CYBERSECURITY

SOC 4.0

Managed Security Services

AIRBUS

SUMMARY

INTRODUCTION

Why a SOC service is needed

A Security Operations Centre (SOC) is defined as a combination of experts, tools and processes to help prevent, detect, analyse and evaluate security risks. A SOC will also coordinate and monitor the remediation of security incidents in Information and Operational Technology infrastructure.

Challenges in OT Security Monitoring and Operations

OT operators are facing significant challenges through an increase of cyber-attacks targeted towards Industrial Control Systems (ICS) and Operational Technology (OT), while at the same time, technologies associated with digital transformation, Industry 4.0 and IIoT establish more connectivity for the ICS. Furthermore, threats from the supply chain and information-sharing between organisations, as well as compliance with regulations and standards for cyber security are additional factors that contribute to the need to implement a SOC that monitors, detects, and prevents all possible scenarios affecting the OT infrastructure availability, integrity and confidentiality.

Airbus CyberSecurity provides SOC as a service (MSS) for Information and Operational Technology domains (IT and OT). Airbus can help your organisation by providing the right services to meet the business demands and manage the risks with a complete solution. This whitepaper details the Airbus SOC 4.0 service as well as its key features and benefits.

Although SOC 4.0 MSS covers both IT and OT domains, this paper will focus on the OT side.

SOC 4.0 Managed Security Service Portfolio

SOC 4.0 at a Glance

Airbus' SOC 4.0 is a managed security service to monitor Information and Operational Technology (IT and OT) infrastructure, as well as detect and prevent security incidents and cyber-attacks, equipped with systems and tools to enable the required SOC functionalities. The SOC 4.0 MSS portfolio consists of three main categories as illustrated in **Figure 1**: the core Protective Monitoring service; Advanced Services; and On-Demand Consulting services.

Protective Monitoring

Protective Monitoring is the core service of Airbus SOC 4.0 for OT security monitoring. Within this service, security logs and operational data from OT assets such as PLCs, RTUs, SCADA, Engineering stations, Historians, etc, are captured, collected, forwarded, stored and processed in very high numbers. The events are then correlated using specific and customised detection rules (SOC use cases) which are used to search for suspicious patterns and indicate potential security alerts. These detection rules are enriched with OT threat intelligence contexts and feeds, whereby irregularities are detected, and corresponding alerts are generated and examined by qualified security analysts. In the case of security incident discovery, the incident response team is notified using the ticketing system integrated within SOC 4.0.

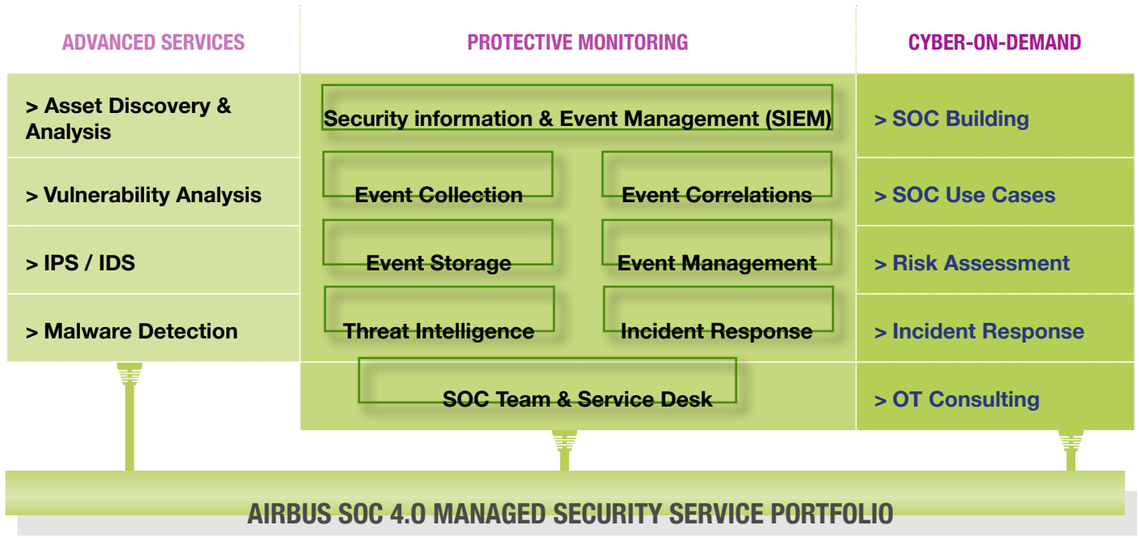
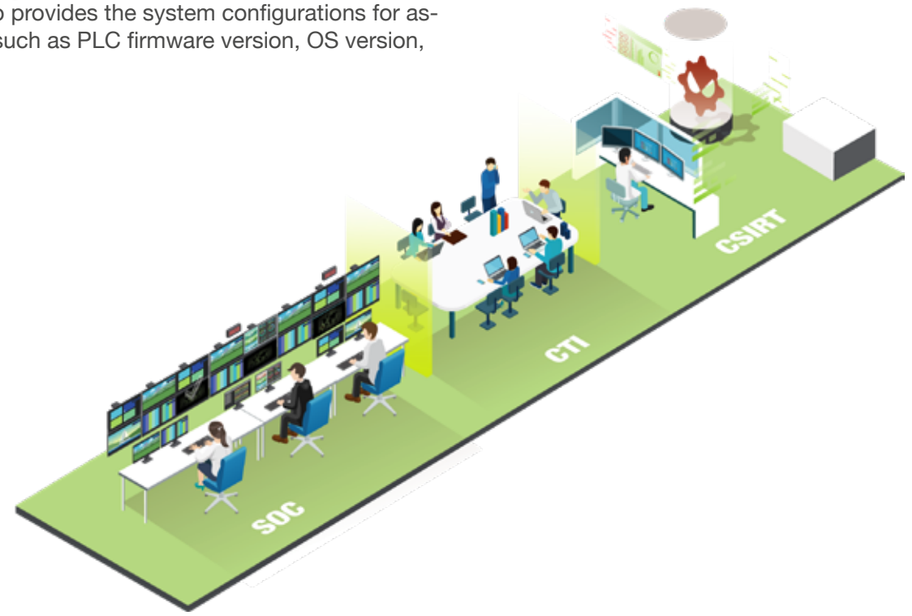


