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OSG's IT for tanker safety

Capt. Panos Hatzikyriakos, head of safety, quality and environment with Greek tanker giant OSG, talked about some of the IT systems OSG uses at Tanker Operator's recent TMSA conference in Athens

CAPTAIN PANOS Hatzikyriakos, head of safety, quality and environment with tanker company OSG, talked about OSG's approach to quality, and some of the systems it uses, at a conference about Tanker Management Self Assessment (TMSA) organised by Digital Ship's sister magazine Tanker Operator in Athens.

TMSA is a new scheme being introduced by oil companies to encourage tanker companies to introduce various safety related measures, several of which have strong IT components, such as planned maintenance systems, condition maintenance, sophisticated safety management and monitoring systems and electronic charts.

In accordance with the TMSA indicator "management commitment is clearly defined in documentation that includes mission statements, policies and procedures", OSG has a DVD explaining what the company wants to achieve.

OSG's CEO and head of shipping regularly visits the vessels. "That's a huge

task - we have 130 vessels," he said.

The company says it is pioneering efforts to develop software to measure seafarers' competence.

OSG spends "an eight digit number" [over \$10m] every year on crew training. "The amount of training I got in four years is the same amount today's seafarers get in two years," said Capt Hatzikyriakos.

There is a very tough formal induction process for new seafarers.

Seafarers and shore staff are encouraged and supported to take higher education courses to improve their value to the company and their possibility for promotion within the organisation, he said.

Software Systems

OSG also has software to calculate work rest periods. "We are very strict about working hours," said Capt Hatzikyriakos. "Captains can stop the vessel when resting hours would otherwise go above the limits. If there is any

deviation the office is notified immediately. There is no issue of crew fatigue."

The company has two



Developing software to measure seafarers' competence - Capt Panos Hatzikyriakos, OSG

or three seafarers working in the company office at any time, as specified in TMSA. "The knowledge they pass when they go back to the vessel is so valuable," he said. "It's one of the best things that the TMSA introduces."

OSG is currently looking at different software tools for root cause analysis. "There's a lot in the market," said Capt Hatzikyriakos.

On the issue of risk assessment, OSG initially

was not receiving enough risk assessments, but now it has so many risk assessments it doesn't know what to do with them. "We try to identify trends and changes to our management performance," he said.

The biggest resistance from TMSA came not from old Greek or English captains, which are often expected to be resistant to change, but from young educated professionals. "People with two degrees - they thought they knew better than anyone else," said Capt Hatzikyriakos.

One gripe is that safety is often considered to be the safety manager's responsibility, not the whole company's responsibility. "Sometimes I feel that we are alone in this problem. This is the problem of all modern shipping companies," he said.

"We've been through the TMSA audits. Why do I have to fly to New York when there's an audit over there? Why don't operations people have any ownership over it themselves?"

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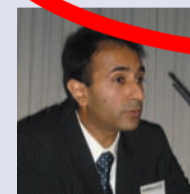
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Chart attention zones

DNV, Kongsberg and C-MAP are working together on a plan to implement 'attention zones' on electronic charts, so mariners know which hazards they should pay attention to, a concept borrowed from the aviation industry.
Bjørn Åge Hjøllo, general manager, C-MAP marine forecast, explains

The aviation industry is considered as one of the safest industries in the world.

Similar to the maritime industry, high costs are involved in the form of property damages, injuries, reputation damages or lost opportunities, when an accident occurs.

As a consequence a series of measures are implemented by the aviation authorities to avoid close encounter situations between planes and the ground.

Especially, measures for keeping aircrafts at a safe distance from each other, known as safe separation distance, has proven to be effective.

This safety distance is not fixed but depends on various circumstances (e.g. airspace class, instrumental or visual flight, meteorological and light conditions, airplane size).

This safety distance defines effectively a three dimensional safety zone (horizontal, lateral, direction of flight) ranging from 500 feet to 5 miles.

The Air Control Management, similar to a Vessel Traffic System (VTS), safely aligns each pilot's planned flight along with the many other planned flights in the same airspace at about the same time, by merging the safe distance zones.

Some maritime authorities have already established safety or no-go zones around a series of various objects and installations

that restrict a ship's movement.

For example, the US has issued safety and security zones in harbours and around vessels carrying hazardous cargoes.

