WEBINAR Q&A SUMMARY

Questions and Answers

Webinar: How will AI transform tanker operations?
Date: 30th June 2025
Time: 09:00 – 10:00am BST

Panellists:
Patrik Desanti-Fettkenheuer (PDF)
Manish Singh (MS)

1. There is confusion about fuel and fuel technologies going forward in the maritime sector, how is or can AI help in this regard?
   MS: I feel AI is not just helpful, but an enabler in this area. AI can help cut through the confusion by constantly monitoring fuel data, emissions, and regulatory requirements. It can help everyone from OEMs, to shipyards to operators model the future fuel mix and how this will play out in the real maritime operational realities. AI can help simulate operational implications of different fuel types under real-world voyage conditions. This enables operational changes based on methodical planning, scenario analysis, operator training and real-time conditions, helping ship operators make the transition whilst staying compliant and efficient.

2. Captain Singh: Given that GPS spoofing attacks have increased 400% near major shipping lanes, what specific algorithms do you recommend for cross-referencing GPS data with inertial navigation systems to detect coordinated spoofing attempts that manipulate multiple satellite signals simultaneously?
   MS: While navigation security experts will rightly lead on algorithm selection, practical applications such as Kalman filtering and sensor fusion are already demonstrating success. I understand various detection and filtering protocols are being considered. Aviation perhaps offered some valuable examples wherein we can combine GPS with inertial navigation data to detect anomalies if the GPS signal suddenly changes but the ship's actual movement doesn't match. Without wishing to single out 1 or 2 players, I am already seeing some ship trancing intel providers already use this layered approach and publishing on a regular basis to address reliability concerns.

3. Captain Singh: How do you address the fundamental vulnerability that VSAT terminals often use legacy encryption protocols from the early 2000s, and what's your view on implementing quantum-resistant cryptography for maritime satellite communications?
   MS: We definitely need to modernise these legacy systems. We encourage vessel owners to push OEMs, ERP partners and connectivity providers for timely firmware updates and compliance with modern encryption standards. Also, this is something for the regulators to put more effort and pace into. Quantum-resistant encryption is coming, but for the purposes of our current day majority concerns, regular patching and multi-layered network defences are our best bets. As investors and builders, we are particularly keen on identifying the best tech and teams in this space.

4. Captain Singh: When implementing network segmentation between OT and IT systems, how do you handle the operational reality that engine room personnel routinely need to transfer diagnostic data via USB devices? What air-gapped transfer protocols do you recommend that maintain both security and operational efficiency?
   MS: I would ideally like to see portable 'plug and play' devices become the exception, because they introduce significant control risks into the eco-system. However, I appreciate using USB transfer won't be eliminated just yet, so we need more robust protocols and control stations that scan and validate data. USB whitelisting or hardware firewalls are also practical mitigation as physical gatekeepers to ensure nothing malicious gets transferred.

5. Captain Singh: Given that most vessels operate with limited bandwidth (512 kbps typical VSAT), how do you propose managing the computational overhead and synchronisation delays inherent in blockchain consensus mechanisms during critical navigation operations?
   MS: This space is changing more rapidly than most of us who are used to lethargic connectivity at sea have learnt to expect. Whereas blockchain has been effective in liner shipping with suitably equipped supply chains, with regards to tanker shipping my humble view is that blockchain for now is still offering limited reliance for real-time shipboard operations until the improvement in bandwidth and the wider ecosystem catching up. But we can use light versions of blockchain for audit trails or reporting and keep real-time AI decisions local to the vessel where speed and safety are key.

6. Manish, given that 70% of the global tanker fleet is over 15 years old, how do you practically retrofit legacy cargo handling systems with AI capabilities while maintaining class certification and compliance with MARPOL regulations?
   MS: It's a challenge, but not impossible and we have many precedents for specific technological overlays through carefully planned retrofits. You can start by layering AI tools on top of existing systems via non-invasive sensors and data gateways. Middleware is an area of development to help us work through the transition. As long as the retrofit doesn't alter the class-certified control loop, and MARPOL standards are met, it feels doable.

7. Manish, a one-size does not fit all principal conflicts with the industry's preference for standardised solutions that reduce training and maintenance costs. How do you balance customisation needs with the operational advantages of standardised systems across fleet operations?
   MS: We do need standardisation in the foundational technology layer. Also, some standard frameworks to build and test at scale. Think of it like your smartphone, whether iOS or Android etc. The base OS is standard, but each user adds and customizes their apps. Similarly maritime AI can be deployed on platform that are built to such standards, with some fleet-specific customisations and training on operability. That way you keep consistency but still address real and specific operational needs in tanker shipping and wider maritime world.

