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Citation: Chuah, J. (2022). Forward Planning – Regulation of Artificial Intelligence and Maritime Trade. In: Commercial and Maritime Law in China and Europe. (pp. 235-244). Routledge. doi: 10.4324/9781003160298-21

This is the accepted version of the paper.

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Permanent repository link: https://openaccess.city.ac.uk/id/eprint/34118/

Link to published version: https://doi.org/10.4324/9781003160298-21

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Forward Planning – Regulation of Artificial Intelligence and Maritime Trade

Prof Jason Chuah*

This chapter, in concluding this very timely book, evaluates the continuing regulatory challenges for maritime trade in the light of rapid technological changes. The scope of the subject is indeed so wide that a single, discrete chapter would not be able to do it proper justice. There is already much ink spilt on the various technological developments to commercial shipping – from the 1990s issues of electronic bills of lading and dematerialisation of shipping documents to the early 2000s when electronic financial solutions were introduced to supply chains, trade financing and warehousing, and then onwards to more recent times, when autonomous shipping and blockchains became the flavour of the month. This chapter chooses to focus on the emerging influence of artificial intelligence (AI) in shipping and international commerce. AI solutions are incrementally designed for use in shipping – an obvious application is in autonomous ships, but in truth, there are far more "disruptive" applications being developed to optimise business processes, voyage and cargo planning and vessel maintenance. The continuing impact of AI on maritime trade is undeniable. Parallel to this technological momentum in the maritime business, governments, including those from the US, EU, UK and PRC, have been quick to respond with proposals for policy and/or regulatory intervention.

The emphasis in this chapter is the recently published EU proposal for a Regulation to regulate the use of AI across the European single market, to be called the "EU AI Act". The rationale for this focus is that whilst many other jurisdictions, such as the US, UK and PRC, have published various position papers and policy statements on regulating AI, none has gone far as the EU in proposing a single all-encompassing legislative instrument.[1] The

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1 In contrast to the UK, although plans are afoot to amend existing laws, the UK Government takes an incremental, cross sectoral approach to AI regulation (https://www.gov.uk/government/publications/national-ai-strategy/national-ai-strategy-html-version). (For more on the UK AI strategy, please see below. The UK has also chosen to adopt a more technically focused but piecemeal approach. Thus, it is currently developing and agreeing international technical standards working with the International Organisation for Standardisation and International Electrotechnical Commission (ISO/IEC) and the Industry Specification Group on Securing AI at the European Telecommunications Standards Institute (ETSI). As regards the PRC, for example, the State Council released the country's strategy for developing artificial intelligence (AI), entitled 'New Generation Artificial Intelligence Development Plan' (AIDP) in 2017 ("新一代人工智能发展规划" State Council Document [2017] No. 35; there is no official translation of the strategy document at the time of writing. An unofficial translation might be found at https://flia.org/wp-content/uploads/2017/07/A-New-Generation-of-Artificial-Intelligence-Development-Plan-1.pdf For an exposition of the AIDP see Roberts, H., Cowls, J., Morley, J. et al. The Chinese approach to artificial intelligence: an analysis of policy, ethics, and regulation. AI & Soc Vol 36 59–77 (2021)). This strategy paper sets out the PRC's aims to become the world leader in

proposal is likely to attract much controversy and interest; the consultation and deliberations will be protracted. However, it would be remiss not to consider the potential impact on maritime trade the proposed provisions would produce.

In April 2021, the EU Commission tabled a proposal for an EU wide Regulation to provide for a harmonised scheme of governance for AI.[2] As a matter of background, the EU Commission had published a White Paper on AI back in February 2020 which set out the policy options on how best to achieve the objective of fostering subscription to AI and that of managing the risks attendant in the use of AI.[3] The proposed legislation which was laid as a consequence aims to provide for 'a high level of protection of health, safety and fundamental rights" for users and European societies, more broadly.[4] However, as expressed by the White Paper, the proposed Regulation also seeks to extend the principle of free movement to AI goods and services. Member States are explicitly prohibited from imposing unsanctioned restrictions on the development, marketing and use of AI systems.[5]

