



KONGSBERG



Vessel Traffic Services

C-SCOPE

www.kongsberg.com

ONE THIRD OF
THE WORLD
IS COVERED BY LAND
- THE REST IS COVERED
BY KONGSBERG

WORLD CLASS

through people, technology and dedication

Kongsberg Gruppen ASA (KONGSBERG) is an international technology corporation that delivers advanced and reliable solutions that improve safety, security and performance in complex operations and during extreme conditions.

KONGSBERG is a customer focused organization with a worldwide performance culture. KONGSBERG works with demanding customers in the global defence, maritime, oil and gas and aerospace industries.

VTS AREAS OF APPLICATION

Vessel Traffic Service (VTS) systems are typically deployed in four types of areas, which are collectively known as Areas of Application. These areas are:

- Ports and Harbours
- Coastal & EEZ
- Offshore Platforms & Windfarms, and
- Rivers & Inland Waterways

PORTS

Successful ports establish Vessel Traffic Services to ensure the safe and efficient movement of vessel traffic through the port's VTS area. The Kongsberg Norcontrol C-Scope VTS system is a scalable, integrated solution that can expand as demand increases.

C-Scope VTS systems enable port authorities to:

- Manage marine traffic
- Identify causes of delays
- Manage marine risk
- Optimize utilization of resources
- Improve port security
- Visualize both "wet" and "dry" sides
- Visualize situations in 3D
- Protect the environment
- Comply with IALA VTS Recommendations

OFFSHORE PLATFORMS & WINDFARMS

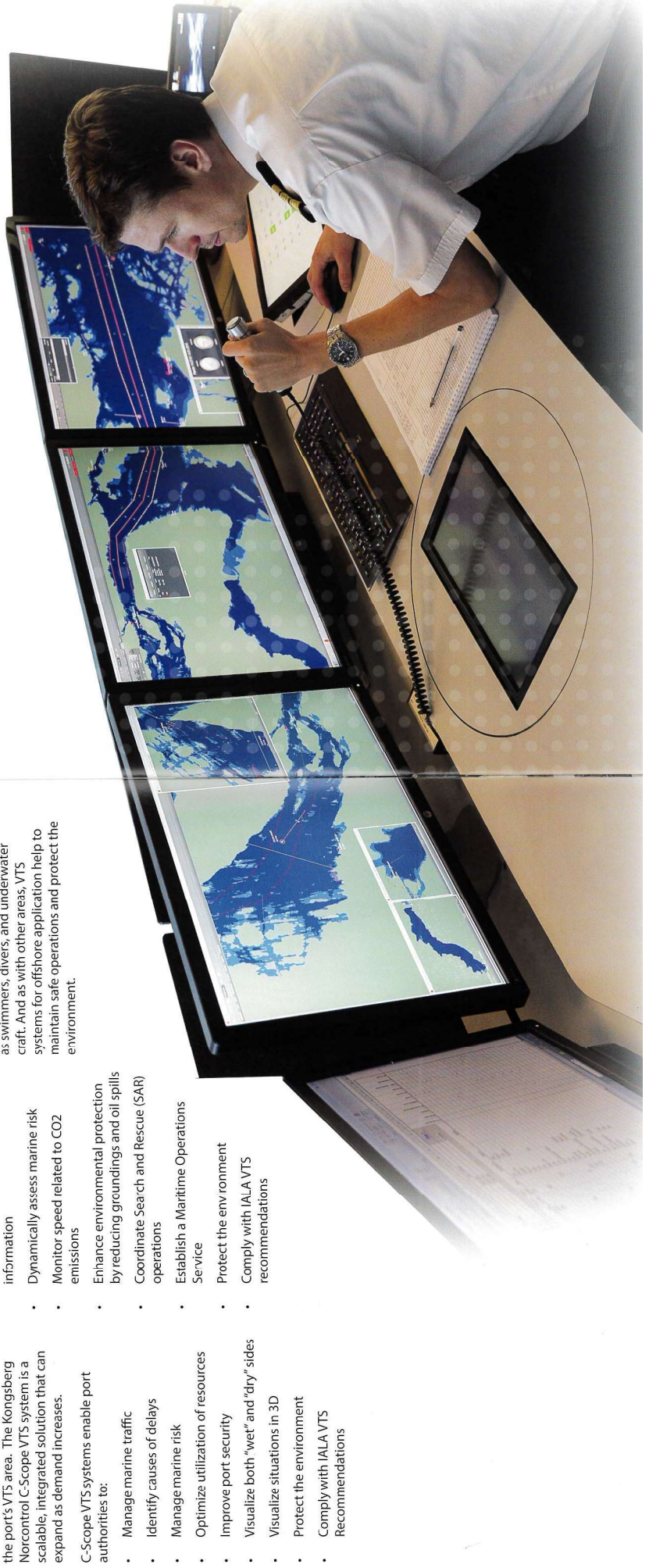
VTS systems for offshore applications protect the environment and valuable assets by providing early striking warnings from approaching vessels and timely notification of real threats. Such systems are typically semi- to fully automated, detecting and automatically tracking ship traffic in their area, and then sending automatic warnings for vessels threatening the platform or entering restricted areas. These systems will also need to detect small craft that can be used for boarding a platform, as well as higher-level threats such as swimmers, divers, and underwater craft. And as with other areas, VTS systems for offshore application help to maintain safe operations and protect the environment.

