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# The future is already upon us

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# A Journey into the Brave New World of Artificial Intelligence, Blockchain, and Cryptocurrencies

*As AI has already crossed our threshold for good, Dr Yannis Kalfoglou—having worked for over 28 years in the field—is certain of the symbiotic relationship between machines and humans. He defends the merits of blockchain technology in the financial and business world, and presents cryptocurrencies, predicting that by 2030 there will be an "AI' arms race" between the US and China*

Interview by Eugenia Anastassiou

**How did you get involved in the world of Artificial Intelligence (AI)?**

My involvement started in the early 1990s, whilst running my own software house. One of the thorniest problems in software engineering is to get the requirements rig—in plain terms—to get some sort of solid specification of what needs to be built, and the purpose of the end product.

At first glance, this sounds very simple; but, it actually is a very tricky engineering problem. To the extent that now, an entire discipline, known as Requirements Engineering, has emerged in order to solve it. However, even with solid Requirements Engineering methods in place, when we first design software and prepare the (digital) blueprints for the development team to work on, there are still subtle and unclear issues. Any mistakes, even at the initial stage, can go undetected in the later phases of development, and ultimately this could be very costly. An occurrence often encapsulated in the motto: "We built the system right, but we didn't build the right system".

This issue motivated me to look into AI technology as a way of recreating "real world" scenarios intelligently, in a digital format, to enable myself to test

my software design theories. If there were any errors, they would be easily detectable, and they could be fixed before we developed the software further.

This, in fact, inspired my PhD research: "How to capture conceptual errors in software specifications using an automated AI system, so that they do not propagate undetected in the later phases of development." That is to say, at a stage where they would be more difficult or impossible to detect, and could often be expensive to remove.

From then on, I began my 28-year journey into AI, and it certainly has been an incredible one!

## A completely new AI world!

**After working for over 28 years in the field of AI and innovative technology, which developments strike you as some of the greatest?**

Admittedly, the pace of new developments and advances has been quite breathtaking. With conventional machine learning techniques, it used to take a long time to get a model trained and validated; then, to get specialised machines to deploy it, and to, ultimately, use it in a real-world context. Only big Wall Street banks could afford to operate such systems.

Fast forward to 2018, and we are now in a completely new AI world!

Today, you can get (mostly) free education and training on the newest machine learning models and techniques, in predominantly deep learning neural networks—which are a set of algorithms, modelled loosely on the human brain, designed to recognise patterns.

You can also get (mostly) free software to build and run your models, backed by relatively inexpensive infrastructure; you can use them in the real world, in a matter of days—not years! Personally, I think this is the biggest game changer.

Of course, as with everything in life, nothing is that simple. You still need specialised skills to make sense of the input parameters in your machine learning models, to fine-tune and adjust the model, as the data feeds change over time. Also, to identify and select the right data for training and testing, as well as performing further engineering tweaks.

## Dr Yannis Kalfoglou: A 28-year journey into AI

**Yannis Kalfoglou was born and raised in Athens. He completed his BSc studies in computer science at Portsmouth University and obtained a PhD in Artificial Intelligence from the University of Edinburgh in the late 1990s, which culminated in an EU Marie Curie Fellowship award. His next accomplishment was a seven-year post-doctorate on the Semantic Web; a technology which is an extension of the existing World Wide Web, allowing machines to process and react to complicated human requests fast, in a structured, machine-readable function.**

**Dr Kalfoglou has accumulated 28 years of expertise and a multitude of skills in advanced technology, not solely in the realms of academia and government funded consortia, where he worked extensively alongside the pioneers of the World Wide Web, Sir Tim Berners-Lee and Sir Nigel Shadbolt. He also has 11 years' experience in the commercial world, managing innovation programmes across a range of industries and companies.**

**He has been a strategic advisor to Forbes Global 500 firms, including US investment management company Invesco, multi-national technology provider RICOH, and as an AI Strategist for Samsung, among many others.**

