

MAS CONFERENCE KEYNOTE SPEECH 17 NOV 16

Delighted to be here – thanks again to the UK Marine Industries Alliance, the National Oceanography Centre and colleagues from the Marine Autonomous Systems Regulatory Working Group, for allowing me this keynote slot.

It's very good to be involved. This conference helpfully brings together authoritative and respected voices from industry, academia, from operators and from government. By actively engaging the views and aspirations of all those players, at one time and in one space, we have a chance to catch up with each other's work and thinking; and perhaps also to take things meaningfully forward. Indeed, I'm sure we already achieved some of that yesterday.

Seen from my experience to date, the MAS agenda is here, and here to stay; it is getting bigger; it has massive future potential; and it's probably outstripping our ability both to understand its full ramifications, and certainly to 'control' it in any conventional way.

If I may speak just for the UK government for a moment, the MAS initiative enjoys strong support around here, with the Dept for Business, Energy and Industrial Strategy in the lead and providing important seedcorn funding through its specialist research and development arm, Innovate UK. Separately, as many of you will know, the UK Ministry of Defence last month committed a lot of resources to the live maritime exercise called Unmanned Warrior, which sought to demonstrate the potential of MAS in a challenging operational environment. Meanwhile my own Department, Transport, has tasked my Agency to address and develop aspects of the safety, environmental and regulatory dimensions of marine autonomous systems. And our Foreign Office strongly supported the initiative last June for the UK to address delegates of the IMO Maritime Safety Committee on the MAS issue: a presentation which was gratifyingly well attended and well received.

Individually, these may all have been quite modest inputs. But collectively they represent considerable governmental commitment. They've established some real momentum around the subject of MAS, and the direction of travel is quite clear. We

recognise and welcome the fact that the industry is already developing, producing and selling unmanned systems; and that people are buying and deploying them for useful and productive purposes. Just one example is Plymouth University's Mayflower autonomous research ship project – a public/private venture, part supported by crowd funding - to develop a 32-metre, solar-powered autonomous ship to cross the Atlantic in 2020, exactly 400 years after the Pilgrim Fathers did so in the original Mayflower.

So what? Well, first I'm delighted to see these innovations take root. And I've been privileged to see some marvellous applications, some brilliant people, and a bright young industry bursting with ideas and energy, with a passion to grow far and fast. My Agency wants to help support and promote all these things. And to help knock down any barriers that needlessly get in the way.

There are challenges of course: not the least of them is finding the resources to support our aspirations in the MAS field, amongst so many other competing priorities for funds, assets and – especially – able people.

I also recognise that there are some generic challenges around the adequacy of our national infrastructures to support the growth of MAS. For example, in providing enough capacity in broadband networks and the regional radio spectrum to enable uninterrupted services for data-heavy communications and telemetry between unmanned vessels and their control centres – especially noting that autonomous aviation and land vehicles are likely to be making some similar demands.

Those things aside, the biggest hill to climb from my own perspective is this, and you'll all be very familiar with it, I guess. How do we successfully and promptly integrate the construction and operation of these unmanned vehicles into the existing global 'ecosystem' of conventional, manned vessel operations? An ecosystem that has been gradually built up over many centuries, and is now overlaid and interleaved with comprehensive and quite elaborate regulatory requirements....Regulatory requirements that have, up to now, always assumed a human presence on board that is both intelligently creative, and on the other hand also sometimes fatally fallible.

We really do need to get on with tackling this particular challenge, and I know that a number of institutions are seeking to do exactly that right now. As I've said, a wide range of marine autonomous systems are already out there. As far as I can tell, they are being responsibly built and sensibly operated, with due care being taken to manage risks and maintain intelligent oversight of what they are doing. But it is surely only a matter of time before – just as with unmanned air systems and driverless cars– we find ourselves perturbed by a near miss or two - or, heaven forbid, some real accident involving a MAS vehicle which could have been foreseen and avoided, but wasn't.

So my attention is focussed mainly on this – what polices and rules must we now develop and put in place that can effectively mitigate those risks to maritime safety, security and environmental protection? And how can we do this quickly enough, and with the least possible penalty to legitimate commercial interests and to the potential of MAS to contribute to a more efficient, prosperous and sustainable maritime world order?

What you really don't need in a keynote speech like this is any attempt at a full answer to that huge question. But maybe I might have a stab at just a couple of points of basic principle? First, can we please sensibly assess the risk, and then limit our regulations to addressing just that degree of risk, and no more? Second, can we inject as much pragmatism as reasonably possible into the way we design our rules? Third, can we keep our regulations proportionate to both the nature of the problem and its potential consequences and avoid unnecessary complexity? And finally, whatever we decide to do in our wisdom as regulators, can we please do it in close and continuous collaboration with the industry itself, which will of course have to work and live with our carefully constructed rules, day in, day out?