RIVERS

Rivers present a unique challenge due to the broad and dynamic nature of the surveillance area, the need for more accurate vessel position data, and the wide variety of organizations needing access. Our River Information System (RIS) is designed to meet these challenges.

RIS is defined as a concept of harmonised information services to support traffic and transport management in inland navigation, including interfaces to other modes of transportation.

**KONGSBERG NORCONTROL
HAS DELIVERED OVER 300
MARITIME SURVEILLANCE
SYSTEMS WORLDWIDE**



THE C-SCOPE SYSTEM

C-Scope is Kongsberg Norcontrol's 7th generation VTS system. It conforms with and is compliant with IALA/VTS Standards, Recommendations, and Guidelines.

The C-Scope System has been designed using Human Centric Design (HCD) principles to ensure that the right information is provided to the right VTS Operator at the right time for informed decision making.

Service Oriented Architecture is the over-arching phrase to describe the interaction between the C-Scope modules and interfaces. Based on an MS Windows platform in an Open Virtual Environment and a Private Secure Cloud, key technologies include Geographic Information System (GIS), Web Services (WMS, WFS) and the Data Distribution Service (DDS).

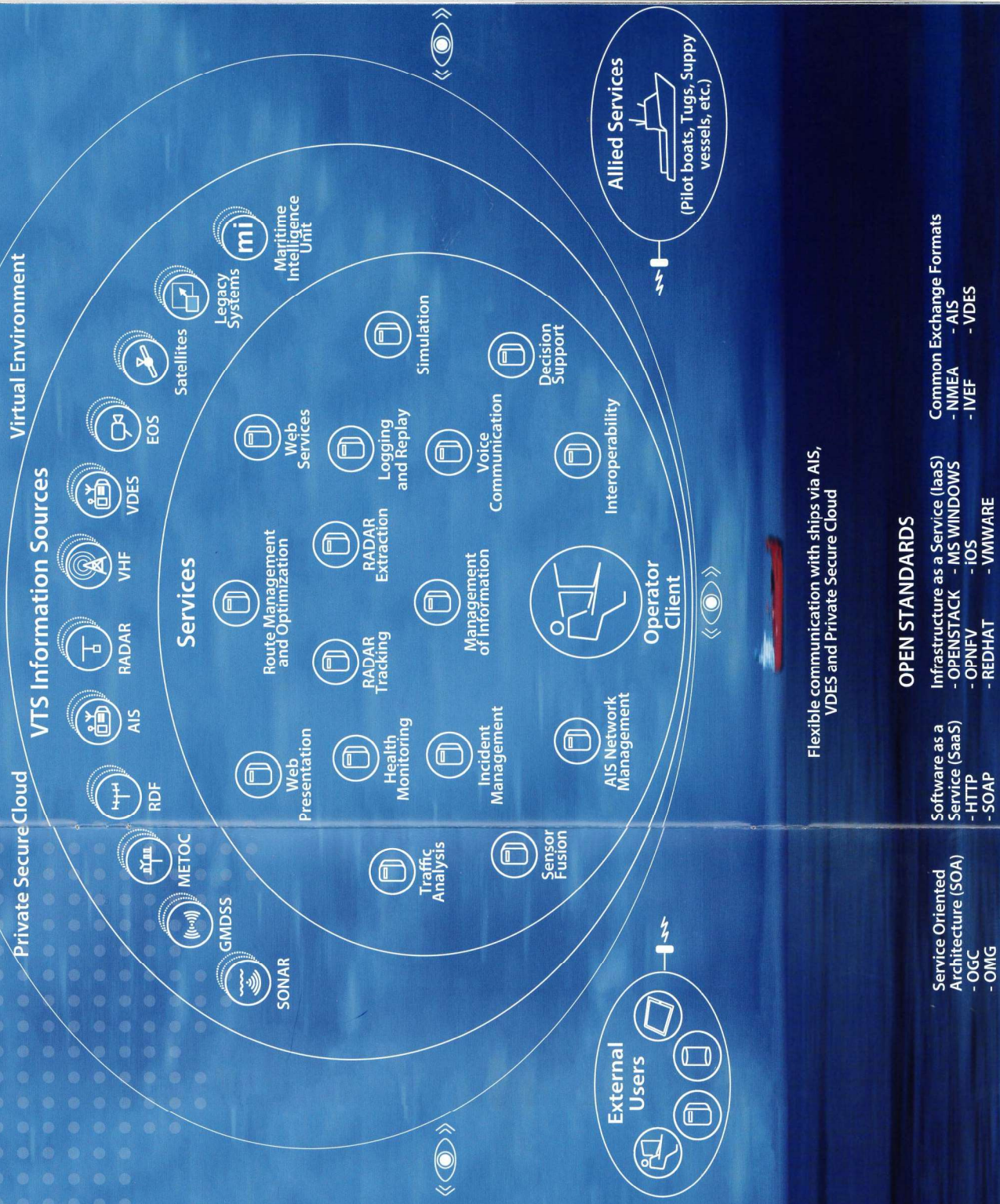
Today's VTS systems are rarely "closed" and typically need to interoperate with other systems such as financial systems, port management systems, incident management systems, external Maritime Intelligence Unit databases, etc. As interoperability increases the risk of cyber-attacks, C-Scope software has been designed to the quality assurance standard required by NATO (AQAP 2110 Ed 3 & Ed A Version 2).

The key features of C-Scope are its open architecture, autonomous services and flexibility. C-Scope's design is such that implementation of additional components will not change the basis of the system but will be a natural progression, with all information available in the same unambiguous manner for all users, without hazard.

As requirements, tasks and needs differ from operator to operator, C-Scope provides the possibility of customizing the operating environment. If needed, each operator can create a unique workspace with tailored lists, dialogs, context menus, color schemes and chart layers to meet his or her needs.

Similarly, decision support tools are available to provide operators with highly configurable and specific alert areas and criteria for safety, security and efficiency.

