



# focus

#124

Your gateway to International Standards

# Transport trends





#124



# ISOfocus

September-October 2017



Photo: SPRING Singapore



**ISOfocus** September-October 2017 – ISSN 2226-1095

*ISOfocus*, the magazine of the International Organization for Standardization, is published six times a year. You can discover more content on our Website at [iso.org/isofocus](http://iso.org/isofocus), or by staying connected with us on:



Head of Communication | **Katie Bird**

Editor-in-Chief | **Elizabeth Gasiorowski-Denis**

Writers | **Maria Lazarte, Barnaby Lewis, Clare Naden**

Contributing writers | **Li Qiang** and **Ouyang Tao**  
representing the *China Institute of Marine Technology and Economy*

Copy editor and Proofreader | **Vivienne Rojas**

Designers | **Xela Damond, Pierre Granier, Alexane Rosa**

Translator | **Alexandra Florent**

**Subscriptions and back issues**

If you enjoy *ISOfocus*, you can download the pdf for free or subscribe to receive printed issues through our Website [iso.org/isofocus](http://iso.org/isofocus). You can also contact our customer service at [customerservice@iso.org](mailto:customerservice@iso.org)

**Contributions**

You can participate in creating this magazine. If you think your contribution can add value to any of our sections, please get in touch at [isofocus@iso.org](mailto:isofocus@iso.org). Views expressed are those of the respective contributors and are not necessarily those of ISO or any of its members.

© ISO 2017

Published in Switzerland. All rights reserved.

Articles in this magazine may be reproduced for non-commercial purposes only. These may not be modified and must be properly referenced, with due credit to ISO being given. ISO may revoke this permission at its sole discretion. For enquiries, please contact [copyright@iso.org](mailto:copyright@iso.org).



Photo: CSSC-SWS

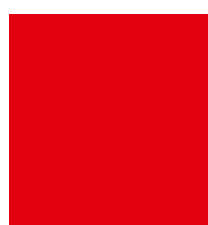


**28-29** World Smart City Forum in Barcelona  
World Standards Day 2017  
BSI celebrates ISO's 70<sup>th</sup> birthday

- 2** Shaping the future of transportation  
Comment by Christoph Winterhalter.
- 4** #smart farming  
Getting social about agriculture.
- 6** Why intelligent supply chains will rule the world  
Dynamic data for faster freight.
- 14** Tracking worldwide freight  
A global picture of transport trends.
- 16** Building China's Silk Road  
Pushing the new economic frontier with ISO standards.
- 22** Greening the deep blue  
The rising tide of eco-friendly shipping.
- 30** When standards are the anchor for sustainable growth  
Bunkering with confidence in Singapore.
- 36** All aboard for quality rail!  
How standards keep the world on track.
- 40** Boxing clever – How standardization built a global economy  
Why shipping containers changed the face of freight.
- 46** ISO welcomes its new Secretary-General  
Sergio Mujica takes the helm.



This magazine is printed on certified FSC® paper.





# Shaping the future of transportation



Photo: Christian Kruppa

**Christoph Winterhalter,**  
DIN Executive Board Chairman.

The logistics sector plays a crucial role in maintaining and improving trade flows between the world's economies. But technology is changing every aspect of how logistics companies operate. So with growing pressure to deliver better service at an ever lower cost, the race is on to define the industry's future.

The logistics sector is an innovative and dynamic market with outstanding growth potential. It is of enormous strategic importance to German industry, because Germany is the world's leader in exports. The "Made in Germany" success story would never have been possible without the highly efficient structures of the logistics sector. Every year, 4.3 billion tonnes of goods are transported along German roads, rails and waterways, supported by a robust logistical network that employs 2.8 million people. With a turnover of approximately EUR 258 billion in 2016, logistics represents the third-largest share of the German economy, right behind the auto industry and trade, and ranks ahead of the electronics sector and mechanical engineering. It is valued at over EUR 1 trillion in Europe alone.

Logistics brings all other industries together. What makes the sector particularly unique is the large number of interfaces all along the delivery chain. With such complex, interconnected economic structures, standardization has never been more essential. The benefits are obvious: standards support the global exchange of goods. They remove trade barriers, improve logistical processes and create a common language for all market participants.

Logistics is not a new topic for global standards organizations. The ISO shipping container (ISO 9897) and European pallets (EN 13382) are classic success stories of standardization in logistics. In fact, they made the upswing in global trade over the last 60 years possible. But the challenges and framework conditions facing logistics standardization today are very different to what they were back then. Globalization and digitalization have accelerated the flow of goods worldwide, dramatically increasing the number of interfaces and processes involved in moving goods between the point of origin and the point of consumption. New business models, new business participants and new technologies all conspire to make innovation cycles shorter, forcing the logistics sector to constantly reinvent itself in order to keep up. More than ever, this will require a cross-sectoral perspective and global cooperation.

This is where standards organizations worldwide can demonstrate their real strength. In collaboration with other technical rule-makers, as well as forums and consortia, they can bring together the necessary expertise to standardize such overarching and complex areas, both at the national and international level. Roadmaps developed in conjunction with industry and policy makers can point the way forward, creating a sense of security and trust among users.

But speed is of the essence. Innovations are being churned out at unprecedented speed. Whether or not an idea is successful depends on how long it takes to reach the market. This forces the international community to continually question existing processes, to optimize them and to move quickly with standardization. As service providers, we must consistently align ourselves with the requirements of our partners from industry and society, identifying early on new developments in technology, missing interfaces, gaps and duplications in areas covered, and necessary collaborations. We then need to coordinate them in a timely and comprehensive manner.

As things stand, I am confident that, together, we can succeed. In my first year as Executive Board Chairman of DIN, the German Institute for Standardization, I have delved deeply into our organization's past, not least because we are celebrating our hundredth anniversary this year. The overall economic and social "added value" created by standards since the beginning of industrialization – for which it still stands today – is immense. And the dedication and steadfastness with which standards makers around the world have faced up to the social, economic and political challenges throughout the many years of standardization's history deserve our utmost respect.

The open conversations I have had with many of you have confirmed what I truly believe: Together we can shape the future. We are largely in agreement about the "homework" we should be doing and I look forward to discussing these topics with you during this year's ISO General Assembly in Berlin. As an organization, we are in a good place right now. But more importantly, I feel the global standards community is closer-knit than ever before. A wind of change is blowing. The theme of ISO's General Assembly – "Open-minded. Open for change." – has already planted a seed in many of our organizations. Let us nurture this seed all together – something great can grow from it. ■



# #SMART farming

How will we feed an exploding world population in an environmentally sustainable and cost-effective way? Smart farming provides the answer with technologies like drones, wastewater reuse, drip irrigation or the Internet of Things. But for these solutions to thrive, they must be supported by standards. This was the message of the **#smartfarming** campaign held on 5-9 June 2017.

See the highlights: [storify.com/isostandards/the-future-of-farming](http://storify.com/isostandards/the-future-of-farming)

## Top 8 influencers:

- UN Geneva @UNGeneva
- Bayer Crop Science @Bayer4Crops
- FAO Climate Change @FAOclimate
- Microsoft India @MicrosoftIndia
- Aerospace Industries @AIAspeaks
- UNRISD @UNRISD
- UNECE @UNECE
- ISO @isostandards

**In numbers**  
641 tweets  
by 339 users  
reaching  
**1 984 471**  
people  
**Total impressions**  
**6 251 320**

The highlight of the week was a Tweetchat – literally, a chat on Twitter – that brought together stakeholders from different backgrounds for an open conversation on the subject. From ISO members like UNE (Spain) to influencers like the United Nations Food and Agriculture Organization (FAO) or life sciences company Bayer, participants offered their insights on how smart farming can help address the challenges of modern agriculture.