Definitions

An important plank in any regulatory scheme is establishing the definitional parameters. As far as the EU is concerned, a formalised definition is provided for in the draft Regulation. Article 3(1) defines AI as "software that is developed with one or more of the techniques and approaches listed in Annex I[6] and can, for a given set of human-defined objectives, generate outputs such as content, predictions, recommendations, or decisions influencing the environments they interact with". It is obvious that this definition largely adopts what might be termed, a functional approach. It focuses on the principal functional characteristics of the 'software' – in essence, how the software could be deployed to generate content, predictions, recommendations and decisions without substantial manual handling or processing.[7] Those outputs, such as predictions or decisions, are intended to pursue a given set of human defined objectives. However,

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AI by 2030. In particular, it sees an opportunity to monetise AI into a trillion-yuan industry. The strategy also sets out in general terms the commitment to establish ethical norms and standards for AI. It is clear too from the national strategy paper that maritime trade is envisaged to be a sector which would benefit from AI adoption. (See section 4.1.2 "智能物流")

2 COM(2021) 206 final; 2021/0106(COD)

3 COM(2020) 65 final

4 Recital 1, Preamble of the Draft Regulation

5 See for example Titles V and VIII

6 Annex 1 describes AI techniques and approaches as: (a)Machine learning approaches, including supervised, unsupervised and reinforcement learning, using a wide variety of methods including deep learning; (b)Logic- and knowledge-based approaches, including knowledge representation, inductive (logic) programming, knowledge bases, inference and deductive engines, (symbolic) reasoning and expert systems; (c)Statistical approaches, Bayesian estimation, search and optimization methods.

7 Recital 6, Preamble

the EU Commission, intending to keep the regulation as technology neutral as possible, leaves room in the annex of the legislation[8] to specify the type of AI techniques or approaches which fall to be governed by the law.

This definition, predictably, reflects that recommended by the OECD: "An AI system is a machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations, or decisions influencing real or virtual environments. AI systems are designed to operate with varying levels of autonomy."[9]

A contrasting position might be had from the PRC's AI Development Plan (AIDP).[10] The PRC's AIDP though not a legislative instrument does flesh out what the PRC government considers to be AI for the purposes of legislative intervention. It tends to concentrate on what "basic theories" AI is founded rather than a purely systemic approach in its attempt to define AI. The AIDP considers that AI is premised on the following theories/notions:

Big data intelligence theory

Cross-media sensing and computing theory

Hybrid and enhanced intelligence theory

Swarm intelligence theory

Autonomous coordination and control, and optimized decision-making theory

High-level machine learning theory

Brain-inspired intelligence computing theory

Quantum intelligent computing theory

The PRC's approach is clearly more narrow, preferring to emphasise the presence of some machine learning methods or processes, or logic based procedures, than the EU's. That breadth is not entirely welcome. For example, Annex 1 of the proposed Regulation refers to "Statistical approaches, Bayesian estimation, search and optimization methods"[11]. This reference to statistical approaches is clearly expansive and potentially would cover almost all existing and future software that does not involve an element of machine learning.[12] Statistical approaches could be fairly mathematical. For example, a software which computes the standard deviation of a set of data might well be deemed an AI system if this type of definition is adopted. Although in practical terms, it is entirely legitimate to

8 Supra n.6
9 Art 1, Recommendation of the Council on Artificial Intelligence (OECD/LEGAL/0449 (22 May 2019))
10 Supra n.1
11 Supra n. 6
12 See generally Ehsani S., Glauner, P., Plugmann, P. and Thieringer, F.M. (eds), "The Future Circle of Healthcare: AI, 3D Printing, Longevity, Ethics, and Uncertainty Mitigation" (Springer, 2022)

take a “sensible” interpretation by positing Annex 1 within the wider frame of the EU AI policy, firms, especially startups, might not be prepared to take the risk.

Scope of the Proposed Regulation

The Regulation, being a single market instrument[13], is limited to the use and movement of AI systems or services in a commercial setting alone. AI guided military uses and AI systems in law enforcement fall outside the legal competency of the EU.[14] Article 2(1) stresses that the Regulation applies to:

(a) providers placing on the market or putting into service AI systems in the Union, irrespective of whether those providers are established within the Union or in a third country;

(b) users of AI systems located within the Union;

(c) providers and users of AI systems that are located in a third country, where the output produced by the system is used in the Union.