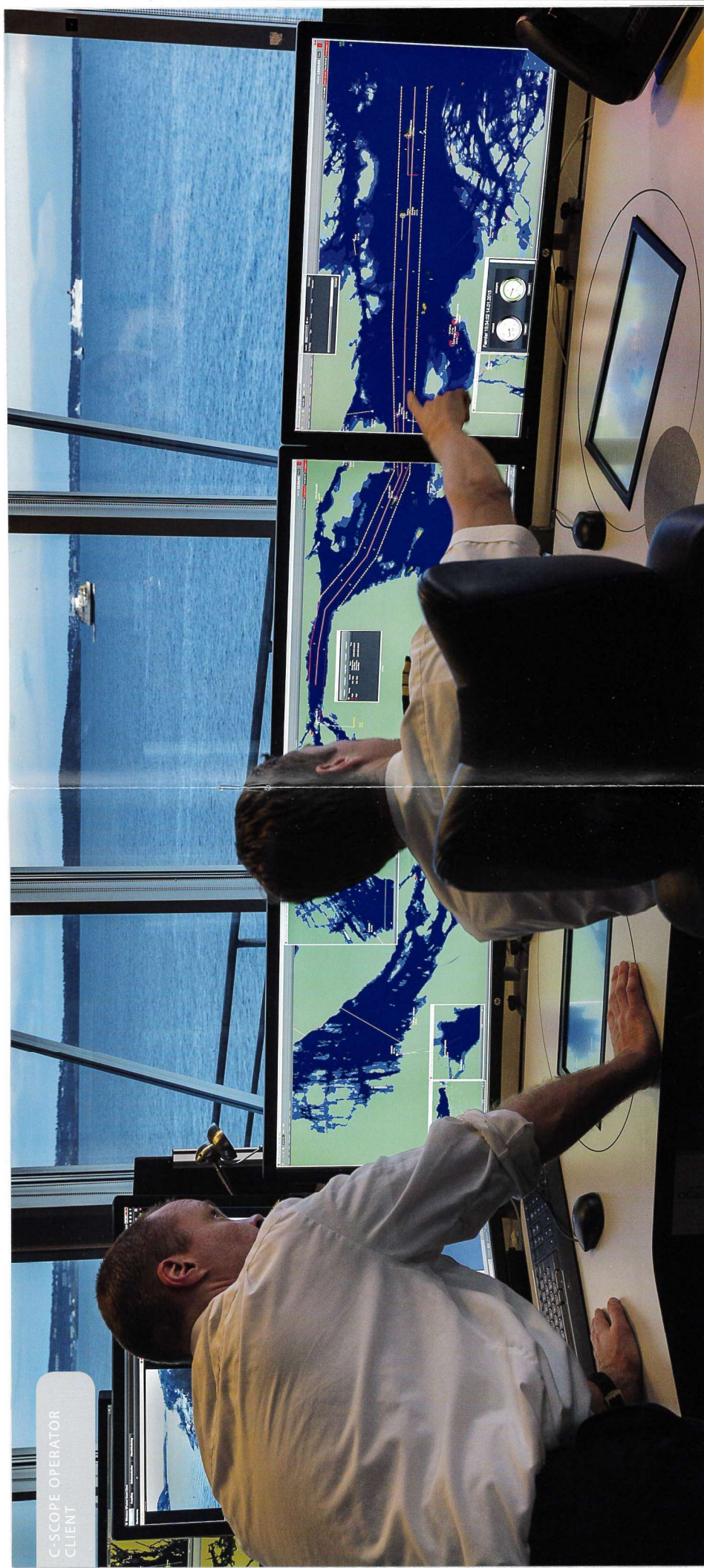
Kongsberg Norcontrol holds a Gold Standard Global Partnership with Microsoft, and C-Scope possesses a NATO Stock Number.



Flexible communication with ships via AIS, VDES and Private Secure Cloud

OPEN STANDARDS

- Service Oriented Architecture (SOA)
 - OGC
 - OMG
- Software as a Service (SaaS)
 - HTTP
 - SOAP
- Infrastructure as a Service (IaaS)
 - OPENSTACK
 - MS WINDOWS
 - OPNFV
 - REDHAT
 - IOS
 - VMWARE
- Common Exchange Formats
 - NMEA
 - AIS
 - VDES
 - IVEF



C-SCOPE OPERATOR CLIENT

The user's primary portal into the C-Scope VTS System

The C-Scope Operator Client (CSOC) is the primary HMI of the C-Scope VTS system for visualization of the realtime VTS Traffic Image. This is a fully correlated product derived from C-Scope VTS system's real time sensors: radar and AIS, visualized on an SS7 chart, normally sourced through the C-Scope Web Services.

In CSOC, vital picture compilation services provide a clear and coherent picture. Each discrete radar target is shown only once. In turn it correlates automatically or manually with its associated AIS track and other radar generated contacts on that same track. This track can have history markers and

vector lines to show where it has been and where it is going. It can also be given standard C-Scope classification symbols or bespoke symbols as required by the operator. The end user decides the specific configuration.

Predicted vector, direct reckoning and voice reported tracks are all provided to the user. This allows future arrivals and sailings to be shown on the CSOC before either an AIS track or Radar track is seen. Boundaries, geo fences, navigation channels, foul grounds, dredging operations etc. are also applicable for visualization.

With regards to picture compilation, all data for each radar track is shown on the Track Details dialog to give a full or tailored track Situation Report (Sitrep). Most any track data can be displayed in the track label, if required by the user.

In addition, critical data to complete the VTS Traffic Image is shown through client windows and dialogs. These include electro optic data & control, radio direction finder (RDF) data & control, weather and sea state (METOC) data, and others.

VHF radio is integrated into the C-Scope VTS so that voice communication can be recorded with the C-Scope Logging & Replay service. This is combined with the master time source and stored for instant replay or archived for future reference.

