

## GLOBAL SUPERYACHT FORUM 2006

Conference Day 4 — 16th November 2006

### Navigation Forum

Andy Gifford	Larry Smith Electronics
Jim Cashman	Holman, Fenwick & Willan
Dr Volker Koehler	Sam Electronics
Ole Husoey	Marine Technologies
Shepard Tucker	Nobeltec

### Martin Redmayne

Good morning everyone. Trying to get back on schedule, nine minutes late. To my right I have five distinguished panellists; all of which have differing opinions and differing comments on the navigation world, most of whom are in the actual manufacturing and supply and integration of navigation equipment but the loose cannon at the end is Jim from the legal profession talking about issues relating to navigation, that is collisions—obviously, touch wood, rare, but we'll talk about that in a different subject. I'm going to ask Andy Gifford from Larry Smith Electronics to come up to the podium and set the scene and then we'll let the panel just have their opinion. I've a list of a few topics which they have as well. We're going to talk about user friendly bridges and things like that, where the technology is heading, and are we getting too far advanced for our own good in terms of the operational criteria. Andy, do you want to join me?

### Andy Gifford      Larry Smith Electronics

I'm from Larry Smith Electronics based in Viareggio in Italy; there's some bumph in the brochure about me so you can read about me there. Unfortunately I guess our pictures are not going to make it today so I'll read it to you. The idea was that when an owner has an idea like this and a designer complements the idea with a bridge styled like this it's our job as an integrator to take this and turn it into something functional. And this was Maltese Falcon—it was a project we finished for Perini Istanbul, in Turkey, this year and I guess most people have seen it in Monaco or in the various magazines—it's definitely been covered well in The Yacht Report. It's a pretty sensational vessel is I think the only thing to say about Maltese Falcon.

The bridge of course is no different, it's an integrated navigation system, it's a one manufacturer bridge so it has all the bells and whistles that perhaps in this scenario we're being told here that's maybe over complicated or may lead to accidents at sea. I would like to debunk that theory for a few reasons in the next few minutes. So let me just give you a few reasons why an integrated navigation system from one manufacturer is the way to go. And I won't bore you with any more pictures. The first thing is ergonomics. Ergonomics can be broken into three aspects; the arrangement of the work in place, the instrumentation and the operation of the equipment itself. As a watch officer spends a large part of his bridge watch at one central station he needs an all round view from this position. Particularly out of the windows, if possible without blind spots. This means setting up a workplace in a sort of bay window which minimises the number of blind spots. And nowadays a good number of yacht owners decide upon the bridge system first then construct the physical bridge to follow. Design is an important aspect, especially for the designers. In this day and age when

either everything is a black box system it's become very easy for the designer to turn the bridge into a very nice looking area, very clean, perhaps aviation style. Does it mean it's any less user friendly, does it mean it's any more user friendly? No. It just looks nice. They're available in many different shades of black, and then of course the bridge system which is perhaps more important is the uniform operating philosophy. If you are using a one manufacturer integrated navigation system you'll have the benefit that each keyboard will be similar, the enter button will be in the same place on each one, the cancel alarm button will be in the same place, and other functions such as the menus will all be similar and so what happens there is crew changeover takes place, it's easier for them, they basically learn one piece of equipment and it's the same functionality for each piece of equipment. The operating units are self explanatory and this has been available now for 3—4 years so this is nothing new. This isn't all vapour layer. By having a one manufacturer bridge system there should be some benefits to that because it usually has a cost plus impact on the project. The first thing is that the pilot in giro usually function with the systems to get a much higher level and amazing degrees of accuracy can be maintained in the track system. The next would be the monitoring of all processes; a conning display for example will take all the information relevant to the running of the vessel and will be able to give you such things as track deviation, heading, radar turns, speed head, lateral speed, rudder position, water depth, distance, course, wind and drift etc. All combined in one screen. So it makes it much easier to see all the relevant information. The other nice thing about the conning screen is it brings all the alarms together in one place. In the past we always hear different alarms going off from different places and crew members running around trying to cancel alarms, as opposed to actually being able to have one area to go to to do that. The next item is safety and redundancy. Usually in an integrated navigation system you'd have at least two radars, two giros, two GPS, two autopilots so if any one fails you have backup immediately available. And obviously the failure of one product doesn't impact the entire system. Perhaps the most important thing is what we've heard often in this seminar is the lack of crew training. If you do use a one manufacturer bridge system whether it's any of the manufacturers that are out there, you're able to send the captain and crew along to the factory, they're able to do a three day training course and able to come on board the vessel at sea trial already knowing how to use the X and S radar, how to use the plotter and how to use the pilot and giro. So that takes some of the stress and the pain out of a newbuild. The other part of it that's very good is that the vessels sail around the world, you should be able to call one company and have them come and service that vessel no matter where you are. Essentially that's my plus for why someone should use an integrated navigation system and I will pass on to the other panellists for their point of view. Thank you

### **Martin**

Andy thank you.

### **Martin**

I think the process of this is really to ask the three manufacturing panellists, Shephard, Volker and Ole to give some perspective on what is a user friendly bridge system from their own point of view. Ole can you start?

### **Ole Husoey** Marine Technologies

OK. I'm from Marine Technologies and my aim as a navigator through 18—19 years I always thought when I was on the bridge why hasn't someone come up with something simpler than this. The first thing was I took a cruise ship out in 94, we had

