NEPTUNE ENERGY

Cyber Security Risk Assessments from an Operator Perspective

AGENDA.

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1 Bring cyber expertise to the ICS.

2 Cyber Assessment Framework from an Operators perspective.

3 IT Learnings from the CAF Process.

Presenters

Duncan Hutton
Lead Instrument Engineer

Ben Ramduny
Head of Digital Security

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1

Bring cyber expertise to the ICS

HOW TO BUILD CYBER SECURITY SKILLS IN YOUR INDUSTRIAL CONTROL SYSTEM TEAMS

TRAIN AND UPSKILL YOUR ICS TEAMS?

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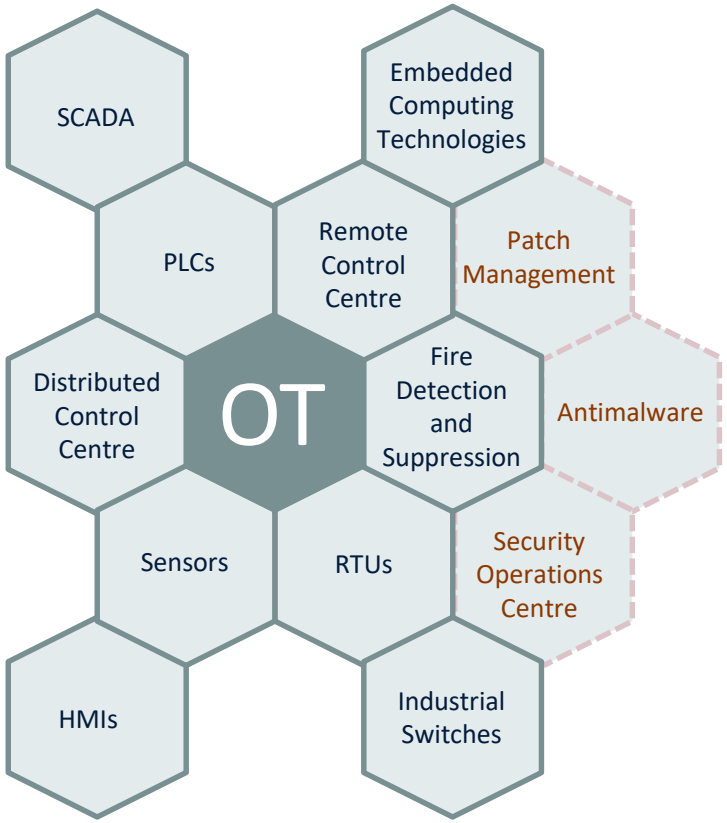