CSOC then allows the operator to present the VTS Traffic Image in a bespoke manner in accordance with standard operating procedures. With this in place, the VTS Traffic Image can be released, as required, to internal sources via a secure internet link using the C-Scope Web Service, and to external C-Scope customers.

To summarize, CSOC ensures an accurate, coherent traffic image, fully integrated with a host of possible sensors, and presented in a highly customizable HMI. This guarantees a fully correlated system that not only surpasses performance requirements but delights the VTS operator with intuitive functionality and ease of use.

DETERMINED INNOVATIVE COLLABORATIVE RELIABLE

KEY C-SCOPE VTS SERVICES

What sets C-Scope apart from the rest



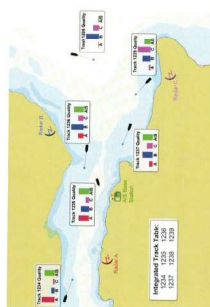
C-SCOPE EXTRACTOR TRACKER (CSET)

At the front-end of the C-Scope VTS Traffic Image is the CSET. This is a highly effective, state of the art Radar Extractor & Tracker with extremely high resolution. It extracts and tracks very small RCS targets as well as very large RCS targets. It also detects and tracks extremely high speed targets as well as immediately detect targets splitting and merging. CSET ensures excellent quality of radar data input, whether analog or digital. It is compatible with the majority, if not all, VTS radars available today.



C-SCOPE DECISION SUPPORT (CSDS)

CSDS provides the right information, to the right VTS operator, at the right time in order to make critical decisions. This is a state of the art service, with high flexibility, that can be configured to the specific needs of each operator. It uses intelligent track alert algorithms for navigation channels, anchor and berth position, potential collisions and groundings, congestion, and integrity checks for track data source deviations, which provide a critical counter-measure to spoofing, ghosting, and duplicate MMSI numbers.



C-SCOPE SENSOR FUSION SERVICE (CSSF)

C-Scope's core principle is to display one track for one set of data, with no dual tracking at any point, thus maintaining a clear, coherent, and accurate VTS Traffic Image at all times. The CSSF achieves this by continually analysing the quality of contact and tracking provided by each data source for each track. By identifying the track quality of each data source, CSSF ensures that C-Scope uses the correlated track for picture compilation. The result is a highly accurate, clean and integrated traffic image, free from false tracks and dual tracking.



C-SCOPE MANAGEMENT INFORMATION SERVICE (CSMI)

The C-Scope Management Information (CSMI) system helps ports and coastal authorities improve efficiency and safety of operations by integrating functionality for all phases of a vessel's voyage, from planning to invoicing, including tools for incident management and scheduling of allied services. The CSMI is based on more than 30 years of experience of delivering port, offshore and coastal management information systems to some of the largest and most successful customers in the world. It integrates the best functions and Human Machine Interface features from our previous CSMI solutions in one easy to use package.



C-SCOPE LOGGING & REPLAY (CSLR)

The CSLR is the core element of C-Scope's analytics capability, and its analytical process. It is a fully integrated hard disk recording system with instant replay and capacity to record up to 5 years' worth of system and sensor data. It can be used to replay through a CSOC window or can be taken to a separate console for replay. It can be configured as required for screen shots from every second to every hour dependent upon task and standard operating procedure.



C-SCOPE WEB PRESENTATION (CSWP)

The C-Scope Web Presentation is Kongsberg's thin MDA client for access to multi-sensor tracks and radar video. CSWP is built with the latest web technology framework. The architecture is highly flexible, easily allowing multiple external data sources, with an API for consuming and overlaying a variety of geospatial data. CSWP's responsive user interface adapts to a wide array of viewpoints and platforms for displaying a variety of data types, such as streaming video, charts, 3D graphic, etc. A sophisticated tile caching system ensures optimal performance for web-based applications.



C-SCOPE HEALTH MONITORING (CSHM)

CSHM provides an essential service for the mission critical C-Scope VTS system, which requires near 100% availability 24/7. The CSHM provides complete monitoring of all VTS system hardware components, complete monitoring of all VTS software applications, processes and services, warnings for any VTS component failure, performance monitoring of all critical component, traceability of all warnings being handled, full graphical presentation of warnings and performance counters, remote configuration and control within the network, and integration to enterprise (ESM) frameworks.



