A bridge too far.

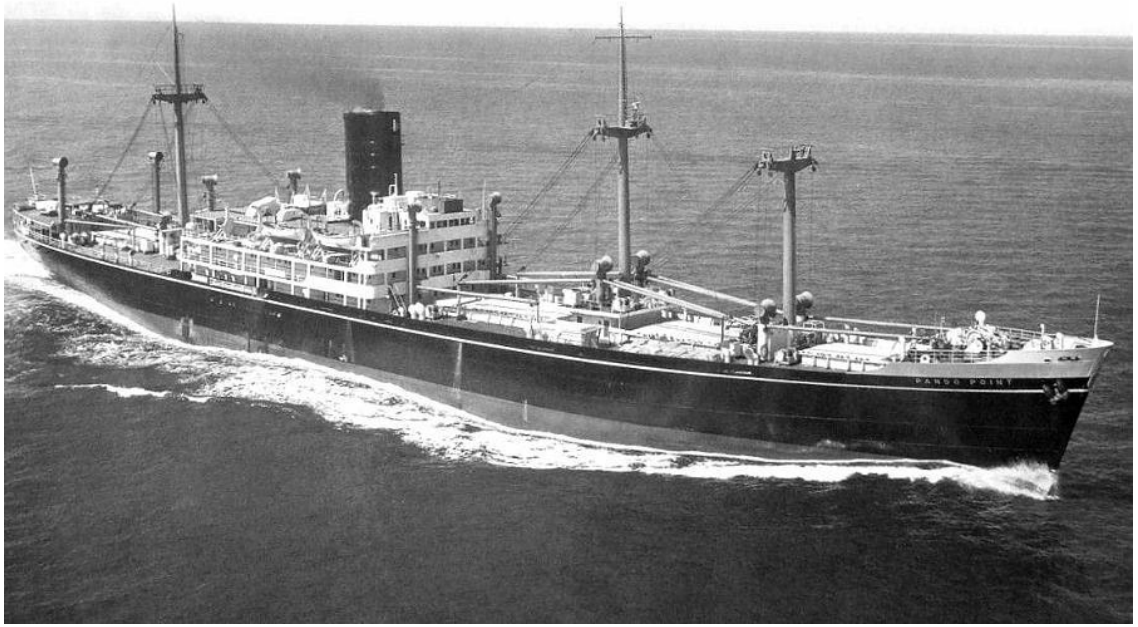
Reducing complexity on the bridge.

Mark Bull FNI

Independent Marine Consultant

Early career

- Commenced career in 1970 with P&O



End of the seagoing phase

- Came ashore in 1997

Post seagoing career

- 10 years in ship management.
- Moved into P&I as the Loss Prevention Manager at one of the IG Clubs
- Then assisted a new start up ship management company in Germany.
- Since 2012 IMC
  - The last 12 months have been spent almost exclusively conducting navigational assessments of tankers on time charter to oil majors.


Hog Roast
RG 48K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142.1
PARK
1/min x1000
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Complexity

- Complexity can take many forms – it is not just limited to the hardware or equipment includes
  - Ergonomics
  - Procedures
  - The Human Element
  - The Environment
  - Interaction of new developments with other systems (i.e. puchasing)

Complexity on the bridge

- Of course we are limited in our ability to change many issues on the design front.
- We can draw attention to those signing off items of equipment and bridge layout on statutory certificates.
- We can take into account bridge design for future new builds.

Regulation 15 - Principles relating to bridge design, design and arrangement of navigational systems and equipment and bridge procedures

Summary

- **Requires owners, naval architects, manufacturers and administrations to ensure compliance with specified ergonomic principles.**
- **Requires owners and masters to ensure that bridge procedures are adopted which take ergonomic criteria into consideration**

Regulation 15

1. *All decisions which are made for the purpose of applying the requirements of regulations 19, 22, 24, 25, 27 and 28 and which affect bridge design, the design and arrangement of navigational systems and equipment on the bridge and bridge procedures* shall be taken with the aim of:*

1.1 *facilitating the tasks to be performed by the bridge team and the pilot in making full appraisal of the situation and in navigating the ship safely under all operational conditions;*