**Dr Kalfoglou has been a blockchain practitioner for the past five years, running a number of innovative blockchain projects; such as a smart contracts transactive energy system for a major oil/gas company; transactive energy is a concept where consumers can transact any excessive energy they have or generate, with their neighbours, using smart contracts. He was also involved in developing the world's first intellectual property infringement backed patent coin, where the litigation proceeds, or license loyalties, are paid off automatically to vetted stakeholders via smart contracts.**

**In addition, he is also on the advisory boards of four tech start-ups, as well as participating and delivering numerous talks in symposia, conferences, and trade shows around the globe, inspiring international audiences with his visionary approach to technology and its applications for the benefit of society.**

The big difference is that now the entry barrier is much lower to get going on the initial start, using these systems, and AI software.

## The symbiotic relationship between machines and humans

**One of the biggest fears is that the advance of AI, together with other emerging technologies, will take over and replace many jobs, leading to greater unemployment. Is there any truth in this assumption?**

Contrary to the popular view in the media, I am a fervent believer that AI will not take away millions of jobs. In fact, I am a strong supporter of the increasingly sound school of thought, that AI will actually create more jobs and opportunities for everyone.

It is without doubt a fundamental technology, and the transformative power of AI is simply mind-boggling in the way that it will affect the world and our lives. From the manner in which we interact amongst ourselves in a professional and personal capacity, all the way to how companies and entire countries can interact and transact on every level.

The coming wave of automation does not necessarily equate to job losses, or even eliminate certain functions in the workplace. Although it has been reported that AI would replace 800,000 jobs, the same report states that more than 3,5 million new ones will be created; so, overall, more jobs will be generated than lost by AI.

On a personal level, I was closely involved in a strategic initiative at Invesco, where we wanted to pilot a new AI-driven RPA (Robotic Process Automation) solution to speed up our back-office processes. We successfully

managed to deploy the RPA solution, which did a better, faster, and cheaper job, than the equivalent of 40 full-time employees who were doing the same work—yet not a single one of them lost their jobs.

Instead, they were re-trained and moved to cognitively heavier jobs, where they could apply their unique, creative, human skills. Conversely, some of them were trained to program and use RPA tools themselves; in this way, AI actually improved their employment prospects.

**The USA now has a serious challenger in its long-standing domination of the international AI engineering race, with China rapidly catching up—in some estimations China may have already surpassed US supremacy in the industry**

**In your opinion, which occupations are the most vulnerable to the onset of AI? Also, since new ways of working will need to be established, are there any indications as to the 'new jobs' of the future?**

There will have to be changes across the board, with this new surge in automation, especially in the area of menial jobs or those of a repetitive nature. These are normally uninspiring tasks prone to errors, due to their bureaucratic nature, which often need large numbers of full-time employees to function round-the-clock, due to global market demands. Generally, white-collar jobs in office environments: administration, support, customer call centres, troubleshooting, etc. could and should be automated.

Some "out of office" jobs could also be automated, but at the moment the level of AI is not at the stage of development to handle all eventualities in an open environment.

For example, there is talk that lorry drivers could be replaced by robots. However, autonomous vehicle AI technology is not at the stage to be undertaken on a large-scale basis. It might possibly work in controlled environments, like airport runways, docks in large depots, at ports, etc. but the technology will need a testing ground before it is ready to be deployed out on the open road.

The new jobs of the future could be in the realms of our imagination, or as "unknown" as social media managers, or influencers would have been in the early 2000s, before Facebook, Twitter, and YouTube became widespread. Back then, such a job would be almost unthinkable, yet today it is perfectly acceptable. So, following that line of logic, there will be jobs created specifically for AI in the not-so-distant future, beyond the pure engineering roles (machine learning researchers, engineers, etc); for instance, AI algorithms tester, quality assurance, AI ethics coordinator, AI system configuration expert, AI data acquisition specialist, AI systems' field engineer, AI system support, etc.