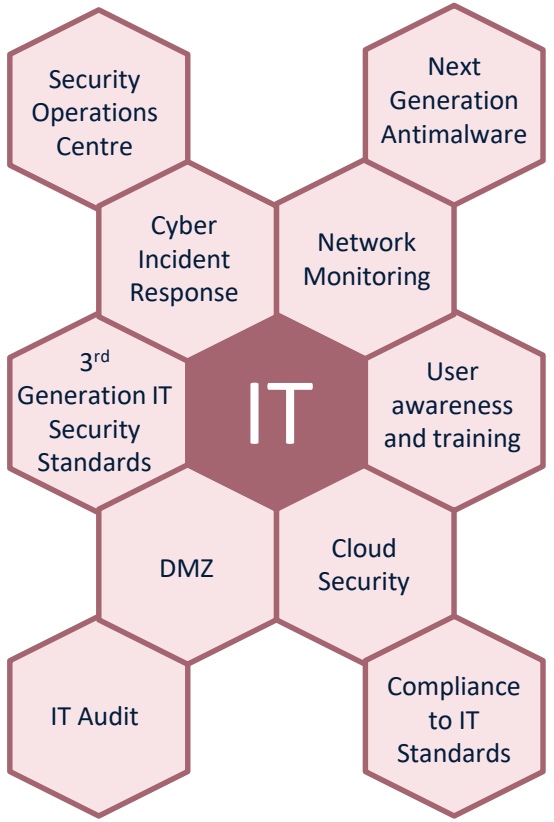

HOW TO BUILD CYBER SECURITY SKILLS IN YOUR INDUSTRIAL CONTROL SYSTEM TEAMS

YOU DON'T, YOU BRING BOTH TEAMS TOGETHER AND LEVERAGE THE EXPERTISE

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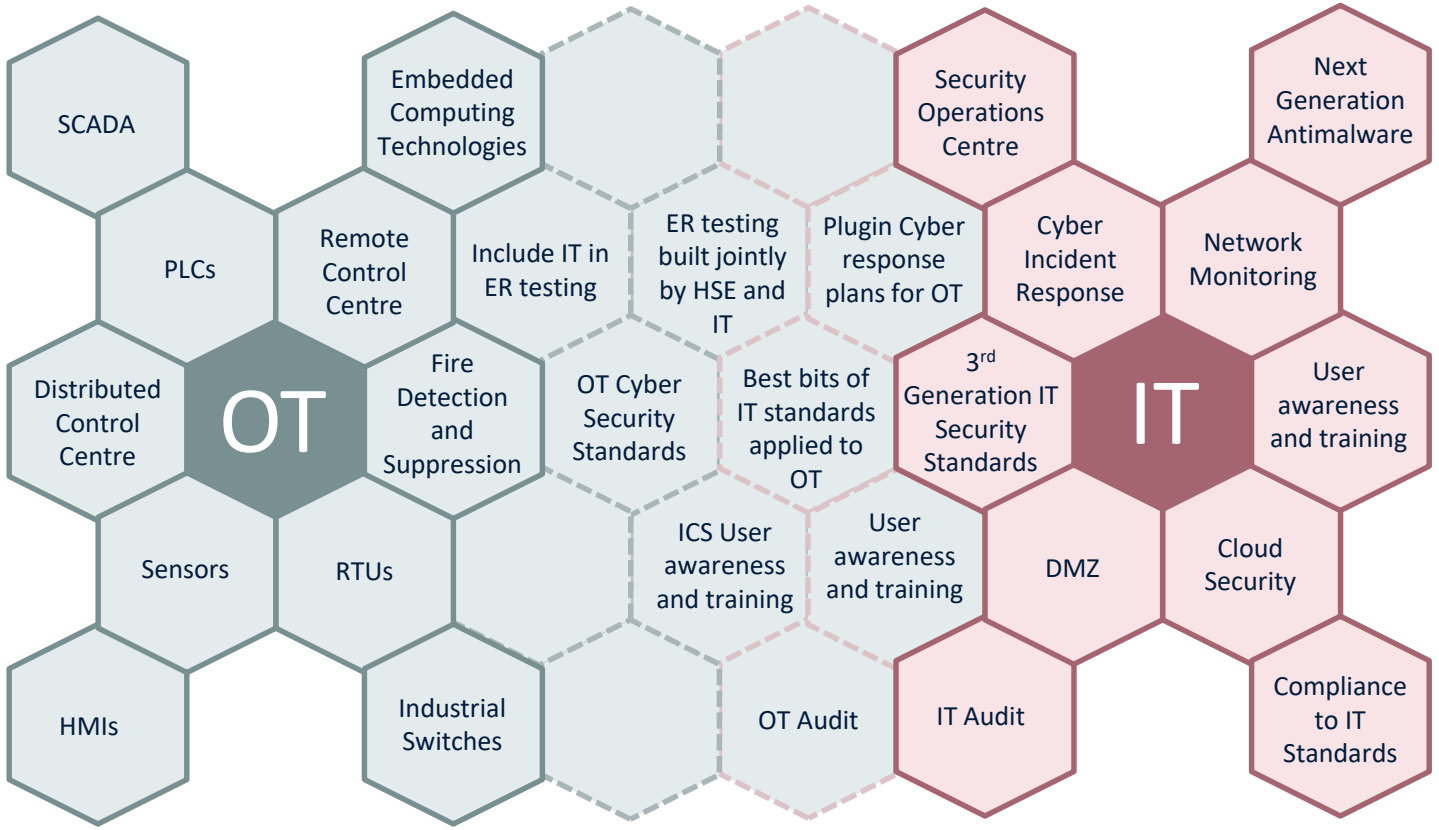