1.2 *promoting effective and safe bridge resource management;*

1.3 *enabling the bridge team and the pilot to have convenient and continuous access to essential information which is presented in a clear and unambiguous manner, using standardized symbols and coding systems for controls and displays;*

1.4 *indicating the operational status of automated functions and integrated components, systems and/or sub-systems;*

1.5 *allowing for expeditious, continuous and effective information processing and decision-making by the bridge team and the pilot;*

1.6 *preventing or minimizing excessive or unnecessary work and any conditions or distractions on the bridge which may cause fatigue or interfere with the vigilance of the bridge team and the pilot; and*

1.7 *minimizing the risk of human error and detecting such error if it occurs, through monitoring and alarm systems, in time for the bridge team and the pilot to take appropriate action.*

** Refer to Guidelines on ergonomic criteria for bridge equipment and layout (MSC/Circ.982) and the Performance standards for IBS (resolution MSC.64(67); annex 1); and for INS (resolution MSC.86(70); annex 3).*

MCA Guidance

1. Regulation 15 applies primarily to companies, ship builders and naval architects. Masters and watchkeepers of all vessels are responsible for ensuring the efficient deployment and use of bridge resources in particular noting the requirements of 15.1.6.

2. The Regulation addresses the principles to be followed in the design and layout of ships' bridges and the establishment of bridge procedures using ergonomic criteria. These criteria are detailed in IMO MSC/Circ.982. Where ships are fitted with Integrated Bridge Systems (IBS) or Integrated Navigational Systems (INS) the appropriate IMO Performance Standards should be referred to.
(For Performance Standards see also Regulation 18).

3. The Regulation specifically covers decisions which are made for the purpose of applying the requirements of Regulations 19 (Navigational Equipment), 22 (Bridge Visibility), 24 (Heading/Track control systems), 25 (Operation of main source of Electrical Power and Steering Gear), 27 (Nautical Charts and Publications) and 28

Complexity on the bridge

- The actual equipment required to be carried on the bridge is documented in SOLAS V – 19. There is little change we can make in equipment levels.

- We can reduce complexity by making sure our certificates show the actual equipment levels onboard.

3 *Details of navigational systems and equipment*

Item	Actual Provisions
1.1 Standard magnetic compass*	Provided
1.2 Spare magnetic compass*	Provided
1.3 Gyro compass*	Provided
1.4 Gyro compass heading repeater*	Provided
1.5 Gyro compass bearing repeater*	Provided
1.6 Heading or track control system*	Provided
1.7 Pelorus or compass bearing system*	Provided
1.8 Means of correcting heading and bearings	Provided
1.9 Transmitting heading device (THD)*	Provided
2.1 Nautical charts	Provided
2.2 Back up arrangements for ECDIS	-
2.3 Nautical publications	Provided
2.4 Back up arrangements for electronic nautical publications	Provided
3.1 Receiver for a global navigation satellite system *	Provided
3.2 9 GHz radar*	Provided
3.3 Second radar (3 GHz) *	Provided
3.4 Automatic radar plotting aid (ARPA)*	Provided
3.5 Automatic tracking aid*	Provided
3.6 Second automatic tracking aid*	Provided
3.7 Electronic plotting aid*	Provided
4.1 Automatic identification system (AIS)	Provided
4.2 Long-range identification and tracking system	Provided
5.1 Voyage data recorder (VDR)	Provided
5.2 Simplified voyage data recorder (S-VDR)	-

Number of two-way VHF radiotelephone apparatus

3	Λεπτομέρειες Ναυτιλιακών Συστημάτων και Εξοπλισμού/ ***Details of navigational sys***	
	Είδος/ ***Item***	Διαθέμ
1.1	Διοπτηρία μαγνητική πυξίδα[2] *Standard magnetic compass*[2]	**Provide**
1.2	Εφεδρική μαγνητική πυξίδα[2] *Spare magnetic compass*[2]	**Provide**
1.3	Γυροσκοπική πυξίδα[2] *Gyro-compass*[2]	**Provide**
1.4	Επαναλήπτης πορείας γυροσκοπικής πυξίδας[2] *Gyro-compass heading repeater*[2]	**Provide**
1.5	Επαναλήπτης διοπτεύσεων γυροσκοπικής πυξίδας[2] *Gyro-compass bearing repeater*[2]	**Provide**
1.6	Σύστημα ελέγχου κατεύθυνσης ή σύστημα ελέγχου τήρησης πορείας[2] *Heading or track control system*[2]	**Not App**
1.7	Ταξίμετρο ή διόπτρα[2] *Pelorus or compass bearing device*[2]	**Provide**
1.8	Μέσα διόρθωσης της πορείας και των διοπτεύσεων *Means of correcting headings and bearings*	**Provide**
1.9	Συσκευή μετάδοσης πορείας[2] *Transmitting heading device (THD)*[2]	**Not App**