Most of these roles do not need to be purely technical, as we are entering deeper into the symbiotic relationship of machines and humans. People will need to trust and become comfortable in using automated systems—so there will be a host of new jobs just to train and enable people to have confidence in AI.

**Could AI become as effective as human brainpower?**

All in all, it boils down to what we mean by "effective". If we assume that AI is this kind of super-intelligent machine that can think like a human, has emotional intelligence, creativity, empathy, and is able to exhibit soft intelligence features, as well as all sorts of non-mathematical traits, then I would safely say we might never see that!

However, if by "effective" we mean an AI system which possesses immense computing capabilities and can perform better than humans in certain, well defined tasks—which deal mainly with computation, large data sets, arithmetic, pattern matching, and general brute-force computing—then I would say that we are already experiencing this phenomenon and we will see a lot more of it!

## The blockchain technology

**How does blockchain technology work and what impact does it have on the financial and business world?**

Blockchain is a decentralised database—typically a record of transactions—that is not owned by any party, in which anyone can participate. It is immutable in the sense that you cannot go back in time and delete a few records, without having the agreement of all the participants in the network.

This is a very simplistic definition of a rather complicated set of technologies; cryptography, distributed computing, peer-to-peer networks, and economics, all stuck together under the umbrella term "blockchain". It is called Blockchain, as the transactions are typically chained together in a block; hence the name. However, these are the under-the-hood technical details, which most users of blockchain do not need to know, or will not even notice when they use them.

Blockchain is the underlying technology behind the world's biggest crypto-currency network, Bitcoin. Bitcoin first surfaced in 2009, and after it gained popularity in mid-2013, a host of other crypto-currencies, sometimes called Altcoins (alternative coins), emerged. The most famous of them is Ethereum, the Ether crypto-currency.

**We live in an era of technological revolution and those who choose to ignore it, will be left behind**

The business world got excited with blockchain, with lots of pilots and proof-of-concepts appearing, between 2013 and 2014. There are now commercial and enterprise grade blockchain systems, powering up many functions in a typical organisation.

One of the benefits of using blockchain is the promise of cutting-out-the-middleman. This means companies can save money, by streamlining their processes, supply chains, and speed up product-to-market. Blockchains go beyond simple registry of events (transactions) over time. They also bring in automation: smart contracts, which is a fanciful way of having a process completely and totally automated. Actions are triggered by some sort of external event input, typically called oracles.

The use of smart contracts in shipping is a good example of how Blockchains would benefit the smooth transportation of goods across the world.

Basically, a shipping container from Shenzhen to Piraeus would have all the necessary steps in trade finance taken care of: confirmation of the container loaded up on the vessel in China, tracking of the vessel's voyage in the oceans before reaching Piraeus, sorting out its letter of credit, bill of lading, customs declarations, and all other necessary paperwork, confirmation with port authorities on the arrival of the vessel, safely docking at the port, unloading the container, and depending on the condition of these events, releasing deposits, payments, or imposing penalties on the transacting parties.

The function of a smart contract is essentially replicating a real-world process in a digital, traceable, and immutable way—so, it reduces the risk for transacting parties, especially those with little or no history in doing business.

**People will need to trust and become comfortable in using automated systems—so there will be a host of new jobs, just to train and enable people to have confidence in AI**

## Follow the (digital) money

### How do cryptocurrencies work?

A cryptocurrency is essentially a digital form of money. Its difference from conventional hard currency is in that it is intangible, and it does not exist in the physical world. It is created, transacted, traded and eventually burned or destroyed, only in the digital realm. Cryptocurrencies can be minted (created) by individuals, companies, even governments, and are not necessarily produced by the official money printing business of a country—though some have produced a central bank digital currency. Also, they are totally borderless and global. So, you can get your bitcoin from the US, and go and spend it in China.

Like conventional currencies, they adhere to market dynamics. Therefore, they are traded for real money at exchanges and peer-to-peer transactions. Their value goes up and down, depending on market volatility and the dynamics of supply/demand. They can be stored in a digital wallet, which could be on your computer, mobile phone, tablet, on a digital wallet service provider site, or off the network—if you want additional security.