INTEGRATED APPROACH TO CYBER SECURITY

STRUCTURED, STANDARDS BASED, RIGHT TOOLS, MANGING OUR RISKS AND REMAINING COMPLIANT

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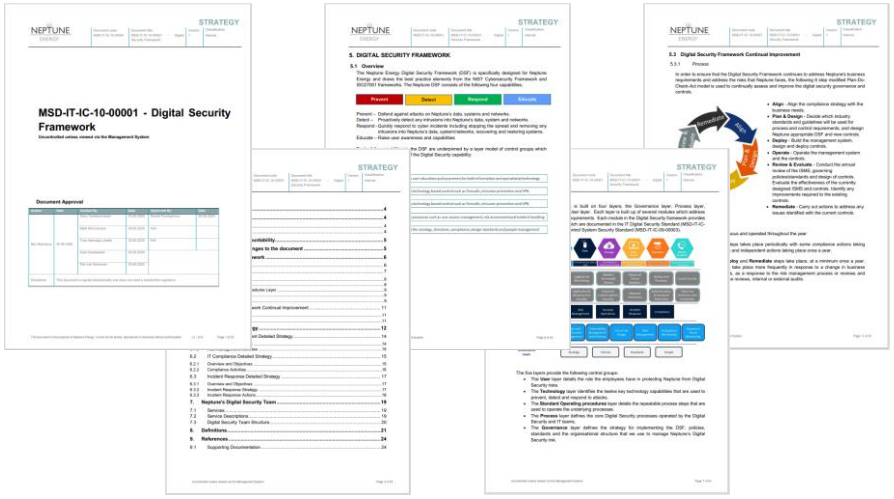
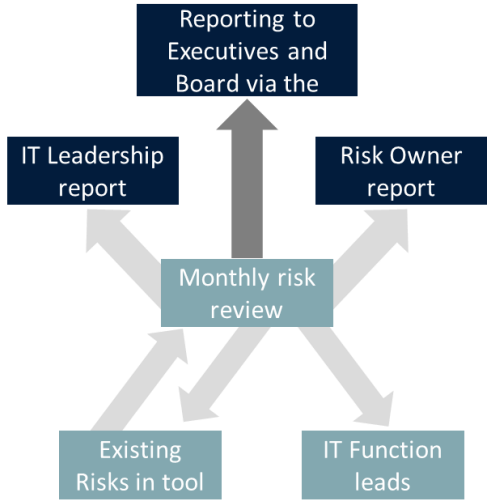
1. Define a target, a framework and strategy



2. Build a robust Risk Management process



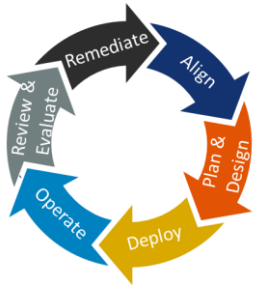
Top Risks:

- Cyber ICS
- Cyber IT
- Outage of IT Systems or Network
- Compliance
- Software Licencing

3. Deploy the right technology and processes

Remote and Cloud Access	Logging and Monitoring	Mobile / Removable Devices	Advanced Threat Analytics	Backup and Recovery	Email Security
Network Security	Application & Infrastructure Security	Industrial Control System Security	Malware Protection	Authentication & Password Protection	Data Loss Detection and Prevention

4. Build 1st line compliance function to monitor controls



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Cyber Assessment Framework

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- What risk assessment method approach to apply?
- HSE Mandatory completion of Basic Cyber Security Inspection Pack – responses reviewed against OG86
- BCSIP extracted from Cyber Assessment Framework^{v3} for CAT2 installations – is it enough?
- CAF Major Accident Hazard (or loss of essential service) focused:
    - **Review against good practice**
    - **Does not reveal business risk or financial consequence**
    - **Output feeds improvement plan**
- HSE OG86 (MAH Focused) aligned with IEC 62443