The Regulation thus focuses on the human agents behind the AI systems, not to the AI itself. The latter is clearly perceived too radical for the time being; to do so would be confer legal personality on AI.[15] By and large, those who argue for legal personality the autonomous nature of the AI in making informed decisions, decisions of which carry consequences on others, should lead to the recognition of legal competence. On the other hand, the other side argues that legal competence should be underpinned by a moral consciousness which AI systems do not possess. That debate, interesting as it is, contributes little to the task at hand which an evaluation of the proposed law in question.

The proposed Regulation will have an extraterritorial reach, as is common with legislation seeking to protect the internal market and fundamental EU rights. Article 2 makes this plain. Providers placing on the market or putting into service AI systems in the EU would be required to comply with the terms of the Regulation, irrespective of whether they are established in the EU or in a third country. The article goes on to state that the Regulation would apply to users based in the EU; it seems from the tenor of the

13 It is noteworthy that the proposed Regulation has as its legal basis, art 114 TFEU which is concerned with enhancing the internal market. This commercial trade dimension of the law is important – not only as a matter of understanding the legislative policy but also when the Regulation comes to be interpreted by the courts, the EU law teleological approach to legislative interpretation will require a direct or indirect interaction with this rationale.
14 Arts 2(3)(4)
15 There is increasing literature on AI and legal personhood. See Chesterman, Simon. "Artificial intelligence and the limits of legal personality." International & Comparative Law Quarterly 69.4 (2020): 819-844; Čerka, P., Grigienė, J., and Sirbikytė, G.. "Is it possible to grant legal personality to artificial intelligence software systems?." Computer law & security review 33.5 (2017): 685-699; Abbott, R., and Sarch. A., Punishing Artificial Intelligence: Legal Fiction or Science Fiction. (2019) UC Davis Law Review 53: 323–84;

provision that the user is not only entitled to the rights in the Regulation but also subject to the legal duties, where appropriate. The Regulation also extends to "providers and users of AI systems that are located in a third country, where the output produced by the system is used in the Union."[16]

These provisions are quite far-reaching. Taking an example from commercial maritime trade as a case in point. Assuming that a company based in the PRC uses an AI guided cargo operation system for their ships, registered in Panama. When the vessel calls at the Port of Antwerp, the AI system is deployed via the internet by the stevedoring firm to facilitate unloading of the cargo. The Regulation would be engaged because the user is in Belgium, an EU Member State. It does not matter that the system was stored or accessible in cyberspace.

It should be noted that art 2(1)(a) goes even further – there is no requirement that the AI system or service was even actually used. Article 2(1)(a) is activated as long as the AI system is placed on the EU market. "Placing on the market" is defined in art 3(9) as "the first making available of an AI system on the Union market" but take-up from users is not mentioned.

Naturally there might be perceptibly a concern from commercial undertakings as to the regulatory burden despite very nominal interaction with the EU.

Opportunities for innovation

Maritime trade is continually evolving and improving in making greater and better efficiencies. In this section, the provisions in the proposed Regulation on how best to support innovation shall be assessed. The objective is to enable maritime trade stakeholders to contribute to the ongoing deliberations on policy choices. There are two discussion points here – the introduction of a regulatory sandbox scheme to promote innovation and the provisions to protect essential rights and interests.

AI regulatory sandbox

While there are different and varied regulatory sandbox models with different policy and strategic emphasis, broadly speaking, a regulatory sandbox is intended to allow the commercial undertaking to test its products with real customers or users in an environment that is not subject to the full panoply of rules that would otherwise be applicable. That does not mean that the sandbox is entirely bereft of the regulator's involvement. The regulator will typically offer guidance and information so as to foster a collaborative relationship between the two sides. From a regulatory theory perspective, the regulatory sandbox might be considered a form of principles-based[17] regulation as it removes some of the more hardcore

16 Art 2(1)(c)

17 As against a rule-based system

regulatory hurdles concentrating instead on allowing some flexibility in meeting the basic parameters of the regulatory objectives and concerns.