over 30 alarms on the bridge and I think 15 came from the same manufacturer, the buzzer. So when you heard this buzzer you were walking around trying to find out where did this sound come from. It took two or three months before you actually knew the bridge system and by that time it was time to go home again and you ended up on a new ship. With the new technology our network based bridge systems you can very simply also have a common alarm system which was mentioned by Andy and where any of the monitors that are nearby you can acknowledge the alarm and you can actually see what you're acknowledging, which I think is a condition to deal with that the tags come up and they might be a micro window in the conning also that pops up in the Actis, there are very many possibilities of how to do this. But more important, an integrated bridge will give you the opportunity to give you the information you need according to the operation at hand. I've been on bridges where there's been over 40 monitors. And as a navigator, your mind is working all the time, filtering the information that is coming in. You need totally different information when you're going into port, or in transit, or if you're lying at anchor, or hovering on dynamic positioning, whatever. Today you can actually set it up, mode based where you say OK harbour mode, then I want this monitor to do this, to do that, and so forth. One push button and it's all defined. You can also have this done according to who's on the bridge. You can have the captain—he likes it like this—push the button and it's all set to his desire. First officer comes on duty and he can have his setup. This doesn't interfere with any class rules or anything as long as you have all the required applications available. And as long as you have a possibility now to get all the equipment on the monitor you can do away with several sq metres of pushbuttons. You can have a very very clean bridge. I primarily work towards the offshore industry where we have two bridges, one transit bridge on the forward part and then a much larger bridge on the aft where all the operation happens, where you might on the existing vessels have more than 20 monitors to relate to. And everything has to be at hand. You can't walk and push a button, you have to have it sitting around you. And this has necessitated that you have to be able to have multi function work stations and you have to have them mode based. And this is running the development because the oil price is over 60 and everyone is out there drilling holes and they have to have rigs and support vessels so it's gone over the top, the shipyards are fully booked until 2009 to 2010 with offshore supply vessels so it's a good market to be in, but it's challenging us in new perspectives. They say OK but can you also put this into the bridge system and we have done pretty far, so you're down to 7—8 monitors which are doing the same job as 15—18 did only 2—3 years ago. And one of the things that we had a very big challenge was a requirement from the classification companies what was supposed to be within reach, and that's only as far as your hand goes. Now there was 3 times as much equipment supposed to be within reach that was possible to put there so we had to go into the think box and find out how to do this. And the natural solution is, can this function be done with a graphic user interface. Most of it could. All the thrusters etc —you had hordes of EHF's and short wave UHF's to talk with the crew with a rig and now they've got what they call a Madonna mic—you hang it on like a blue tooth or you've got a mic on your chair and you can actually on a monitor go through the PABX go on satellite, go through VHF, go through the mobile phone or you can go on UHF, you can have a programme like a mobile phone. And it's just one mimic picture. Away with all these different hand sets and control panels, it's all done from the monitor and you relay to one mic, which is exchangeable in 10 mins if it breaks down, with four screws and a plug. And going down the road that way indicators, analogue indicators. You can get it on the conning picture—we have overhead 10—12 inch monitors that can do a combined giro repeater, wind meter where you will get the relative to wind on the vessel, you can do head up, north up, instead of having 3—4 different analogue instruments to do the same job. And when it comes to logistics, everything based on the monitor you have maybe three different sizes on the bridge, one spare for each and you're out of the

problem. If you're going with analogue indicators from different manufacturers you have to order it from that manufacturer and some come in black, some are white and some are this size, or that size. It looks more a lot more untidy. Which I know is important for a yacht, not so much on a workboat. But another thing, when it comes to computers, the biggest problem that I've experienced with PCs is that sooner or later the hard disk is going to crash. And if you change the hard disk, the fan goes down, and after 4—5 years the batteries on the bios goes down and then it's time to do a changeover on all the PCs, get them out before a problem arises. Technology today with flash disks have come so far that for about the same price you can get marine approved PC that has no moving parts. there is no hard disk, there's a flash, there's no battery on the bios and there is no fan. This can be used all over the ship, whatever application you have that needs a PC. So far the only problem is you can't use it for the Actis, you will have to have a hard disk because of the mere size of for example the world data base for seamap, which is 10Gb. Only the military can afford flash disks of that size. But I wouldn't be surprised in a few years if prices have actually come down. So it's viable to also buy a flash disk of that size. But for the time being that is the limitation. All the other yacht applications can be run on a PC with a flash. If you use embedded CE or a lot of people are very sceptical of Mr Gates and the power he has in this world and what happens if a virus comes in when you have 20 identical PCs —if one goes down they will all go down at the same moment; it's very black and dark out there. One of the solutions is if you do have to work with Gates software and that is to use the embedded version because all the parts of the operating system which can be attacked by a virus are removed; you cannot get a virus infection on an embedded CE. I need a little break, I'm talking myself dry. So can I hand it over for a little while.

### **Martin**

Yes, pass the ball. Volker?

**Dr Volker Koehler**          Sam Electronics

These things are true, which are addressed by Ole. But we are in between the rules on one side and on the other side the requests from the owner, or the user which are not in any case the same. And therefore it's sometimes rather difficult to meet the final requirements, very often we do not know really at the end of the day who is the person what this bridge should look like. Is it really the captain or the owner, or both together? Many things are possible but what we are able to do then is, driven by the rules as well as by the final decision makers. And we should not forget one thing—we do not have only the display. A bridge is much more, and there's a lot of work to do. That means we have to integrate the sensors much better than we do at the moment. I think most of them know that for almost each of these nice sensors we have an individual display; we have a lock display, we have echo sonar display, we have a GPS display, and they are part of the navigation system which normally these individual displays no-one really needs in this integrated bridge but the sensors do not give us enough capability to control, to supervise, what they are doing, and that is also a way where we have to come forward if we would like to have a really integrated bridge. Another topic is dimming. It sounds very easy; but if you are on board a real ship then you see what happens there, they have a lot of knobs and buttons which you have to press to get the bridge during the day or during the night in a similar brightness. And to come forward in this direction, that is a huge challenge. And I believe that it's not possible if you are only an integrator. You have to have access to all these parts, which means you have to be a manufacturer of the majority of the parts, and that makes it of course very difficult to get a grip on all these things. And additionally the bridge, all this navigation equipment has a main