The safe distance is 500 yards (and 1000 yards ahead) for LNG vessels, 100 yards around US naval vessels and around Outer Continental Shelf facilities there is a zone of 500m radius.

Interestingly, there have even been specified minimum distances (in space and time) around whales of 100m and 15 minutes for whale watching vessels.

DNV, Kongsberg Maritime, Kongsberg Norcontrol IT and C-MAP have adopted and adapted the minimum distance approach from the aviation industry to the maritime industry.

An attention zone can in principle be assigned to all maritime objects.

The objects can be fixed (e.g. reef, bridge), mobile (e.g. vessel or floating container) or semi-fixed in place or time (e.g. sandbank or a sailing regatta, floating container).

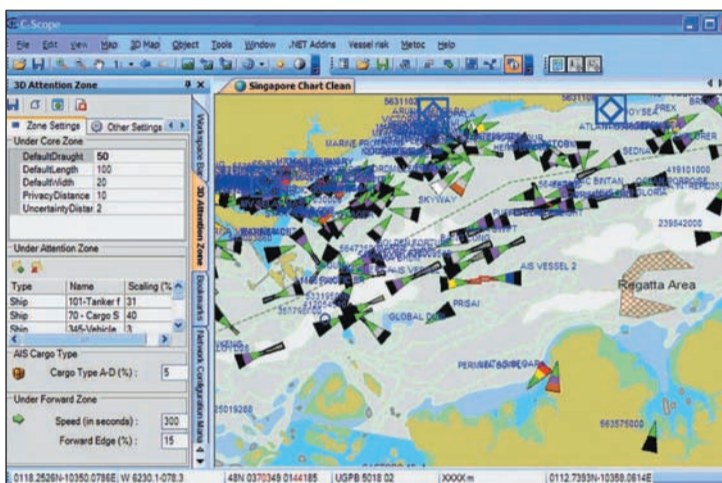
The size of the attention zone can reflect a maritime object's risk potential.

Some objects will have a larger risk potential either due to a higher accident probability or because of more severe consequences, and will therefore have a larger zone size assigned.

Moving objects will have a prolonged zone corresponding to the object's speed

and direction.

Wind or currents may even slightly deform the zone. As a ship has a draught as well as a height, the resulting attention zone is in fact 3 dimensional.



Attention Zones used as part of the VTS automatically indicate which ship zones overlap (red outline in centre)

Displaying the attention zones on an Electronic Chart Display Information System (ECDIS) would give the bridge navigator or VTS operator a very intuitive indication about a vessel's "navigational space" based on its risk potential.

In this way it helps to focus the navigator's attention on specific objects, hence

the term Attention Zone.

Overlapping zones indicate potential upcoming critical situations.

Their visualization on a navigational chart system lets the navigator or VTS operator recognize these situations much easier and earlier.

Unnecessary and disturbing anti-collision or anti-grounding warnings could thereby be avoided, further contributing by reducing the risk of information overload on navigators and VTS operators.

The attention zone gives a qualitative and relative indication of risks associated with the object, e.g. a vessel.

The computational model for the zone size is kept as simple as possible and is

mainly based on available AIS data, general ship type accident probabilities, and user defined parameters.

Some of the model parameters are static, like ship type, semi static, like cargo, or entirely dynamic like the vessel speed or meteorological and oceanographic parameters.

User defined parameters allow,

for example, a VTS to take into account the potential negative consequences of an oil spill near a sea bird colony.

The basic zone shape was chosen as a trapezoid since it is an intuitive representation of an object's navigational space but also because it is a simple mathematical form. Simplicity is prioritized before exact accuracy.

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Bridge systems

Kongsberg Maritime has implemented the attention zone concept for its ECDIS and Planning Station.

