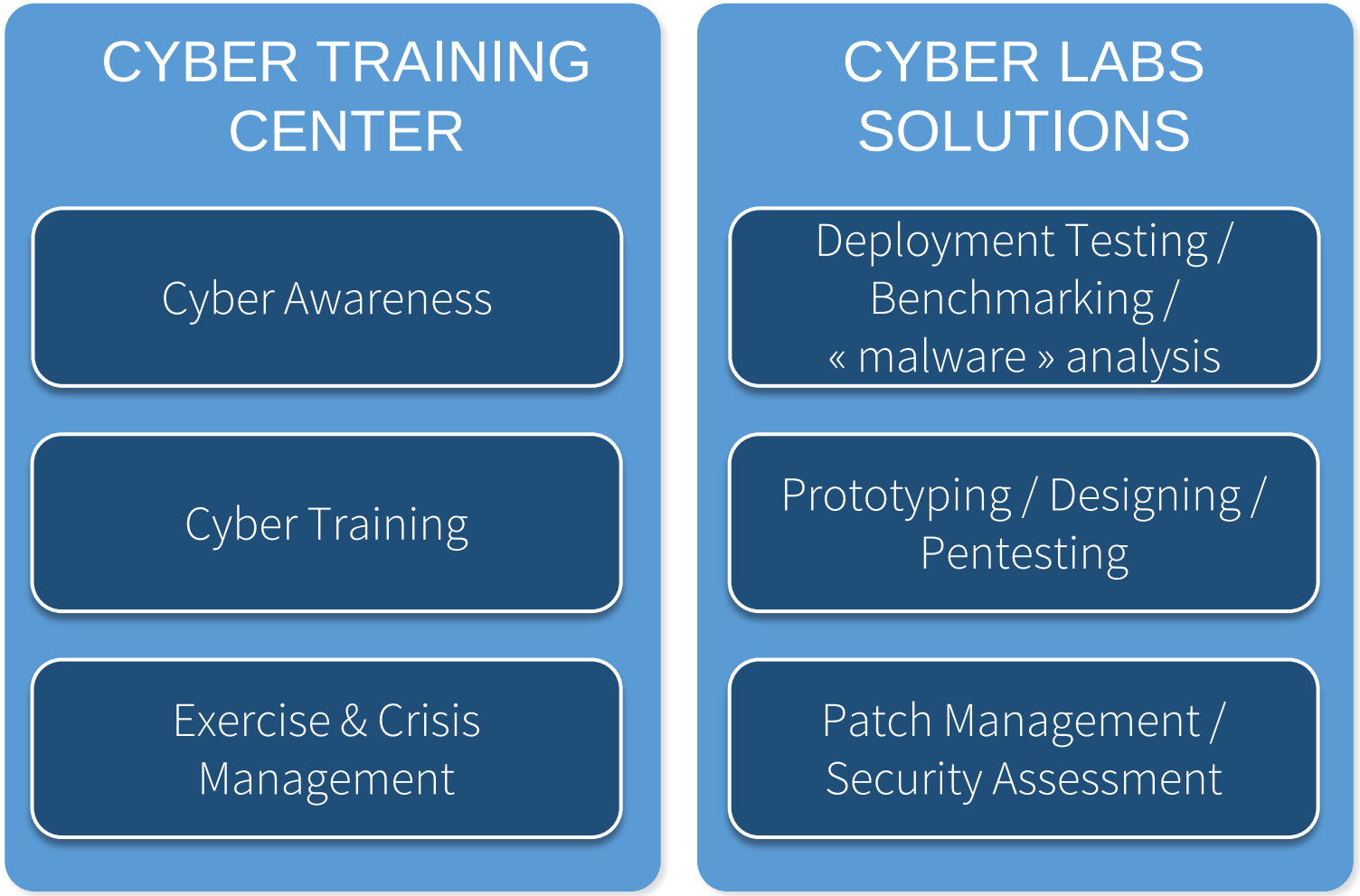
List of Pilots

- Valencia Port Energy Sources **[Completed]**
- Piraeus Port: SCADA Container Terminal
- University of Plymouth: Ship Simulator