Figure 1: Airbus SOC 4.0 Managed Security Service Portfolio

Advanced Services for SOC 4.0

Additional and advanced capabilities can be added on top of the core service to empower SOC operations in order to meet customers' specific demands. SOC 4.0 is a modular service that provides flexibility to accommodate any future expansion.

- The Asset Discovery and Analysis add-on service provides an automatic discovery for the OT assets and identifying new assets added or existing assets disconnected from the network. It also provides the system configurations for assets such as PLC firmware version, OS version, etc.
- Vulnerability Analysis is a service for identifying all vulnerabilities (tracking and scoring vulnerabilities) associated with the discovered assets. It also provides reports and recommendations for remediations.
- Intrusion Prevention and Detection Systems (IPS/IDS) is an advanced service that grants the possibility to detect all anomalies, malicious activities, human errors and outsider cyber-attacks.
- Malware Detection provides end-point protection from malware and unknown threats, as well as host-based intrusion prevention against new vulnerabilities.



Cyber-on-Demand

These are consultancy services that help customers define and build security managed services and to provide support during SOC operations.

- SOC Building service is a consulting service to help customers set up a SOC programme, define requirements and SOC scope such as operation hours, SOC tools, etc. It also develops the structure and determines the delivery method for the SOC (either in-house or outsourced). This can be applied to the enablement of an OT service on an existing IT SOC.
- SOC Use Cases consultancy service is used to identify all possible and applicable use cases based on OT infrastructure risks and operational requirements.
- Risk Assessment service assesses OT threats and vulnerabilities, identifies and score all risks, and then develops a remediations roadmap.
- Incident Response service supports customers in the case of emergency response, preservation of evidence, triage and investigation assistance
- Other OT Consulting services are available, such as threat intelligence, active directory audit, awareness sessions and demonstrations, and other kinds of reports related to OT security such as OT hardware pentests and OT security controls.

