

ECDIS and the ISM Code

The ISM Code requires the company to ensure ECDIS training

Arne Sagen MNI
Skagerrak Safety Foundation

The grounding of *Costa Concordia* seems to join a growing series of 'ECDIS-assisted' groundings. The accident seems to be very similar to many other grounding accidents where ECDIS was used in combination with paper charts and manual steering. These include the grounding of the 25,000 ton bulk carrier *Rocknes* in 2004.

In both cases the ships were navigated by a combination of electronic charts and paper charts. The investigation of the *Rocknes* accident estimated that, because of the strong currents in the passage, the ship would probably have been better off if the navigation had been based solely upon the non-approved electronic charts with automatic tracking, rather than using both this and the paper charts, which in this case were the primary method of navigation. Maybe the choice of primary navigation method should be left to the Captain in such cases.

The introduction of manual steering also adds a communication issue. *Costa Concordia* had a primary information processing system in place, but for all the technology involved this system ultimately came down to the traditional maritime method of manual steering by a helmsman, even where there are language problems.

The real problem is that all electronic navigating systems are complex and complicated. Bridge management guides are full of warnings about problems including:

1. Difference in the layout of the various integrated electronic chart systems. (It seems to be left to the individual manufacturer to interpret the IMO's regulations.)
2. Difference in functions between manufacturers, even between equipment from the same manufacturer.
3. Difference in type and quality of electronic charts (EC, ECS, ENC, vector/raster charts).
4. Authorised electronic charts (ENS) might be digitalised paper charts, a century old or more.
5. ECDIS has different operational modes (ICS, ECDIS, RCDS, radar only, radar overlay, etc.), which may cause 'mode confusion' for the operators.

ECDIS is an organisational issue

According to simulator expert Dr Margareta Lutzhoft of the Maritime University of Australia, we need a closer relationship between the purchasing and technical departments in the company and the operators on the ships to make ECDIS systems to work:

'The main aim is that equipment and systems are designed for the user and should limit as much as possible the need for the users to adapt to the equipment and systems they use.' (See article by Nick Lemon, *Seaways* July 2015.)

I will go even further, and claim that, as ECDIS is still in a development phase, there should also be an organised liaison between the shipping company and the national and hydrographical institutions, combined with national restrictions for the use of ECDIS

in different waters. In some coastal areas, the minimum safety distances off critical points should be determined by the relevant coastal state. Finally, shipping companies and charterers should specify or recommend minimum distances off land for critical navigational passages.

ECDIS and the ISM Code

Under the ISM Code, the shipping company has the responsibility to ensure that: *'all personnel involved in the Company's SMS have an adequate understanding of relevant rules, regulations, code and guidelines'* (Section 6.4), and to *'establish and maintain procedures for identifying any training which may be required in support of the SMS and ensure that such training is provided for personnel concerned'*.

This means that if a ship is equipped with ECDIS, the company has the duty to ensure that users of such a system are properly trained in such operations, the use of electronic charts, and are familiar with the shipboard equipment before using the ECDIS operationally at sea. Furthermore, the STCW Convention puts the onus firmly on the company to ensure that mariners on their ships are competent to carry out the duties they are expected to perform. This means that the operators must be trained to use the particular ECDIS on the vessel.

The hazard of the ECDIS back-up in an emergency

As shown in both the *Rocknes* and the *Costa Concordia* incidents, when the bridge team shifts to paper charts with manual, there is a clear possibility for navigation to go wrong. In manual steering mode, the most common rudder control will be of the 'non-follow-up' type. This means that the turning circle in relation to the rudder position and the speed is not indicated to the bridge (only the rudder angle and the rate of turn are relayed). The conning OOW is not able to predict the optimal rudder angle in advance, as he can when the vessel is using ECDIS/RCDS, but has to wait and see as the ship starts turning. If the ship is sailing in confined harbours or channels, the vessel may easily end up in the same position as the *Costa Concordia*, where, given the optimal rudder angle, the vessel should have gone clear, but the manual steering system failed.

Again, maybe the decision about whether paper charts should be used as the primary means of navigation, resulting in the need for manual steering, rather than non-approved electronic charts, should be left to the Captain or OOW to decide according to circumstance. Indeed, for large cruise ships with a wide beam, carrying 6,000-7,000 people onboard, having a clear prediction of the turning profile in narrow channels may be crucial.

ECDIS is still at a preliminary stage. In the meantime, the passenger transportation and cruise ship industry should be specially protected by various bodies such as IMO, flag states and the authorities of national waters placing clear limitations on coastal and harbour sailing conditions. Shipping companies should strictly support safe passage planning by paying full attention to the ISM Code requirements for safe and secure navigation. 🌊

Arne Sagen is an accident investigator, and an ISM and ISO quality assessor