Infrastructure Cyber Range | Hybrid Cyber Range



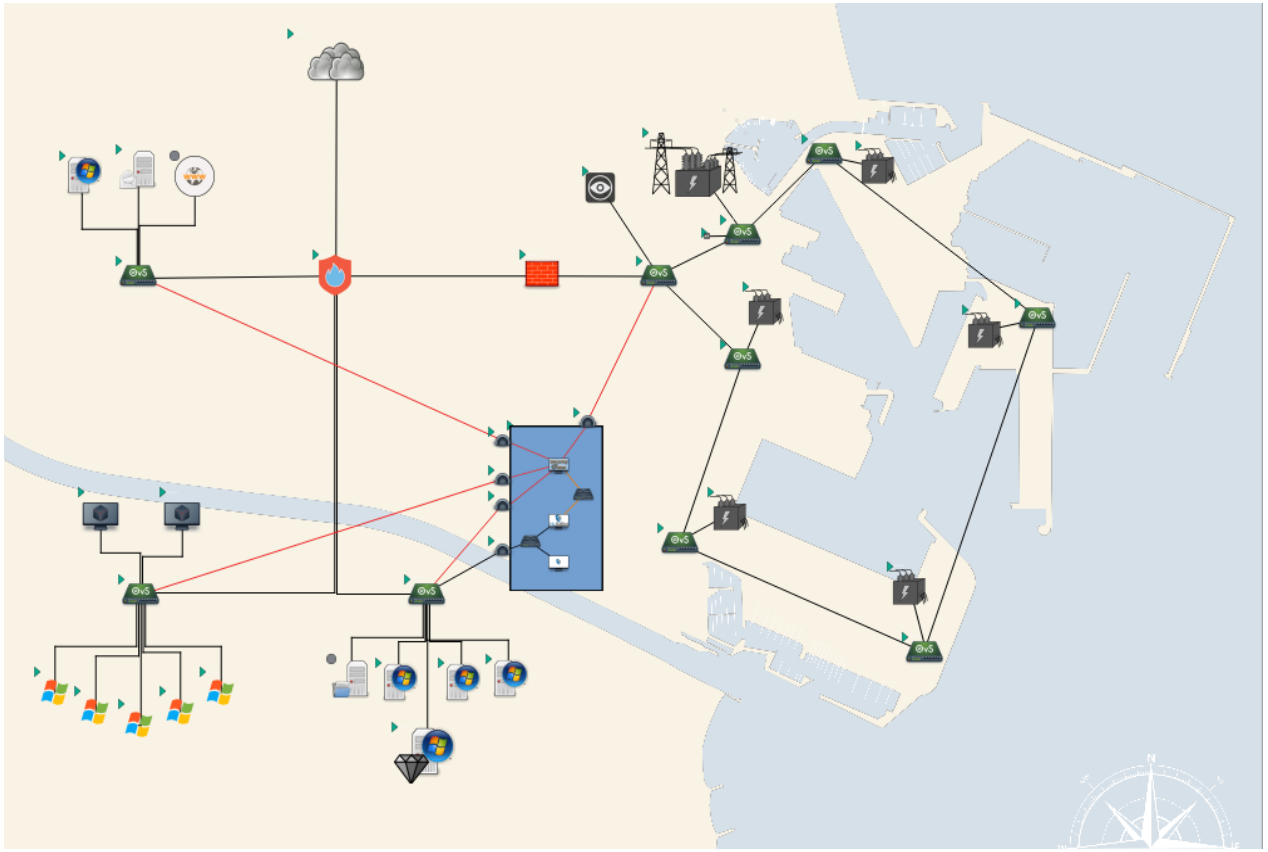
Cyber Range Infrastructure | Cyber Range: what for?