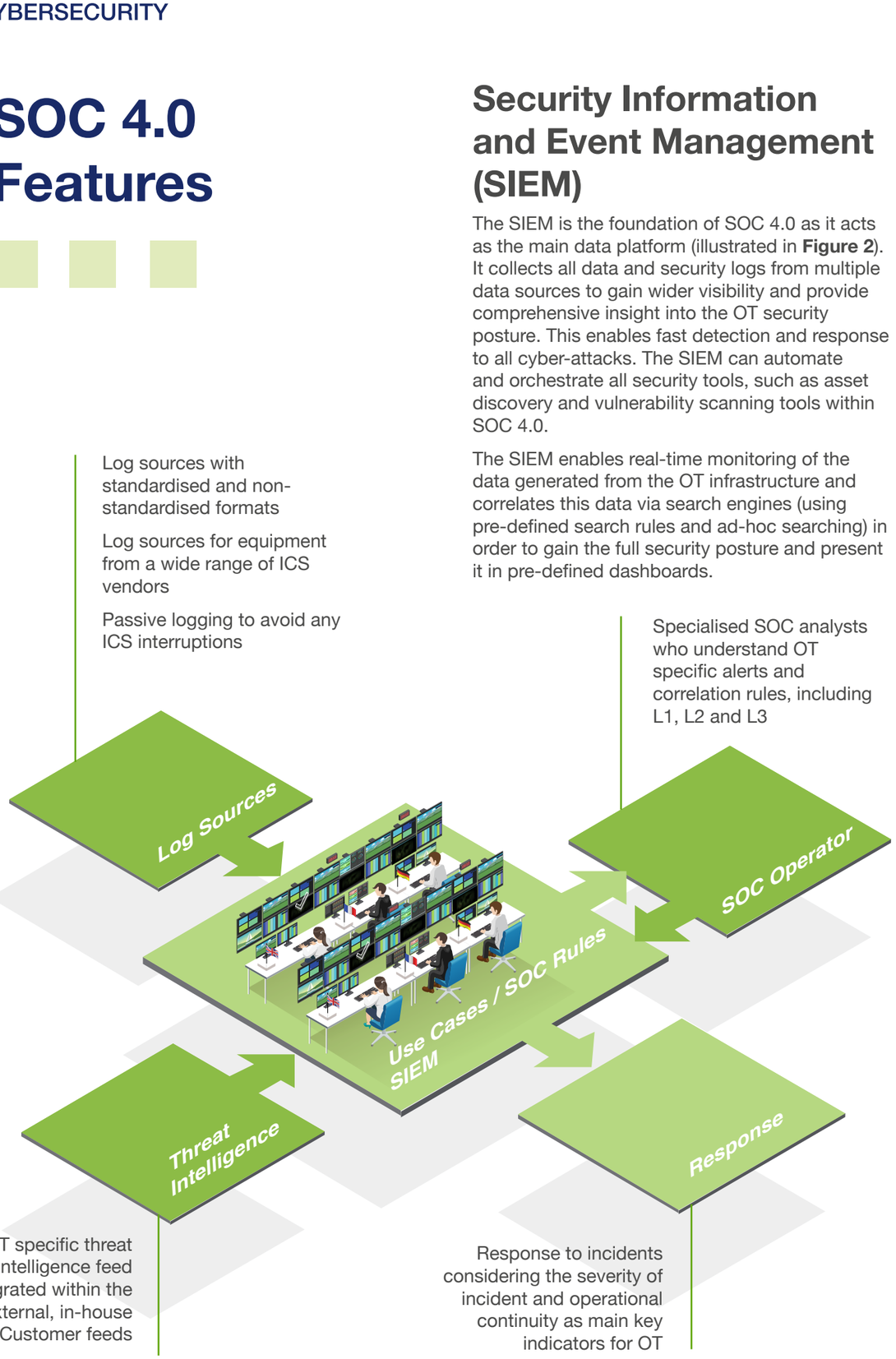
SOC 4.0 Features

Log sources with standardised and non-standardised formats

Log sources for equipment from a wide range of ICS vendors

Passive logging to avoid any ICS interruptions

Specialised SOC analysts who understand OT specific alerts and correlation rules, including L1, L2 and L3



OT specific threat intelligence feed integrated within the SOC; external, in-house and Customer feeds

Response to incidents considering the severity of incident and operational continuity as main key indicators for OT

Figure 2: SIEM, the foundation of Airbus SOC 4.0

Security Information and Event Management (SIEM)

The SIEM is the foundation of SOC 4.0 as it acts as the main data platform (illustrated in **Figure 2**). It collects all data and security logs from multiple data sources to gain wider visibility and provide comprehensive insight into the OT security posture. This enables fast detection and response to all cyber-attacks. The SIEM can automate and orchestrate all security tools, such as asset discovery and vulnerability scanning tools within SOC 4.0.

The SIEM enables real-time monitoring of the data generated from the OT infrastructure and correlates this data via search engines (using pre-defined search rules and ad-hoc searching) in order to gain the full security posture and present it in pre-defined dashboards.

Data Onboarding

The objective of data collection and onboarding is to make sure that the right information flows to the right places at the right time. This is crucial to the success of SOC 4.0 as it enables the detection of threats and provides the situational awareness for SOC analysts to react to and investigate incidents with minimal delay.

Data onboarding for the OT infrastructure is considered to be a challenging task, not only because it requires considerable time, cost, effort and knowledge, but also since it requires the collection of the data and security logs passively and without interruption to the operations of the plant or the factory. Airbus understands these challenges and provides practical solutions based on OT infrastructure, ICS system architecture and existing technologies (security solutions) in use. Different solutions can be used to satisfy and achieve this mission such as OT sensor solutions, remote management tools, syslog machine collector, log receivers, and many others.

Once security logs and data sets are collected, it will be onboarded to the Airbus SOC 4.0 via site-to-site secure VPN that is protected using certificates exchanged in advance. Airbus could also utilise any Identity and Access Management (IDAM)/Privileged Access Management (PAM) solution or multi-factor authentication technologies already in use by the customer.

Log Management

All onboarded data will be logged at the Airbus SOC 4.0 - the standard policy will ensure retention of logs in their original format for a pre-determined duration e.g. 12 months. However, these logs can be stored for a period defined by the customer. Analysts and the security operations team can access these logs for security investigations and incident response. SOC 4.0 also has redundancy of data storage capability, which provides high data availability, data recovery and automatic failover.

SOC 4.0 Use-Cases (UC) Development

SOC use-cases, or the SOC rules development activity, is a critical step in SOC building, because it defines the correlations and detections SOC rules. SOC UC development follows a risk-based approach focused on the OT environment threat landscape, applicable risks to OT assets, attack scenarios, and the assets or systems to be monitored within the SOC.

Developing and implementing SOC use-cases will follow the Airbus workflow and framework, which is “Planning, Analysis, Design, Implementation, Testing and Deployment” as illustrated in **Figure 3** below. Once the SOC UC is developed and tested, it will be released as an official UC with version control. Customers will benefit from a continuously updated library of OT Use-Cases, built on Airbus’ own experience as well as industry developments and emerging threats.

01 PLANNING
Define a set of Use-Cases or Threats. Define the needed log sources and objectives for the Use-Cases.

02 ANALYSIS
Analyse the Threat and identify the different scenarios that we are looking to detect.

03 DESIGN
Design the Use-Case in a generic format and add the meta data around the Use-Case such as version, log sources.

04 IMPLEMENTATION
Implement the Use-Case in your SIEM and verify its behaviour. Adapt th Use-Case if needed.

05 TESTING
Test the Use-Case in order to verify that the Use-Case is detecting the specific threat.

06 DEPLOYMENT
Deploy the Use-Case in the production environment.

Figure 3: Airbus SOC 4.0
Use-Cases Development phases

AIRBUS

SOC 4.0 Features

Asset Inventory and Management

Automatic asset discovery and analysis is one of the most important tasks for OT security management. Within this service, SOC 4.0 will automatically provide a passive discovery for all networks and identify the connected real time assets, asset configurations and IT/OT communication protocols. A comprehensive report will be generated to demonstrate up-to-date assets and categorise them based on vendors, hierarchy levels (Purdue Model), or utilised protocols.

A FLEXIBLE AND MODULAR SOLUTION

Airbus SOC 4.0 is a flexible and modular solution, with the capability to roll out a new asset discovery solution on the OT infrastructure when needed, or alternatively to integrate and interface with existing asset discovery solutions used by the customer.

Vulnerability Management and Assessment (VAS)

This is another add-on service for SOC 4.0 which empowers Airbus' solution to perform passive vulnerability scanning for the IT/OT infrastructure. It gives the ability to identify vulnerabilities inherited in all systems that can be exploited by adversaries. Our SOC analysts will monitor the outputs from scheduled and on-demand scans in order to identify potential vulnerabilities within the plant or factory.