Well, I could claim that in the UK maritime sector we already have a decent track record for risk-based, reasonably pragmatic regulation that enables, rather than inhibits, new ventures. This has often been a question taking 'full-fat' international safety regulations off the shelf. And then adapting them sensibly and proportionately into a 'semi-skimmed' variety that is good enough to ensure appropriate levels of safety, in specific contexts and for specific

purposes. Good examples here are the large yacht code; the workboat code; the small commercial hovercraft code; the rescue boat code - all of these apply adaptations, exemptions or equivalences to existing international regulations which, if stubbornly applied in their purest form, could otherwise smother any prospect of practical construction and commercial viability.

This isn't a case of playing fast and loose with the rules – it's all about applying risk-based common sense to keep up with operational need and to enable continued innovation. And I'm sure there must be things we can learn from those colleagues who are grappling with similar issues in the air and land transport environments.

I believe the UK Marine Industries Alliance has made a good start with this approach by issuing their industry-wide Code of Conduct. Agreed, this guidance is still quite high-level and generic in content, and it has no inherent legal force. Nevertheless, it carries the weight of a wide industry consensus as accepted 'best practice', and is thus helping to establish a level playing field in terms of the principles of business conduct, along with basic safety and environmental protection measures. It was successfully used to de-risk the 'Unmanned Warrior' exercise, and is a really good example, in my view, of ethically-based self-regulation, by a responsible and forward-looking industry.

In the same vein, we would also encourage the industry to carry on with producing a corresponding Code of Practice that would focus principally on the deployment and practical operation of autonomous and unmanned systems. Progress here has yet to bear authoritative fruit, after a couple of years of good work, and I would hope that we'll see a robust draft Code next year. I'm aware that this was discussed yesterday and that there was an encouraging consensus for the developing Code as it stands.

Meanwhile it has also been interesting to see Lloyd's Register's work on a goal-based design code for unmanned marine systems, along with the helpful definition of 6 graduated autonomy levels for ship design and operation. I would also highlight and applaud the research programme, again including Lloyds Register amongst others, that was recently announced into collision-avoidance algorithms for marine autonomous vehicles. This area, and the

whole question of how we can possibly bring MAS smoothly and successfully into the regime of international Collision Regulations, could become an ‘elephant in the room’. Of course this matter just has to be confronted at some point, and made to work; and it is encouraging to see the level and success of academic and commercial work being undertaken to achieve this.

So I think it’s fair to say that - up to now - the approach to regularising the way MAS will evolve and interact, both amongst its own kind and with conventional systems, has been relatively ‘light touch’. This is probably quite appropriate for the time being, whilst marine autonomous systems are still typically quite small, and still used largely for scientific research and for limited military and commercial applications, usually within well-bounded or controlled sea areas. We are for the most part still feeling our way forward, as the technologies become more mature and as further research tests the boundaries of what cyber-enabled marine systems can offer us.

At some time, though, I’m sure we will need to break out from this slightly ‘grey’ area of experimentation and exploration, and move further along the road toward a formal legal identity for MAS vessels, and a correspondingly tauter regulatory framework built around the pragmatic and proportionate management of risk that I spoke of earlier. Once marine autonomous systems move seriously into commercially competitive scenarios – and especially as they become involved in high-seas operations and international trading, with sizeable vehicles, substantial speeds and potentially high-risk payloads – then they will surely need to be embraced by an internationally agreed set of rules that set the definitions, mitigate the potential hazards, provide clarity around minimum safety requirements, and take due account of the vitally important human factors – including the competences of operators and maintainers, and their working environments - at the varying degrees of autonomy. I would be interested to know whether the industry has the appetite for any formal guidance to be issued by regulatory authorities like mine at this stage? Maybe not quite yet, but we should perhaps start preparing for that need quite soon.

Addressing this whole regulatory framework is one good reason why it was felt very important for the MAS agenda to be introduced this year at the IMO. James Fanshawe and his regulatory working group very wisely judged that the time was ripe to stimulate initial IMO interest in the topic, and to prepare the ground for getting marine autonomous systems into that Organisation's always very full work programme. Plans are in place to trigger this work at IMO next year. Difficult though it may prove to be, establishing MAS more formally on the international maritime agenda probably has to be the right way to take it now.

Meanwhile I would love to hear from you all about what more you think the MCA and our partner regulatory and safety organisations could be doing to support your endeavours. And whether there are any specific priorities that you believe we should be pursuing to help you. (Please leave a note with my poor overworked staff....!!)

Thank you for your attention. I'm sure we can all anticipate another excellent conference day.

15.5 mins.