purpose, it's not to be a display for a computer game or something like that, it should really be used for navigational topics and there we have at least at the moment and I hope it will stay in that way, rather strict rules what has to be presented on the display and what not, and you have of course some space to do additional things, but you should not forget that this part of the ship is vital, to get the ship from A to B and that should be our major focus. I think up to now we are not so wrong in our kind of thinking, we have sold a lot of these systems of course not only to yachts but to many of the cruise liners trust in our equipment and therefore the advance are important but we should not forget what is the main purpose of the bridge. Also because of legal issues, which we have not addressed yet, the knob where you can press and switch over between this and this place, I think it's one of the things that will come in the future. And also maybe in the way that Ole explains that you have some standard information which you need according to the rules but you have also to get a very easy way to handle alarms, some kind of exception handling. We do not need the information about many of the status information that we get at the moment; we need only information if things are not going as we expect, maybe a certain time in advance if things could come in a way which could be dangerous for the vessel or for the crew. These are also some requirements which have to focus and the manufacturers I believe are going in this direction, they are working on that, driven by the owner, driven by the users, but the feedback which is coming from them is rather weak; if we are doing certain things and these things are OK then everyone accepts this but there's no feedback. But if you do something which is not as expected then everyone is blaming us. We would like to have also positive feedback and that is sometimes rather difficult to get. These are a few things which I would like to address in addition to the things Ole said, I would say 80% of the things he said I can design, not everything, but a lot of these things. And these are only some things which I would like to add to these items.

### **Martin**

Volker, thank you. Shepard?

### **Shepard Tucker**

Nobeltec

Our users are not that polite, they tell us immediately. And we get blamed for just about everything. I'm with Jefferson Marine, we're the new players on the block. We own the Nobeltec brand and we were primarily responsible for the PC revolution, mostly in the US but we're slowly gaining traction here, thanks to a little bit of hard work by our international sales manager David Neil, and our parent company. We're slowly making the rounds. But our core market today is a leisure vessel 40—80 feet and we're slowly pushing up into superyachts and principally it's the captains that are getting us on the boats.

It's very user driven, we typically are not the primary navigation but oftentimes a companion and secondary navigation but more and more we're seeing PCs take a more prominent role on the bridge. But again, regulations and certifications will hold that back. I think my first real wake up call when I got involved in this industry was sitting through an international forum many years ago when we understood that the blue screen of death could get translated into just about every language and everyone knew what that was. And so that's one of our challenges, is with the PC itself. I think there's a lot of new things coming on the technology side with PCs and being marinised, there seems to be no definition of what marinised is, we know a guy who put hairspray on some of the connections and called it marinised. But hopefully they don't do that anymore. Our biggest problem today is that people are trying to do things with navigational PC that they shouldn't be doing, connecting to the internet

and downloading their email and getting viruses and they're letting their kids do all kinds of fun things on it, they're balancing their cheque book and that's certainly not something I would want to do on my yacht but people do it. It might drive the lawyers and insurance people crazy but I have a lot of opinions about where things are going and would like to hear from others as well.

### **Martin**

Shepard thank you. Let's throw it open to Jim. Do we blow everything out of the water?

### **Jim**

Thank you. Yes. I first went to sea in the Merchant Navy in 1977 and on my first ship the only thing at the front of the bridge was a row of windows, two boxes for binoculars and some windscreen wipers, and that was it at the front of the bridge. By the early 80s I was working on cross channel ferries as a second mate and for about 3—4 years and we had ARPA on board. In those days, in the early 80s, ARPA was high technology. And I remember a very wise captain came up to me on once particular crossing of the Channel and said take your head out of the radar, open the bridge wing doors, this is not a video game. After about 5 years as a master mariner I moved on to different ship types, and I went to University at Southampton and did a law degree. And for obvious reasons after I became a lawyer I specialised in casualty work, strandings, groundings, etc. Martin, you said happily collisions don't happen very often. Actually investigating collisions is a large part of my job. I see a lot of them, a lot of groundings and a lot of strandings and one of the issues is always causation. Why did this happen. And I have to say from my experience that normally it's mariners failing to observe the basics. Collisions in particular, the problem in particular is they're simply not looking out of the front window. If the ship alters course you will see it with your eyes immediately. You will not, on a radar, it takes much longer. And in close quarter situations those last minutes or seconds are absolutely crucial, the head must not be in the radar. Those are just some of the mistakes that people are making. Statistically, traffic separation schemes reduced the number of collisions. ISM when it was introduced, I'm talking about merchant ships now, I'm sorry, but I don't deal in superyachts as much as I would like to. But statistically ISM reduced the amount of cargo claims we saw. With deference to all the other gentlemen sitting on this panel I have to say from my experience in what I do for a living and with my background I haven't seen any evidence that integrated bridges reduce the number of casualties or assist mariners in avoiding having collisions. If as Ole says all the computers go down and it all becomes very black and dark out there, well fantastic. You'll be able to see where you're doing and what you're doing and what other people are doing. The bridges I go on now look like aircraft cockpits. I think in the marine industry we tend to copy the aircraft industry far too much. They don't always get it right in the aircraft industry. There was a Boeing 737 crash in the Midlands in the UK and they discovered that the problem was that one of the engines had gone down. Remember the cockpit of an aeroplane not that long ago consisted of five people, someone who specifically did navigation, someone for the engineering, and then 2 people flying the plane and a navigator. They reduced that all down to 2 people. Something went wrong with one of the engines on this particular plane and the captain, in addition to trying to land the aircraft, manoeuvre it in 3 dimensions, communicate, navigate, etc, made the basic mistake of switching off the wrong engine. Had he been able to turn around to the engineer and say will you please switch off the engine, it's got fire on it, it wouldn't have happened. But the aviation industry continues to have simply two people on the bridge. What's happening in the Merchant Navy is that we're reducing the number of people on

ships all the time. These massive container ships now sometimes have only about 15 people on board. The first ship I went to sea on had 47. Copying the aviation industry is not the way forward, in my view. I would encourage the people who design bridges to get rid of all the equipment at the front of it, put it back a couple of metres and leave the front of the bridge clear so that people can look out and see where they're going.

### **Shephard**

it had to be a Boeing aircraft, didn't it!

### **Martin**

Right. Who wants to come back on that. Volker?