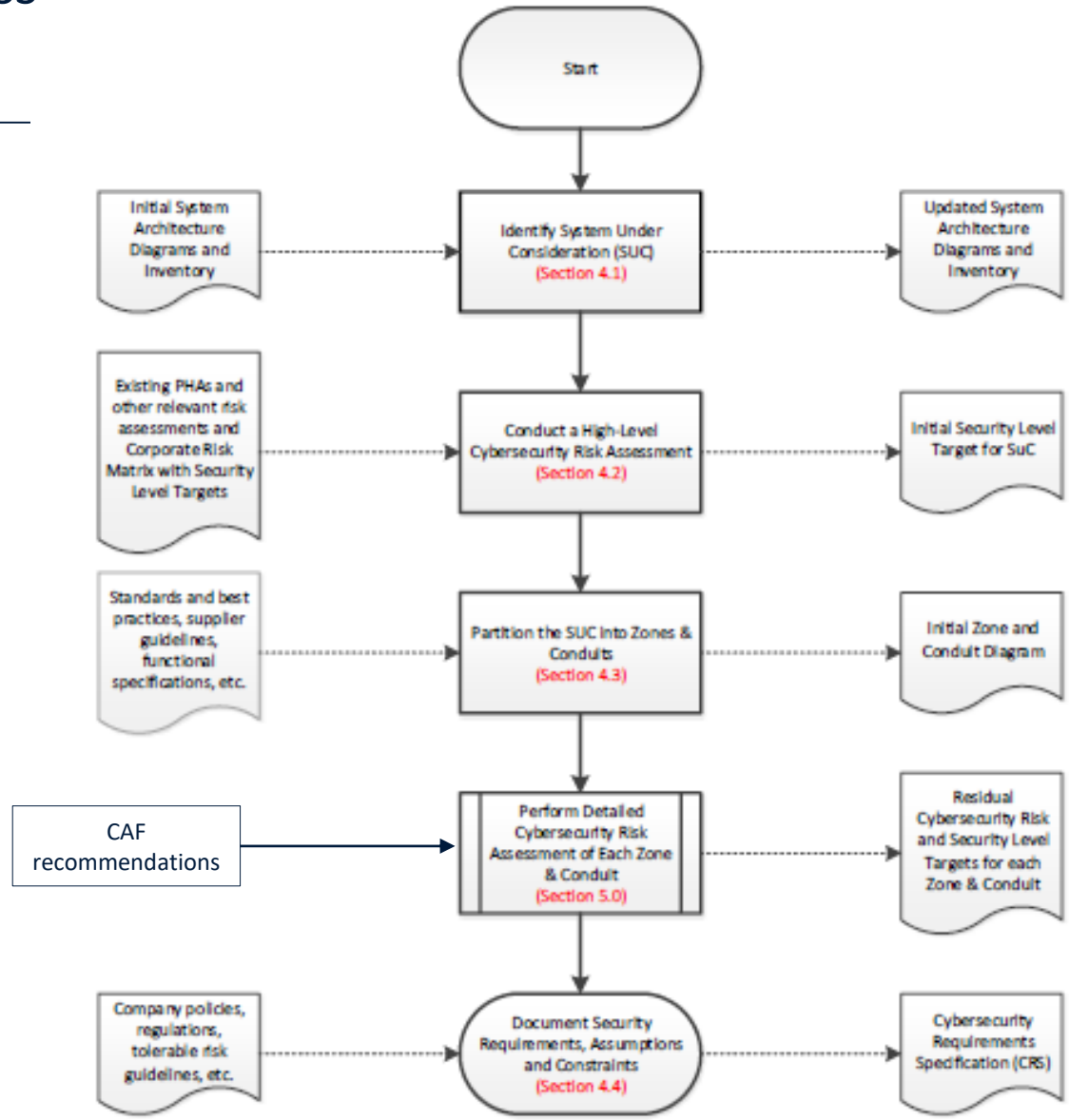
- Neptune ICS Corporate Standard based on NIST 800-82 r2 (annual risk assessment)

- Concluded IEC 62443 compatible with NIST 800-82 r2 and complements CAF

- IEC 62443 risk assessment process identifies:
    - Safety Risk
    - Environmental Risk
    - Business Risk
    - Reputation Risk

CAF & IEC 62443 RISK ASSESSMENT PROCESS

1. **CAF**
2. High Level Risk Assessment
3. Zone & Conduit Analysis
4. Detailed Risk Assessment
5. Cyber Security Improvement Plan
6. Cyber Security Management Plan



See Figure 1 in
IEC 62443-3-2 2015

Why?

- Cygnus is ‘Category 2’ installation.
- HSE expect DH to complete CAF self-assessment and produce improvement plan
- HSE onshore inspection:
  - BCSIP/CAF response & improvement plan against OG 86
- HSE offshore inspection:
  - Cyber Security Barriers breached by a hypothetical Cyber event (compromised engineering workstation)

When?

RA meetings July/August 2020 via MS Teams.

Who?