Cyber Attack Scenario | Valencia Pilot

- IT segment: Server/Users/DMZ nets
- OT network: Scada Supervision (PcVue) PLC (Physical & Virtual)
- Monitoring segment
- Remote attack from the Internet

TARGETED TOPOLOGY



<u>Port Power cut & Cryptolock of key machines.</u>

- **1st Target:** Active Directory
- **How:** Spearphishing
- **Who:** the OT Manager
- **When:** Friday PM
- **What:** Malware through Macro
- **Bonus:** Ransom & Leaks

Scenario Objectives

- Assess the electrical grid system to adapt it to avoid any kind of cyber-attack

- Be prepared to mitigate and restore the system in the case of having an attack

- Train port personnel in the necessary skills in cyber threats and quick response in case of
Emergency

- Test some of the components of the Cyber-MAR components

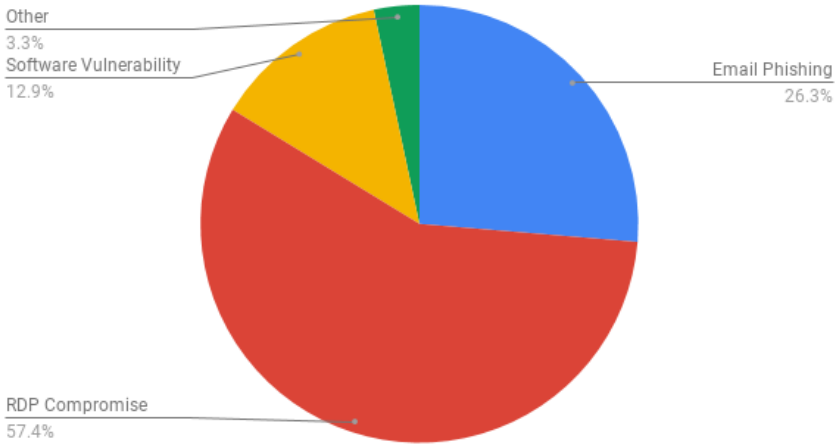
Ransomware Ecosystem

Figures and Facts

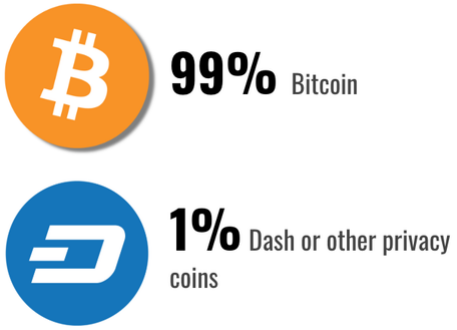
How Often Is a Decryption Tool Delivered After Paying a Ransom?

Do Ransomware Decryptor's Work?

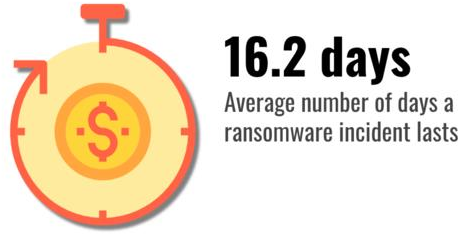
Most Common Ransomware Attack Vector Q4 2019



What Cryptocurrencies Are Used to Pay for Ransomware?