### **Volker**

I cannot fully agree with the comments of Jim. There's a classification society which was today here not around, the NVA, which has already rules for high advanced equipment for more than ten years and they have investigated the results of casualties if they have an integrated bridge installed and if not, and they have found that if there is this equipment installed according to the rules, and it's functioning according to the rules, and they have procedures that means it's the task of the ship owner to work with this equipment, then they have reduced the amount of casualties substantially. I do not have the figures exactly, but I think it was between 60—70% compared with bridges which was considered without this kind of equipment. That means we should not only focus to the manufacturers, the manufacturer is only one part of the game. There is also the owner involved and the user, at the end of the day. There must be also training for them, in many cases this training is not given because we are not supplying this training. Of course we supply training not only 3 days, you can also get it longer. We can come on board also, and what we do if the owner or user would like to have it, is someone has to request this kind of support, because we are commercial companies and we cannot provide everything free of charge. But the things are there, they are on the table and we can provide if they are needed and if someone is asking for them.

### **Andy**

I come back on a couple of those things. You know it always gets a good—I guess most of us are getting on a bit now. So we all remember the bridge when we were lucky if we had a radar etc and everyone really cheers and applauds when someone says we need to look out of the window. And that's wonderful, but in the middle of the night or a dark foggy day in pouring rain, you can look out the window all you want, you can't see bugger all. You need to have your radar, you need to have people helping you. It's a balance. As we were talking about with project managers yesterday, AJ was talking, there is a balance between the owner's representative, there's a balance between the shipyard. There's a balance between looking out of the window and a balance between knowing how to use the instruments. It's all about using the equipment properly and doing your job properly.

### **Ole**

I agree, I'm trying to find a balance between my right and left sides here. I know that it's correct what Dr Koehler says, that it has been proven. If you have a too integrated bridge system and you're trained to use it, it will definitely put the incidents rates

down. Then come back to the question what is an integrated bridge system. I held a paper here for 6 years ago exactly about that and a lot of what I pointed out that time still stands today. I have seen this term misused so many times you will find manufacturers who will take a lot of stand-alone equipment, put it in a nice cockpit, put some mahogany around it and it all blinks and he calls it integrated. It has nothing to do with integration at all. They have to play together and one has to be redundant for the other. You will find degrees of integration, there are—I'm not mentioning names—there are some manufacturers that do sell their integrated bridge systems even for the world's largest cruise ship and for the user it will seem like this is a multi-functioning workstation bridge. But what is often done which is a simple way of doing it, you have one process station for each application. For each radar, for altimation, for conning, maybe two for the Actis to have the backup, and they're all multi-broadcasting. You can have 10 monitors on the bridge and you can sit and toggle the applications and it looks very fancy. What you're actually doing is changing television channels. But if one of these processes goes down, if the processor that broadcasts the altimation goes down all 10 of these workstations will be without altimation. A two-integrated bridge system will have one computer on each monitor that has all the applications, all the software, within. Which means that should this workstation go down you go to the next one, or the next one. And all the information coming to and from these computers is on a redundant network. Then it works more or less like an office environment, if you suddenly want an extra two stations you just add them on, click in with a CAT5 cable, give them an IP address and copy the software on the other PCs and it's up and running. It's actually that simple. But this takes one, as Dr Koehler pointed out, you basically have to get this from one producer, one manufacturer or he has to agree to take on board software from third parties. Because it doesn't matter how much you wish to integrate, as long as most of the sensors today are still lagging behind or one way information and you can't communicate back with them and that's why you still, like class requirements, need the control panels. You can today move them back and have them someplace out of your face at least, because you're getting the same information on the multi-function workstations but you still have to be on the bridge. The next step I think is to get everything in a black box; the problem is that when you are displaying the class societies have no possibility to check that you are actually giving the exact same information as the manufacturer originally gave when it was type approved. Because then you're going into software and you have to be a specialist basically to find it out. So that's why they're holding back, and I do understand why.

### **Martin**

Thank you. Any response to this Jim? Can I have the lights up please. Any comments from the floor.

### **Simon Jackson** Riviera Charts

I've got a comment and then a question. In comment, I believe that there is clear objective evidence that primary electronic navigation does increase safety, it does indeed increase the time available for the officer on watch and the people on the bridge to lookout. So it has that double benefit. There are, as I see it, particularly for yachting, two significant problem areas. First of all it is a significantly different process from classic passage planning and classic navigation. Therefore it requires training. Training is not mandatory although it's usually required by the MCA under their risk analysis basis. The way the military have approached this because most military navies have now moved over to electronic navigation they've gone for a whole scale programme and switched over. The problem that the yachting industry is particularly going to have is people moving from yacht to yacht and the difficulty of

dealing with two entirely different processes of navigation without interim training is a real one. The other problem which I think is particular to yachting is that legally you can't use electronic navigation as your primary navigation without available ENC's, electronic navigation charts. Even the nations that are being diligent in the production of ENC's are limiting their production to primary navigation routes for commercial shipping, and areas of military interest. I therefore do not believe that there will ever be satisfactory ENC coverage of quite a lot of cruising areas. Therefore I don't see that legally it will be possible to use electronic navigation as primary navigation. Whether it's used practically, I believe that actually for many years now yachts have been using their ECS's, whatever chart plotters they have, as their primary navigation system. So I think that in practical terms it's probably less of a problem that it is in legal terms. My question for the panel concerns the differentiation between use of integrated suites and I applaud the speaker who's going for integrated dimming which must be something that mariners have long wanted— does this clash with the legal requirements for type approval that various systems and indeed for having because there's Actis, there's the AIS, there's the LRIT etc —they're all separate systems with separate type approval requirements as indeed still the magnetic compass that's still required to be separate, how do you fit those in with the overall integrated scheme?

### **Ole**

You can today get a type approval as a system. Each component in the bridge system has to be type approved. The switch, the computer, the monitor, each single part by themselves with an ENC945 radiation all the rules are applied, tested, you get a certificate, that's the hardware part. Then you go in and run pretty thorough tests with the class societies where you have it working as a whole to meet the exact same requirements as the stand alone equipment would do. Then you would get a split system certification meaning that the PCs can be in equipment room, on the deck under, you can have the monitors on the ceiling and you can have the control board here. There are several systems today that do have that type of approval which will meet all the requirements but as a split system working over a dual network. Your point with the charts, I think you're quite right, the commercial market is driving the map market and the most used and most demanded charts will of course be the ones first vectorised and if you have a hang up on these little private beaches where only you know about, yes, there's a very good chance that you will be in a wheelchair before that time when your little area is charted, I totally agree. I also agree that yes, if you don't have the chart you can use another chart and you hope there's not too much change with the measurement from 1929 which in most cases are not. But that is the way. You will have a problem if you run into something and they said ok let's see your updated paper charts because you don't have verified vector charts for this area. Then you're down the drain.