**1. What are the biggest issues facing agriculture today?**

Agriculture today is facing multiple complex challenges, such as climate change, land degradation, and population growth.

- UNRISD @UNRISD**  
Replying to @isostandards  
A1 farming challenges now include rapidly declining seed/crop diversity, seed patenting, fertilizer overuse, climate change  
#smartfarming  
3:06 PM - 8 Jun 2017
- UNE UNF Normalización @NormasUNC**  
Replying to @isostandards  
A1: Food production to feed all the population in the planet in the coming years  
Global warming, #smartfarming  
3:41 PM - 8 Jun 2017
- Martin Frick @mfrick**  
Replying to @isostandards  
#smartfarming A1 loss of arable land at the heart of multiple #crisis - often leading to #conflict and #migration  
3:11 PM - 8 Jun 2017

**3. Climate change could impact seasonal life cycles of production, what solutions are there?**

Hybrid crops, agroforestry, and standards could all help agriculture adapt in a world affected by climate change.

- Bayer Crop Science @Bayer4Crops**  
A3: Resilience to #climatechange through native traits that work together with nature to protect yield. #smartfarming, eg. hybrid rice  
2:20 PM - 8 Jun 2017
- Martin Frick @mfrick**  
Replying to @isostandards  
#smartfarming A3 #crops with shorter life cycles can still yield where other crops fail @FAOclimate  
3:21 PM - 8 Jun 2017
- Pix4D @pix4d**  
A3 In #smartfarming, monitoring and tempo of harvest are more important than ever. W/ #climatechange we need to adapt, we need to be aware twitter.com/isostandards/s...  
2:21 PM - 8 Jun 2017
- FAO Climate Change @FAOclimate**  
RT @mfrick: #smartfarming A3 regions moving into new climatic zones might benefit from species from diff. regions  
3:20 PM - 8 Jun 2017
- CEN and CENELEC @stanant44-17**  
Replying to @isostandards





# Why

intelligent supply chains  
will rule the world

*by Elizabeth Gasiorowski-Denis*

Global freight transport is a key component in the trade of goods and materials, but new demands on the transport network are creating fresh challenges for data. Transport companies are endeavouring to meet those new demands, but are they successful? Discover how an adaptive, intelligent supply chain – built around standards – accelerates innovation and drives change.



Imagine an advanced interconnected freight transport network that connects goods safely, quickly and cost-efficiently, a network that makes different modes of transport easier to use than ever before, and provides reliable, predictable and accessible information to enable moving a product from A to B to reach its final destination.

In today's congested world, most would agree that the e-logistics related to movement of goods is a growing field, and one that will not plateau. Companies are seeking faster and better ways to get product to market and on consumer's shelves or in their driveways. At the same time, many would agree that demand frequently outstrips the available capacity of transport infrastructure. There can be few companies that have not experienced sporadic load disparities, slow freight movement, or high transport expenses.

### Global growth

Every product in our homes and offices got to the shop shelves as a result of efficient, safe and rapid transport, sometimes in the same city, at other times from across the globe, and often using multiple modes of transport such as rail hubs, air freight and land-based services. The movement of freight is changing in ways that could barely be imagined a few generations ago and at a pace that is faster than any in recorded history.

To better understand the impact of global freight movement, consider this. The freight industry transports trillions of dollars' worth of goods every year to every corner of the globe and back, through an increasingly interconnected and interdependent global freight supply chain. In 2015, world trade in goods was valued at about USD 16 trillion, according to the UNCTAD report *Key Statistics and Trends in International Trade 2016*, the latest analysis of trade-related issues by the United Nations Conference on Trade and Development. Each seaport and airport is connected to road and rail networks with intermodal dwelling times, reflecting the multimodal nature of most freight journeys.

International and domestic freight shipping is projected to continue to grow rapidly in the coming years and decades as export-oriented economies and developing nations generate more international trade. Additional demands in freight volume (tonnes of goods moved), and the distance at which this freight is being carried, will be coupled with problems of rising traffic congestion, environmental damage and associated economic losses.

There is no question that today's industry is different from that of the past because of the premium placed on speed and safety of deliveries, not only in local markets but also across borders into other countries. When will a load arrive? Where is a particular shipment right now? What condition is it in? Why did a truck make an unscheduled stop? The need for real-time data has never been so important to companies.

In 2015, world  
trade in goods  
was valued at about  
USD 16 trillion.



### New demands

As the industry moves into the connectivity era and becomes more efficient, the way data is presented also takes on added performance. In the present state of things, systems cannot cope with the volume of different data formats involved. Take, for instance, the average supply chain. There are several hundred GPS devices being used by haulers and their subcontractors at any one time. This requires that data from a transporter's own fleet and that of its subcontractors be unified into one stream and distributed only to relevant customers.

Today, the industry needs to manage the plethora of inbound and outbound data. And then there's the problem of interconnectivity of data. The supply chain uses an alphabet soup of so many types of standards – UN/EDIFACT, SMDG, LOGINK, GS1 and OAGi – yet the lack of seamlessness and inefficiencies in general, as well as the rising costs and complexities of shipping and delivering goods, are adding to profit pressures faced by manufacturers across the globe.

“In transport and logistics, there are many standards and there will be many standards for a long time,” says Jan Tore Pedersen, President of Marlo, a leading independent logistics and transport company. “Hence, for interoperability to be efficient and effective, International Standards are important, both for connectivity and for information exchange.”

Understanding these trends is key to radically rethinking freight and future-proofing intermodal transport. It's something Pedersen says is likely to change with initiatives such as the European Gateway Services in the Port of Rotterdam and the Common Booking Platform in the port of Antwerp, where visualizing that intermodal transport becomes more and more relevant for the feeding of intercontinental containers. “When such services are implemented further, they may attract cargo that normally would have been using road transport – due to increased availability, increased frequencies and lower cost, etc.,” he says.

### Innovation in action

Much of the innovation needed to address these challenges is already happening. The ideas in data transport are not science fiction. For example, ISO technical committee ISO/TC 204, *Intelligent transport systems*, seeks to fill a role focusing on data exchange needs for the international supply chain, including data needs for the interface with all modes of transport. Those needs are essential for transport information and control systems.



The longer-term vision is one of harmonized intermodal transport that will enable economic growth.

Take ISO technical specification ISO/TS 24533:2012, *Intelligent transport systems – Electronic information exchange to facilitate the movement of freight and its intermodal transfer – Road transport information exchange methodology*. It focuses on motor carrier transport interfaces through the supply chain, or those data items that deal specifically with the key pieces of transport information critical to getting the goods to the marketplace without delay related to data sharing. Therefore, the interfacing modes' data structures and formats must accommodate each other to ensure efficiency and security from end to end.

The aim of ISO/TS 24533 is to allow electronic data sharing through many-to-many relationships between supply chain partners, which will help ensure sustaining standards. The many-to-many relationships also guarantee that data initiated by the first partner will allow other partners equal access and can help customs agencies to access data early in the progress of goods coming through the supply chain.

Although the technical specification contributes to removing bottlenecks in data exchange, it was its predecessor – the Universal Business Language (UBL) – that started the trend. Published as ISO/IEC 19845, the standard is a generic data interchange language that allows disparate business applications and trading communities to exchange information along their supply chains using a common format.

### All too obvious

But how are companies taking the news? Commercial transport companies have been hesitant about adopting more advanced technologies for a number of reasons and there is widespread confusion about which breakthroughs will have the biggest effect on profitability and overall organizational performance.

Marlo believes International Standards are, and will continue to be, important for the logistics industry. “If we want to achieve increase in intermodal transport,” says Pedersen, “international standards organizations need to perfect what they have, but, more importantly, support interoperability and collaborate, rather than compete.”