C-SCOPE MOBILE APPLICATION (CSMA)

As part of C-Scope VTS, the CSMA operates in conjunction with the C-Scope Web Services (CSWS). The CSMA allows the VTS Traffic Image to be shown to mobile users, such as the Harbour Master and pilots, on tablets or smart phones. It is one of the very few, if only, VTS smart phone and tablet-based apps that displays both tracks and radar video.



C-SCOPE 3D SERVICE (CS3D)

CS3D improves situational awareness around high-risk areas where Vessels are maneuvering in close proximity (tugs, barges etc.). It is also exceedingly useful in the analytics process, especially with regards to incidents within or near to land or port areas. It provides additional situational awareness for non-mariners such as visiting dignitaries, press, and operators with a non-maritime background.



KONGSBERG AND THE FUTURE OF VTS

e-Navigation: Berth-to-Berth and Beyond

As a forward-looking solutions provider, Kongsberg Norcontrol is involved in a number of projects that keep us at the leading edge of VTS development.

BEHAVIORAL ANALYSIS

While the C-Scope VTS system already detects and alerts anomalous behavior, automatic behavioral analysis and anomaly detection will be an essential part of next generation VTS systems. Together with our technology collaborators, Kongsberg Norcontrol is developing SMART Agents, which will detect specific types of anomalies well before they occur, such as near misses, groundings, and collisions, and allow the operator to proactively manage risk. The same technology can also be used for operational analysis, meaning the port can identify which vessels earn the port the most money, for example.

E-NAVIGATION

With e-Navigation implementation approaching, partnering with the right solution provider is now more important than ever. The entire Kongsberg Group is involved in e-Navigation development, from the ship systems, to terrestrial and satellite VDES (VHF Data Exchange System), and shore-based ship traffic management systems (STMS). This mix represents the three technology pillars e-Navigation requires: shore-based infrastructure, ship systems, and robust communication technology. Kongsberg is the only VTS supplier with solutions for all three technology pillars.

We are not only involved in e-Navigation development; Kongsberg Norcontrol leads the ongoing SESAME e-Navigation test bed projects, which deliver and test STMS technology both in Norway and in the Straits of Malacca and Singapore.

AUTONOMOUS VESSELS

Autonomous vessels will become part of sea traffic in the years to come. Kongsberg Norcontrol technology is not only ready but ahead of the curve. We are involved in work that is shaping the future for how VTS systems will interact with autonomous vessels.

PORTABLE AND WEARABLE TECHNOLOGY

Kongsberg Norcontrol was the first VTS provider to develop tablet and smart phone apps, and we remain the only company to offer radar video on Android and iOS apps. Looking ahead, we will exploit emerging technology that can benefit the operations and working environment in VTS centers, including VTS-specific technology for smart watches and other wearable and portable devices.

SUPPLY

In the process of delivering a new VTS system, typically Kongsberg Norcontrol undertakes the following:

- Site survey
- Seamless transit on when replacing an existing system
- Dedicated Project Manager
- Design of the new VTS system in collaboration with the customer
- Manufacture of the new VTS system
- Factory testing and acceptance of the new VTS system at our premises
- Shipment to country and location of the new VTS system
- Installation and set to work of the new VTS system
- Training of VTS personnel, either on-site or at the KNC Academy
- Commission the new VTS, with system acceptance testing, followed by a warranty period

KNC ACADEMY

Kongsberg Norcontrol offers IALA V103 accredited training at the KNC Academy, where individuals can be trained from recruitment onwards to become fully qualified VTS Operators. CSOC Operations, System Administration, Super User and Maintenance courses are also regular course offerings, as well as individual refresher courses and other tailored offerings.

