good morning
I would like to take this opportunity and thank you for kindly inviting me to this workshop. It an absolute please to be here and share some of my experiences as a yacht captain.
I have been in the industry since 1988 and have been a captain for 30 years now, starting on small sail boats and eventually moving up into the super yacht sector.

Most of my career I have spent in the realm of the exotic, outside of what I like to call the navigable semi circle of western yachting. After 14 years in Southeast Asia I spend around 5 years in the Caribbean, Central and South America and I have also run two trips into polar waters.

cruising in remote destinations brings with it a multitude of challenges, from provisioning to securing spare parts, dealing with foreign cultures and unexpected visitors and of course the lack of navigational charts or what is maybe even worse, charts with wrong or missing information.

Preparing for this talk this I went over my files and I found this chart of the Thousand Island outside of Jakarta, Indonesia. It is the real deal, a paper chart with coffee stains on it. I was managing the Island Papatheo there for 3 years. It must have been in 1995 when I saw a German flagged cruise ship steaming into the bay and before I had a chance to raise the captain on VHF16 they had already gone aground hard on one the reefs I marked in pencil. Luckily there was no major damage done, no hull breach or any pollution. Sharing local knowledge was a big challenge back in the day, things have much improved in the last 30 years, however I believe we are still years away from sharing our local knowledge effectively to avoid accidental groundings.

Accidental grounding is of course the one thing we as mariners always are striving to avoid, the embarrassment of running aground is one thing, the financial implications, costly repairs and down time and possibly environmental damage or the risk of loss of life are still in this day and age very real issues. These pictures here are incidentally not from a yacht under my command. I have gone aground, but thankfully with never more damage than a dinged propellor and a severely bruised ego

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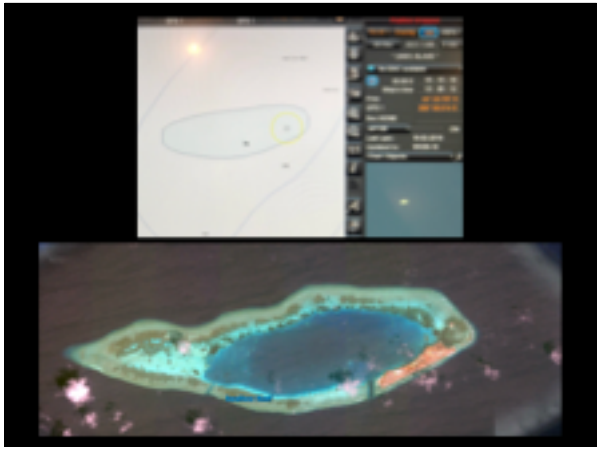
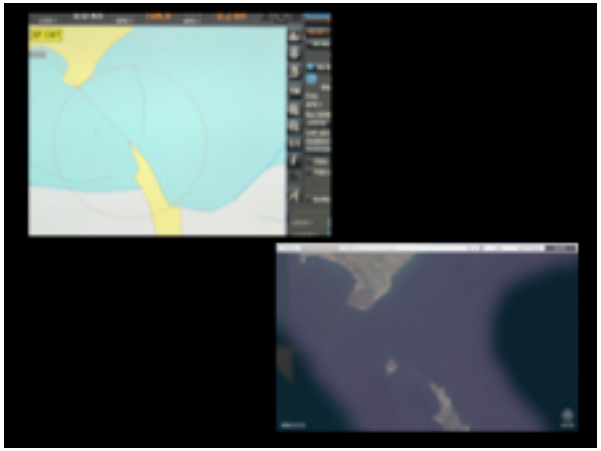
Boating has in the old days been a rather paranoid experience. With GPS coming online and ever better charts things have become far less daunting when navigating in waters where we don't have local knowledge. But how often do we actually move in well charted waters? Some of us do but others like myself have been navigating off the grid for many years.
On one cruise in the Red Sea I had an engineer join from the merchant navy. He always shook his head in amazement at how we yachts men go about our business. During the second cruise he came to bridge and said: I finally figured out what yachting is: "*It is going close to rocks! We spend all our time avoiding rocks. You look for them*." And he is quite right.

Here lies the problem and this is one fo the reasons we are meeting here today: only about 5% of the yachts are actually cruising worldwide. The majority cruise in well known areas, where they have local knowledge, the Med and the Caribbean. Should they cruise further afield most will stick to well charted areas. But many of the most interesting places to us yachts are well away from places of commercial interest. No commercial interest equates to no charts. I have always run yachts that move off the well trodden path and have over the years developed some navigational techniques that I want to share with you.



Besides the traditional techniques that already James Cook used, such as using all your senses to detect dangers and sending a boat ahead and lead lining, one of the earliest techniques with the spread of the internet was Google Earth. I remember clearly how I was immediately fascinated by the possibilities this wonderful software. To this day I formulate approach plans using Google Earth. Here you see a screenshot of the data that I got off the TX97 Transas charts and a GE screenshot of the same place, Swallow Reef in the South China See. No one with any sense of responsibility would try to enter a lagoon based on the information the chart gives without local knowledge. The satellite imagine very clearly shows the cut through the reef. On the original image at the time I entered the lagoon the ocean was completely calm and I could actually see the shadows cast by the channel markers. This updated image shows the development on land since then but unfortunately the channel markers are no longer visible. This is progress and shows how sometimes things work against us.