Articles 53-55 of the draft Regulation sets out the parameters for the establishment of AI regulatory sandboxes within the territories of the different Member States. Article 53 labels the sandbox, "a controlled environment that facilitates the development, testing and validation of innovative AI systems for a limited time before their placement on the market or putting into service pursuant to a specific plan".[18] There follow in that Title of the draft law detailed provisions on how Member States must retain control over data protection and other public interest concerns (such as health and safety, environmental protection, crimes etc.). What is perhaps of interest is that the level of cooperation or collaboration between regulator and firm is largely left to individual Member States. Certainly, such an approach coincides with the principles of subsidiarity and proportionality – it would not be prudent for a principles-based sandbox scheme such as that in the AI Regulation to fly in the face of flexibility.

There is an increasing volume of literature on the design, use, criticism and defence of regulatory sandboxes generally.[19] This chapter will however consider more narrowly the question as to how useful the proposal scheme might be for maritime trade.

These provisions place the sandbox squarely within the jurisdiction of individual Member States. For maritime trade, which is highly globalised and networked, it is difficult to see how a sandbox located in and firmly controlled by a single Member State would incentivise AI innovation. On the other hand, as a regulatory sandbox scheme, it might well be impractical for all Member States to adopt the same level of involvement. It thus raises the question as to whether a regulatory sandbox would actually be beneficial to a highly mobile and globalised sector such as maritime trade.

Another observation is that the rights to be guarded by the AI Regulation are deep-seated ones, the derogation from which is likely to attract public opprobrium. The question thus is to what extent would a regulatory sandbox remove or reduce the so-called hardcore or concrete regulatory requirements. Any reduction or removal might risk controversy, especially where the AI providers are established in third countries. The regulator would be under immense pressure (perhaps rightly so) to provide guidance erring on the side of caution.

Key to a good regulatory sandbox scheme is the provision of guidance by the regulator. In the UK, for example, the Financial Conduct Authority's approach in their sandbox scheme for the fintech sector will give guidance

18 Art 53(1)

19 For a good overview including useful references on writings on the subject (albeit with a strong US focus) see Allen, H. J. "Regulatory sandboxes." Geo. Wash. L. Rev. 87 (2019): 579.

on how it will interpret the application of regulatory requirements to new technology. Such guidance is helpful given that the UK regulations in question "pre-date smartphones, let alone blockchain or biometric identifiers".[20] For the regulator tasked with making the sandbox scheme work successfully, the challenge with AI solutions is that the guidance is really only as good a proper understanding of the risks. Informational competence is thus key. It follows that how each Member State will develop their regulators' informational competencies will be critical.

It is trite to suggest that an effective regulatory sandbox must therefore be properly resourced. Considering the resources required and given the potential limited reach and usefulness of a regulatory sandbox in the maritime business, a vital question thus is whether so substantial an investment is justifiable and proportionate.

The proposed Regulation states that the AI sandbox approach is intended, *inter alia,* to foster AI innovation and remove barriers to the AI market for small and medium enterprises (SMEs) and start-ups.[21] It has to be questioned as to whether the promotion of innovation, for innovation's own sake, actually serves the social good. In the maritime trade sector many start-ups which were conceived to develop AI solutions to disrupt ancient, long-established shipping practice regularly face access to finance.[22] Such startups do increasingly end up being acquired by (much) larger technology companies. As one commentator said in respect of the fintech sector, "to the extent that the technology developed by these startups is ultimately deployed to entrench the market position of large established financial institutions, without any concomitant reduction in cost or increase in efficiency for customers, it will not address any real market need".[23] The need for finance could also propel startups away from developing AI solutions which respond to a real market need, to simply designing an AI innovation which would make the startup attractive to venture capitalists out to snare the technology deemed to be the flavour of the month.

Lastly, the Regulation calls for the sharing of the startup's intellectual property consisting of data and AI with the relevant authorities.[24] Given that

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20 See speech by Mr Christopher Woolard FCA Director for Strategy and Competition (11 April 2016) https://www.fca.org.uk/news/speeches/innovate-finance-global-summit
21 Recital
22 As regards a general startup's access to finance see for example Bollaert, Helen, Florencio Lopez-de-Silanes, and Armin Schwienbacher. "Fintech and access to finance." Journal of corporate finance 68 (2021): 101941; for the maritime sector, see in the context of empirical work carried with reference to Germany see Bass, Hans-Heinrich, and Robert Ernst-Siebert. "SME in Germany's maritime industry: innovation, internationalisation and employment." International Journal of Globalisation and Small Business 2.1 (2007): 19-33; for the maritime sector more generally see Van den Burg, Sander WK, et al. "Mobilizing investors for blue growth." Frontiers in Marine Science 3 (2017): 291.
23 Allen, Hilary J. "Regulatory sandboxes." Geo. Wash. L. Rev. 87 (2019): 579, 608.
24 Art 53

there is no explicit rationale for this requirement, it seems thus to be disproportionate for most firms, especially SMEs and startups.