Vulnerability management follows a systematic approach starting from discovery, analysis and prioritisation to remediation. Analysts within SOC 4.0 can use network modelling and attack simulations to find exposed vulnerabilities. Scheduled reports will provide a summary of the vulnerability scanning activities and detail whether the vulnerabilities identified pose a specific risk to customer infrastructure. In addition, reports will provide an overview of the recommended remediation actions required to patch and mitigate the identified vulnerability.

Incident Response and Management

SOC 4.0 MSS includes Incident Response and Management within the Protective Monitoring core service. In case of an incident, the security operations team will initiate an incident response based on a systematic workflow. The primary objective of incident management is to notify the customer as quickly as possible about the incident. The Airbus incident response process is based on best practices following the SANS Incident Response (IR) methodology as shown in **Figure 4.**

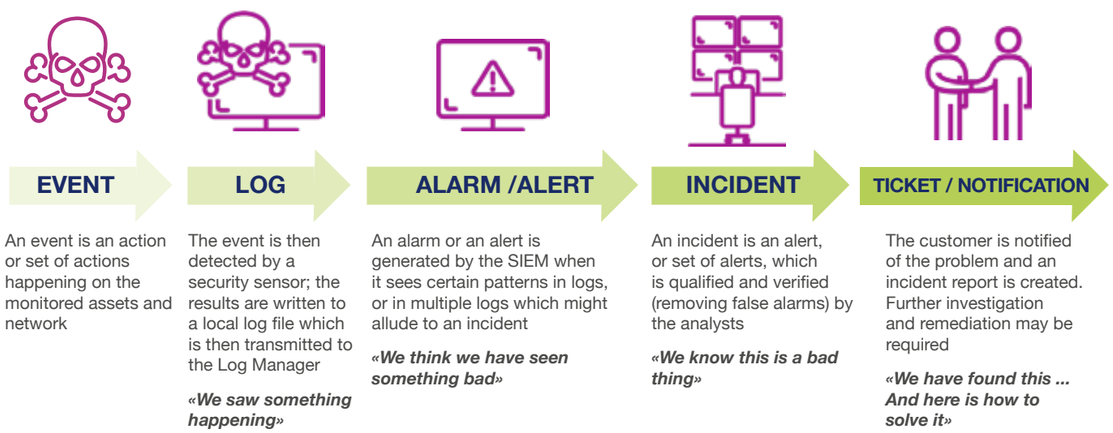


Figure 4: Airbus SOC 4.0 Incident Response Process

Upon detection, Level 1 SOC analysts will first qualify and verify the alert, if the alert is found to be a 'false positive' the analyst will tune the system to ignore it. If not, the alert will be promoted to an incident and a ticket will be created to record the relevant information and the customer incident response team will be notified. The verified new incident will then be passed to the Level 2 SOC analyst to establish the scope of the possible attack. The analyst is supported by the SOC knowledge base, which collates the latest external threat feeds, along with the supplier and control vendor bespoke cyber threat intelligence feeds. Depending on the complexity of the incident it may subsequently be passed to a Level 3 SOC analyst for further investigation to qualify the nature of the threat. Upon completion of analysis by Level 2 or both Level 2 and Level 3 teams, appropriate recommendations will be provided to the customer.

Due to the nature of OT systems and the consequences of their disruption on running processes, the resolution for security incidents is usually carried out by the customer's asset owner. However, support can be provided as an additional service to the customer by the Airbus CSIRT team.

SOC 4.0 Characteristics

Cyber Threat Intelligence

Cyber Threat Intelligence (CTI) is a fundamental component of the Airbus SOC 4.0 MSS and is used daily by the security operations team in conjunction with the other security tools to improve detection and guide investigations. Threat sources include the following:

Selecting a Threat Intelligence source for OT should have specific selection criteria that meets customer and ICS sector demands. OT Threat Intelligence should have meaningful Contexts and Actions to the specific OT industry or vertical. CTI Contexts describe the threat and demonstrate its impact on the ICS and the affected industry vertical and geographical coverage. OT Threat Intelligence Actions describe the recommended technical and administrative steps that need to be taken to enable hunting and detection for specific threats; i.e. the threats that are presented by the CTI feeds.

CTI feeds include automatic indicators such as IP addresses, domains, URLs etc, alongside associated context. They also inform SOC analysts of the Tactics, Techniques and Procedures (TTPs) used by adversaries known to target a specific industry or vertical.

Within SOC 4.0, Cyber Threat Intelligence is provided in the form of CTI contexts and live feeds that are uploaded into the SIEM. Cyber Threat Intelligence feeds are used to develop correlation rules, which in turn, feed alerts. SOC 4.0 SIEM has a trace back function, which automatically looks back through historical data for Indicators of Compromise each time a threat source is added. The alerts are reported in standard reports and dashboards.