2. Εναλλακτικά μέσα για την ικανοποίηση της απαίτησης αυτής επιτρέπονται βάσει του Κανονισμού V/19. Στην προσδιορίζονται

2. Alternative means of meeting this requirement are permitted under regulation V/19. In case of other means the

Complexity on the bridge

- The autonomous or unmanned ship is not far away, but to get there, we have a lot to sort out.
- It starts with adopting some of the new equipment arriving on scene now – ECDIS being just one item – into our existing management systems.
- The new radars under development will be another.

Complexity on the bridge

- Paper charts have been in existence for many years. They are very versatile but they require physical delivery, manual updating and, if you trade over a large area, you need to carry a lot of them. (WYSIWYG)
- ECDIS is however, much, much more than just charts; it is a very powerful tool, which if used properly, can be a significant aid to safer navigation

Complexity on the bridge

- New procedures for this equipment are of course required, but not only for the operation – for the purchasing also.
- The carriage of ECDIS translates into only requiring the charts (cells) you are going to use. The system allows a shopping basket to be created which lists all cells needed for the voyage – and these to be transmitted direct to the supplier.
- In return a simple e-mail contains the keys needed to open these cells.

Complexity on the bridge

- It makes no sense to have to convert this into a requisition, send to the company and then what??
- KISS
- As most charters are fixed on a Friday evening when everyone else has gone home; we must use the automated system for obtaining new chart cells in the shortest possible time rather than await for the office to open to go through the normal requisition process.

Complexity on the bridge

- Other possibilities with ECDIS are the creation of the deck (bridge log book) in the history function. It would not require such a major software change.
- This is where Flag State would have to become involved. There are still Flag States today insisting on the use of Log Books which have to have each page stamped by them. Others have not changed the format since the days of sail!!

Complexity on the bridge

(Log book cont)

- Compare this to waste recycling and garbage disposal, make the facilities available and people will cooperate willingly – make it difficult (duplication or triplication) and it will work in the opposite way.

Complexity on the bridge

- Along with ECDIS, many supporting publications are now available in electronic form. Again you only need the publication for the area you are trading in (Light Lists, Tide Tables etc)
- Reducing complexity translates into reducing the number of publication formats as much as possible. To try and operate a mix results in increased cost and the possibility of missing corrections.
- Digital charts and publications also means using help lines to resolve problems promptly.
- It also entails submitting reports about anomalies – this is also an IMO “requirement”.

Complexity

- Environment – switch to video clips
- 1 BD
- 2 CS
- 3 CC

Complexity on the bridge

- Rule 1
- Ensure the bridge is used for what it was intended – navigation.
- Keep all non-safety communications off the bridge
- Ensure non navigation tasks are NOT undertaken on the bridge (crew lists, cargo plans etc)

Complexity on the bridge

- Rule 2
- Do not allow “navigation mission creep”. No ECDIS or ARPA or GPS monitors in the Master’s office.
- If he needs to focus on navigation, then he should be on the bridge;
- If he is trying to navigate from his office, he will not be paying due attention to his administration.

Complexity on the bridge

- Rule 3
- Consider what navigation means and requires. A first principle is keeping a good visual lookout. So design a layout such that a good field of vision is available from the conning position. Reduce the size of the bridge!!
- Avoid refraction.
- Windows do not need to be complex
- Consider window wipers carefully (top??)

Complexity on the bridge

- Rule 4
- A ship needs to be steered. Ensure there is a position on the CL for the helmsman.