Collaboration is key indeed. New partnerships and new ways of working with other standards organizations are needed to achieve shared goals. To this end,

ISO/TC 204 has advanced the idea of close coordination among other appropriate ISO technical committees, OASIS, IATA, IEC, CEN, the UN Centre for Trade Facilitation and Electronic Business and the World Customs Organization. Working in isolation is no longer viable, particularly in view of the dramatic growth of the global intermodal freight market.

Research consultancy MarketsandMarkets<sup>1)</sup> expects the global intermodal freight transport market to grow to USD 26.19 billion in 2019. This represents an estimated compound annual growth rate of 16.4% from 2014 to 2019.

1) The analysts working with MarketsandMarkets come from renowned publishing houses and market research firms globally adding their expertise and domain understanding. They get the facts from over 22000 news and information sources, a database of a hundred thousand key industry participants and draw on a relationship with more than 900 market research companies globally.





In the current scenario, North America is expected to be the biggest market on the basis of spending and adoption of the intermodal freight transport market. Given the global boom in the intermodal freight transport industry, the need for standards has risen dramatically. Add in today's heightened security concerns and there is perhaps no other sector that better illustrates the axiom "the time is now" as it looks for new ways to manage the challenges of moving goods across the planet.

### A vision of the future

Today's freight transport system has become as much about dealing with a crisis and understanding technology as it is about loading boxes on to trucks, trains, ships and aircraft. New challenges are pushing boundaries: minute-by-minute tracking in all parts of the world; realizing cost efficiencies while guaranteeing timely delivery; and anticipating problems and having back-up plans.

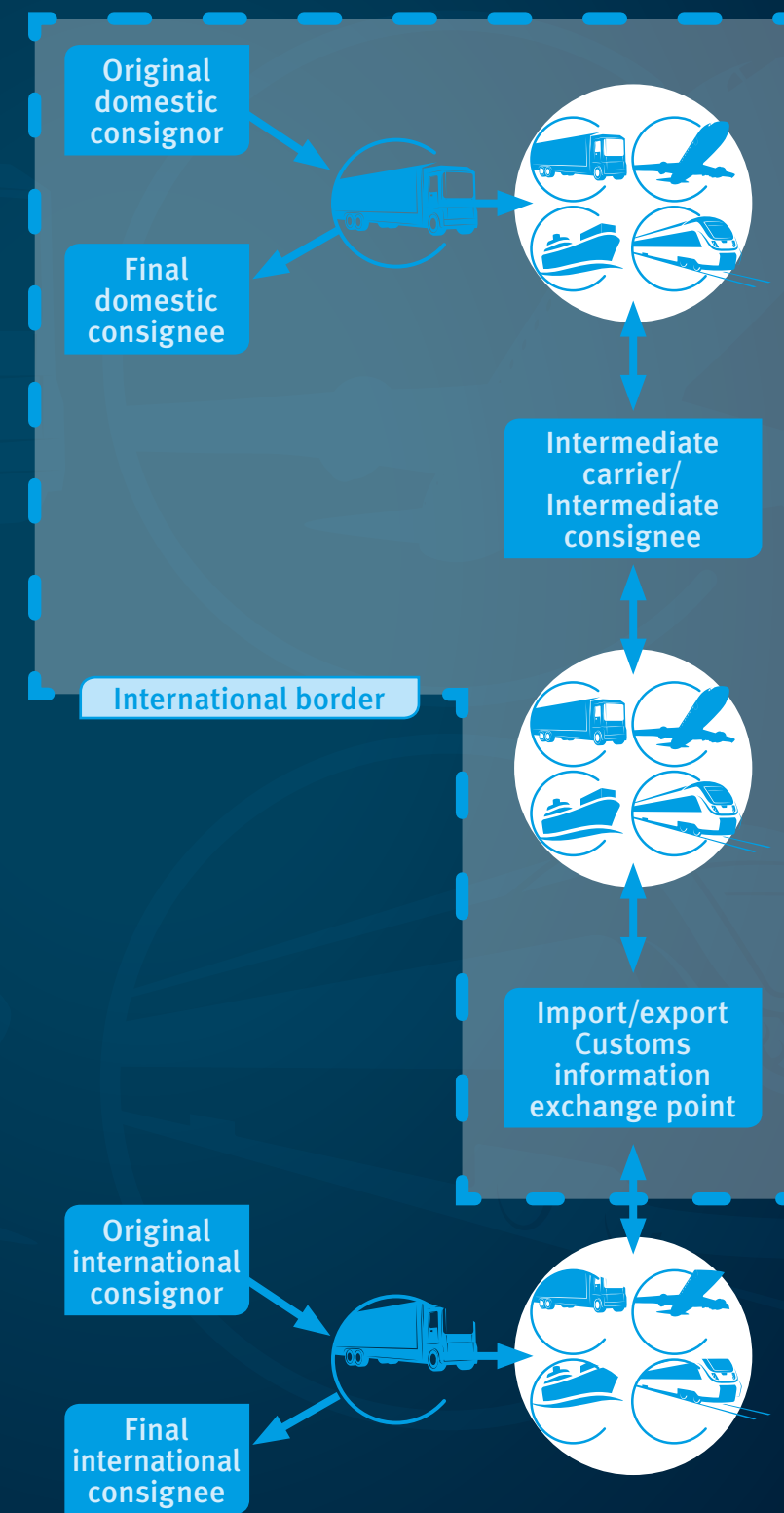


Michael Onder, President of C3 Consulting in the United States, gives his insights into these important questions. "Today's highly competitive global market calls for intermodal transport systems that meet industry's expectations in efficiency and reliability as well as government's sustainability expectations," he says. "There can be no doubt that transport is a very complex and diverse system of systems, with complex networks. However, well endorsed and accepted International Standards are essential for building an interface system." Onder, who is also the project leader for ISO/TS 24533, goes on to explain the benefits: "We are hoping to use ISO/TS 24533 as a standard for interoperability that will allow the messages constructed under ISO/IEC 19845 to be used interoperably with other systems (UN/EDIFACT, GS1, LOGINK). This will reduce the cost of operation and energy consumption and, at the same time, deliver greater reliability with predictability that is vital in the decision-making process of the logistics chain."

What seemed impossible yesterday is now very possible with access to today's technology and information. Achieving a perfect world in future transport means overcoming a series of challenges, not to mention an array of standards and interoperability issues. Intermodal data exchange standards developed by ISO will help connect our ports with the rail hubs, air freight and land-based distribution, and offer greater efficiency in how goods are moved. In this future, the longer-term vision is one of harmonized intermodal transport that will enable economic growth. It will be resilient, energy-efficient and sustainable. So, will ISO standards be the solution? If design and forward-thinking technology are the drivers, there is every chance. ■

# INFORMATION EXCHANGES AT INTERMODAL INTERFACES

Information exchanges at transport interfaces along the chain of participants responsible for the delivery of goods from the point of origin through to the final recipient.



Based on ISO/TS 24533:2012, this thread may be generalized to address the various combinations of segments that occur in the global supply chain while focusing on the information exchange at the interchange points.