Controlling harm

Perhaps it is apposite to start by considering what the Regulation does *not* provide for, where harm is concerned. The noticeable omission in the draft Regulation concerns liability for AI systems. It appears that the EU was content to leave that matter of liability to individual Member States. Any dispute or claim over liability for damage caused by an AI system would be resolved using applicable contract and tort/delict laws.

The Regulation's approach to controlling harm is by (a) banning certain AI systems and (b) regulating the delivery of certain AI systems based on their risk profile.

Title II of the proposed Regulation sets out a list of prohibited AI. The regulation has given up the binary low-high risk framework initially proposed in the Commission's White Paper on AI[25] and replaced it with a four tier risk framework. The four tiers relate to uses of AI which carry:

(a) An unacceptable risk
(b) A high risk
(c) A limited risk
(d) A low or minimal risk.[26]

Quite predictably those AI technologies which violate fundamental rights would be banned. The prohibitions in the Regulation would also outspread to practices that have a significant potential to manipulate persons through subliminal techniques beyond their consciousness or exploit vulnerabilities of specific vulnerable groups such as children or persons with disabilities in order to materially distort their behaviour in a manner that is likely to cause them or another person psychological or physical harm.[27] Other manipulative or exploitative practices affecting adults that might be facilitated by AI systems could be covered by the existing data protection, consumer protection and digital service legislation that guarantee that natural persons are properly informed and have free choice not to be subject to profiling or other practices that might affect their behaviour.[28] The proposal also prohibits AI-based social scoring for general purposes done by public authorities.[29] Finally, the use of 'real time' remote biometric identification systems in publicly accessible spaces for the purpose of law enforcement is also prohibited unless certain limited exceptions apply.[30]

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25 COM(2020) 65 final (19 Feb 2020)
26 Para 5.2.2 Explanatory Memorandum to the Draft Regulation
27 ibid
28 ibid
29 ibid
30 ibid

During the consultation exercise following the publication of the Commission's White Paper[31] most respondents, whether in support or against the proposal for an AI law, complained about the lack of clarity. The criticisms relate to the lack of clarity on what is meant by high risk and low risk[32]. To my mind, whilst acknowledging that the draft law is not flawless, such a criticism is simply too easy. The subject matter for regulation is risk or harm – a highly subjective and fluid notion. One has to acknowledge that either AI regulation is needed for the public interest or not. Most respondents were in one voice that it is needed.[33] It follows thus that we should be realistic about linguistic niceties in the regulation. Quibbling over the precise boundaries of low, limited and high risk is unhelpful. The maritime trade market participants, in their sector replete with standard form contracts where certainty is so highly prized, know too well that certainty is a pipedream.

In the context of maritime trade innovations, many will not attract a high risk profile. The risk of harm is associated in the draft law to impact on human beings. In maritime trade, the AI solutions tend to be about the deployment of algorithms to collate, learn and process large data sets. For example, the compilation and interpreting of data relating to particular sea voyages to enable the shipmaster better to navigate the vessel or mitigate against equipment failure and defects whilst the ship is at sea. The human factor in the data set, it would appear, is fairly limited and controlled. It might be useful to draw on another example. An increasingly popular AI led solution in shipping[34] is the use of AI to combat cybersecurity threats. At a benign or defensive end, the AI solution can inform the users as to whether IT communications traffic appears normal or not. At the other end, the AI solution might react by quarantining external files or impeding data traffic which, if not properly executed, could lead to damaging one of those interests adumbrated in Annex III of the draft Regulation referring to high risk AI systems.

In the case of high risk AI systems, the proposed law provides for technical documentation requirements in art 11 (Technical documentation), registration requirements in art 60 (EU database for stand-alone high-risk AI systems) and reporting requirements in art 62 (Reporting of serious incidents and of malfunctioning). Whilst some respondents to the White Paper consultation were sanguine about these requirements, others

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31 Supra n.