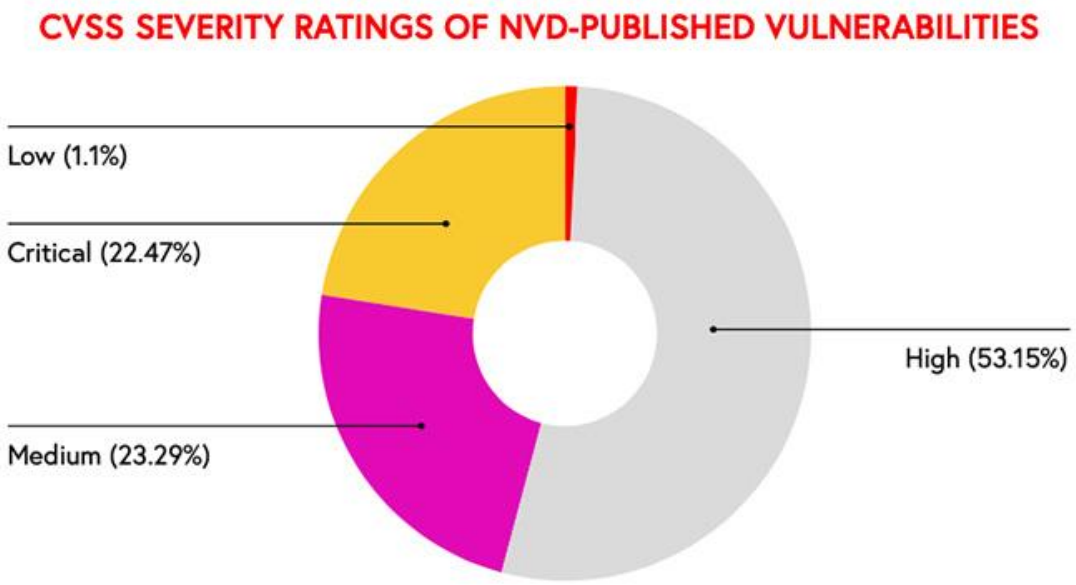


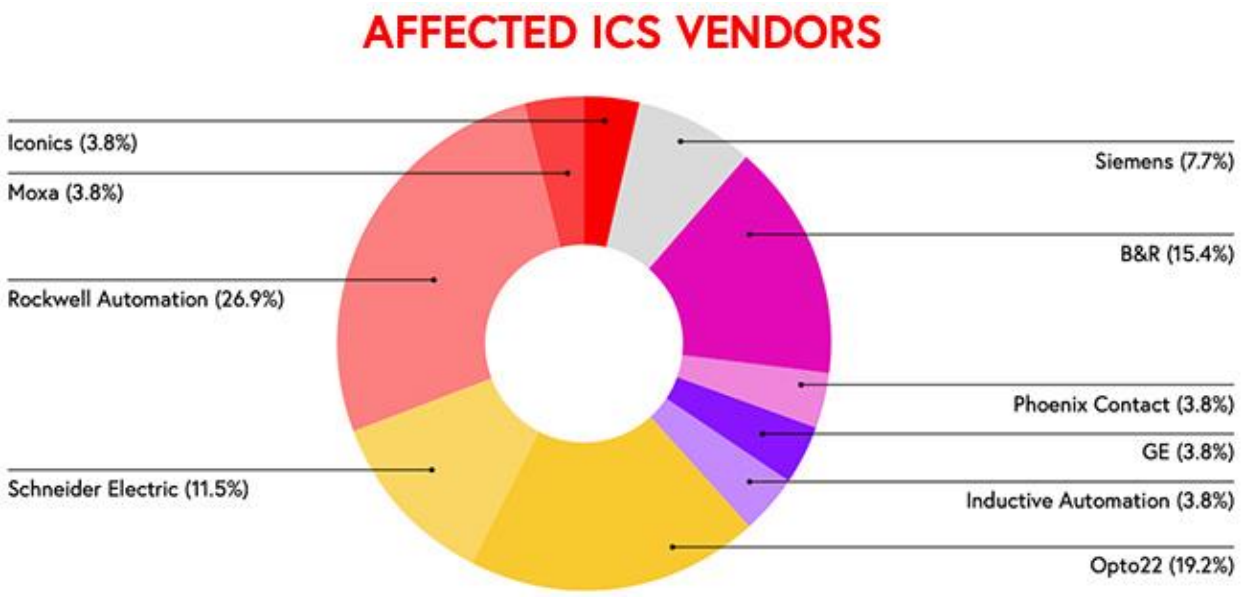
How Much Downtime Does a Ransomware Attack Cause?