8. Manish, tanker operations often involve equipment with 25–30-year operational lifespans. How do you justify the ROI for AI implementation when the underlying physical systems may not be replaced for decades?
   MS: As I mentioned on the webinar, I think because we have expensive capital assets with long lifespans, it is even more important that we look at sensible overlaid tech and systems to keep them relevant, compliant and efficient through the asset life. I also mentioned that the investment to onboard is reducing and the cost of non-compliance or inefficiency is increasing. So, the ROI can be demonstrated by looking at parameters such as incident prevention, fuel efficiency and smoother operations. If AI helps prevent even a single major compliance breach or machinery failure, the avoided cost can outweigh the implementation expense, making the business case clear even for older vessels.

9. When implementing AI-based threat detection on vessels with mixed-age fleets, how do you handle the interoperability challenges between modern AI systems and legacy equipment that may be 20-30 years old but still functionally critical?
   MS: You are correct to flag this and in a trillion-dollar fleet refresh, we are seeing a lot of development in the middleware and data adapters space. We will retrofit integrators that can translate data capture from old systems, clean and organize them into formats that more contemporary AI enabled platforms can understand and respond to. Its uneconomical and even unnecessary in most cases to replace hardware. Future ready ERP will replace monolithic legacy systems and will leverage middleware to connect them smartly to the ship, plant, machinery, systems etc

10. Manish, to what extent (10%, 50%, 100%?) do you see AI employed as a tool for real-time compliance. Which areas (environmental regs, chartering, HR, other) will see the AI deepest penetration?
    MS: I'd say we're already seeing the upper quartile of tanker shipping already experimenting and, in several cases, integrating real-time compliance tools with AI in place. This is especially true in emissions monitoring, navigation safety and regulatory reporting. In the next 5 years, it is my personal mission to roll out technologies right through to the bottom quartile. But to be realistic I would say easily more than half the fleet will likely have deep adoption in high and immediate ROI use cases like emissions, fuel, and voyage planning.

11. Patric: McKinsey reports 80% of companies see no material earnings contribution from AI. How do you explain investors pouring money into a sector with an 80% failure rate to generate business value?
    MS: Innovation often comes from where there's talent and capital. We have access to these in the UK, but application must be grounded in operational reality and in this regards some of the other maritime hubs seem to be moving with great pace and intent and UK must do as well. That means close collaboration between tech providers and end-users. I travel across the industry because we need more "design with the operators" not just "design for the operators". Over my 32+ years, I have learnt from experience on ships, in development teams and in maritime boardrooms. So specifically for the UK we need more collaboration (and some creative competition) with

other maritime hubs to stay competitive in maritime AI.

12. Implementation of AI in various processes would require lot of software upgradation for onboard equipment and systems
    MS:As I said on the webinar, this is probably the biggest risk as well as opportunity for scalable Maritime AI. We can't train AI on fragmented, inconsistent inputs. Standards like S-100, ISO 19847/8 are a step forward, but we also need platform-level APIs and open data-sharing frameworks. Think of it like common grammar, different dialects are fine, but we need to understand each other.

13. Patric Are maritime startups overselling immature technology as market-ready solutions to capitalise on AI hype?

14. Patric: With crewing and crew management showing only 33% AI adoption despite human factors causing 75-96% of maritime accidents, why isn't the industry prioritising AI where safety impact would be greatest?

15. Great presentation. When you speak to Tanker Operators, do you see reluctance or acceptance to ditch their existing archaic ERPs and adopt new AI solutions?
    MS: My experience is that there's a cautious interest, not outright resistance. Most tanker operators recognise their ERP systems (especially in-house systems) are dated and ill-suited for AI-era workflows but replacing them is seen as too risky and costly or moving away from proprietary approaches. What I see is a strong "watch and wait" posture, with early adopters experimenting at the frontier, on fuel optimisation, compliance automation, and predictive maintenance etc but also increasingly on the core ERP layer. So, acceptance is growing and maritime technologists like me have our work cut-out to make this change gain pace.

16. A question for both panellists: the UK dominates maritime fintech while being physically disconnected from major shipping operations. How do you ensure financial innovation aligns with the practical needs of global shipping operations?
    MS: Innovation often comes from where there's talent and capital. We have access to these in the UK, but application must be grounded in operational reality and in this regards some of the other maritime hubs seem to be moving with great pace and intent and UK must do as well. That means close collaboration between tech providers and end-users. I travel across the industry because we need more "design with the operators" not just "design for the operators". Over my 32+ years, I have learnt from experience on ships, in development teams and in maritime boardrooms. So specifically for the UK we need more collaboration (and some creative competition) with other maritime hubs to stay competitive in maritime AI.