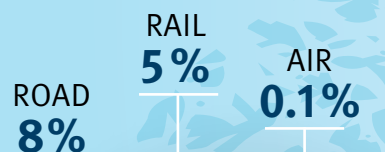
# Tracking worldwide freight

## WORLD TRADE IN GOODS OVER THE LAST DECADE

2005 | USD 10 TRILLION

2014 | USD 18.5 TRILLION

2015 | USD 16 TRILLION



## ROAD THE TOTAL SURFACE FREIGHT (ROAD AND RAIL)

IS EXPECTED TO ACCOUNT FOR 25% OF THE TOTAL GLOBAL FREIGHT DEMAND

**2015**  
32 000 BILLION TONNE-KILOMETRES

**2050**  
83 000 BILLION TONNE-KILOMETRES



**ISO/TC 22**, Road vehicles : 843 standards  
**ISO/TC 110**, Industrial trucks : 70 standards

## RAIL AT A GLOBAL LEVEL

THE USA, CHINA AND RUSSIA ACCOUNT FOR NEARLY 80% OF GLOBAL RAIL FREIGHT

- 8 696 million tonnes carried worldwide in 2015
- 8567 466 million tonne-kilometres worldwide in 2015

**ISO/TC 269**, Railway applications : 4 standards  
**ISO/TC 17/SC 15**, Railway rails, rails fasteners, wheels and wheelsets : 14 standards

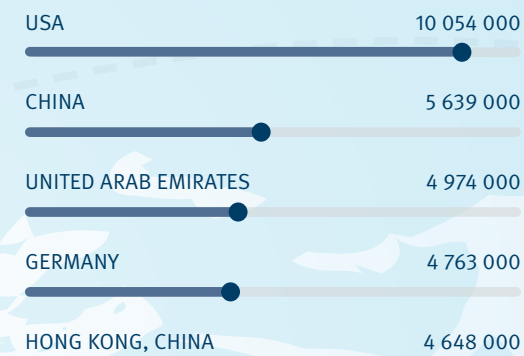


## AIR 52 MILLION METRIC TONNES OF GOODS

WERE TRANSPORTED IN 2016

**ISO/TC 20**, Aircraft and space vehicles : 655 standards

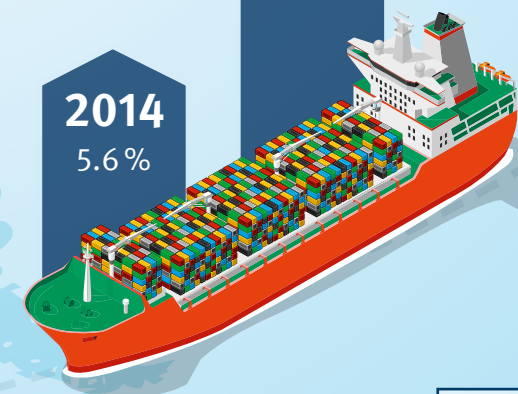
### THE 5 LARGEST INTERNATIONAL FREIGHT MARKETS BY 2016 (IN TONNES)



## GROWTH IN CONTAINERIZED TRADE

**NOW**  
15%

**2014**  
5.6%



## WATER MARITIME SHIPPING

REMAINS THE MAIN TRANSPORT MODE FOR LONG-DISTANCE TRADE (OVER 70% OF GLOBAL TRADE)

- Container port traffic in 2014 : 679 264 658.406 TEU (20-foot equivalent units)
- Growth in containerized trade : 5.6% in 2014 and now represents 15% of global seaborne trade

**ISO/TC 8**, Ships and marine technology : 307 standards  
**ISO/TC 104**, Freight containers : 46 standards



# Building China's Silk Road



*by Li Qiang and Ouyang Tao*

China has become a leading centre of maritime activity. As the industry revives its trade routes across the seas, it looks to International Standards to promote ship technology development along the country's Silk Road, which will lead to a new era of maritime cooperation.



China is aiming  
for joint efforts  
with global partners.

The story of China's relationship with the sea and its maritime history of trade and exploration date back to the Tang and Ming dynasties. The country's rulers, realizing the importance of the sea for its national economy, developed a vibrant and prosperous maritime trade and businesses that outstripped countries around the world and became a lucrative source of trade to rival that of the terrestrial Silk Road. At that time, the so-called "Maritime Silk Road" referred to the sea route of economic and cultural exchange and communication



Photo: CSSC-SWS

between China and the rest of the world. The route started from the south-east coast of China, winding around the peninsulas and countries of South-East Asia, through the Indian Ocean and into the Red Sea, and finally to East Africa and Europe. It became the key path for intercontinental trade and cultural exchanges, which facilitated the common development of countries along the route. Over the years, Chinese shipbuilders led the way with their massive ocean-going vessels.

### Innovation and collaboration

Leaping forward to today, China is once again building on its strength as a major global player in shipping and the shipbuilding industry with its 21<sup>st</sup>-century Maritime Silk Road, also known as the "One Belt, One Road Initiative". It is a development strategy that conceptualizes the feasibility of maritime cooperation at regional and international levels to coordinate manufacturing capacity with other countries.

China is aiming for joint efforts with global partners to build the Maritime Silk Road into one that promotes green development, common prosperity, safety and security, as well as advances in smart technology, innovation and collaboration in governance. The initiative also focuses on cooperation in the exploration for, and use of, maritime resources, maritime connectivity, enhanced efforts under the international convention framework for sea transportation, navigation security, maritime law enforcement, maritime scientific research and technologies, and smart maritime application systems. Ships and ocean engineering equipment are the key carriers for the Maritime Silk Road and its emerging opportunities, and raise huge demand for maritime equipment and technologies.

Since the beginning of the 21<sup>st</sup> century, China has made remarkable progress in its maritime engineering equipment and shipbuilding. For six consecutive years from 2010, the country has ranked number one around the world in the three core indicators for the shipbuilding industry. And in 2014, it surpassed other countries in the number of business orders and its total amount of maritime oil and gas engineering equipment.

### Market expansion

Notable developments have also been achieved in maritime equipment for renewable resource exploitation, equipment for seawater desalination and management, oceanographic observation and marine biological development, to name but a few.

Looking ahead, the market for marine engineering equipment and high-tech ships is expected to expand further in response to forthcoming developments in the sector, including:

- The opening of the polar channel
- Increasing demand for resource exploitation in the Arctic region and sea



- New economic growth based on emerging sectors such as marine food and energy and marine mining
- Stricter requirements for maritime safety and environmental protection
- The urgent need to protect maritime rights and interests

It is estimated that by 2020, the potential market for marine engineering equipment and high-tech ships will scale up to about USD 170 billion, totalling USD 260 billion by 2025. Given such opportunities, it is crucial for China's shipbuilding industry to set up a standards and specification system for new manufacturing technologies, to make a leap forward in development.

### Common ground

Meanwhile, the variety and diversity of cultures in countries along the Maritime Silk Road pose their own challenges. Therefore, it is necessary for these countries to think about seeking a common ground amid their differences, namely how to collaborate and cooperate for inclusive development. The only viable solution is to abandon harsh, profit-based competition and set a new path to coordinate complex relations and interests through institutions, rules and standards.

The production and use of ship products must break down the border barriers to comply with harmonized International Standards at the technical, operational, management, safety and environmental levels, while conforming to the safety and environmental requirements of the International Maritime Organization (IMO).

At present, there are some 400 ISO standards for the shipping industry, developed under the stewardship of technical bodies ISO/TC 8, *Ships and marine technology*, ISO/TC 188, *Small craft*, and ISO/TC 35/SC 12, *Preparation of steel substrates before application of paints and related products*. Altogether, ISO's standardization efforts cover areas such as design, rescue, fire control, environmental protection, machinery, pipes, outfits, navigation and communications for marine ships, large-scale yachts and small craft.

Over the past years, ISO standards for ships have not only provided a practical basis by which to bring the design, building and operation of ships in different countries in line with the provisions of the International Maritime Convention, they have also helped level the playing field for the global shipping market.



### Reaping the benefits

The active uptake of applicable ISO standards has brought remarkable benefits to China's shipping sector. By adopting ISO standards, Chinese shipbuilding enterprises have been able to grow fast, especially small and medium-sized enterprises (SMEs). Standards have also provided technical support for the export of ships, with increased competitiveness, while, at the same time, helping China to establish its own standardization system for the shipbuilding industry based on relevant International Standards, to harmonize and normalize the design and building of ships.