SOC Team

Role	Profile	Description
Service Desk	Call Centre	Act as single point of contact for the SLA, responsible for recording security incidents and initiating service and change requests.
Level 1 Security Analyst	Real Time Monitoring and Triage specialists	Triage and short-term analysis of real time data feeds and events (such as system logs and alerts) for potential intrusions. All suspected incidents are prioritised and escalated to Level 2 analysts for further investigation.
Level 2 Security Analyst	Analyst	Review and analyse potential intrusions and tips forwarded from L1 analysts. It must be completed in a specific time span to support a relevant and effective response. This capability will usually involve analysis leveraging various data artifacts to determine the who, what, when, where and why of an attack (or intrusion)—its extent, artefacts how to limit damage and how to recover. Analysts document the details of this analysis with a recommendation for further actions.
Level 3 Security Analyst	Incident Responder	Prolonged, in-depth analysis of the affected constituents to gather further information about an incident, understand its significance, assess mission impact and coordinating response actions and incident reporting. Gathering and storing forensic artifacts related to an incident in a manner that supports its use in legal proceedings. Depending artefacts on jurisdiction, this may involve handling media while documenting chain of custody, ensuring secure storage and supporting verifiable bit-by-bit copies of evidence. Interrogation of consistency hosts for vulnerability status, usually focusing on each system's patch level and security compliance, typically through auto-mated, distributed tools. Care and feeding of sensor platforms owned and operated by the SOC: IDS, IPS, SIEM and so forth. Tuning these systems, minimising false positive and maintaining up/down health status of sensors and data feeds.
Cyber Threat Analyst	Intel and Trending	Collection, consumption, analysis and redistribution of cyber threat intelligence reports, cyber intrusion reports and news related to OT security, covering new threats, vulnerabilities, products and research. Primary authorship of new cyber threat intelligence reporting, such as threat notices or highlights, based on primary research performed by the SOC. Extracting data from cyber intel and synthesising it into new signatures, content and understanding of adversary TTPs, thereby evolving monitoring operations (e.g., new signatures or SIEM content). Holistic estimation of threats posed by various actors against the constituency, its enclaves, or lines of business, within the cyber realm. This will include leveraging existing resources such as cyber intel feeds and trending, along with the OT infrastructure architecture and vulnerability status, often performed in coordination with other cyber security stakeholders.
SOC Manager	Operations and Mana-gement	Supervises the activity of the SOC team, role mapping and resource planning, skills matrix and training planning. Manages the escalation process and reviews incident reports. Ensure com-pliance to SLA and achieve operational objectives. Coordinating with other stakeholders, ensure SOC performance and commu-nicates the value of security operations to business leaders.
Cyber Security Architect	Cyber Engineering	Market research, product evaluation, prototyping, engineering, integration, deployment, and upgrades of SOC equipment, principally based on free or open source software (FOSS) or commercial off-the-shelf (COTS) technologies, Includes budgeting, acquisition, and regular recapitalisation of SOC systems. Maintain a keen eye on a changing threat environment, bringing new capabilities to bear in a matter of weeks or months, in accordance with the demands of the mission. Testing the security features of point products being acquired by constituency members. Analogous to miniature vulnerability assessments of one or a few hosts, this testing allows in-depth analysis of a product's strengths and weaknesses from a security perspective. This may involve "in-house" testing of products rather than remote assessment of production or preproduction systems.
Cyber on Demand Consultants	Audit and Risk	Providing cyber security advice to constituents.
OT Security	Assess-	Supporting new system design, business continuity and disaster recovery planning; cyber security policy; secure configuration guides; and other efforts. Regular, repeatable repackaging and redistribution of the SOC's knowledge

What can SOC 4.0 monitor

Depending on the OT/ICS architecture and asset types, different collection methods and techniques can be introduced. Below **Figure 5** shows the reference Purdue Model for ICS infrastructure with different possible data sources for each layer.