17. Patric, with navigation enhancement receiving the largest single AI investment, but existing navigation systems already computer-assisted, are investors paying premium prices for incremental improvements marketed as revolutionary AI?

18. Another question for both panellists: given that tanker operations involve proprietary systems from multiple vendors, what specific data standardisation protocols do you recommend for creating the unified datasets necessary for effective AI training?
    MS: As I said on the webinar, this is probably the biggest area of confusion and risk. For the opportunity on scalable Maritime AI, we need better orchestration between solutions, more standardisation of protocols and better organisation of data lakes. We can't train AI on fragmented, inconsistent inputs. Standards like S-100, ISO 19847/8 are a step forward, but we also need platform-level APIs and open data-sharing frameworks. Think of it like common grammar, different dialects are fine, but we need to understand each other.

19. Patric, phew .5 million for a AI project. Why so high? No customer is going to bet .5 million on a PoC? Is there a gap in understanding between stakeholders and solution providers?

20. How can we ensure that the adaptation of AI in maritime shipping enhances decision-making at sea and ashore, without eroding the accountability, safety culture, and seafarer expertise that underpin this industry?
    MS: As I said on the Webinar, AI shouldn't be seen as replacing human decision-making but augmenting and enriching it. We need transparency and auditability in how AI tools or agents reach their recommendations and built-in escalation thresholds. I gave the analogy of AI as the cadet: capable, fast, alert and with promise, but final judgment and accountability still rests with the captain. Training, protocols, and feedback loops that we already have in place, will need to be reinforced to continually improve our safety culture.

21. AI needs data to learn but sharing information in shipping has always been an issue. Will the potential benefit to all overcome this natural reduction? Does the panel think that AI need for information to enhance learning be a significant driver in M\&A?
    MS: Yes. I used the analogy of 'Congestion before clarity' with regards to fragmentation within maritime tech. If systems providers and operators can organise clean, structured datasets, we can leverage these. I have personally been an active consolidator in maritime tech, and we are already seeing M&A pace and rationale driven by data access and potential to train proprietary AI models. The more AI depends on context-rich data, the more pressure there will be to own or align with the sources of that data. Building excellent point solutions is one thing, but our industry needs better orchestrated eco-systems where data and the applications interplay with each other in a structured and auditable manner. So, M&A driven consolidation is one of the ways in which we will go from CONGESTION AND CONFUSION towards CONVERGENCE AND CLARITY.

22. A question to both panellists: How can AI tools be integrated into ship brokering to improve market intelligence, automate repetitive tasks, and enhance client satisfaction—without compromising the human relationships that drive deal-making?
    MS: This is an area of upcoming change. AI can't replace trust, industry insights, intuition and relationships. But AI adoption in commercial platforms can remove friction. We are seeing automated screening, real-time fleet and cargo matching, risk scoring and standard documentation generation. That frees up brokers, shippers and carriers to focus on the human side of maritime fixtures. More informed negotiations and relationship-building based on better and shared intelligence. I think of AI as the broker's analyst, not the broker's replacement.

23. Patric, don't you think these project economics are going to change dramatically as AI improves? Won't the costs come down rapidly and projects become more accessible to everyone? Particularly with AI improving lead times in CX and coding by 100x or 1,000x?

24. Will we be having this webinar in five years' time, or will AI be normalised, and unnoticed?
    MS: An analogy I used on the webinar is that our success will be evident in AI moving beyond experimentation to becoming AMBIENT Intelligence that is deeply integrated in our eco-systems. And I do see this happening in the next 5 years. I gave parallels in industries such as aviation, where we have ample blueprints and lessons to draw upon in our own digitalisation journey.

25. what level of AI adoption do you see by ship owners and managers or are we still in a sit and wait mode to see which AI providers come to the fore.
    MS: I used the 'popcorn' analogy on the webinar, to say that we are past the first few pops of the curiosity stage but not yet at mass adoption. Most operators are experimenting in their domains or on specific use cases like fuel, maintenance, compliance, but appear suitably cautious about scaling. What most of us are seeking is interoperability, resilience, and proof that solutions won't just create another layer of complexity. Once a few platforms prove their value and reliability, the tipping point will arrive for Maritime AI. I feel its imminent.