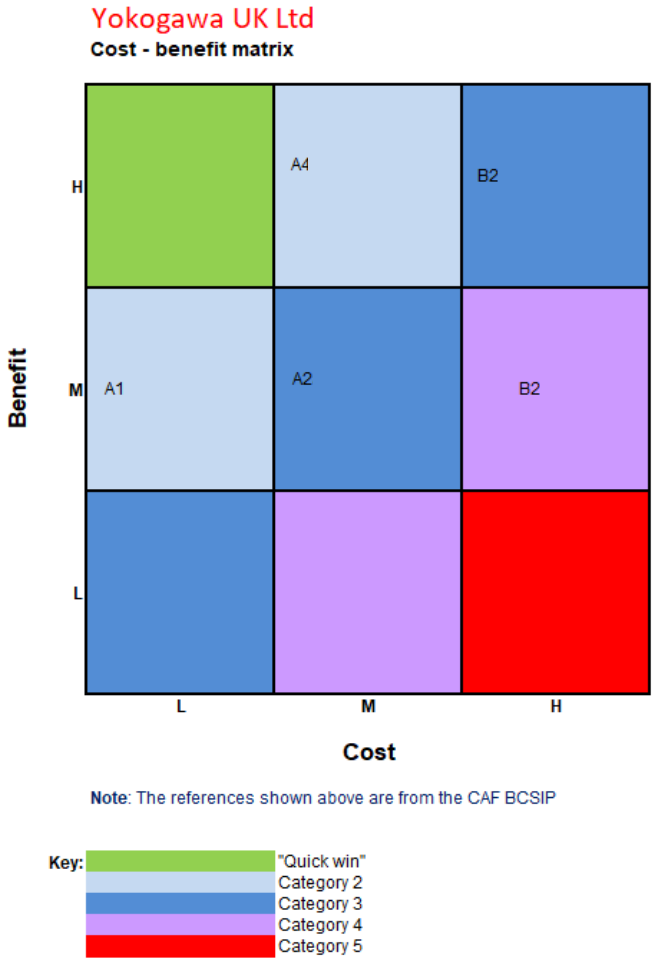
Duncan Hutton – Lead Instrument Engineer
Muhammad Tariq – Instrument Engineer
Rob Turner (Yokogawa – Facilitator and SME)
Tracy Guthrie – Procurement
Sam Smith – Industrial IT
Tony Duncan – Cyber Lead
Ben Ramduny – Head of Digital Security & Risk Management

1. **Self-assessment against the Indicators of Good Practice in BCSIP/CAF**
2. Sort ‘not achieved’ items by cost v benefit.
3. Group by Improvement Category (dependency)
4. Assign a priority to each item.
5. Develop a high-level improvement plan based on Improvement **Category** and **Priority**.

- Matrix shows ref from CAF BCSIP

- Cost (resource and/or service/equipment)
  - Low: <1 week OR <£20k
  - Med: 1 week to 1 month OR £20k
  - High: >1 week OR >£100k

- Benefit
  - **Low:** Minimal improvement defend / detect / respond capability
  - **Med:** Some improvement defend / detect / respond capability
  - **High:** Significant improvement defend / detect / respond capability
  - **"Quick wins":** Low cost & High benefit