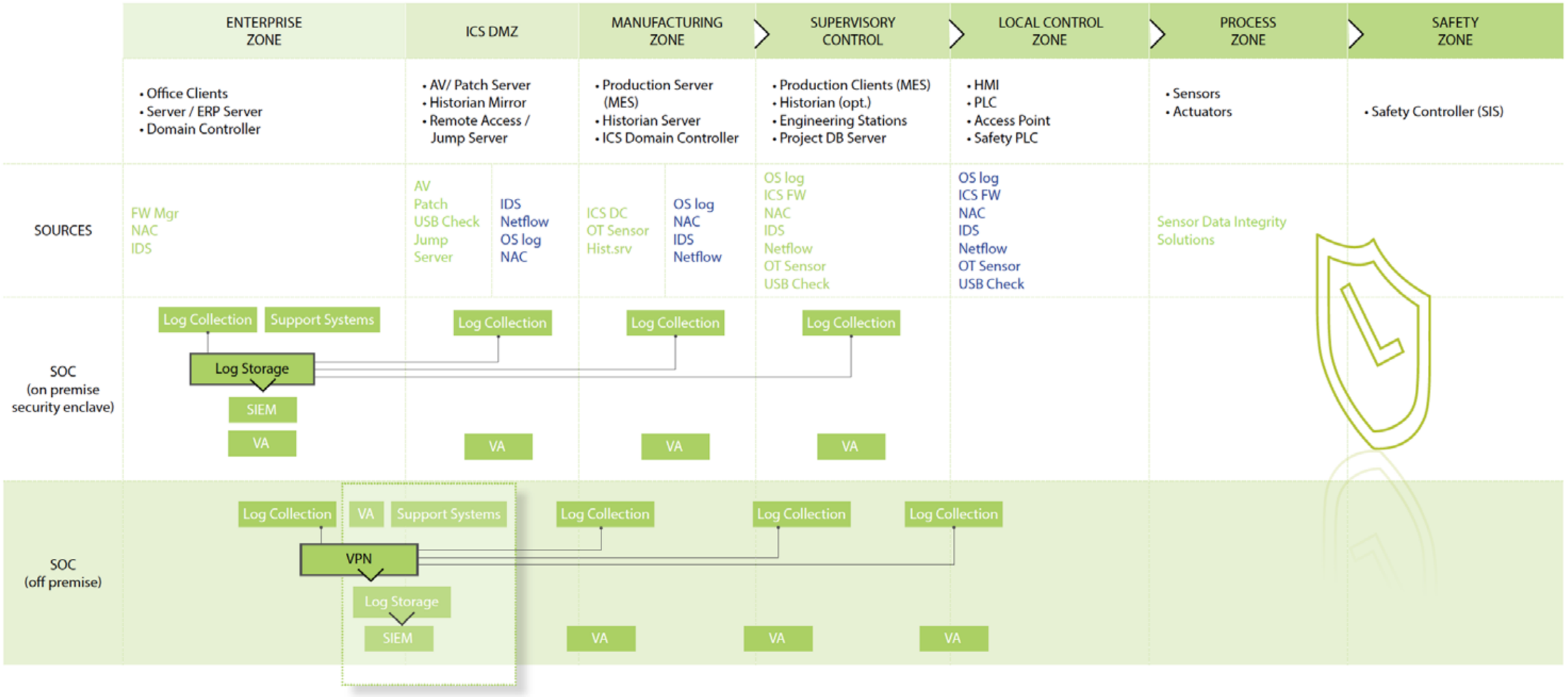


Figure 5: Purdue Model and possible data sources for SOC 4.0 monitoring

Based on the Purdue Model example, the OT infrastructure could have different asset types such as PLC, HMI, Engineering workstation, SCADA servers, Historian, MES and ERP servers, AV/Patch server, Domain Controller, Jump server, OPC server and other assets. Most of the assets in Level 2 and upwards are PC-based assets, Firewalls, Switches and Routers. The data collection will mainly focus on collecting logs from the operating system's security events, system error logs, logs from databases such as Active Directory, SQL, AV/WL solution database, etc., syslogs from firewalls and switches, and logs from running Applications such as Network Performance and Management Applications, Remote Access Applications, and others.

On the other hand, assets in Level 1 are mostly consisting of embedded devices such as PLC and HMI. Therefore, the data collection techniques will be based on passively monitoring the network traffic generated by these devices in order to capture the asset behaviour, monitor some process values and monitor the read/write commands to PLC, HMI, VFD or other IED. However, Level 1 and 2 assets use industrial protocols, which are different from the traditional IT protocols. Hence, SOC 4.0 has the capability to perform Deep Packet Inspection for these industrial protocols such as DNP3, MODBUS, S7 comm, EtherNet/IP and many others. SOC 4.0 can monitor different control system vendors such as Siemens, Rockwell, Honeywell, Emerson, ABB, Yokogawa, Schneider Electric, GE, and Mitsubishi, among many others and perform Machine Learning techniques to baseline the ICS assets and capture the deviations, critical changes or malicious activities.

Service Model Description

SOC 4.0 Offering Model

SOC 4.0 is a modular Managed Security Service that fits small, medium and large organisations/ OT infrastructure. **Figure 6** illustrates the offering model for SOC 4.0 MSS: the Protective Monitoring Service (PMS) is the core service for SOC 4.0, where all other services are options that can be added to complement the PMS. Depending on the scope of the SOC and the requirements, SOC 4.0 offers the flexibility to add these services at any time of the cyber security programme lifecycle.