Complexity on the bridge

- Rule 5
- Ships do not need chart tables anymore. Any tables should be reduced to desk height and provided with fixed chairs.
- Build angled bookshelves for the remaining paper publications so that they do not fall out

Complexity on the bridge

- Rule 6
- Miniaturise engine, thruster and steering override controls. They are after all, only used for a fraction of the time during navigation.
- Other controls and alarm panels such as lighting could be grouped and operated from a touch screen (vis a vis aircraft)

Complexity on the bridge

- Rule 7
- All illuminated panels should face aft to avoid reflection from the bridge windows
- All deck heads should be painted a dark, matt colour; again to avoid reflection
- Consider the stairway to the bridge exiting directly into the wheelhouse and door with cut out switch for lighting below.

Complexity on the bridge

- Rule 8
- Consider the ship rolling up to 50 degrees. Are those seats safe?
- Do the bridge team have something to hold on to?

Complexity on the bridge

- Rule 9
- Consider the need for adding new equipment in the future. Insist on modular design. It almost exists now.
- When fitting new equipment DO NOT just put in any available location; make sure you consider SOLAS V, 15

Complexity on the bridge

- Rule 10
- Check your form E of the Safety Equipment Certificate. 95% of those I have seen in the last 12 months are full of errors as regards navigational equipment – a gold mine for PSC or vetting inspectors
- Don’t forget navigation lights!!!!! There are cross eyed ships on the oceans.

Complexity on the bridge

- Rule 11
- E-navigation is here; live with it and use it to advantage.
- It allows you to carry just what you need in terms of charts and publications. Do not let your purchasing system stand in the way (tale wagging the dog or dog wagging the tail).

Complexity on the bridge

- Rule 12
- Engage with ECDIS manufacturers; the possibility of using the history function could obviate the need for a deck log book

Complexity on the bridge

- Rule 13
- Contingency Planning; you will still need to carry a sextant for some time yet and with that Nautical Almanacs, Navigation tables, Star Finders etc etc.
- However, a single, simple approved Celestial navigation programme can replace all these publications valid up to the year 2100 – mine does!! $$$$