The actual cryptocurrency is nothing more than a combination of private keys and public keys—the private ones are always kept in your safe, known as the digital wallet. Public keys are the ones you exchange with other people, used for the payments you make and receive.

All cryptocurrency transactions have a unique address where they end up, in your personal safe. Once the transaction is validated by the network, you have your wallet updated with new information, which reflects your current balance, just like a conventional bank account.

**Cryptocurrencies, by virtue of the name 'hidden', have a questionable reputation at the moment, and there are concerns regarding an unregulated global economy. Is anything being done to address this issue?**

Indeed, there seems to be a flurry of activity in regulating cryptocurrencies. Most of it is driven by large institutions and governments, since there is little oversight on the origins of funds transacted with cryptocurrencies—there are concerns that illegal activities could be funded by cryptocurrencies—as essentially, they are digital money which is free from censorship.

The ICO (initial coin offering) boom of summer 2017, proved a salutary lesson, with many questionable blockchain projects raising millions and millions of dollars in funding, to deliver very little. In hindsight, it appears that many of them were either outright marketing scams, or simply overly optimistic projects, taking advantage of the market conditions at the time.

***Nonetheless, cryptocurrencies are here to stay, and the day when we will see a crypto-Euro or crypto-Dollar etc. is not far off. However, clear and workable regulations are essential, and this is where activity is focused at the moment.***

Cryptocurrencies have a cumulative market cap of just over $150bn, peaking at nearly $800bn in December 2017. By contrast, the money markets are worth an excess of $80 trillion globally, and if derivatives and real estate are added, their value rises to $400tr. All in all, at present, cryptocurrencies are still too small to have an impact on the global economy; however, future potential is there.

The core issue is the "Know Your Customer" (KYC), and "Anti-Money Laundering" (AML) regulations:

- Know who is issuing the currency.
- Know what purpose the currency is issued for. Is there any collateral in case things go wrong?

- Any routes to recourse in case of a dispute?
- How and where will the currency be used?
- How can it be traded or exchanged for other currencies, goods or services, etc?

Fundamentally, it is the knowledge we have about money and conventional currencies which needs to be transformed and aligned with the technical intricacies of cryptocurrencies: censorship-free, decentralised, anonymous, non-fungible (not-interchangeable), a limited or unlimited supply.

**Are Bitcoins and the like just hype? Could they ever take over the way we use money and make payments?**

Bitcoins have been around for 10 years now—there are close to 17 million bitcoins in circulation—you can transact them and purchase a limited number of goods and services; so, it is definitely not hype. Rather, bitcoins are a trailblazer for a global digital currency future, which could benefit society.

We have already experienced huge changes in the way we use money and make transactions. Mobile and online payments are so popular now, with some merchants only accepting these methods, and with entire global economies building their strengths on online and mobile payments. Crypto-currencies and the like will be an extension of this whole phenomenon.

**Blockchain technology has transformed developing economies, with the introduction of 'currency platforms' such as BitPesa and M-Pesa, which have redefined financial transactions in Africa. Do you think countries like Greece would benefit?**

Cryptocurrencies have indeed worked well in sub-Saharan economies. I am also aware of a rather subdued effort, at the peak of the Greek economic crisis in 2012—by some influential members of the Greek diaspora—to help out the ailing economy using bitcoin, but that didn't come to fruition.

Even though I am a believer in censorship-free cryptocurrencies and their innovative uses in the economy, and just because M-Pesa works well, it doesn't mean it can be replicated successfully in a Eurozone economy.