26. AI have indeed improved transparency in monitoring and streamlining certain operations like fuel efficiency, route optimization but what about the day-to-day operations which need more human involvement like loading / discharging and tank cleaning. Can AI really take over on this.
    MS: AI is unlikely to fully take over operations like loading/discharging and tank cleaning. And that shouldn't be our foreseeable goal at this stage of early adoption. What we're seeing is AI being used to assist, monitor, and augment human-led operations in such areas. For example, with the human operator very much in command, we envisage AI increasingly used to monitor loading rates against safe limits and detect anomalies in real time. Tank preparation is a critical operation, and we can use AI to meticulously plan

tank cleaning based on prior cargo types, adjacent stowage etc. We are seeing interesting developments in safety systems that are getting better at detecting deviations from standard operating procedures through video analytics or sensor data. But to be clear, these tools do not replace the human, but they make the process safer, more efficient, and better documented. So, think of AI as an added colleague within the cargo control room, just as in the navigation bridge or the engine control room.

27. Manish: I know it's still early days but what governance structures do you think need to be in place to ensure trust, transparency, and explainability in AI-driven decisions aboard ships?
    MS: Governance is crucial if we want AI to be trusted in operational environments. We touched upon a few areas where governance structures must evolve. To reduce black box risks, AI decisions should be logged and explainable. So, we need audit trails just like we have for manual decisions. We need the Human operator in command so we there must be clear protocols for when and how human operators will continue to verify and override AI decisions. The foundational cyber resilience layer will become more advanced so that AI outputs can be secure and tamper-proof, particularly as more AI systems connect across ship-shore networks. Just like most other maritime equipment or plant, AI systems should need "type approval" and operator training for safe usage. I see too many early growth experimenters and sellers of tech tools skip this vital gate.

28. To both! So many companies are selling sensors/systems to get the data ashore. There is still no system that uses that data for predictive maintenance. Why is this so? I see everyone wants AI to analyse this data that comes ashore, but no one is willing to spend time or money to train the AI to read the data. Any insight will help!
    MS: I am seeing some change in this space. The challenge isn't the hardware; it's the data integrity and context. Some predictive maintenance models have in fact been rolled out, but I feel they over-promise and under-deliver now, because the incoming sensor data lacks consistency across fleets or OEMs. There is not enough 'human operator in the loop' built in to offer context and expert oversight for AI embedded in such systems to learn from. Operators hesitate to label data because it's time-consuming and perceived as a low-return task. So yes, we end up with AI systems that are under-trained or misinformed. Here again, we need tech eco-systems to develop a scale, where the OEM, the shore-based operators and the shipboard colleagues all have the ability to interrogate and label the data better. I am particularly interested in capabilities that offer fleet-wide data standardisation and semantic tagging and an iterative loop that build incentives so that shore and onboard teams see value in training the system. Once we make the AI learning loop feel worth the effort, the predictive magic will follow.

29. Manish, do you have an idea of the overall value / potential cost savings of AI to the shipping industry within the 10 years' time?
    MS: I see too many claims of % and dollar savings, but it will be irresponsible and inaccurate to comment without the operational context and readiness of the fleet and operators. But directional estimates are compelling, and the ROI makes sense. With hundreds of billions of dollars in total operational and capex spend annually, even if AI can drive just a 10% efficiency gain, that alone represents significant recurring impact by the 2030s. To be helpful, perhaps I should point to a few cost savings headers that

each fleet should track within their fleets and perhaps we need benchmarking with the top percentile operators, to see what's achievable. The high value areas include crew and vessel safety, fuel and routing optimisation, predictive maintenance, fleet utilisation and uptime, non-conformity reductions and compliance improvements, smarter decision-making improving TCE and vessel utilisation etc.

30. Patric/Manish - What is your advice to maritime startups? Focus on a narrow use case or wide? How to face the data issue when incumbents ERP are not ready to share.
MS: I speak with and mentor many promising maritime tech teams at the early growth stage. My consistent advice is start narrow—but design with the operator's workflow in mind. The last thing our fragmented industry needs is yet another disconnected application. Dozens already exist, often solving the same narrow problems in isolation. What we need is solutions that work at scale, to industry standards and across the workflow, not just within a point function. That's why the most successful teams will be those who can scale beyond their original niche, ideally by joining forces within larger, more integrated ecosystems. We're already seeing a trend where strong innovators bring their IP and talent into more scalable homes, where they can co-develop solutions that operate across departments, systems, and decisions. Those who resist convergence or fail to scale at the pace of operator expectations will likely hit a ceiling. But this is all part of the creative cycle of experimentation, iteration, and even failing forward, all being necessary steps toward achieving true innovation and orchestration in maritime tech.

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