IEC-62443 RISK ASSESSMENT PROCESS

1. CAF
2. **High Level Risk Assessment**
3. Zone & Conduit Analysis
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5. Cyber Security Improvement Plan
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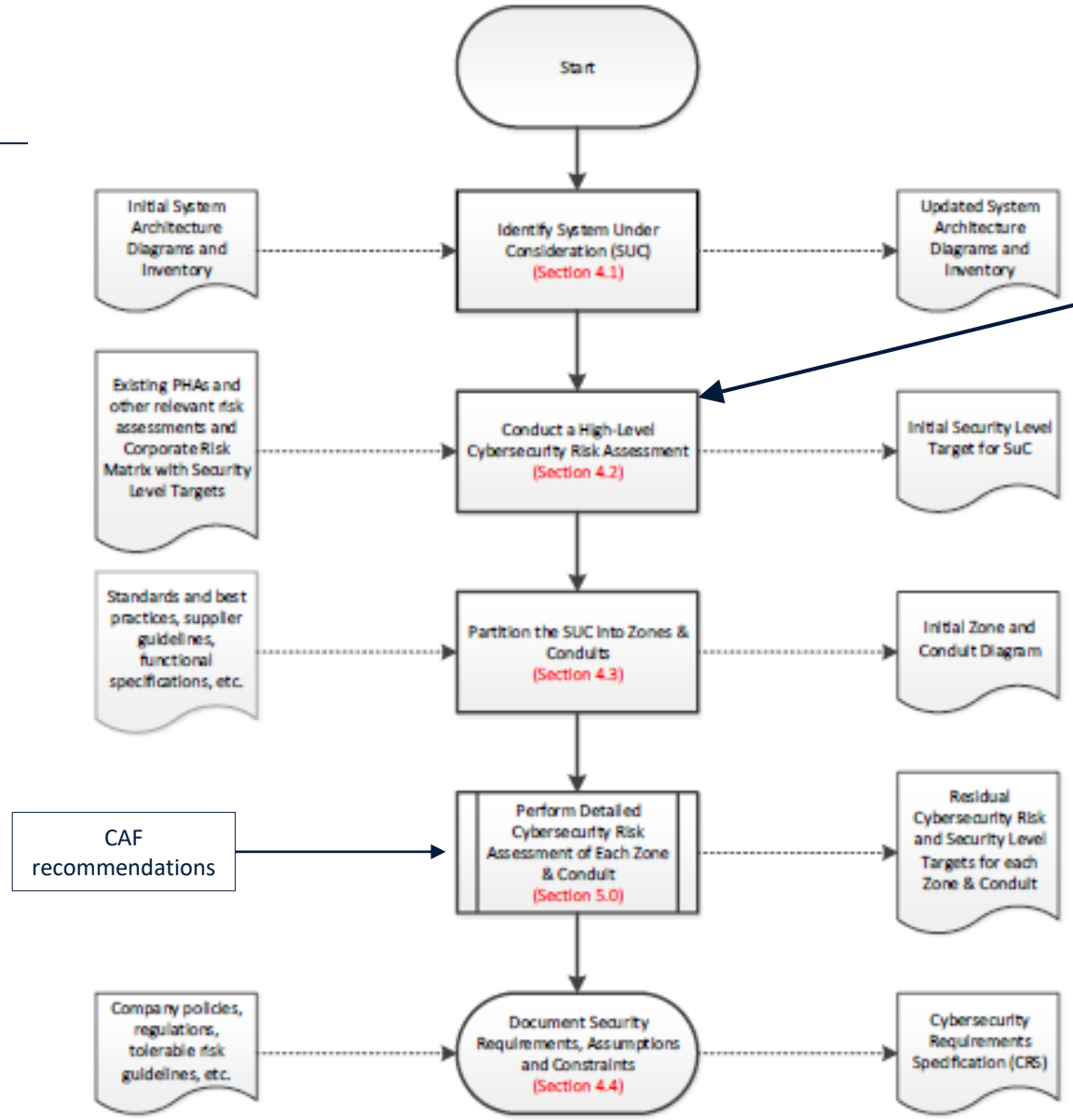

See Figure 1 in
IEC 62443-3-2 2015

1. **Terms of Reference** for HLRA: CF00-32-AC-103-00004 "Terms of Reference, Cygnus Cyber Security High-level Risk Assessment"
2. The System under Consideration (SuC)
3. The corporate risk matrix

SuC:

"The industrial control systems located on the Cygnus platforms, including the associated networks, up to and including the Cygnus boundary firewall."

No 'back office' or other IT-related systems on the Cygnus platforms were considered as part of the SuC.

RISK ASSESSMENT MATRIX

SEVERITY	CONSEQUENCE						LIKELIHOOD				
	People	Environment	Assets / Financial			Reputation / CSR	A	B	C	D	E
			Business Interuption & Business value lost	Production Loss	Material Damage/ Cost Impact		UNLIKELY	POSSIBLE	SOMETIMES	REGULARLY	OFTEN
							Never heard of in E&P industry	Heard of in E&P industry	Incident has occured in NE	Happens several times per year in NE	Happens several times per year in the Asset
5	Catastrophic health effect / Multiple Fatalities or multiple PTDs	Sensitive Environment Can be restored to a satisfactory / agreed state in period of YEAR(S)	>6 months	> 500 kboe (>3000 mmscf)	Catastrophic Damage >10M USD	International Public Attention - International Press and TV	High Risk		Intolerable Risk		
4	Major health effect / PTD or Fatality or Multiple LTI with PPD	Sensitive Environment Can be restored to an equivalent capability in a period of MONTHS	1 - 6 months	200 to 500 kboe (1200 to 3000 mmscf)	Major Damage 1M - 10M USD	National public concern - National Press and TV - International echoes					
3	Serious health effect / injury (LTI with PPD/Multiple LTI)	Sensitive Environment Can be restored to an equivalent capability in period of WEEKS	2 weeks - 1 month	50 to 200 kboe (300 to 1200 mmscf)	Serious Damage <1000k USD	Regional public concern - Regional Press and TV - National echoes	Medium Risk				
2	Moderate health effect / injury (Single LTI without PPD)	Non-sensitive Environment Can be restored to an equivalent capability in period of WEEK(S)	1 - 14 days	10 to 50 kboe (60 to 300mmscf)	Moderate Damage <500k USD	Local Public concern - Local Press - Regional echoes					
1	Minor Health effect / injury (first aid/MTC)	Non-sensitive Environment Can be restored to an equivalent capability in period of DAYS	<1 day	<10kboe (<60mmscf)	Minor Damage <50k USD	No public concern - Local echoes	Low Risk				