32 Some arguing that low risk can become high risk through the process of development; see Report prepared by the Montreal AI Ethics Institute for the European Commission's Whitepaper on AI 2020 (https://montrealethics.ai/)

33 The author has some sympathy for a non-unified approach to regulating the impact of AI systems on the human subject. See below.

34 It could not have been escaped the attention of the industry the massive cyber-attack sustained by the likes of Maersk in 2017. However, ransomware and other forms of cyber-attacks on less widely reported companies continue to plague the industry. (Source: Reuters News update 27 June 2017)

expressed dismay at how heavy handed and burdensome the requirements are. There is no doubt that these requirements could be onerous and there is no provision or facility for a more nuanced approach whereby cases are evaluated on an individual basis. It is also unclear to what extent the regulatory sandbox schemes could be used to avoid the regulatory burden, at least at conception stage.

Given the fact that in the maritime trade AI systems with a high risk profile are relatively uncommon, there is some force for the maritime sector to argue against a single, unifying AI law but merely writing into individual specific legislations dealing with various rights and interests an AI dimension. For example, where the concern is over biometric data processed by AI, that could be written into any biometric data specific legislation. A unifying horizontal legislation such as the proposed regulation is probably unlikely to be very useful. Similarly, where the concern is about protection of vulnerable persons being profiled by AI systems, that could be addressed by equal rights and anti-discrimination legislation making a reference to AI, if needed.

The UK indeed prefers a so-called cross-sectoral, piecemeal approach to regulating AI. Instead of a single all-encompassing legislation on AI, the UK has chosen to publish a National AI Strategy, a policy instrument rather than a legislation. This cross sectoral approach to regulating AI seems set to remain for the time being, the UK Government states:

> "The UK already regulates many aspects of the development and use of AI through 'cross-sector' legislation and different regulators. For example, there is coverage in areas like data protection (Information Commissioner's Office), competition (Competition & Markets Authority), human rights and equality (Equality & Human Rights Commission). As well as through 'sector-specific' legislation and regulators, for example financial services (Financial Conduct Authority) and medical products (Medicines and Healthcare products Regulatory Agency)."[35]

The UK Government's view is that the cross sectoral approach is right because:

(a) "The boundaries of AI risks and harms are grey, because the harms raised by these technologies are often non-AI, or extensions of non-AI, issues, and also because AI is rapidly developing and therefore what counts as the AI part of a system is constantly changing.
(b) Use cases for AI, and their wider impacts, can be highly complex in their own right. There is a big limitation in what can be covered in cross-cutting legislation on AI, and regardless of the overall regulatory

35 UK Command Paper 525 (Sep 2021) at p.51

approach, the detail will always need to be dealt with at the level of individual harms and use cases.

(c) Individual regulators and industries are already starting to respond to the risks of AI, and to work with innovators in their sectors to guide on interpretation of existing regulations, and on what further regulatory responses are appropriate. Enabling and empowering individual bodies to respond is a much quicker response to individual harms than agreeing to an AI regulatory regime that makes sense across all sectors.

(d) AI is not the only ongoing technology change, and its impacts are often interlinked with other innovations and behaviour changes, including increased connectivity, the move to mobile working, the dominant role of major platforms etc. It is often hard to unpick the specific impact of AI; focusing regulation on the particular use cases where there is risk allows risks to be addressed holistically, and simplifies things for innovators."[36]

There is much in the UK position which makes good sense. It is better suited to avoid over-regulation and in the maritime trade context, much more flexible and pro-innovation.

Conclusion

This chapter has demonstrated using the proposed EU AI law to show how a single, horizontal AI regulatory framework would apply to the maritime trade and argues that such an approach is problematic in its approach. The legislation tries to be all things to all people – preferring a principles-based approach both in trying to incentivise AI innovation and to protect against harm whilst simultaneously trying to provide a harmonised regulatory framework for AI use in the EU. Other than the obvious criticisms around the lack of clarity over its many provisions, its shortcoming is not properly recognising that many parts of the economy do not have the kind of interface with vulnerable human subjects as the Regulation seeks to protect. The net result being, at best, the *perception* of over-regulation by the industry and at worst, a real risk of over-regulation and gilding the lily by regulators.

36 Ibid, at p.52