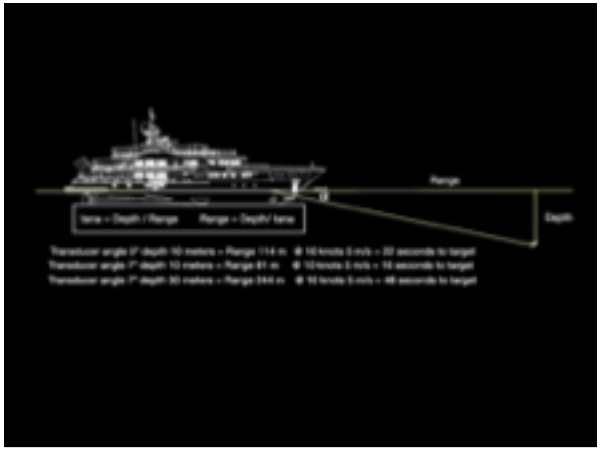


I mentioned before my bruised ego when I dinged my props off Isla Tiburon in the Sea of Cortez.
The image above is from the current charts for the area. The sat imagine is from Apple Maps.
Now if Apple Maps that is as we all know lacking even in the most developed urban centres in the US offers better navigational information on an uninhabited island in the Sea of Cortez it just demonstrates how long of a road we actually have ahead of us.
One of the big issues with aerial imagery is the obvious lack of bathymetric data. Basically all it allows us is to take an educated guess at what we are likely to encounter.

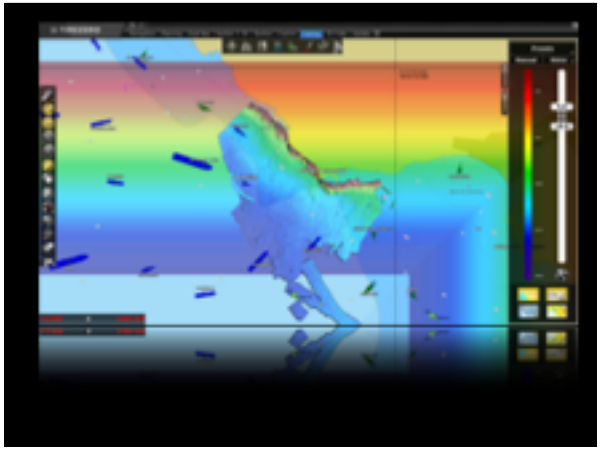
A new tool we have available are drones. Before entering this bay we did an aerial survey and then sent the tender in to confirm the cove was free of isolated dangers and offering sufficient depth.

On this image here you see us around a ¼ mile inland albeit in 100 meters of water.

A view out the bridge window shows us in deep water about another ¼ mile away from the glacier front in Magdalena Fjord in Svalbard. There is no useful satellite imagery of Svalbard with the sun always relatively low on the horizon. So here obviously even with a drone we have to resort to other techniques, the tried and tested tender with a shallow draft taking soundings as we go along.



I have used the Furuno Color Search Light Sonar with great success on a vessel in ran in Indonesia. The Furuno sonar takes considerable time to learn and understand. Much like radar one does not become a proficient operator over night. FarSounder are approaching this issue by painting a 3D image of what lies ahead. Unfortunately we did not have the FarSounder installed at the time of our polar water cruise so I have no firsthand experience how it performs. Like all forward looking sonar the real challenge lies in shallow water and the distance we can look ahead. Operating in 10 meters of water like on the Bahama Bank will only allow you to look ahead a short distance, of several ships lengths.



This is where the WASSP comes into play: the wide angle sonar seafloor profiler. The transducer is fitted on the tender and connected to the mothership via a wireless link. Under ideal conditions this link is stable to a distance of about 600 meters. That is a significant distance to allow us to make decisions on submerged object avoidance in due time. Here a screenshot of our MaxSea plotter from St. Barths. You can see in what great detail we managed to map the area of interest to go stern to the rocks and get out of the wind.

Both, FarSounder and WASSP are working on making this data collected available to other users through a cloud based databank. To me this is the certainly the future and it will take away much of the stress of guessing what is lying ahead of us in uncharted waters, which we are still experiencing to this day.

We are currently working on offering a one day seminar for captains and navigational officers to show the different systems out there, their pros and cons and we will be going into deeply into details on sound propagation in water, the difficulties on effectively identifying isolated dangers etc. For anyone interested in receiving information on this seminar please send a mail to christoph@superyachtglobal.com and I will keep you informed on how we progress.

On a final note where do I see the future taking us: besides the obvious crowd sourcing I hope we will see waterborne drones, autonomous little craft that we launch from our yachts to survey bays and anchorages, survey coastlines while the crew deal with the needs of our guests. We can fly our drones in search patterns while recording video. Why not have autonomous craft doing the same, returning to the mothership with a wealth of bathymetric data that we can then share through the cloud.

What is the rational behind it all? The more data we collect the safer we make navigation, but equally if not even more import is the gathering of data to see what effect the climate change has on our coast lines. We are well aware of major changes as beaches disappear, houses fall off cliffs and glaciers retreat. But what we need to start doing is looking for the subtle changes, essentially become more aware of what impact we have on our environment.

The yachting industry is ideally suited to provide much of this data as it is our business to go close to rocks.