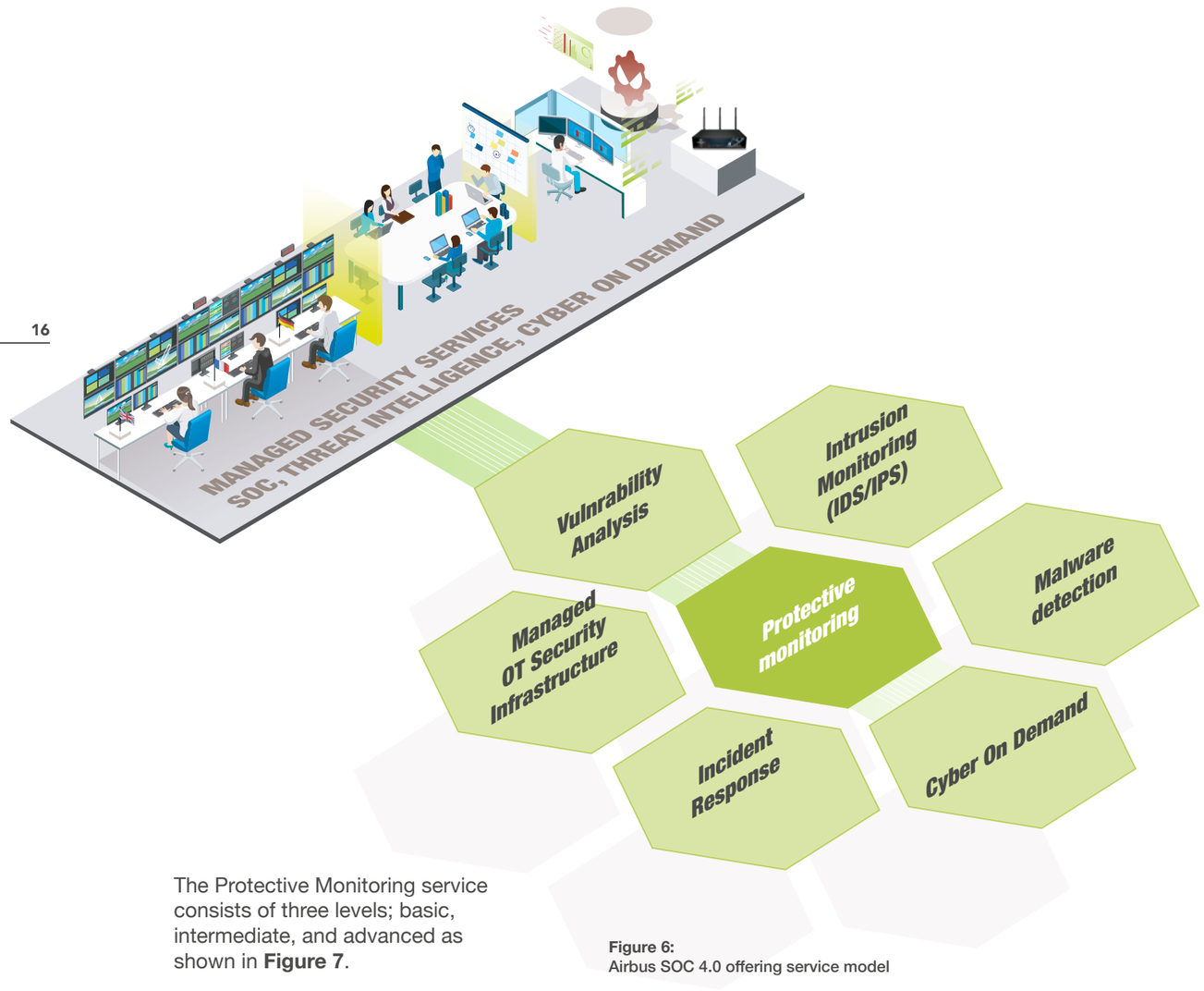


Figure 6:
Airbus SOC 4.0 offering service model

The Protective Monitoring service consists of three levels; basic, intermediate, and advanced as shown in **Figure 7**.

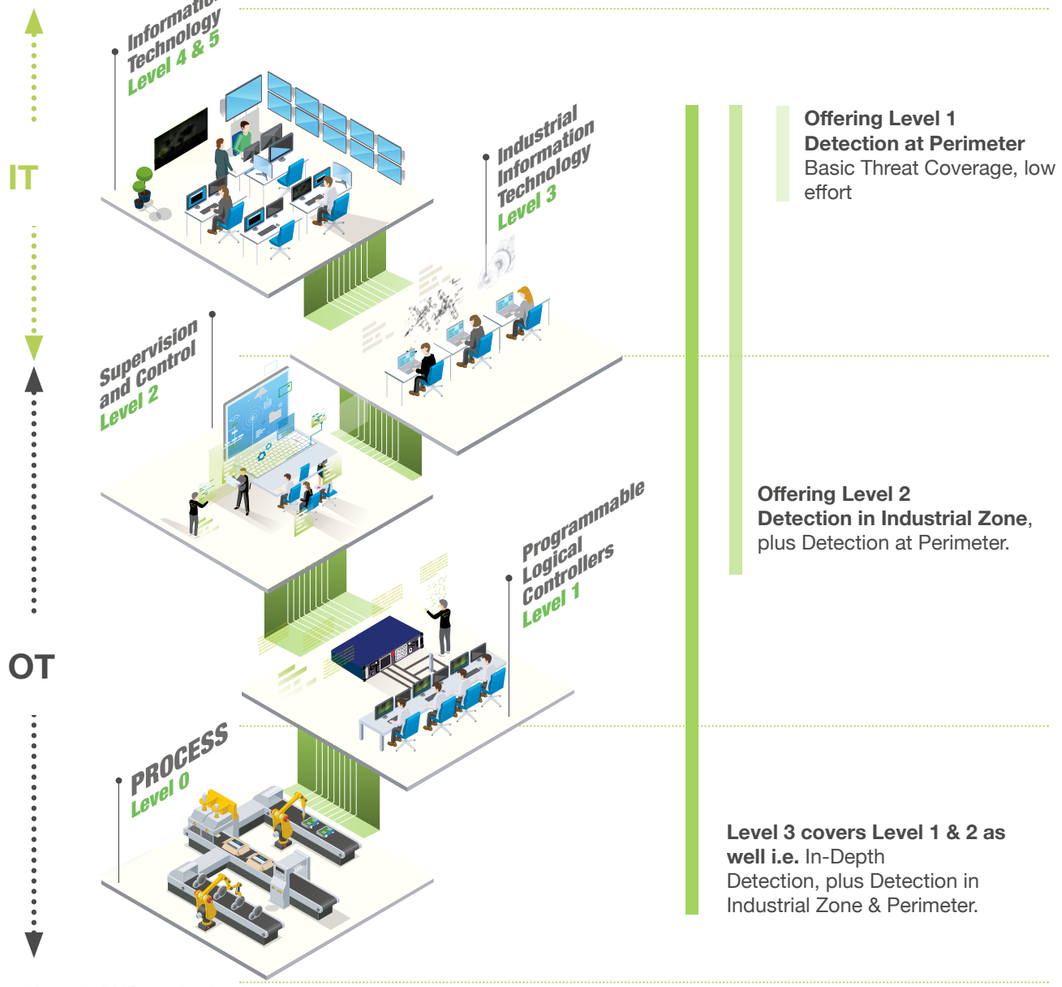


Figure 7: PMS offering levels

	Offering Level 1: Detection at Perimeter	Offering Level 2: Detection in Industrial Zone	Offering Level 3: In-Depth Detection
Benefits	Generic and high-level cyber security monitoring of your OT systems	Adapted and granular cyber security monitoring of your OT systems	Tailored and very granular cyber security monitoring of your OT systems
Threat coverage	Basic Common attacks (such as virus infection) should be detected	Intermediate Common and some dedicated attacks (such as DoS) should be detected	Enhanced Common up to complex and targeted attacks (such as APTs) should be detected
Deployment effort: Data collection	Perimetric systems (Firewall logs & Antivirus management server logs)	+ Supervision systems (Domain Controller, Historians, Engineering workstation, SCADA Servers, Industrial HMI)	+ Full command control network flow (OT sensors, workstation seal, specific firewalling & zoning with industrial protocol DPI etc.)
Deployment effort: SOC Use Cases	Standard OT use cases (based on system monitoring: system alarm, SNMP, etc. with little SOC process adaptation)	Specific OT uses cases (based on system monitoring and OT sensors)	Highly tailored OT uses cases (based on system monitoring, OT sensors and operational processes and behaviours)

AIRBUS

Service Model Description

Service Level Management

The Service Level Management shall manage the Service Level Agreement (SLA) with the customer and ensure that services are designed to meet the agreed Service Level Targets (SLT) and Key Performance Indicators (KPIs).