FULL SERVICE PROVISION

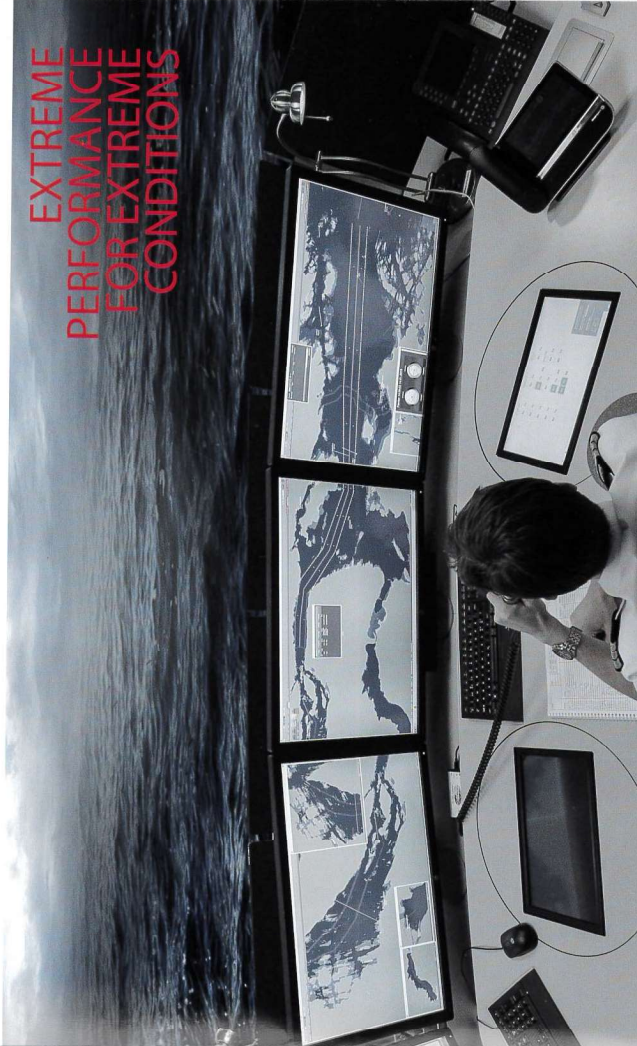
Kongsberg Norcontrol is the only VTS provider that offers full service provision, wherein a full turn-key solution is provided, including capital equipment, installation, commissioning, and the provision of fully trained personnel, plus commensurate support.

FLEXIBLE FINANCING

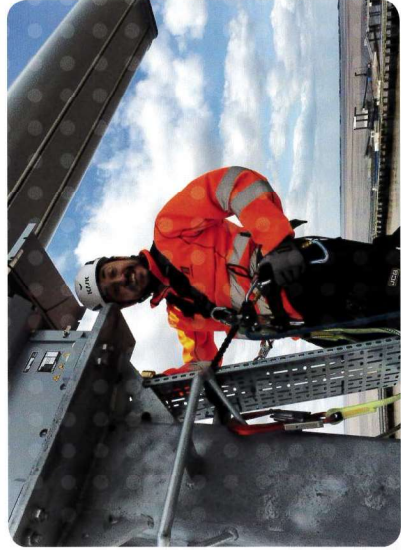
Kongsberg Norcontrol can provide highly attractive finance terms for our customers through Norwegian Export Credit Guarantee (NECG). This is dependent upon the nature of the project and is subject to NECG Terms and Conditions.

INTEROPERABILITY

The Kongsberg Norcontrol C-Scope VTS System can receive and integrate data from outside the system, as well as share its data with other surveillance systems and service providers via the Interoperability Service. Shared data can include IVEF, Web Map Services (WMS), other track data sources such as fisheries vessel monitoring systems, and data from 3rd party databases.



KONGSBERG NORCONTROL DELIVERED THE WORLD'S FIRST VESSEL TRAFFIC SERVICE SYSTEM TO TEESPORT IN 1979



WORLD CLASS SUPPORT

We are there when you need us, 24/7

Kongsberg Norcontrol prides itself in offering an excellent support package for all of its VTS Systems. Typically this can include:

- An on-site spares package
- 24/7 telephone Help Line
- Remote access diagnostics integrated with the C-Scope Health Monitoring service
- Fault reporting and audit process
- Provision of a dedicated point of contact
- Refresher training
- Maintenance and system performance checks
- Annual software updates and upgrades

*Kongsberg, Asker, Bergen, Billingstad, Horten, Kjeller, Kristiansand, Oslo, Sandefjord, Sandvika, Stavanger, Stjørdal, Svalbard, Tromsø, Trondheim.

**KONGSBERG NORCONTROL
PROVIDES THE BEST VALUE
FOR MONEY SOLUTIONS
IN THE MARKET**

WORLD CLASS

- through people, technology and dedication

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