OT Attack Surface

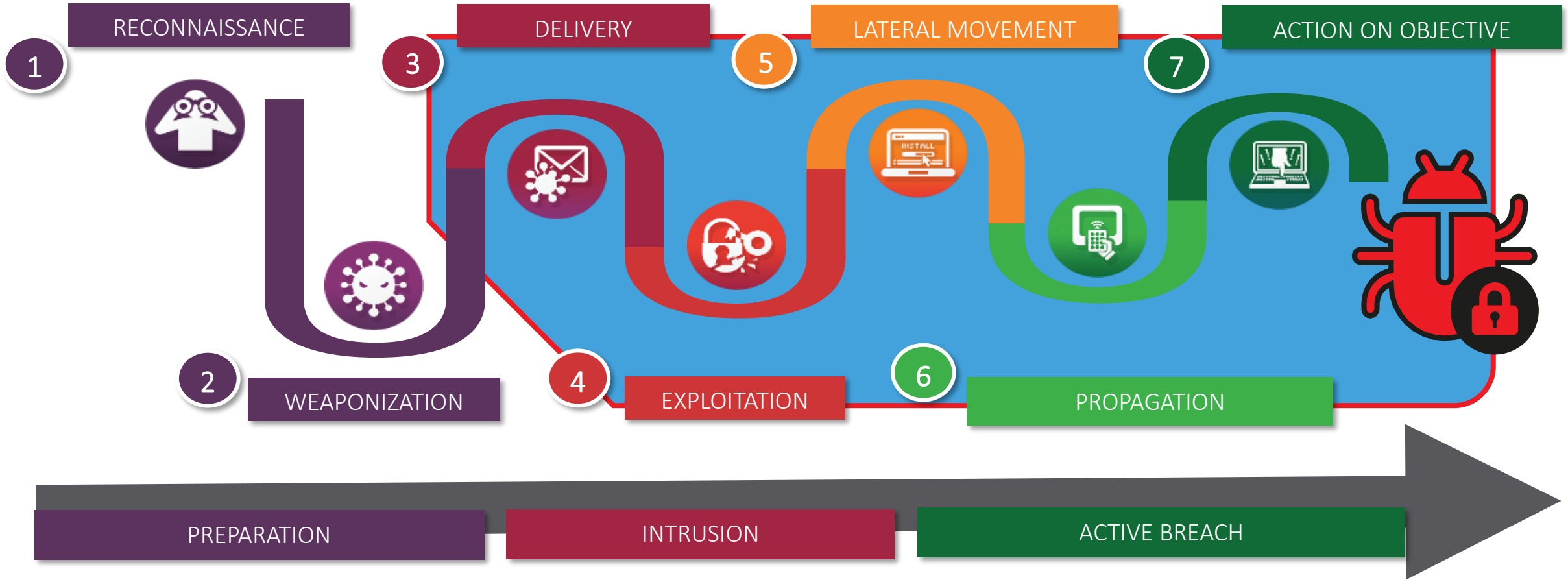
According to the Claroty 2020 report,
+70% of ICS (Industrial Control Systems) vulnerabilities published by the NVD can be exploited remotely