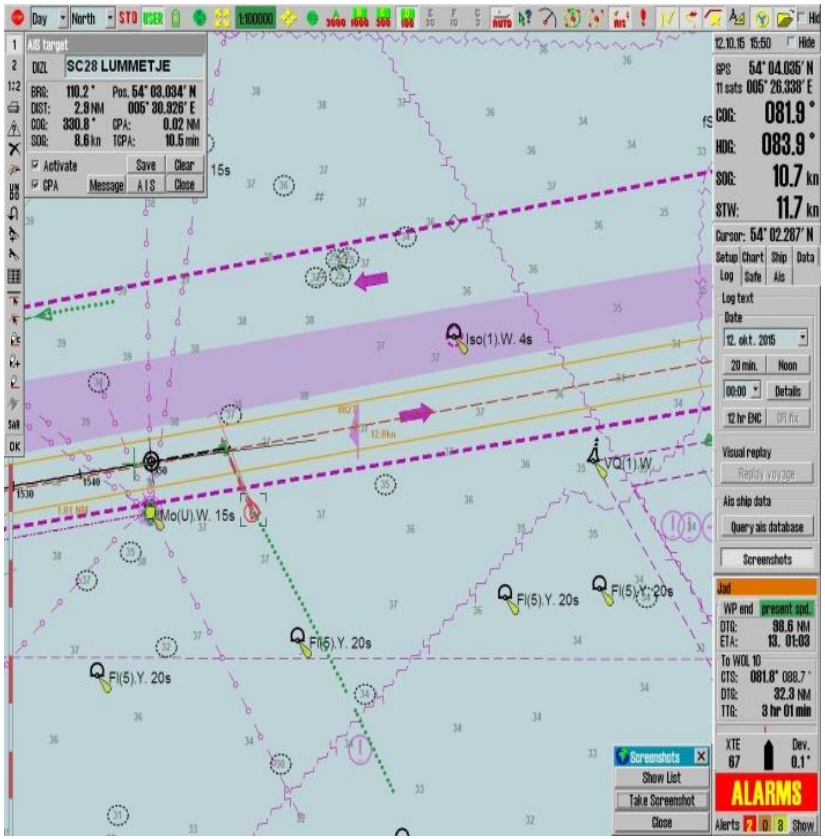
Complexity on the bridge

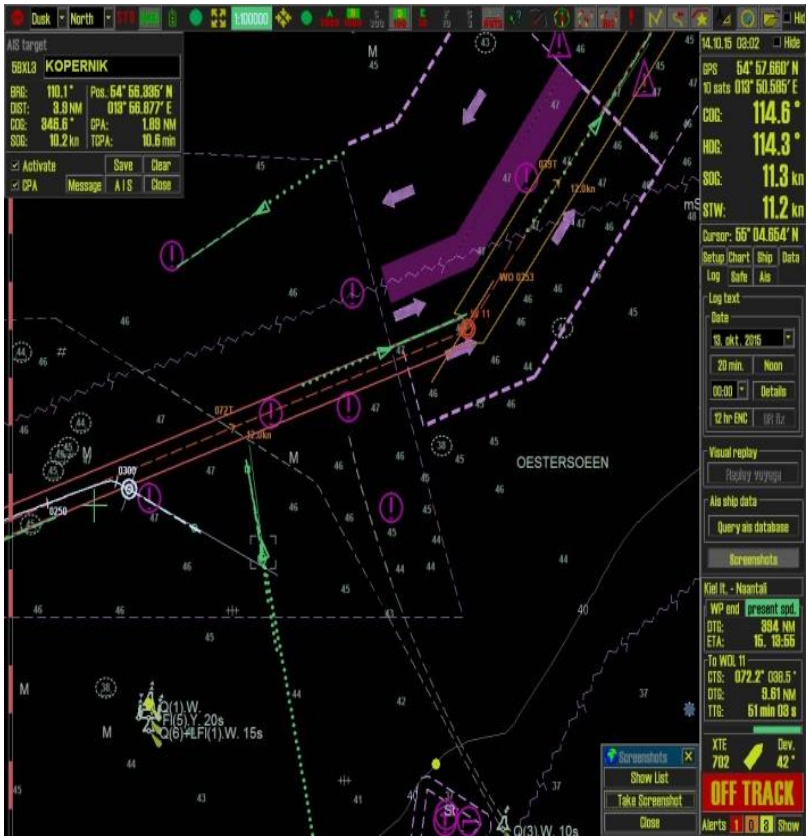
- Rule 14: Procedures (I am sure both Axel and
- Keep them simple and to a minimum BUT remember they must satisfy the Master on his retirement trip and the first trip 3rd Officer so they can include sections providing guidance notes and worked examples to support the procedures as well as just instructions.
- Watch your language – keep words for specific elements (Fleet Regulations for company rules and Standing Orders – what the Master writes)

Complexity on the bridge

- The Human Element: Given the right support, the ship's personnel will respond.
- Encourage them to report navigational near misses with screenshots from ECDIS
- Training: New systems require training –training is ongoing – some of the CBT modules for navigation I have seen recently are excellent – simple and to the point
- Do not forget to check the implementation status onboard however

Complexity on the bridge





Complexity on the bridge

- How much have you spent on magnetic compass maintenance?
- Do you have twin gyro compasses? How much is the maintenance bill for these?
- How much have navigational incidents cost you in the last 5 years?

Complexity on the bridge

- Costa Concordia wreck removal cost in excess of 1.2 billion USD. Who paid?
- If you have a navigational incident, what happens with the Oil Majors – say a collision or a grounding? – a technical hold? How much does that cost in loss of revenue?
- Will your declared TMSA progress match objective evidence?

Complexity on the bridge

Make compliance simpler.

- In the last 2 weeks there have been at least 5 major navigational incidents involving tankers. This is a remarkable reversal of the good trend previously established by the world tanker fleet.
- Worst we now see lawsuits issued against owners in the USA.

Complexity on the bridge

- OCIMF will not have let this go unnoticed and as tanker operators – you are all aware of TMSA.
- Element 5 spells out what OCIMF expect for the management of navigation.
- They will be looking during SIRE inspections.
- The bottom line is that compliance should not cost you anything more than you are spending on your safety budget now.

Complexity on the bridge

- I close by asking you three questions:-
- 1 Do you have a (safe) navigation policy
- 2 Did you change this following the Costa Concordia incident?
- 3 Are you considering changing it following the El Faro loss?
- If the answers are yes, brilliant;
- if the answer is no then be ready for the major fallout that will follow should you have the misfortune to experience a major navigational incident.