HIGH LEVEL RISK ASSESSMENT - PROCESS

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For each sub-system:

1) **Allocate to one of the following equipment classes**:
   - BPCS (Basic Process Control System)
   - SIS (Safety Instrumented System)
   - Other control equipment
   - Network equipment
2) Consider the two scenarios of:
   - **Total Loss** of sub-systems functionality
   - **Partial Loss** (I.e. compromise) of the sub-system's functionality
3) For each scenario assess:
   - The <u>most likely</u>, dominant **consequence** and its **likelihood**.
   - Use risk matrix to identify **<u>unmitigated</u>** risk the sub-system presents to the organisation.
   - Identify risk ranking driver: **Safety**, **Environmental**, **Financial** or **Reputational** consequences

Sub-systems:

(derived from the asset inventory)

1) Sub-system A i.e. ICSS - Safety System
2) Sub-system B i.e. Instrument Air Compressor UCP
3) Sub-system C
4) Sub-system D

HIGH LEVEL RISK ASSESSMENT - OUTPUTS

- Attendance register
- The risk assessment worksheet for each sub-system within System under Consideration:
    1. The failure mode (partial or complete loss of the sub-system)
    2. Consequence rating 1 to 5
    3. The most significant consequence category (safety, financial, environmental, etc.)
    4. Likelihood rating A to E
    5. The risk ranking Low, Medium, High or Intolerable Risk
- A register outstanding questions, assumptions or other observations
- Assessment study close out report

Study conclusion:

Following sub-systems are 'high risk' and shall be put forward for detailed risk assessment:

1) Sub-system A i.e. ICSS - Safety System
2) Sub-system B i.e. Instrument Air Compressor UCP
3) Sub-system C
4) Sub-system D

IEC-62443 RISK ASSESSMENT PROCESS

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2. High Level Risk Assessment
3. **Zone & Conduit Analysis**
4. **Detailed Risk Assessment**
5. Cyber Security Improvement Plan
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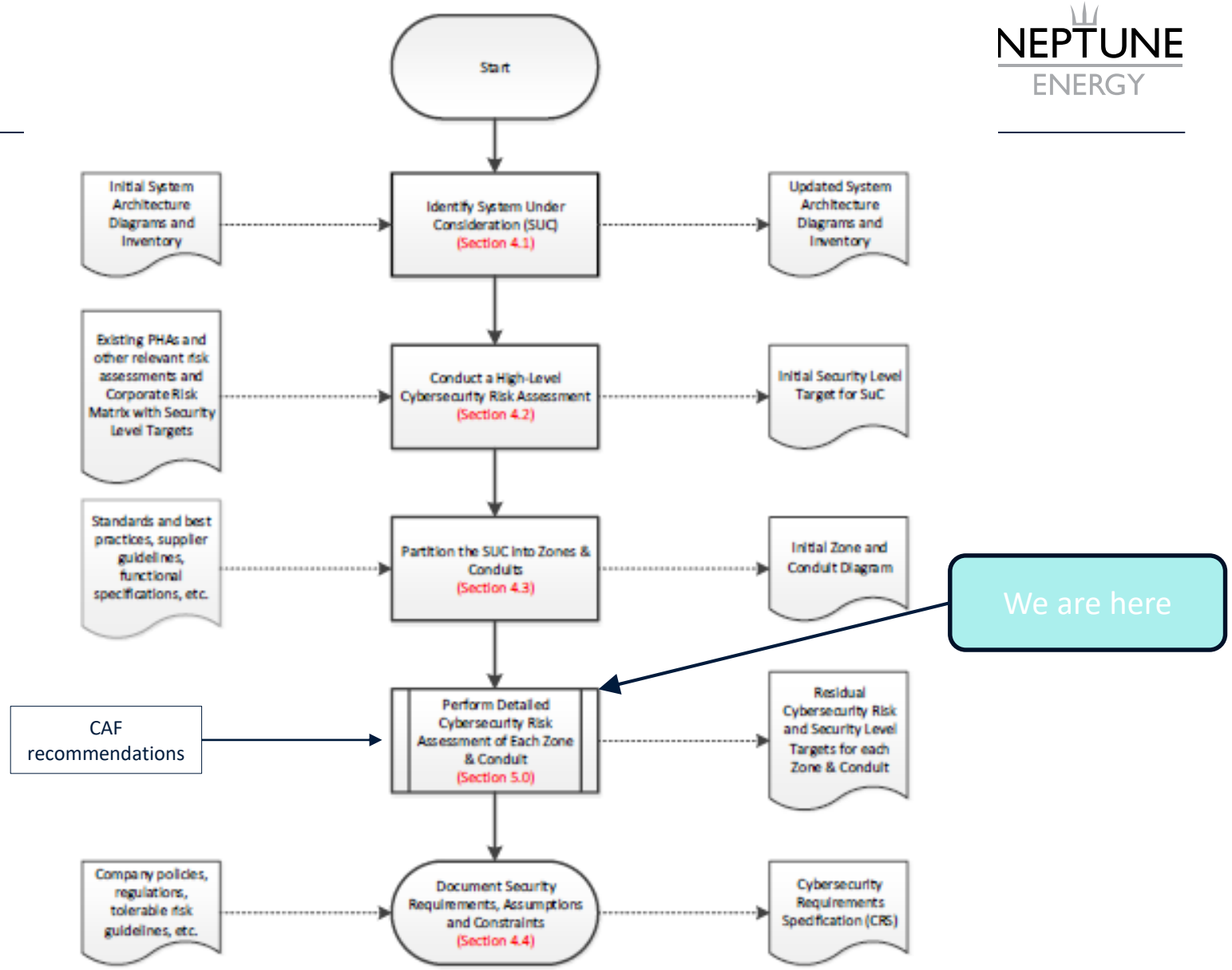