For starters, the sub-Saharan African economies had a great track record, and a huge proof point, with M-Pesa being the world's leading mobile payments platform in terms of native population penetration. Some will dispute the numbers, comparing M-Pesa with We-Pay and other Chinese mobile payment platforms, but M-Pesa was there earlier and it redefined an entire economy. In addition, M-Pesa's adoption was greatly boosted by the lack of a workable central government banking system, or even a reliable banking system—this is not the case in Greece. We might **have faced** the biggest economic crisis in living memory, but Greece is a modern Eurozone country, and the country's banks are fully functional. Introducing a cryptocurrency in Greece as an "official" currency—like the Petro in Venezuela—is not so simple, or even feasible, since it is a member of the Eurozone.

**Cryptocurrencies are here to stay, and the day when we will see a crypto-Euro, or crypto-Dollar, etc. is not far off. However, clear and workable regulations are essential, and this is where activity is focused at the moment**

However, there are other uses of cryptocurrency, where it can be used alongside the Euro as valid tender and as a medium of exchange. Greek cryptocurrency holders already enjoy the use of cryptocurrencies as a store of value, as they are adhering to global networks' econometric principles, and are not relying on some sort of national policy.

In fact, the country as a whole would benefit from cryptocurrencies, but this requires a pan-European agreement. For example, issuing a Greek crypto-bond, asking investors to buy a Greek crypto-coupon, or diluting their positions to other crypto-assets, etc. cannot be introduced unilaterally, since Greece is part of the Eurozone. There has to be an agreement from the ECB, which means that it will be beneficial, and applicable to all Eurozone member countries, not just confined to Greece.

## Uses of AI: a Swiss Army knife f or an enterprise

**How can businesses use AI, blockchain, and other emerging technologies for their benefit and to transform their enterprises for the better?**

All types of businesses can, and should use, AI, blockchain, and other emerging technologies. We live in an era of technological revolution and those who choose to ignore it, will be left behind.

Uses of AI vary in many ways, as it is a Swiss Army knife for an enterprise.

- AI can be used to boost your customer experience: shop floor events, virtual changing rooms, customer analytics, identifying and promoting the right products for the right customer, pro-active and automatic support using ChatBots, and many other means.
- Business interaction: predictive and prescriptive analytics, which help manage your suppliers, vendors, and product lines. Fraud detection systems to rule out fraudulent transactions, automatic supply chain functions, from inventory control to order fulfilment.
- Regulatory compliance: automatic reporting systems, compliance checking systems.
- New product development: identify and launch new products, in segments not previously active, using analytics

and AI systems to predict possible revenue volume, cost-effective marketing strategies, and real-time monitoring of products and services in the field.

- New model interfaces with customer, clients and employees: ChatBots, image recognition systems, digital ID and biometrics.

## The Future of AI: Harnessing the 'Known Unknown'

The capability of AI technology can be likened to nuclear power: when managed safely and operated effectively, it is an efficient, virtually clean, and inexhaustible source of energy. On the negative side, if not controlled properly, the devastation caused by nuclear plant accidents and the destructive force of atom bombs demonstrate how dangerous that power can be.

The crucial point in the development of AI was when it came out of the "safety net" of academia, and entered commercial use, thus accelerating the pace of development, to meet the needs of the global AI market.

Additionally, large tech conglomerates need to be on top of their game in technological progress, to stay ahead, not only to give them the competitive edge, but also to secure the future of their multi-billion-dollar profits. This drives the unprecedented boom in creating AI applications, with the industry set to be worth $50bn by 2020. However, this meteoritic rise often creates inflated expectations of what AI can do; and disappointment awaits those who don't prepare for a less impacted future.

Another major factor is—according to numerous experts in the field—that there has been a striking shift in the global AI landscape in 2017-2018**.** The USA now has a serious challenger in its long-standing domination in the international AI engineering race, with China rapidly catching up. Some estimate that China may have already surpassed US supremacy in the industry.

## AI 'arms race' by 2030

China's spectacular ascendency in AI is largely due to its government understanding the strategic importance of this emerging technology. For this reason, it has committed $150bn in funding to drive this agenda through, to win the AI 'arms race' by 2030. There are certain key areas that give China the advantage over the USA, Europe, and other countries; namely, the vastness of its population, the large amounts of data gathered on Chinese citizens—owing to high-level public surveillance—easier access to their personal data, and fewer data protection laws.