### **Martin**

Yes. Volker?

### **Volker**

If you're looking about the equipment which we are normally supplying and the class of yachts where we are supplying all the equipment to, then they are very often very close to the commercial shipping rules. They are using the type approval from the commercial shipping and especially for the navigation systems there's currently a type approved standard under approval and if the things are running as expected then next year there will be an official type standard for type approval of integrated

navigation systems. How good it is, or how bad, that is another question. But at least we have something which is equal. At the moment we have a situation that each classification society has its own rules and they can not only differ a little bit, there can be huge differences between different classification societies and therefore coming back to the discussion in the previous panel we would like to have one rule for the whole world. But I know that is only an idea at the moment. Maybe we are coming in a similar direction like the aircraft industry where it is similar. Regarding the charts, I have a similar opinion like Ole that it will be very difficult to get the indices from each corner of the world. Of course you can digitise charts but then you have the same errors as you have on the paper chart, I do not tell you my personal opinion about this as an electronic chart. Therefore ENC's will be used, or supplied, for the major areas for commercial shipping, there it's helpful, but I can't see at the moment that for each small beach we can expect such good data. But at least it gives the operator more opportunities to look out of the window to compare information. That is also one of the tasks of the navigation as I understand this, as he has to gather the information from different sources to compare and then he has to decide. The navigation system will not decide. And we are completely against fully automated navigation system. There are still operators in between and he has to decide. But the presentation of information, as a check of the information, its consistency or not, these things can be done by a navigation system much better than an individual human being can do this, and therefore it is one reason why we believe that integration of information is the future.

**Martin**

Andy please?

**Andy**

Simon, I have a question for you. We were talking at the break there and we had a feeling that perhaps paper is the future. Can you let us know, as I believe you provide charts of all varying descriptions, what percentage is it that paper charts still going out the door versus electronic charts, and is that percentage increasing?

**Simon**

Difficult to put in percentages of my sales. Because my sales are still in favour of paper. A part of this is regulatory, the difficulty is that on the one side with the merchant fleets driving things, they see no reason to change. There is no cost advantage to them in changing, because they have to keep their paper charts. Unless they can go to the fully ENC answer, which is not yet available. The UK Hydrographic office have been predicting the changeover point, the crossover point, and it's been going from 5 years away to sometime in the next 5 years, or 10 years, and with each following report they have to report increased paper chart sales. Last year they went up 10% globally. There will be a changeover point, it is coming, a huge number of ENC sales have now been produced, there is also a likely requirement I suspect through IMO to make Actis mandatory at least in some areas. So that will drive merchant fleets. My concern, and it applies as much to paper charting, where coverage has been reduced, is that increasingly yacht captains will find themselves with inadequate chart coverage of any sort, certainly they're not going to get it in ENC's. If I can take the Mediterranean, France for example, the French have been particularly diligent in producing ENC's, they provide ones at the coastal navigation level for the whole coast, and they have provided ones at the port approach level for Marseilles, Toulon and Nice. They will probably add Monaco out of politeness to the international hydrographic bureau. But the Gulf of St Tropez —never. Equally the

Italians—the Sardinian coast. Never. And the problem about producing ENC's — others don't produce them. They can reproduce information, it's down to coast states to produce ENC's. Which is why I don't think the Caribbean or the Indian Ocean will ever be adequately covered. And because foolishly or sensibly the hydrographers raised their standards of what was required in ENC that means added cost. Therefore the only way for the hydrographers to manage this is to minimise that which they have to do, or reduce the areas that they have to do. And since most hydrographic offices depend on defence budgets which are either being spent elsewhere or being cut or both, they're in a difficult situation.

### **Martin**

Does that cover your question, Andy? Any more hands out there?

### **Shepard**

Just one thought Simon. Jeffersons is the worlds leader in paper charts on the aviation side and we too have been predicting, and each year we keep selling more paper charts.

### **Goetz Vogelmann** Hatteland Display

We are supplying actual equipment like this place, and monitors and I agree I don't like this marinised thing as well because I think the tested and type approved is a clear statement what it should be of course for the maritime applications. I have a question for you and then hopefully we can find an answer on that because that would also include a sort of offer for the future. My question is how can we achieve faster adoption of rules concerning the reality of the world? And I hope we can work together and please find an answer on how we can achieve that in a better way because for example, we see that Actis needs 800 lines on a display, whereas the standards says something like 768 lines on display technologies or of course above. Another example of this is also the ARPA radar for ships larger than 10,000 which was going to be reduced from 340mm to 320mm but these are only two examples which must be adopted to the reality of the world of equipment which is available. And my question again is how can we achieve to adopt such rules —for example from IMO—faster to the real world, because then if we can achieve such better adoption we have a chance to supply you, as system integrators, for yachts which of course maybe then reduce the system costs by reducing the number of displays which of course we don't like to use much but on the other hand we fully understand. It is clear that when we can reduce, for example, the number of displays to not having this kind of disturbance at the front of the bridge, which also then helps Jim of course to have a bit more room to look outside the window, so by reducing the number of displays, for example including widescreens in the future, then of course we have a reduction in system costs, and which certainly helps make more space on the bridge itself. The other thing is by adoption of such rules to the reality we could also think about a future where a monitor or a computer should just work and not have to be touched, so would be hands off. Meaning a sort of centralised dimming or other options, like a menu via control panel. So we are actually happy and ready to go this way and we as supplier have to follow your requests and of course ships request, but it also includes adoption of rules towards the reality, otherwise we are limited to certain equipment, which we just can get, so maybe the question to the panel, how can we work to get faster adoption of rules like IMO to the reality?

### **Martin**

Who wants to answer that? Volker please.