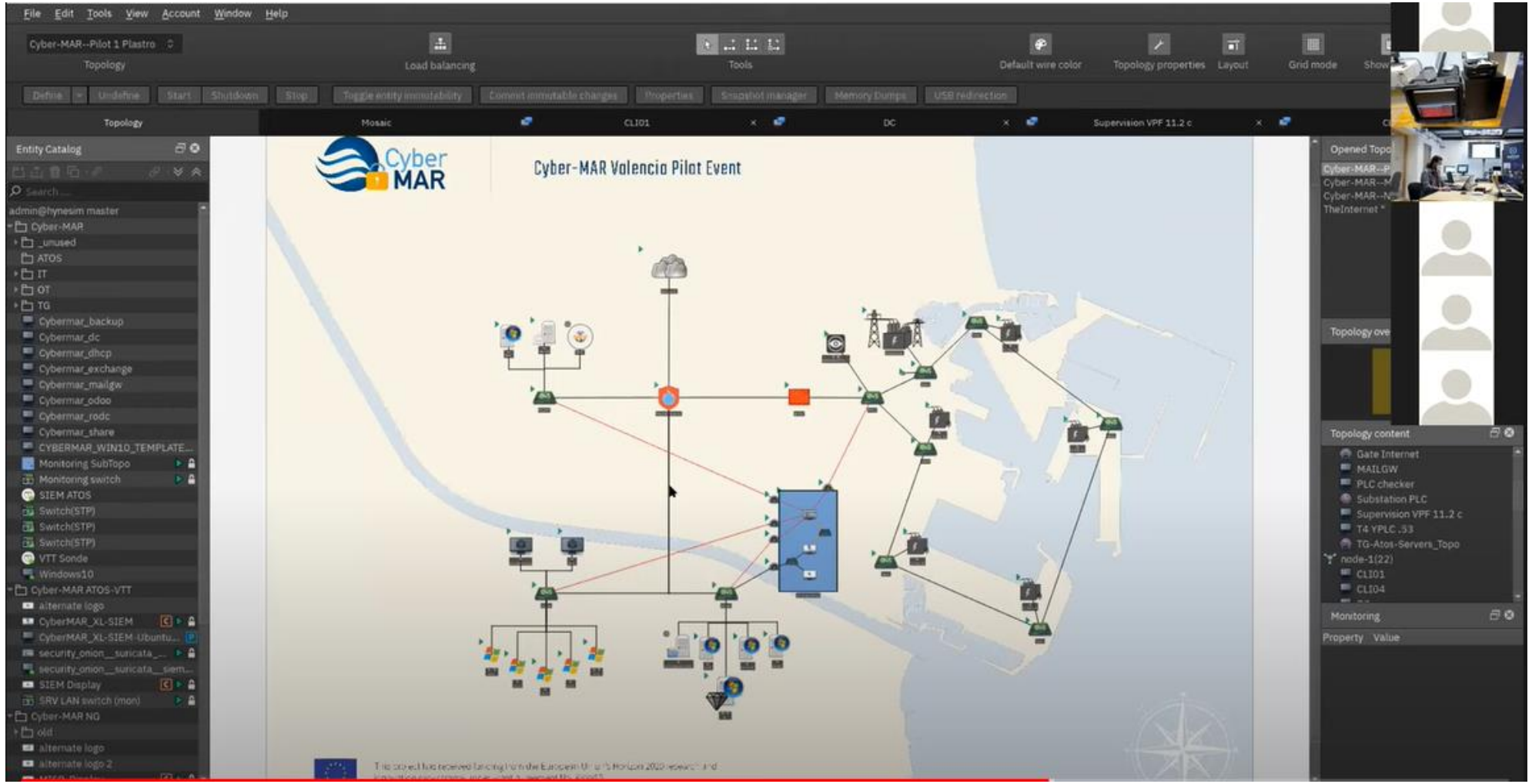


Attack Scenario | Valencia Pilot Event

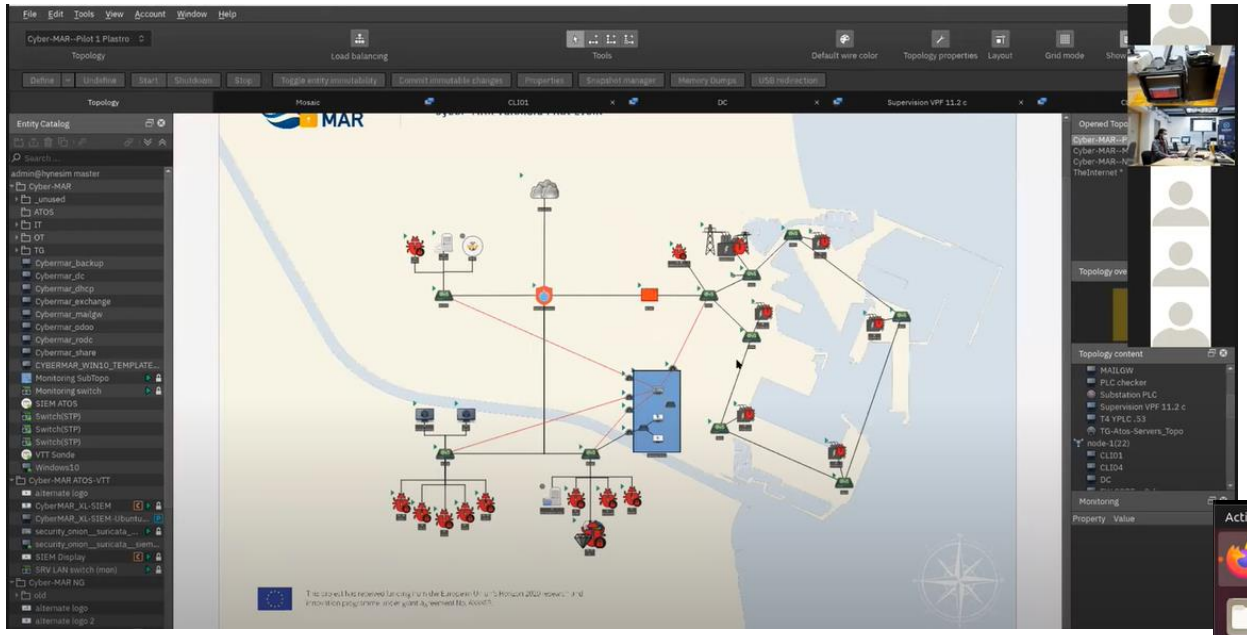
Presentation of scenario through 7 steps