The Service Level Management function:

- Defines documents, agrees, monitors, measures, reports and reviews the level of service provided to the customer.
- Ensures that the customer has a clear and unambiguous definition and expectation of the level of service to be delivered.
- Identifies those interfaces that constitute links in the service delivery chain.
- Provides and improves the relationship and communication between the supplier service function and the customer.
- Monitors and improves customer satisfaction through the quality of service delivered.

Service Level Targets measures Airbus' performance to deliver SOC 4.0 MSS, they include SOC operating hours and incident notification to customer team. Key Performance Indicators measure SOC 4.0 MSS in terms of availability, efficiency and quality.

SOC 4.0 Service Hours

SOC 4.0 MSS is operating in three different patterns as per below table;

	Profile	Description	Operating Pattern
1	Standard	Five days a week Monday to Friday, from 9:00 until 17:00	8x5
2	Extended	Daily from 09:00 until 17:00 including holidays	8x7
3	Around the clock	Daily with 24 hours service for all 365 days of the year	24x7

Customers will have the ability to amend their Service Hours coverage; for example, if they wish for their Service Hours coverage to move to 12:00 to 16:00; this can be actioned. However, the request will need to be raised to Airbus with a defined lead time.

Why Airbus CyberSecurity

Our SOC experience

Airbus CyberSecurity provides dedicated Cyber Security solutions to protect governments, national agencies, critical infrastructure, manufacturing and commercial organisations around the world from increasingly sophisticated cyber threats through a range of protective and responsive services.

Our cyber security solutions were developed to protect the Airbus business from cyber-attacks. Over a number of years, our methodologies, tools and processes have been continuously refined to protect us against the evolving cyber threat landscape. The same highly experienced individuals and technologies used to defend Airbus' systems are made available to our commercial and Government customers, in order to ensure that their systems and networks are as well protected as those of Airbus.

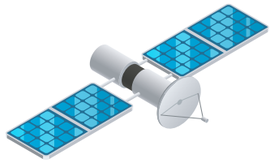
Based on our heritage, within the aviation, transportation, defence and space sectors, Airbus is well equipped to operate in a highly regulated, global and complex business environment. Operating on a 24/7 basis, our cyber security solutions can be adapted to the customer's specific requirements. Airbus continues to invest heavily in developing our cyber security solutions to ensure that we provide the best defence possible against current and future cyber threats.

Our ISO/IEC 27001 certified SOC services deliver highly accurate, near real-time detection and alert against the world's most sophisticated threat actors and provides a global view across the business, all from a single management platform. This, combined with our powerful global Threat Intelligence (TI) and in-house developed malware analysis tools, means we can accurately and quickly identify even the most advanced cyber-attacks.

Airbus CyberSecurity		
Best of breed technologies configured to best meet our customers' specific requirements	Protecting critical IT and OT systems across a range of industries	Highly skilled security cleared experts across full spectrum of cyber capabilities
24x7 security monitoring with three levels of expertise, customised reporting and a Service Delivery Manager	Bespoke use cases and threat intelligence to detect cyber-attacks at all stages of the cyber kill chain enabling earlier identification and informed mitigation actions	Modular solutions provide flexibility to meet customer specific requirements and reuse customer existing equipment where possible
Accredited and trusted by national authorities to operate securely and confidentially	Experience in defending our own systems gives us unique insight in understanding the security threats and vulnerabilities facing safety critical industries	Continual service improvement by tuning system, using the latest threat intelligence, refining use cases and on-boarding additional devices

AIRBUS

What makes us different



EXTENSIVE SECURITY EXPERTISE

Highly skilled, certified, security cleared experts across full spectrum of cyber capabilities

PROVEN EXPERIENCE

Protecting critical IT and OT systems across a range of industries

UTILISE BEST OF BREED

Choosing the best tools to effectively and cost-efficiently deliver results

ADVANCED DETECTION CAPABILITY

Leveraging Advanced Correlation and Anomaly Detection

FLEXIBLE AND RESPONSIVE

Modular solutions provide flexibility to meet customer specific requirements and reuse customer existing equipment where possible

COMPREHENSIVE END TO END SERVICE

24x7 security monitoring with three levels of expertise, customised reporting and a Service Delivery Manager

LONG TERM PARTNERSHIP

Continuous service improvement by using the latest system. Using the latest threat intelligence, refining use cases and on-boarding additional devices

UNDERSTAND OUR CUSTOMER

Experience in defendlng our own systems gives us unique insight in understandlng the security threats and vulnerabilities facing safety critical industries

TRUSTED

Accredited and trusted by national authorities to operate securely and confidentially

Contact us

FOR MORE INFORMATION:
Airbus CyberSecurity

FRANCE
Metapole 1, boulevard Jean Moulin /
CS 40001 / 78996 Elancourt Cedex/
France

GERMANY
Willy-Messerschmitt-Str. 1 /
82024 Taufkirchen /
Germany

UNITED KINGDOM
Quadrant House / Celtic Springs /
Coedkernew / South Wales NP10 8FZ /
United Kingdom

contact.cybersecurity@airbus.com
www.airbus-cyber-security.com

This document is not contractual. Subject to change without notice. © 2021 Airbus CyberSecurity.
AIRBUS, its logo and the product names are registered trademarks. All rights reserved. // 917 E 0875

AIRBUS