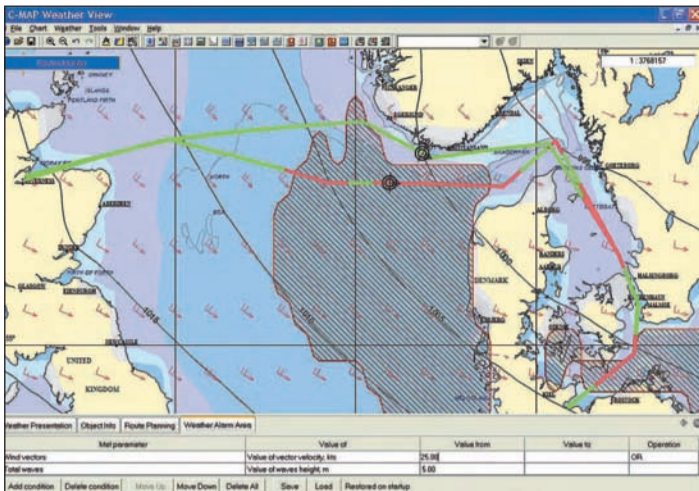
The navigator's own vessel is the primary target with its velocity vector and direction.

In addition, zones are defined around all other ships to display their risk potential. Higher attention should be paid to situations when zones overlap.

The zones make it much easier to quickly grasp the total traffic situation, particularly helping to focus the navigator's attention on the potential critical situation when the zone of his vessel overlaps with that of another ship or object.

Attention Zones for VTSs

The attention zone concept offers traffic monitoring organisations an improved way of visualizing potentially dangerous situations and assists them in advising vessels before a situation gets



C-MAP's Weather View software predicts weather attention zones where specified metrological conditions such as wave heights or wind speed will be exceeded

minimal accident probability and with lowest possible negative consequences. They might therefore want to assign larger zones around vessels carrying high risk cargo such as crude oil.

They might further be interested in having higher attention on the traffic in certain areas with, for example, valuable nature resources, or areas where a regatta or some diving activities are going on.

In these situations the VTS operator can enlarge the zones for specific objects for a certain time and location.

In heavily congested waters potential collision or grounding situations can easily be missed by the operator. In the new VTS traffic monitoring system from Kongsberg Norcontrol IT, the VTS is assisted by the attention zone concept as it automatically indicates which ship zones overlap. The operator can even draw an attention zone directly into the chart to

start monitoring on the fly.

Weather Attention Zones

C-Map has also applied the attention zone concept to metrological conditions that could pose a threat to a vessel.

Its new WeatherView 2.0 software allows the ship navigator to specify the critical weather parameters for his ship, e.g. maximum wave height, maximum wind speed or a combination of several parameters that shouldn't be encountered.

The system then displays the predicted areas (i.e. weather attention zones) where the specified values would be exceeded. A re-routing to avoid rough weather areas is thereby easily achieved.

The navigator gets information where on the planned route the vessel would be exposed to rough weather (red part of the route, see picture, above left) and can reroute accordingly, e.g. upper leg of route is almost outside rough weather areas.

The way ahead

Currently, the 3D Attention Zone concept is developed for implementation in ECDIS chart systems, VTS systems, and weather map systems.

A tighter incorporation of C-Map's weather view functionality with

Kongsberg Maritime's ECDIS chart system is also planned.

This will allow the user to see both the attention zones of ships as well as areas where a vessel would be exposed to bad weather conditions.

The current computational model for the attention zone is quite simple and can act as a stand alone solution. Internationally however, there are a lot of ongoing initiatives focusing on deriving risk indices that could be applied to individual vessels. Such risk indices could quite easily be incorporated into the zone model.

A tighter interconnection of the attention zones in the VTS and ECDIS bridge systems is under development such as to allow exchange of zone parameters.

The great advantage would be that a navigator would receive updated zone data from the VTS about other vessels or high attention areas and could therefore be able to stake out the course accordingly. This would indeed be a step towards the collaborative sea. DS

The homepage for the 3D Attention Zone Concept, including a video demonstration, is at <http://research.dnv.com/hci/3daz.html>

out of control.

They further get a tool for effectively handling ship traffic in highly trafficked waters.

Since the attention zone concept is common for vessel traffic systems and seaborne navigators, there is a possibility to communicate and share risk assessments among sea-farers.

In contrast to ship navigators, a VTS has to deal with a total traffic situation to ensure effective traffic throughput with

US maritime security system 'falls short of expectations'

A US Coast Guard (USCG) plan to combat terrorism by creating the maritime equivalent of an air traffic control system off the coast of Miami, as a test for a nationwide effort, has fallen far short of expectations, according to reports in the New York Times.