A large population affords China the capacity to educate and train 'armies' of AI specialists; one of the major problems in the West is that technological education and investment in tech subjects has not caught up with the demands of the industry. The advantage of increased data gathering and reduced data protection means that there are enormous amounts of information available to the Chinese to train AI systems.

All in all, as far as democratic countries are concerned, this has the potential to create the dreaded 'Big Brother' scenario; especially regarding US and western values on privacy, state surveillance, and over rights in accessing individuals' data—as we saw earlier this year with the Facebook/Cambridge Analytica data gathering scandal, and the introduction of more stringent GDPR laws in Europe. This leads to one of the most important ethical questions of our time. Who is going to govern AI applications, how are they going to do it, and in what way?

If you try to restrict the potential and capabilities of AI, it could impede a country's cyber-security systems and its ability to fight off cyber threats, or cut-off billions of people from the banking system. It could constrain scientific discoveries, as AI is increasingly being used in research, diagnostic services and in the medical world.

The fatal crash involving an autonomous Uber car, which killed a woman in Arizona earlier this year, is a case in point in what we are up against in the ethics and regulation of AI. It is also a harsh reminder that today's AI may be not as advanced as the popular media leads us to believe.

Essentially, was it the failure of the car's autopilot to identify the pedestrian, or lack of action from the human "operator" to intercede in preventing the accident? Even if the latter is true, how does the well-known marketing tag "self-driving" come into play?

**Blockchain is a decentralised database—typically a record of transactions—in which anyone can participate, and it is not owned by any party**

What came out of this unfortunate incident is that there is still very little understanding of AI capability in making "sound" judgements. The other issue is, where do you draw the line in a mixed human-machine environment, and the difficulty of evaluating who is in control; the human or the machine? Or both?

Having said that, any rushed initiative to put out some sort of official regulatory control on AI in response to our fears and misconception of the technology would be highly misguided. AI systems and current practice need to reach a state where we can understand and evaluate the reasoning behind the system, and rationalise it in human terms. It may well be the case, that once we develop a solid body of knowledge about best practices, protocols and models, we can set up a workable international system of rules and regulations governing AI. bf

# Sailing Back to the Future


*Costas Apodiacos of Piraeus-based Blue Planet Shipping has taken the pioneering step, in partnership with leading Anglo-Greek rotor sail specialists Anemoi, to use the force of wind as a renewable energy source on bulk carrier AFROS which was named 'Ship of the Year' at the Lloyd's List Greek Shipping Awards 2018. In this interview C. Apodiacos explains that the use of a renewable energy source could be the best remedy for both reducing dangerous emissions and avoiding the possible climate-change consequences of burning fossil fuels like LNG*

Interview by Eugenia Anastassiou

**As opposed to using other, more 'popular' alternatives, such as liquid nitrogen gas (LNG) that other shipping companies are considering, what compelled you to build the MV AFROS using Flettner Rotors?**

There were several reasons for outfitting the AFROS with rotor sails. The first being to validate laboratory predictions on the performance of Flettner Rotors; the second was to test the durability of the design and the materials used and thirdly to demonstrate the practicability of the whole system under the harshest of operating conditions on a working vessel.

## The best remedy

I am pleased to say that all the aforementioned criteria have now been validated and this *is a positive result for the development of Flettner Rotor technology.*

The reason for opting for a renewable energy source, as opposed to choosing to go down the LNG route, is that I'm a firm believer in "leaving it in the ground." I think this is the best remedy for both reducing dangerous emissions and avoiding the possible climate-change consequences of burning fossil fuels like LNG.

**How did the trialling of the vessel go in terms of saving fuel, cost effectiveness, and the environmental impact?**

Of course, reducing emissions is a consequence of burning less fuel which in turn results in saving money. Financial payback is estimated to be between five to seven years depending on the price of fuel. However, we should also consider another important cost here: what price do we put on the environment?