See Figure 1 in
IEC 62443-3-2 2015

1. **Terms of Reference** for DRA: CF00-32-AC-103-00005 "Terms of Reference, Cygnus Cyber Security Detailed Risk Assessment"
2. The System under Consideration (SuC)
3. The corporate risk matrix

SuC:

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No 'back office' or other IT-related systems on the Cygnus platforms were considered as part of the SuC.

RISK ASSESSMENT MATRIX

SEVERITY	CONSEQUENCE						LIKELIHOOD				
	People	Environment	Assets / Financial			Reputation / CSR	A	B	C	D	E
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DETAILED RISK ASSESSMENT - PROCESS

Zones under Consideration:

(Derived from 'High Risks Systems' from HLRA)

1) Sub-system A i.e. ICSS - Safety System
2) Sub-system B i.e. Instrument Air Compressor UCP
3) Sub-system C
4) Sub-system D

For each ZuC:

- Identify potential threat scenarios including threat source, action and vulnerabilities.
- Review threat scenarios and use risk matrix to identify: Consequences, likelihood and the unmitigated risk the threat scenario presents to the organisation – Ref HLRA to assist progress & consistency

- Determine the CRRF and the Security Level Target, SL-T. See the diagram below.
- Consider existing countermeasures for each threat scenario identified and use risk matrix to re-evaluate the residual cyber security risk.
- Evaluate the residual risk and consider additional countermeasures if still above the tolerable risk level.

DETAILED RISK ASSESSMENT - OUTPUTS

- Attendance register
- The risk assessment worksheet for each ZuC:
    1. The name of the ZuC
    2. The threat scenarios
    3. Most significant consequence (safety, environmental, financial, reputation)
    4. Impact rating for most significant consequence 1 to 5
    5. Likelihood rating 1 to 5
    6. Risk rating 1 to 25
    7. Security Level Target, SL-T
    8. Existing countermeasures
    9. Recommendations to reduce assessed risk to a tolerable level
    10. Residual risk
- A register of any outstanding questions, assumptions or other observations
- Assessment study close out report.

Study conclusion:

Most Significant risks in ZuC

- **Assessed Mitigated Risk**
- **Above or Below tolerable risk?**
- **List of additional mitigating defence measures**

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3

IT Learnings from the CAF Process

WHAT DID I LEARN FROM GOING THOUGH THE CAF PROCESS

RIGS ARE COMPLEX, CAF TAKES TIME, YOU NEED SOMEONE WITH EXPERIENCE

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About the Rig

- Lots of ancillary systems need to be considered
- It's not the obvious systems that are the most “at risk”
- Nothing is isolated (anymore)

About the Process

- Get someone who has done it before
- Need the guys who know to participate
- Present the results at management level AND technical level

Going Global…

- Neptune approaches the issue of cyber security differently in each country.
- Building relationships between the teams is hugely important.
- Need the buy-in from senior management.

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QUESTIONS AND ANSWERS