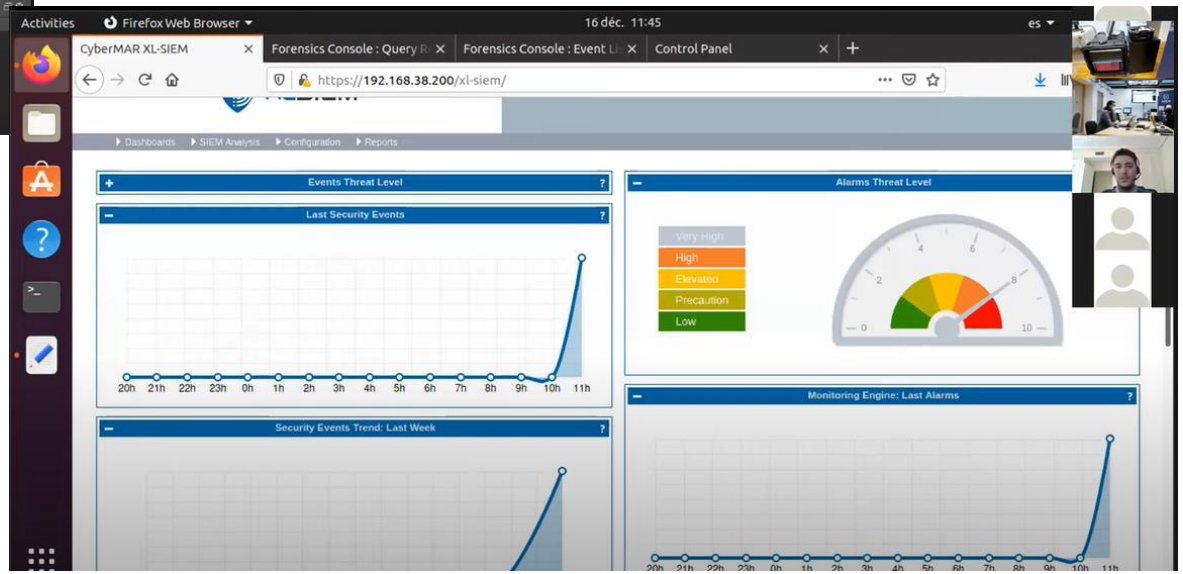


Valencia Pilot

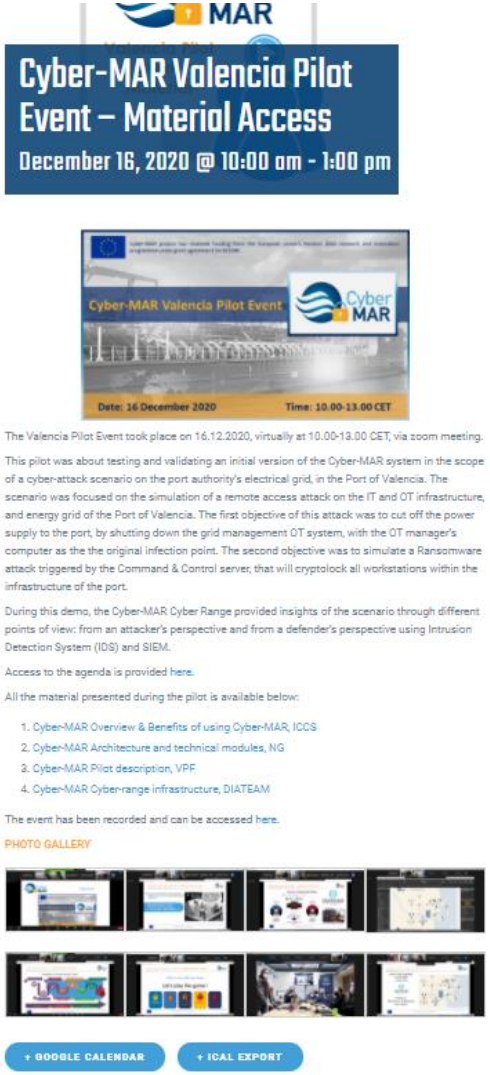


Valencia Pilot





Valencia Pilot | Available on YouTube



https://www.youtube.com/watch?v=7dUEBOc_Gik

Scenario Conclusions

- Importance of cyber-security
- Big economic impact on a port infrastructure
- Severe incident could need from hours to days to recover
- Cyber-range added value
- Test all kind of vulnerabilities in your systems
- Training for all the company personnel