**Volker**

I'm involved from our side in the development of several rules, and we have to understand this development of a rule, especially in the IMO, is mainly a political process. It has nothing to do with technical issues, not 100%, but the majority of these things are discussed are political issues, political opinions, ideas, with an annex which is technical issues. And there are so many different parties involved with different interests, that currently I don't see that we have a chance to accelerate this process. What we can do, and that is really a long term process, is to come from a definition of units of boxes to a definition of functions, what we would like to have. Then we have a degree of freedom, how we realise these things. And this process has just started and is very difficult to get all interests together in this direction. So if we're talking about functions, we are not talking about the unit or the specification for a special box any more. Currently, especially in our field, in our area, we are talking about performance standards. And then it's described as how a certain unit should work. And if we are only talking about the function for instance you should have something where you can do that or that or that, and it's up to you how to realise this, then we are of course a step forward. And then we also have a degree of freedom to adapt this to the reality and to the technical developments. But I don't see there a real way to accelerate the process, to get performance standard, rules and regulations faster on the market.

**Martin**

Anyone else to comment on that? Jim please.

**Jim**

I was just going to say our industry is actually plagued with this particular problem, if I could use limitation of liability as an example. In 1924 there was a convention to try and standardise limitation of liability, there was another one in 1957, in 1976, there was a protocol to that in 1996 and still even amongst the EU nations not everyone is agreed on which particular system they should sign up to. There are still countries which apply the 1924 regime. In 2002 there was a proposed protocol to the Athens convention on limitation of liability for passenger claims and all the delegates left London thinking there would be enough signatories to this to have it in force within 6 months. And it was just within the EU. They went back to their respective governments and that was the end of it. It still hasn't been implemented. I don't know how we can adopt rules quicker, it should be much easier I would have thought for the type of rules we're talking about here, where it's all about equipment. But it's interesting to note that you have the same problem there as well. I suppose the only solution is to keep on talking.

**Martin**

Does that cover your point OK? There's no hope. Any more hands out there before I throw something in. David?

**David Morton** Admiral Maritime Electronics

I agree with the comment from Jim that navigation in the old days was a bit more manual but also new technology is helping reduce the stress level. I think we're losing focus on the chart as one single element of the navigation process and the

focus of charting information on the screen gives the impression that it must be true. Now ENC's are quality controlled but they are no better than the original survey data and that information may be 100s of years old. So it's a wise man who looks out of the window and interprets what he sees in terms of the sea colour and shape in conjunction with what he's got on his screen. I think paper will never be replaced entirely and it shouldn't be, because no matter how good your equipment, and no matter how good your backups, the basic fact is that electronics go wrong. And the navigation techniques which are taught, rely on the basic techniques of fixing and predicting your position without electronic help.

### **Martin**

Any comment? Yes, Ole.

### **Ole**

The electronic charts on the ENC's type approved vector charts are in any case at least as good as the paper charts but in most cases they're better, and it's not quite correct, you won't get an approved vector chart with a 100year old measurement. It has to be remeasured in order to be reclassified as information good enough to be able to issue or sell with a new vector chart on it. When you say that you like to have the paper charts on board, as a navigator, I see the point of getting a much broader view on a standard British Admiralty chart,. When you had a 15" and it was just a little piece of it you feel like you don't get the overall picture. And it's also a mistake very many leisure yachters do is when they see the symbol of their boat on this chart they feel like they're sitting in a balloon looking down at the world, and that's where they are, which in many cases is not, either their position is a little bit off or the chart data is not good enough. It can't be emphasised enough that this is something secondary check, your radar land doesn't move. That's one thing you know for sure. It'll be there tomorrow and the day after, the same point and the same lighthouse. If you know how to do your bearings and you can navigate with a radar and then check this with the chart or the Actis that I think is still the correct way to navigate a vessel.

### **Andy**

I actually have a question for the floor. Going back to something that Jim said, and not to throw the baby out with the bathwater, he talked about moving the bridge back to what I would call an island bridge, I'm not sure of the proper name for it, where the operator has the ability to walk around the bridge and stand at the front and look out the window. I'd like to ask the captains, operators etc that are here, how many would like that and how many of their projects that are underway at the moment are actually having a bridge built like that as opposed to a bridge that's jammed up against the windows. I don't know if you can do a show of hands for instance.

### **AJ Anderson**

Well Andy I think first I think the walkaround bridge is terrific, it's certainly good for the visuals, to be able to see out the window and then get away from all the back scatter, but to be able to source your equipment underneath from the front side can be terrific. But I don't know that it's practical in the normal yacht profile that you see what the superstructure looks like and how the windows are done and so forth. Anything much shorter than about 80metres. Now even a 75metre yacht tends to be pushed up pretty close to the windscreen. So it's difficult to get the island layout. Since I've got this thing I might as well say something about Jim I agree with you and I like the integrated bridge, I learned a lot listening to Ole here, really pretty good

information actually, but it's interesting that Arpa which I think one of the As stands for Automatic, as I recall, in order to have Arpa on board your vessel you must be Arpa certified. So there's a reason for that, and probably one of the things is it's not necessarily the most reliable—looking out of the window is good if it's foggy, it's difficult, of course if it's pitch black night it's kind of risk management, I think. But if you're going to have this bridge integration my recommendation possibly is smaller screens and also that they should require a resource management certificate of some kind, some bridge management. So that you for sure teach your crew, your watchman, that this is good information but also reliance on physical information.