USCG had installed long-range surveillance cameras, coastal radar and an AIS (Automatic Identification System) to help search out possible threats. But the radar began to confuse waves with boats, the cameras covered just a small section of the harbour and coast, and only a small fraction of incoming vessels could be identified automatically.

The system has been acknowledged as not being as successful as had been hoped, despite the billions of dollars invested in security in the port since 2001.

"The more vigilant and alert you are, the less likely the adversary will decide this is a good way to strike at you," said Capt Dana A Goward, director of the project, called Maritime Domain Awareness. "For now, there are lots of cockpit doors that have not been reinforced."

The USCG estimates that 14 boats smuggling drugs, guns or immigrants or engaged in other crimes reach the country's shores every week.

Miami was selected to serve as a laboratory to test the suitability of the Maritime Domain Awareness project. The city has a major container port serving as a distribution point for much of Latin America, and the waterways are usually packed with hundreds, and sometimes thousands, of small boats.

Ineffective technologies

Under previous initiatives at the Miami harbour a protective zone around the cruise ship terminal was created, enforced

by security guards on ships. This surveillance effort in Miami, known as Project Hawkeye, was intended to search out vessels that might present a threat.

Using radar, the Coast Guard would track boats larger than 25 feet within 12 miles of shore. Smaller vessels - even as small as a Jet Ski - would be tracked with infrared cameras up to five miles offshore.

To identify which vessels among the thousands might pose a danger, a software system was installed to assemble and analyse the data produced. Under the plan, officials would then be alerted when boats entered restricted waters, loitered in a vulnerable spot or displayed an unusual course or speed.

Capt Liam Slein, deputy commander of the Miami sector has said that the cameras have at times proved helpful, allowing the Coast Guard to investigate how a ship went aground or to monitor security contractors at the cruise ship terminal, but are not powerful enough or installed widely enough to track small boats approaching the many inlets in the Miami area.

The radar system was said to be so unreliable, mistaking waves for boats, splitting large ships in two or becoming confused by rain, that Coast Guard staff personnel were told not to waste much time looking at it.

Concerns were also raised about the usefulness of AIS for a security system, as a captain or crew wanting to hide or disguise their location could simply turn the system off, or enter data that transmitted false information about the vessel's whereabouts and identity.

Most critically, the software system intended to collate all of the data had not yet been installed when the programme began, meaning that very little of what the



The multi-million dollar security system installed by the USCG at Miami has had limited success (Photo: USCG)

cameras filmed or the radar tracked was ever used or even watched. The data was deemed to be of such limited value that USCG has assigned only volunteers to deal with it.

Project delays

A surveillance system similar to the one in testing was supposed to be installed at as many as 35 ports, but after the problems experienced in Miami the Coast Guard has delayed expanding the effort to other ports until at least 2014. The total spending to date on the Miami surveillance effort has been about \$10 million, and similar projects nationwide total less than \$100 million.

The delays in the programme are further unfortunate examples of problems the United States has had with high-tech initiatives to increase security or enhance maritime safety.

Rescue 21, an emergency services call dispatch system considered a critical pre-

cursor to the Maritime Domain Awareness effort, was supposed to be installed nationwide by 2006, at a cost of \$250 million, allowing faster and more reliable tracking of ships in distress.

That system is now estimated to cost as much as \$872 million, and will not be ready nationwide until 2011, according to Congressional auditors.

The USCG is also struggling to finalise an approach to gather all the data it and other federal agencies collect about potential maritime threats globally and nationally, as cooperation between these different groups has sometimes been lacking.

During a 2006 security drill in which officials pretended that a ferry had been hijacked by terrorists, the Coast Guard and the FBI

competed for the right to take charge, a contest that became so intense that the Coast Guard players manipulated the war game to lessen the FBI's influence, government auditors said.

"Unless such differences over roles and authorities are resolved," a Justice Department report issued this year said, "the response to a maritime incident could be confused and potentially disastrous."

"I don't know how the Coast Guard intends to stop a high-speed boat, loaded with explosives," added Representative Sue W Kelly, a Republican of New York, said at a recent hearing where she questioned a senior Coast Guard official.

Lt Justin W Noggle, chief of the Miami sector command centre, said he recognised that many of the anti-terror tools the Coast Guard had installed were falling far short of their goals.

"We are just in the infancy of this effort here," he said. "But if you don't start somewhere, you don't get anywhere." DS