Thanks to the substantial development of its domestic shipping industry, China has become more deeply engaged in international standardization work. It currently assumes the secretariat for ISO/TC 8 and ISO/TC 8/SC 4 (outfitting and deck machinery), both of which are chaired by Chinese experts. To date, the country has led the development of 40 published ISO standards, with a further 26 in the pipeline.

The effective implementation of International Standards has broken down technical barriers on the global market, increased the competitiveness of domestic products and provided quality ships and technologies to countries along the Maritime Silk Road. For example, ISO 14409, *Ships and marine technology – Ship launching air bags*, and ISO 17682, *Ships and marine technology – Methodology for ship launching utilizing air bags*, on ship-launching technologies have been widely used.

By 2020,  
the potential market  
for marine engineering  
equipment and high-tech ships  
will scale up to about  
USD 170 billion.

Using air bags to launch ships has become the first choice for global SMEs due to low labour and time costs, the increased need for flexibility, safety and reliability, and comprehensive economic benefits. At present, the widespread application of these two standards has attracted attention from more and more countries and regions. For example, ship-launching air bags made in China have sold well in Singapore, the Philippines and Indonesia.

### Global vision

President Xi Jinping of China has underscored his commitment to promote China as a scientific centre with a global vision, through its presence on the International Standards scene. The country has brought many advanced ship technologies to the international sphere, including generic product standards for ship-based cranes and mooring and towing devices, environment-friendly materials standards for bio-soluble mineral wool, generic design standards for mechanical vibration isolation systems, and high-tech product standards for cryogenic valves in LNG (liquefied natural gas) carriers.

As one of the world's biggest manufacturers of ships, China is committed to engaging more countries along the Maritime Silk Road, helping them to understand and use ISO standards, and to take part in standards development. What's more, based on technical standards for traditional design and shipbuilding techniques, China is developing and promoting advanced, smart "green ship" standards to drive cooperation among the relevant countries in the shipping sector. It seeks to take the interests of all parties into account so as to generate mutual benefits, including industrial development and international maritime best practice for safety, environmental protection and energy conservation. In so doing, China wishes to give full play to the comparative advantages of each country and promote all-around practical cooperation. ■

Li Qiang and Ouyang Tao – representing the China Institute of Marine Technology and Economy



# Greening the deep blue

*by Maria Lazarte*

Over the past few years, the tides of the maritime industry have been changing. There's a push for safer, smarter, more environment-friendly and energy-efficient sea transport. What no one expected is that these actions are not only bringing economic benefits, they are also leading to the servitization of the shipbuilding industry.





Long hailed as a less costly and greener alternative to other means of transporting goods, ships carry close to 90% of the world's trade and are instrumental to the global economy. But despite the benefits, growing demand is pushing their environmental impact to unacceptable levels. A chilling warning from top experts, published earlier this year in the journal *Nature*, claims the world has three years to stop climate change. Will this tried and tested industry step up to the challenge? There is hope ahead: new standards are in the making that promise not only to make shipping greener, but to redefine how the industry works.

“Who would have thought that a standard could change the rules of the game for an entire industry? It's really quite extraordinary.” Geir Axel Oftedahl, Business Development Director at Norwegian paint manufacturer Jotun Group, is talking about ISO 19030, one of the new environmental shipping standards published by ISO's technical committee on ships and marine technology (ISO/TC 8). But what is this hull and propeller performance standard doing? And where does paint come into the story? “Like with many other industries, one of shipping's biggest enemies when it comes to environmental footprint is greenhouse gases (GHG),” says Koichi Yoshida, Chair of the ISO subcommittee on marine environment protection (ISO/TC 8/SC 2). These are directly related to energy efficiency, so the transportation sector is under great pressure to increase fuel performance. In 2012, shipping accounted for about 2.1% of global CO<sub>2</sub> emissions, but this has the potential to grow as more and more goods continue to travel by sea.

## Under pressure

The International Maritime Organization (IMO) is increasing pressure on newly built ships by requiring higher fuel efficiency. This makes sense, but what practical solutions are there? You may be surprised to hear that addressing the performance of hulls and propellers is one way to achieve this.

“Part of a ship's hull is in direct contact with water,” explains Oftedahl. “As it moves through the water, the ship uses energy to overcome frictional resistance on the wet part of the hull. The amount of energy used depends on the condition of the wet hull surface. If the surface is smooth, it will be much more efficient and require less energy than if it is rough. A similar logic applies to the propeller. Friction can account for up to 80% of the resistance that a ship needs to overcome to move forward at desired speed – that's about 80% of its total energy use.”

But the underwater environment is harsh and the hull and propellers are exposed to both mechanical damage and biofouling caused by marine organisms like slime, weed or barnacles that attach to the ship's surface. What is really astounding is that these may easily increase resistance and thereby energy consumption by more than 60%,” says Oftedahl.

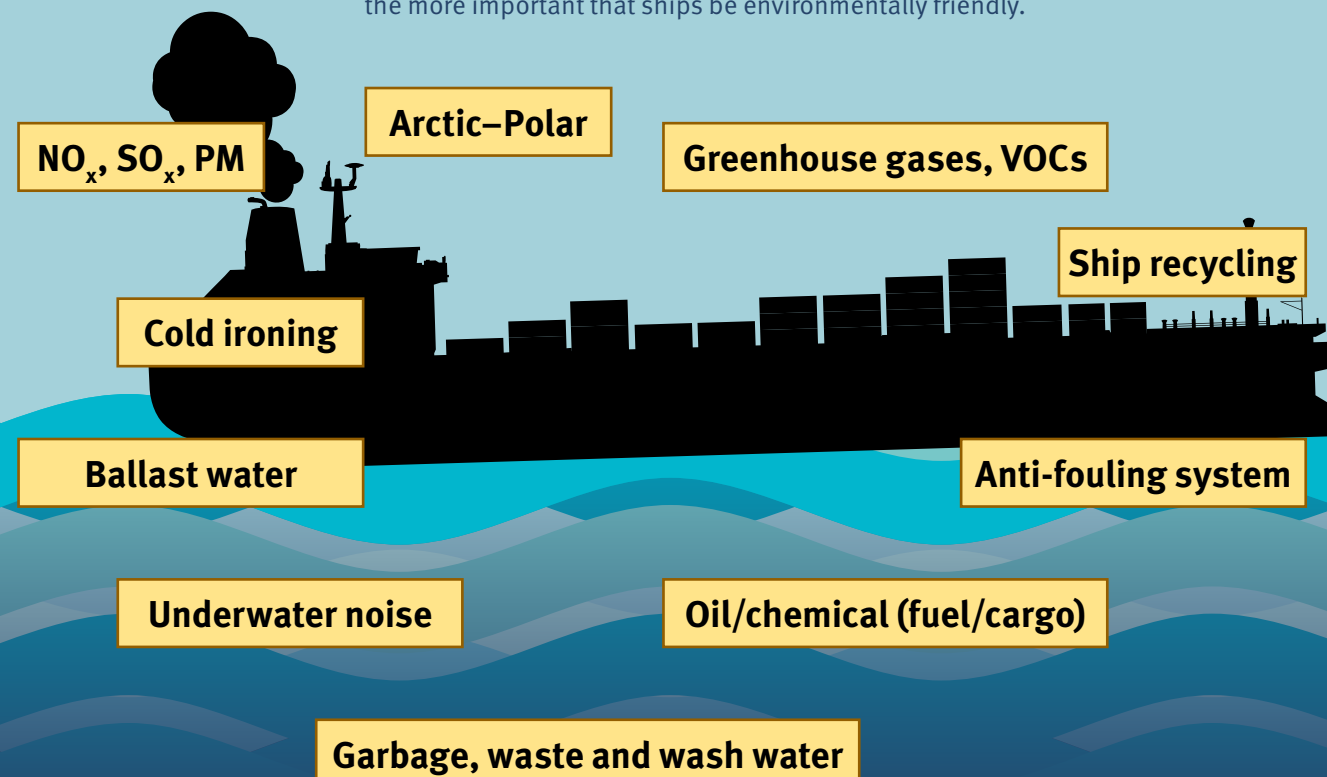
According to the Clean Shipping Coalition, the only international environmental organization that focuses exclusively on shipping issues, the deterioration of hull and propeller performance accounts for an estimated 1/10<sup>th</sup> of the world fleet's total energy cost and carbon emissions. This translates into billions of dollars lost annually and an approximate 0.3% increase in man-made GHG emissions. Even a small change in frictional resistance can have a great impact on the energy required to move a ship at the same speed.