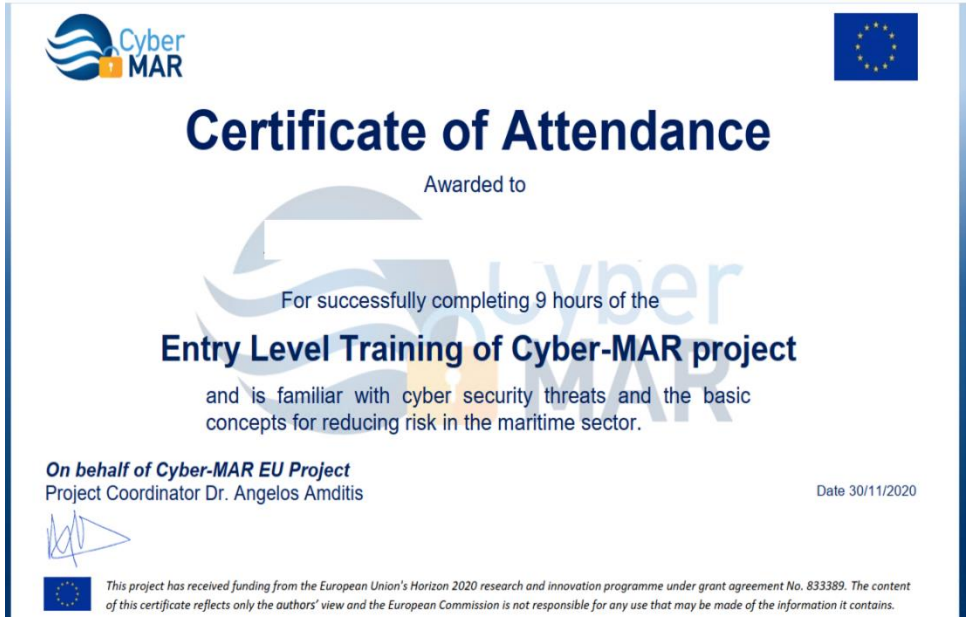
Cyber Range Infrastructure | Human, the weakest link?

- **Cyber security efficiency relies mainly on employees awareness and operational team experience**

REINFORCE THE « HUMAN FIREWALL »

Training

- Training Level 1 (Entry Level) has been completed
  - Module 1: Introduction & Scenarios
  - Module 2: The Regulatory Framework for Cyber Security in Critical Infrastructure
  - Module 3: Attack Issues in deep
  - Module 4: Mitigation and Recommendation
  - Module 5: Knowledge Check Session
  - Module 6: Mini master on cyber security(entry level)
  - Module 7: Hacking and Defensive Tools
  - Module 8: Overview of real cases
  - Module 9: Knowledge check session



Cyber MAR

Certificate of Attendance

Awarded to

For successfully completing 9 hours of the

Entry Level Training of Cyber-MAR project

and is familiar with cyber security threats and the basic concepts for reducing risk in the maritime sector.

On behalf of Cyber-MAR EU Project

Project Coordinator Dr. Angelos Amditis

Date 30/11/2020

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 833389. The content of this certificate reflects only the authors' view and the European Commission is not responsible for any use that may be made of the information it contains.

Training

Entry Level Trainings

One of the objectives of Cyber-MAR is to cover the training needs for all professionals and most importantly to raise the cyber-threat awareness level within those organisations by hands-on training

READ MORE

Mid Level Trainings

One of the objectives of Cyber-MAR is to cover the training needs for all professionals and most importantly to raise the cyber-threat awareness level within those organisations by hands-on training

READ MORE

Advanced Level Trainings

One of the objectives of Cyber-MAR is to cover the training needs for all professionals and most importantly to raise the cyber-threat awareness level within those organisations by hands-on training

READ MORE

Announcements

In this section all the announcements regarding training are available

READ MORE

https://www.cyber-mar.eu/trainings/

www.Cyber-MAR.eu

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Cyber-MAR EU Project

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THANK YOU FOR YOUR ATTENTION

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