As we have seen with the latest regulations to reduce sulphur oxide (SOx) and nitrogen oxide (NOx) in fuel emissions, making it financially viable for shipping operators is not a primary consideration for regulators. However, by using the AFROS as an example we show that by using the wind as a source of power we not only have a sustainable solution, but also a practical and economically beneficial option.

**The AFROS was named 'Ship of the Year' at the Lloyd's List Greek Shipping Awards 2018 and it certainly attracted plenty of interest in the ports it visited**

**What feedback did you receive from the captain and those working on the vessel? How different is using wind power in a bulk carrier from conventional operations?**

Facing and overcoming shipboard challenges is crucial for the smooth operations of a vessel. For example, we had to show the captain that the rotor sails would not interfere with navigation or cargo operations. In fact when in port, the rotors can be moved along the ship's deck, preventing any impact on port operations.

**New technologies are already increasing efficiency in many areas of marine transportation as well as benefiting the health and welfare of the crew; however, they also create new challenges**

At the same time, another issue to consider is course settings, which should factor in winds that are favourable to the rotors' operation, rather like in the past, in the age of the sail.

Similarly, the chief engineer must be made aware of the consequences of the rotors' operation in terms of increased electrical load and how to balance this cost against the power saving to the main engine. Having said that, operation can be fully automated and it would include real-time remote monitoring by our technicians ashore. So, in terms of the other demands being placed on the ship's crew, operating the rotors is relatively simple.

## AFROS: Ship of the Year 2018

**What was the reaction of international shipping organisations, who must be watching these developments with great interest?**

To be honest, reaction has been muted, but it's early days yet. However, the AFROS was named "Ship of the Year" at the Lloyd's List Greek Shipping Awards 2018 and it certainly attracted plenty of interest in the ports it visited.

**At the moment, there is much controversy surrounding the debate about the way the maritime industry is tackling sulphur oxide (SOx) reduction in fuel emissions. What are your views on this subject?**

This debate stems from the recent IMO directive for shipping to achieve a 0.5% reduction in the amount of SOx by early 2020. One way to attain this goal is by either installing exhaust gas cleaning systems in ships, known as scrubbers, which "'clean" the emissions before they are released into the atmosphere—they are equivalent to "catalytic converters" in cars—or by burning low sulphur fuel.

Paradoxically, the window for fitting scrubbers into ships is now closed, simply because there are not enough of them to go around.

Even more concerning for the industry is that we don't know if there will be enough fuel, which the regulators deem compliant to meet demand. Even assuming that there is sufficient supply, there are unresolved issues about the quality of the fuel, which could adversely affect the safe operation of the ship's equipment.

This is a prime example of how well-intentioned regulators pass laws without due care and consideration and in this case they have really" messed up" in their task. Hopefully they will do a better job next time and will also look to tackle $CO_2$ mitigation in a serious manner.

***Costas Apodiacos*** **was born to Greek parents, in London, where he was raised and went to school. He studied economics at Manchester University. Between 1978 and 2015, he worked in London-based shipping company *Victoria Steamship*. He now lives in Greece and has an interest in *Blue Planet Shipping*. His main hobby outside of shipping is the protection of the marine environment.**

## Not a cheap option

**The maritime industry would be forgiven for being sceptical towards the idea that wind propulsion is the 'shining hope' for emissions reduction; how do you persuade them that by, ironically, 'going back' to wind power we are in fact pushing forward?**

Ship operators are right to be sceptical because any new technology (and, if I may add, any new regulation for that matter) must primarily demonstrate that it not dangerous to the safety of the ship, or the lives of the crew. Operational matters onboard which were addressed in an earlier question are also relevant.

The fact that the design, build, and installation of Flettner Rotors on the AFROS was done by a ship operator should put other shipping companies at ease on this fundamental issue. At the same time fitting rotors on your ship is not a cheap option; so, one must be careful to assess the costs of installation and operation, against the likely benefits.