Shipowners and operators know this, so every three to five years a ship will go for maintenance to have the hull and propeller cleaned and repainted. The choice of paint is important as it should protect the hull from damage and keep marine organisms at bay. But so far, it has been very difficult to tell which paint systems are good and which are poor. “Shipowners often don't understand the technology and chemistry, so they don't pay attention to the impact it will have on their ships. They just want to get the lowest price per litre!” says Oftedahl. “It's not surprising that most of the ships in the world's fleet have been sailing around with quite a bit of biofouling, consuming much more fuel than needed.”

If there is  
a need for  
a standard,  
the right place  
is ISO.

# THE SHIP AND ITS ENVIRONMENT

Throughout their life cycle, ships have a close relationship with their environment (water and air), from construction through operation and right up to their decommissioning and recycling. The world's fleet is increasing in size, so it is all the more important that ships be environmentally friendly.



## Tides are turning

That's where ISO 19030 promises to change everything. The three-part standard defines an innovative methodology that uses sensors to indirectly measure changes in the condition of the underwater hull and propeller, signalling the increase in frictional resistance as it happens. With ISO 19030, the industry will be able to collect enough data over time to get accurate averages of how hulls and propellers deteriorate, so that, eventually, shipowners can be more proactive in addressing problems.

The impulse for the standard was given a few years ago when Jotun started working on a methodology to measure the performance of its paint products for hulls and propellers. Although hesitant at first, the company soon realized the value of putting its findings in the public domain. So, together with the Bellona Foundation, an environmental NGO, and the Clean Shipping Coalition, it approached the IMO emphasizing the need for a common methodology. “Someone in the room raised their hand and said, if there is a need for a standard, the right place is ISO,” Oftedahl recalls.



## Promised performance

Jotun is already using the standard to offer unique personalized contracts to its customers. For a prescribed fee, it agrees to deliver a specific level of performance based on ISO 19030-2. If the company fails to meet its promised performance, it charges less or pays out under a cash-back guarantee depending on the commercial model. It's a decisive move away from a product-based to a performance-based industry.

Put differently, ISO 19030 has led to the servitization of paint, and this is also changing the way ship manufacturers think. When someone wants to buy a new ship, the first thing he does is go to the building yard to decide on technical specifications. But for the first time, earlier this year, a shipyard manufacturer, instead of just noting the technology that would go into the hull, referred to ISO 19030 to prescribe an expected performance. "If we continue in this direction, ISO 19030 could well reinvent the way the industry works," concludes Oftedahl.

Like ISO 19030, other ISO standards can help the shipping industry make better decisions. Anti-fouling paint, for example, can contain chemicals that harm the marine environment. ISO has therefore developed a risk assessment standard to evaluate the negative impacts of biocidally active anti-fouling paint, and is now working on test methods for screening these products in controlled conditions. "Understanding how to measure and/or sample data is important. Knowledge is the first step towards action," says Dr Carolyn Junemann, Secretary of ISO/TC 8/SC 2.

## High-tech to the rescue

Surprisingly, some of the greatest ecological hazards come from nature itself. For example, not only does biofouling affect the energy performance of a ship, it also poses a risk to the marine environment. The organisms that attach to the hull are taken to new habitats where they could reproduce and out-compete native species, a bit like pests.

That's also the case with ballast water, which is held inside tanks to increase the ship's stability during transit. When this water is discharged, it could potentially introduce invasive non-native species into the local environment. "ISO is working on standards for sampling ballast water, so that ships can be properly outfitted to monitor discharged ballast water and thus mitigate the risk of translocation of species," explains Dr Junemann, who is also Convenor of the ISO working group on aquatic nuisance species.

Because ISO responds to the needs of the industry as well as those of society, these standards result in both economic and environmental benefits. "The committee is quite excited to have started work on a standard for the calibration and measurement of shaft power, which is a function of the ship's speed and is a key factor in determining efficiency. This could be another game changer for the industry," says Dr Junemann.

As the demand for goods to be taken overseas increases, and the timeline to take environmental action closes up, the industry will continue to look to ISO to deliver the technical specifications and measurements the shipping world needs today. ■



ISO 19030 could  
well reinvent the way  
the industry works.

## The rules of the sea

Shipping has been used to transport goods since ancient times. Today, over 50 000 merchant ships trade internationally, transporting every kind of cargo. Without them, we simply could not have the level of import and export of affordable goods that make up our modern economy and lifestyle.

The International Maritime Organization (IMO) is responsible for regulating international shipping, including limiting emissions and reducing the impact on the marine environment. The ISO committee on ships and marine technology (ISO/TC 8) cooperates closely with the IMO to ensure that its standards respect and contribute to meeting IMO's regulations. Here, Stefan Micallef, Director of the IMO's Marine Environment Division, tells us more.

### What are the most important environmental challenges facing marine technology and shipping?

Sustainability. We need to ensure that shipping is sustainable and operates safely. That means using marine technology in a positive way to protect the marine environment. Technology can also be instrumental in leading the way to low-carbon shipping, helping to mitigate climate change.

### What are the main IMO recommendations for environmental protection?

IMO regulations are above all aimed at preventing accidents, so that change or damage to the marine environment is reduced. Its International Convention for the Prevention of Pollution from Ships (MARPOL) includes regulations relating to the construction and energy efficiency of ships. According to the International Tanker Owners Pollution Federation, IMO measures have been successful in reducing the number of oil spills by 90% since the 1970s.

IMO regulations also aim to reduce operational pollution, for example by limiting the discharge of oily waste from ships or banning the discharge of plastics into the sea. And of course, we have measures for preparedness, response and cooperation to ensure a swift and effective reaction if prevention fails.

### How can ISO standards help?

ISO standards can support the IMO regulatory regime by providing consistent and uniform standards for specific equipment and products. For example, an IMO performance standard may refer to an existing ISO standard. Sometimes, ISO will advise the IMO that it is working on a standard while, on other occasions, the IMO might request ISO to develop or update an International Standard.

### The IMO has published a Polar Code. Why has this become an issue?

As the polar ice caps melt due to global warming, statistical evidence shows that there is an increase in polar shipping, as well as growing interest in ecotourism and passenger travel to the Arctic and Antarctic regions.

The cold and freezing temperatures make any type of spill or discharge harder to manage as the oil might get trapped under ice, for example. The Polar Code looks after the safety of ships and crew by ensuring vessels are built to tolerate the harsh environments as well as prevent accidents. ISO has also started working on standards for polar shipping equipment.



## WORLD STANDARDS DAY 2017

International Standards make things work. They also make cities work by contributing to quality and safety and providing the foundation for essential services that affect us all, such as electricity and electronics. But more than that, they pave the way for innovation and sustainability, supporting the development of everything that goes towards making a city “smart”, including energy-efficient buildings, intelligent transport, better waste management, information security and much more.