### **Ole**

When it comes to how to design a bridge and what's optimal working conditions, if you can have a walk around bridge or if you have a cockpit or how you work it, after I've been on cruise ships for about 7 years I joined Star Cruises which have a policy of sitting in the chair 100metres away from the dock. With 2,500 passengers and a crew of 1000 and I'm used to ships with basically open bridge wings where when we're coming into port we used to go out of Hong Kong, Singapore, Hong Kong is very busy—we even had a dispensation to do 16 knots through the harbour because we didn't make any wake. So you saw the sailboats under the bow and hoped they came out on the other side. On the Saturday there was a regatta, 2000 sailboats and obviously it's good luck for Chinese to come as close crossing a bow as you can, and they aimed at us all the time. It was quite nerve racking and I came on board and was told sit, take her in from here. I was staff captain. I said WOW. But after having done that for 2 weeks never go back. I had all the information I needed around me, running back and forth—OK you go out, you get a view, on your side, but I had a video camera, CC so I could see the sides. The minute I got to the bridge wing and back you lost that chain of thought, the calculation part that was sitting there, concentrating on, and we agreed all of us— we sat until we went over, we started turning her around and when we actually could jump on the dock that's when we went over on the bridge wing and took her in. Never go back. I didn't think I would say that when I started sitting there, I didn't feel comfortable at all. But it's just going over a threshold, relying on the equipment and the information you're getting, but it is based on that you know your equipment and you actually know what you're reading.

### **Martin**

Ole thank you. Volker ?

### **Volker**

I have to say thank you to Ole. It was not agreed that we get such a good representation of the results that are possible on board vessels. The majority of our vessels are equipped with our equipment by the way. I would like to express that bridge resource management. It's one of the issues which is currently under discussion in the IMO. With a long process, I think, but also with high pressure on it because it is now common knowledge that not only the equipment itself affects what's going on there also how the people are working with the equipment. And therefore I am really happy now that we are going in this direction that not only the supplier is pinpointed and he has to do something but also the user has to fulfil his obligations. And one issue where we are not so happy with but it is as it is, that is the change of the STCW, the requirements which are written there have been reduced, compared with the time before, and therefore we have to focus that the crews which are now sailing can not necessarily but they can have a lower degree of knowledge

than before. I do not know if it's the right policy, I think it's not the right policy, to get more safety, but until we have huge accidents, no-one will care about it.

**Martin**

Pascale please?

**Pascal Berger** Aleon

I operate ice breaker vessels years ago, since 10 years now, and we're just finishing a ship now, just deliver it to the owners, with a fully integrated bridge. So a few things. First, I'm agreeing with a fully integrated bridge, on board the ice breaker vessel because I don't have any time to prepare my navigation except on board with an old fashioned paper chart. But when we are cruising, top speed is 42 knots, cruising speed 37 knots so I have no time to take care of the computer. I have full alarm on board, increasing the stress of the crew, I do not agree with people who say there's no stress on board, there's more than most, it's not stress from the owners or from the guests, it's the stress from operating ships, the computer, the problem with the network—so much stuff. And I think it's also a satisfaction—owners are under competition with their neighbours; always a bigger one, more expensive, one deck up, helicopter on board, and whatever and also captains are under competition with the neighbours, one computer is more, one 19" screens—it's kind of competition altogether. I'm not sure it's good to operate safer ships too.

**Martin**

So the ego has landed! Gentlemen, please. I have a question for you in a minute Ole, but carry on.

**Ole**

When it comes to you referring to monitor size, this is in a commercial industry run by rules and regulations as someone mentioned here, you have to have the PPI, the circle of the radar on vessels over 10,000 tons therefore they have to be over 340mm so 16" is from time immemorial—when the first radar came they just kept the rules on, and as you pointed out, IMO doesn't seem to realise that there is a very limited equipment available on the market that will fulfil the requirements set by IMO. The 23" today the flat screen TFT is the only one and there's one producer in the whole world who makes the basic monitor and then you have several companies that will put their software on and it's such a small production series that they actually wanted to stop producing them. They weren't aware where these few thousand 23" were going. Because they're not even wide screen. Then of course they stopped them because the marine industry would be without monitors. There is no alternative. And that's why they cost a pretty penny too, because compared to 27" and 32" wide screen televisions they're produce in the millions, while this is a very small production series and they have to pay more for a 23" than you do for a 32" wide screen, which I know within a few years, just start getting prepared, there will be no 23" available so you will have to have at least 27" wide screen for the new reality of life. So for you who are designing bridges on yachts to be delivered in 2008 or 2009 start fitting in a 27" minimum. Because it has to be high definition, you have to more than 1000 pixels on the short side and then you have to come up to a certain size and you're depending on what the consumers of televisions want, because that's what you're going to get.

**[From the floor]**

Just a comment on all this information on 23" which of course is correct but just to make very clear not to make any hassle here that the supply of 23" is not limited and we have had confirmation from Sharp. Of course for the future we also want to offer alternative wide screens!

### **Pascal**

Yes. I want to answer. We know there are 5000 yachts over 24metres operate now over the world. But one thing, more than 50% of these yachts are operating in the Mediterranean, so may be more. And they operate in the Mediterranean but where, between Antibes, Monaco and St Tropez, Capri. We call it the gold triangle. So Singapore, I've never been in Singapore, maybe one day I don't know, I cross 17 times the Atlantic, I start with a sexton, after I have SatNav and I was very lucky, I got the first GPS. But I think now all the yachts are operating in the Mediterranean and I don't need a lot of electronic on board. How many captains use all the electronic stuff on board? I'm not sure a lot. Very few and what we need is extreme, but everybody can operate a tom tom GPS because it's very simple, sorry Martin, but I think what we need according to rules, according to the class societies that's for sure, something more easy to use, more friendly, not as complicated as what I have on board today. And it's my fault because I push my boss and I push myself like I tell you, I'm in competition, it's kind of —I have the best wheelhouse —I have an aircraft computer that's right. I agree with Jim.

### **Jim**

I was just going to say that the problem I think is not a navigation who doesn't use all the equipment available to him. The biggest problem is when someone relies on just one little piece of equipment. I mean when I went to sea all those years ago you were told you never ever do that, and I find younger navigators, this is news to them, when their ship is sitting aground on a beach somewhere. And they've completely relied on one piece of navigation. I say well lesson one, you never do that. I think the problem really is that what we're failing to do, I'm talking commercial now, is where probably this technology is getting so far ahead of itself that we're overlooking the fact that we actually have to integrate the man as well who's behind all this lot. I think perhaps we need to pay a bit more attention to him and his training and a little less on the fancy electronics.

### **Martin**

Andy, can I ask you an unfair question? The simple question I have is, would you ever say no to a client if he's over ordering equipment?