**In your opinion, what measures should shipping companies be looking at to help the marine environment?**

It really comes down to personal beliefs, and that goes for everyone; from the assistant cook right up to the ship's owner. Education is key to more people being aware of the damage we can wreak on the environment by our lack of thought.

**For all the negativity, it must be noted that the shipping industry is probably the cleanest industry on the planet with regards to protection of the marine environment**

For all the negativity, it must be noted that the shipping industry is probably the cleanest industry on the planet with regards to protection of the marine environment. Regulations exist for the disposal of rubbish, cargo residues, human waste, waste from the fuel treatment processes, treatment of ballast and bilge water, hull paint specifications, and even down to the type of lubricating oil used in the stern tube in case of leakages. Of course, there is always more that can be done. For instance, ships can reduce their speed in areas where marine life is vulnerable, but on the whole the industry is on the right track in its environmental awareness.

I would just like to add one more point on this: in many ways our small planet is just like a ship; we can't be too careful in the way we treat it!

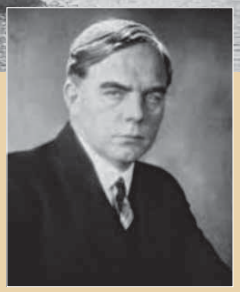
### New technologies-new challenges

**What do you see in the future of shipping in the 21st century in terms of new technology and environmental practices coming into the industry?**

New technologies are already increasing efficiency in many areas of marine transportation as well as benefiting the health and welfare of the crew, however they also create new challenges. For example, the remote monitoring of ships' equipment is relatively benign, but taking the next step, advancing to remote control could bring opportunities for hackers, with unknown worrying consequences.

In future, technology could be applied universally to schedule arrival times at ports, which would save fuel and ship waiting time. Other developments in the pipeline could be adding emissions' monitoring to position and speed reports.

Shipping companies and the industry in general will willingly adopt technology that enables an improvement in competitiveness—in many instances this is often beneficial to the environment. However, having said that, great care and forethought must be applied when considering technologies and regulations designed only to benefit the environment, to avoid doing more harm than good. bf

German engineer Anton Flettner, inventor of the rotor sail technology

## How rotor sail technology works

**As part of the UN's programme to reduce carbon dioxide ($CO_2$) emissions to levels prohibiting temperatures to exceed 2° C by 2050, the International Maritime Organisation (IMO) took the momentous decision to include shipping in the 2015 Paris Agreement, last April. This motion has led the maritime industry to take measures towards finding and implementing methods of lowering the emission of greenhouse gases, within the frame of the UN/IMO mandated effort to preserve the environment.**

**For one Greek shipping operator this means going 'back in time' using wind and sails as a possible solution to this issue, by installing and trialling a Flettner Rotor system on a commercial dry bulk cargo vessel, for the first time.**

***Rotor sail technology* is not new; it was first deployed in 1924 by its inventor, the German engineer *Anton Flettner*, on his schooner the 'Buckau', but it was never fully developed for commercial maritime purposes. The way it works is that the rotors or 'sails', which are cylindrical, spin using an electric motor, which utilises an aerodynamic phenomenon known as the Magnus Effect to provide additional propulsion to the vessel by harnessing wind power. When rotor sails are installed as an auxiliary power source on fuel-powered vessels, the propulsive effect of the rotors helps to reduce fuel consumption, thus lowering harmful exhaust emissions.**

***Costas Apodiacos of Piraeus-based Blue Planet Shipping* has taken the pioneering step, in partnership with leading *Anglo-Greek rotor sail specialists Anemoi,* to commission *bulk carrier AFROS* to be fitted with Flettner Rotor technology. This ground-breaking vessel took its maiden voyage last year and its deployment demonstrated that this innovative use of a renewable energy source on board could be a viable option in meeting the challenges of working bulk carriers conducting business worldwide; as well as proving that it can work for the sustainable future of shipping.**