This is the reason “Standards make cities smarter” is the theme of this year’s World Standards Day. Held on 14 October every year, and coordinated by IEC, ISO and ITU, World Standards Day is “a means of paying tribute to the collaborative efforts of the thousands of experts worldwide who develop the voluntary technical agreements that are published as International Standards”.

Leading up to the event, IEC, ISO and ITU ran a competition where entrants could win up to 1 500 Swiss francs with a video or poster to illustrate how International Standards help make cities smarter. The winner was Reza Rahimian from Iran, whose original piece of work – designed to represent intelligence (the brain) combined with city symbols – will be used worldwide to celebrate the day.

Learn more about World Standards Day and how you can participate at [www.iso.org/world-standards-day.html](http://www.iso.org/world-standards-day.html).



## ISO 50001 HIGHLIGHTED AT CLEAN ENERGY MINISTERIAL

With energy one of the most critical challenges facing the international community, the revision of ISO 50001 on energy management systems was given a major boost at the recently concluded Clean Energy Ministerial (CEM8), a high-level global forum working to advance clean energy globally.

Energy ministers and high-level decision makers, together with technical experts and private-sector leaders, gathered in Beijing, China, for the CEM8 to discuss how to scale renewables, improve efficiency and cooperate on clean energy initiatives. A series of side events, forums and workshops were organized, including an International Workshop on Improving Green Consumption featuring the benefits of ISO 50001.

Developers responsible for ISO 50001 also met in Beijing at the annual meeting of ISO technical committee ISO/TC 301, *Energy management and energy savings*. One of the main outcomes of the plenary was the revision of ISO 50001, which after six years of existence is being updated to ensure it remains a useful tool for all types of businesses and organizations around the world.

Sufficient progress and consensus were achieved to enable the revision of ISO 50001 to move to a Draft International Standard. Publication of the new edition of ISO 50001 as an International Standard is currently planned for November/December 2018.



Photo: Liu Yi/China Standardization Press

## HOW STANDARDS MAKE CITIES SMARTER

More than 400 participants presented the world’s leading thoughts, research, insights and perspectives on International Standards at the 2017 Qingdao Forum on International Standardization in June this year in Qingdao, China.

At the three-day event, China’s commitment to international standards work was reinforced by the unveiling of the International Standardization Training Base (Qingdao). The base will undertake international and regional training activities according to the ISO Action Plan for Developing Countries.

The programme sessions – reflecting the theme of the meeting, “Standards Make Cities Smarter” – covered topics ranging from intelligent manufacturing standards to the sustainable development of cities and ships and marine standardization. These were touched on by SAC Administrator Tian Shihong, Mayor of Qingdao Meng Fanli, ISO President Zhang Xiaogang, IEC Secretary-General and CEO Frans Vreeswijk, and ITU-T Director Chaesub Lee, speaking at the opening ceremony. Speakers highlighted the need for international cooperation, Qingdao’s lead in implementing the “standardization+” strategy, ISO’s unique model based on trust and transparency and the fact that cities are the key background in the fight for sustainability.

The conference, supported by AQSIQ and SAC, the ISO member for China, is designed as a regular event to discuss and coordinate hot topics in international standardization, and is expected to further demonstrate China’s efforts and commitment to International Standards.



## WORLD SMART CITY FORUM IN BARCELONA

In an effort to help city stakeholders worldwide make cities “smarter”, IEC, ISO and ITU are organizing the second World Smart City Forum on 15 November 2017 at the Smart City Expo World Congress in Barcelona, Spain.

Why attend the Smart City Forum? If you have to pick one event in the Smart City space, make sure you attend this forum! From city and public-sector leaders to industry and investors, to standards makers, they are all present at this one-day opportunity to learn, network and find solutions for common challenges. You’ll gain a unique insight from city authorities and hear case-study examples from major contributors to support the development of our cities.

This event is built on the success of the World Smart City Forum, which started in Singapore last year. Over 200 of the most innovative and influential smart cities thinkers will gather together to share knowledge, present visions and highlight solutions on how we will create efficient, economically viable and sustainable cities.

The Smart City Forum is a unique opportunity to learn from the world’s smartest cities. The event will be as interactive as possible, hosting 20 roundtables within key sectors and strategies to bring about real change. The aim is to help cities reach their “smart city” objectives faster and allow them to achieve better outcomes – using standards as the platform for a smarter future.

More information on the programme and registration will follow. To learn more on how standards can help cities: [www.worldsmartcity.org](http://www.worldsmartcity.org)

## BSI CELEBRATES ISO’S 70<sup>TH</sup> BIRTHDAY

Members from around the world are celebrating ISO’s 70<sup>th</sup> anniversary this year. ISO opened for business in 1947 to facilitate the coordination and unification of standards on an international level. Scott Steedman, BSI Director of Standards and ISO Vice-President (policy), shares some history: “BSI was the initiator of the meeting in London, towards the end of 1946, which created ISO.”

The initial gathering was attended by national standards bodies from around the world. “In fact,” says Steedman, “we still have lots of the original documentation from that meeting.” One of the most interesting mementoes is a photo of the attendees taken on the steps of the Institution of Civil Engineers in London. BSI is proud to be a member of ISO and decided to recreate the original photo as part of ISO’s 70<sup>th</sup> birthday celebrations. **Happy 70<sup>th</sup> Birthday ISO!**



Photo: BSI

## REALIZING THE POTENTIAL OF BLOCKCHAIN

Blockchain, or distributed ledger technology, signals the beginning of a new era of the Internet that will be defined by value rather than information, according to a recent World Economic Forum white paper.

Blockchain’s ability to generate unprecedented opportunities to create and trade value in society will lead to a generational shift in the Internet’s evolution, from an Internet of Information to a new-generation Internet of Value. The key to enabling this transition is the formation of a multi-stakeholder consensus around how the technology functions, its current and potential applications and how to create the regulatory, cultural and organizational conditions for it to succeed.

Now, a new ISO technical committee promises to take the technology to the next level, having defined areas for future standardization work. The inaugural meeting of technical committee ISO/TC 307, *Blockchain and electronic distributed ledger technologies*, held earlier this year in Sydney, Australia, brought together international experts from over 30 countries to set the course of standardization in this field.

Craig Dunn, Chair of ISO/TC 307, whose secretariat is held by Standards Australia, the Australian member of ISO, said: “Future standardization in this area can take the development of these technologies to the next step by providing internationally agreed ways of working, stimulating greater interoperability, speedier acceptance and enhanced innovation in their use and application.”

Priority areas will be considered by the study groups as they prepare their reports for their next meeting in November this year, where future standards to be developed will be agreed. Those interested in getting involved in blockchain standardization should contact their national ISO member.



# When standards are the anchor for sustainable growth



Singapore has set the benchmark for bunkering standards since the 1990s. Here, Captain Yoon Peng Kwan of Pacific International Lines (PIL) explains why participation in standards development is an ongoing process, fuelling trust, transparency and stability in a sea of change.



*Towering cranes at the Brani container terminal, Port of Singapore.*

**M**ore than two decades ago, Singapore led the way in developing standards for bunkering under the aegis of SPRING Singapore, ISO's member for the country. Today, as one of the world's busiest ports and a major bunkering hub, it has had to work hard to maintain its leadership position in the global maritime industry. Singapore stays ahead of the game by not only investing in infrastructure but also by giving assurance to global companies, such as Pacific International Lines (PIL), that bunkering activities for their vessels are done in a transparent manner through standards and accreditation. Indeed, industry players say that Singapore's pro-business environment is one of its key success factors.