### **Andy**

That's a very easy one. Absolutely. Because what's happening is we're doing a disservice and his captain's going to come back and it's going to come out later on and our philosophy in this business is we don't find the customer just for one build. It's a very small business, word gets around very quickly, that you're just glorifying or sizzling things just for the sake of it. So you have to take care of the client in the way he wants to be taken care of. In a professional manner, and carry on in that mode. Because you want that client to build another boat.

### **Martin**

But ultimately, don't you feel that some of the bridges are over engineered for the mode of operation, for the criteria?

**Andy**

I tend to think they're under engineered in a confusing way. I tend to think the specification vessels that come out tend to be based on price, they're not based on operation, and I tend to think we do a disservice to the operator in the end.

**Martin**

How does that happen?

**Andy**

Price? We have to remember, where we come in a lot of the vessels are custom and people have larger budgets and they can choose to buy a professional bridge package. At the smaller end of the market maybe in the 30—40metres a lot of times you've got perhaps someone who just wants a big white platform with a blue stripe, to stand on it, and he's not really concerned about what's inside that bridge. And you've got a shipyard who's maybe gone to the minimum price and so they're under a lot of pressure and are looking for the cheapest solution and they end up a lot of times buying directly from various manufacturers and then they get a guy off the street to connect it so one guy connects his piece of equipment, another connects his piece, they never talk together and for probably the first year of that vessel's life it goes around not functioning as a proper bridge.

**Simon**

I just wanted to endorse the fact that training is a real continuing problem area but also to pick up on one thing that perhaps can give a bit more confidence for those who still have doubts about electronic navigation —that is that looking to that area it is good to see continuing government support just as an integrated part of this GNSS area so that during the next sunspot period when there will be a further outages of SatNav as there were in the last heavy sunspot period, there is a high powered emission locked into the same navigation system, there is an independence, so I think the way ahead is electronic navigation that does have that redundancy in the overall system out with the individual ships.

**Volker**

Regarding the training we've already addressed today that the manufacturers are prepared to do this but there must be someone who's asking for it. It's not the right way to blame every time the manufacturer that we do not provide proper training. We can do this and we are ready to do this, but if no-one is asking for that then we are not the right point to address.

**Martin**

What is the cost of the training?

**Volker**

It depends how long you would like to have and where in the world you would like to have it. If you go to our office and we are in the range of €1,000 per day.

**Ole**

Address the law and sea issue first. The DME has dropped that as a requirement because basically poor accuracy in many places and then they won't keep the last stations up my way alive any way. They're shutting down the last big one up there in 2008 or 2009 i think.

**Simon**

No, they were going to shut them down. But in fact the European system is being continued at the moment and for the first time the British Government is putting money in and also adding transmissions and there have been some significant improvements not only in the accuracy but using it as a part of differential GPS if you like.

**Ole**

I stand corrected.

**Simon**

in fact it was announced and someone came into me and said look, what you're saying is rubbish, the Norwegians are going to close down their stations and literally within a month they changed their minds and at the moment there's certainly EU and national money going in to the chain. The Americans are certainly keeping their chains for the moment. It's very much—the argument has been that I think in the last period of heavy sunspot activity there were something like 3 hours of outage, the whole GPS system, or a significant parts of it, with a very weak signal that you got with satellite navigation systems it's always going to be liable to local or general interference.

**Ole**

Would you know how strong the Russian one is compared to the old GPS?

**Simon**

I don't, it's the same order.

**Ole**

But I know that's an alternative, I know there are several of the offshore vessels are putting the Russian one on to fill their requirements because at least then they can use it, compared to many you cannot. If you're going to have a secondary system on board they're now more and more going for the Russian one.

**Simon**

Yes, but —

**Ole**

Since it's Russian I thought it would be maybe just more power and get it going.

**Simon**

But there is the problem that you've got to generate the power from a satellite. And that's the essential problem there, even though and indeed being the smaller satellites with the shorter life, I don't know. But it's the same order of power output..

**Ole**

Bridge, when you're looking at designs of yacht bridges I might step on some toes I don't know who you are out there but my personal meaning is that some designer has much much too much say on some of these bridges because from an operational view many of them are disasters. I mean, the angle of the windows from —you see all the reflections from any bulb that's on, we wouldn't be able to function, we wouldn't in the North Sea they wouldn't let you out of port with that poor visibility and that layout. It's just spread over a bench and they want to go oh, I'm going to drive it from here. I was visiting a few when I was working on the Lady Maud, now that was a nice little vessel —we didn't have that problem with very tight little bridge and small windows. It was like working on a cruise ship. And many thought we were, when we came to places. But I must say that when you see the money put into some of these yachts and I see the money, or total lack of money, that they put in to the bridge system which is the owner's safety when they're out there driving, I'm flabbergasted. I said why cut everything down to minimum, no redundancy, single systems here and there, just to fulfil the minimum requirements of MCA. And you're spending X millions of euros on the yacht. Does anyone have an answer for me on that.

**Martin**

Can I ask John from Cayman Islands —do you ever get involved in that process of bridge design, approving them? Or should you?

**John**

Not normally. But it's also something that's left to class. I mean for an integrated bridge system it should have been in design by class or accepted by class. We should possibly get a bit more involved in it.

**Martin**

Just the design of the window arrangement, surely??

**John**

Well, there are requirements there for a commercial vessel, it wouldn't have been accepted. The angle on the yacht. But on yachts we have accepted something quite a bit different from what you would accept on a commercial cargo ship or a passenger ship.

**Martin**

Andy please jump in?

**Andy**

I think part of the point is here that a lot of these vessels fall under the class radar and so what you end up with is you end up with an operator, a captain, who's basically in a tank. And he's looking through like a letterbox slot. And of course the guy who's in that is not in the Feadship that goes at less than 20 knots. He's in some type of vessel that can do 30—40 knots or more and that's where it's really dangerous.

**Martin**

Luckily he's not in Hong Kong harbour! Any more comments from the floor before we close for lunch?

Gentlemen, thank you very much. We'll reconvene at 2.30 for the final session of the day.

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