PIL, which employs about 18 000 people worldwide and has an annual revenue of about USD 3.7 billion, owns and operates 163 modern vessels. It is ranked 9<sup>th</sup> among the top containership operators in the world and has diversified into logistics-related activities, such as supply-chain management. PIL aims to be a leader in the maritime industry by providing high-quality and reliable services to its customers. Captain Yoon Peng Kwan, General Manager of PIL's Fleet Division, says that setting international benchmarks is not only making the sector safe and sustainable, especially for bunkering liquefied natural gas (LNG), but is also improving efficiency and productivity – all of which are good for business.

Standards build  
confidence.





**Bunkering standards help ship operators to bunker their vessels in a safe and sustainable way.**

**ISOfocus:** How have bunkering standards helped PIL address challenges in its operations and grow its business?

**Captain Yoon Peng Kwan:** Bunkering standards help ship operators to bunker their vessels in a safe and sustainable way. With the application of standards such as Singapore’s technical reference for bunker mass flow metering (MFM) – TR 48 – PIL has better control of our supply chain of marine fuel to our vessels, resulting in greater transparency and productivity. It gives customers, like us, confidence in receiving the bunker quantity ordered and increases the level of trust between fuel suppliers and their customers (see Box on page 34). The improvement in productivity due to the faster turnaround shortens the time taken for each bunker delivery (about 12 hours) by as much as three hours. This is achieved through the use of MFMs, which resulted in the elimination of processes such as pre- and post-soundings and calculations that were required under the traditional method. This significantly improves the operational efficiency of shipowners like us as we can now spend less time refuelling our ships and more time on other critical activities to grow our business.

**How is PIL involved in the standards development process for bunkering in Singapore? How does PIL, as well as the bunkering industry, benefit from participating in the standards development process?**

PIL has been a participant in the standards development process since the 1990s. We represent the Singapore Shipping Association (SSA) as a member of Singapore’s technical committee on bunkering. We were fully on board the development of the “Code of practice for bunkering” (CP 60:1996) and its subsequent revisions to form Singapore Standard SS 600:2014. Most recently, we participated, as part of the bunkering technical committee, in the development of TR 48:2015. The development process of a standard involves discussions with multiple stakeholders of the entire bunker supply chain, including Singapore regulatory agencies and local and international associations and companies. For example, the working group that developed TR 48 included specialists from the maritime industry, equipment manufacturers, bunker suppliers, trading and bunker survey companies, the SSA, the International Bunker Industry Association (IBIA) and government agencies such as the Maritime and Port Authority of Singapore. The strong industry and public-sector partnership leads to the development of a sound quality and standards infrastructure in Singapore, which is a key foundation for building trust and transparency in the local bunkering sector. The co-creation of solutions by industry stakeholders is important to produce standards that are both practical and robust. The standardization process also ensures that standards are brought up to date periodically to incorporate technological changes and lessons learned over time. By participating in standards development, we gained a better understanding of the system and acquired new knowledge.

Setting international benchmarks is important to facilitate fair trade.

Photo: SPRING Singapore

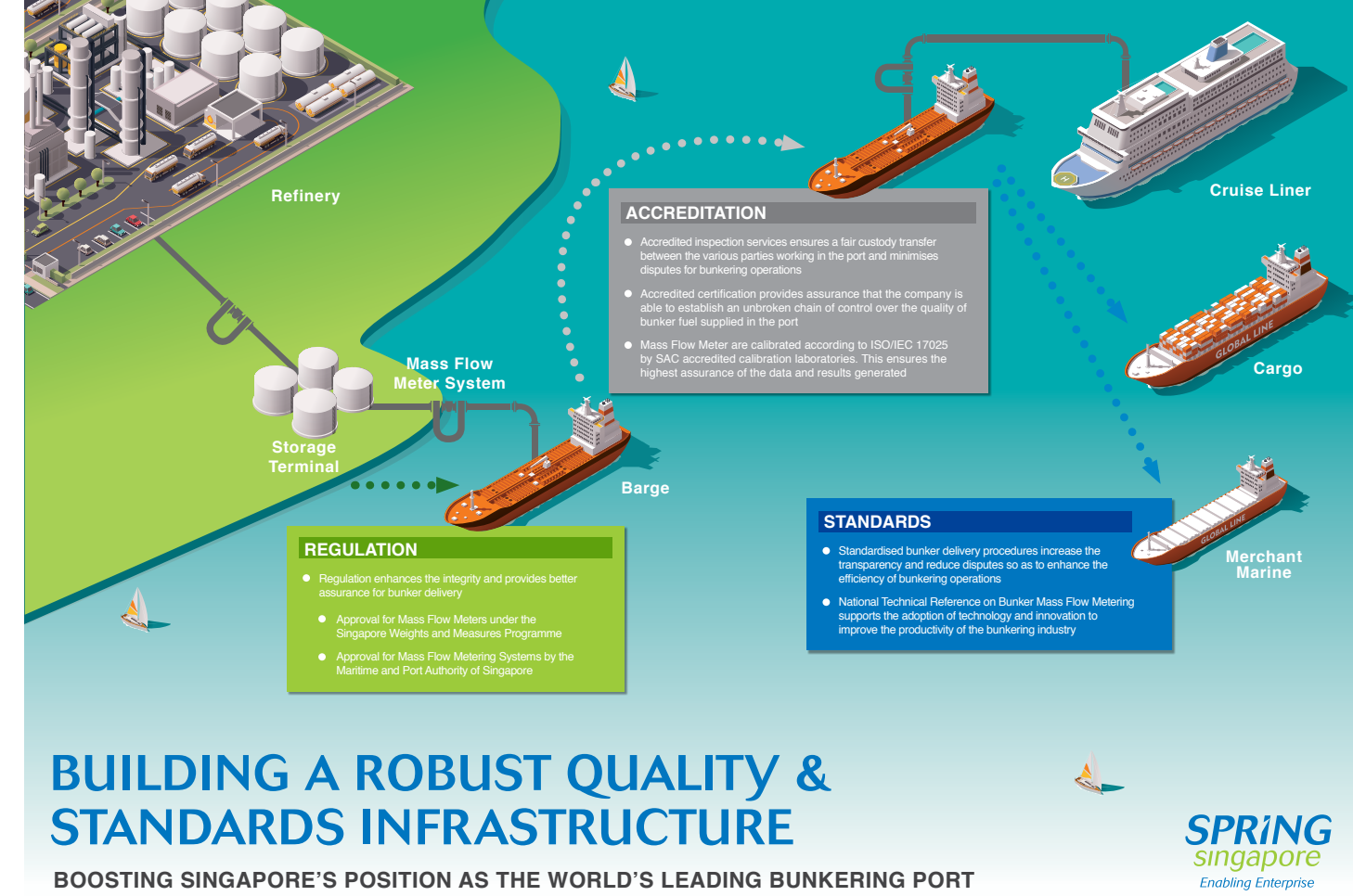


As one of South-East Asia's largest shipowners, with expansive operations and presence worldwide, how have standards on bunkering helped PIL and the international bunkering community enhance transparency, trust, efficiency and productivity?

Bunkering standards build confidence among buyers of marine fuel as they improve a vessel's turnaround time and ensure that you get what you paid for in terms of quantity and quality. In the case of PIL, the implementation of TR 48 is a significant change for us with regard to efficiency and productivity. We have about 24 bunker deliveries in a week at Singapore's port. Each PIL vessel that bunkers there can stand to benefit up to 25% in time savings for a 10- to 12-hour bunkering operation. This improvement in productivity is significant as 80% of PIL's total bunkers consumed are supplied in Singapore. The global bunkering industry uses ISO 13739, *Petroleum products – Procedures for transfer of bunkers to vessel*, and SS 600 as its reference documents. TR 48 is also increasingly being adopted by the industry as the use of the MFM gains traction in other ports. A proposal for converting TR 48 into an ISO standard has been recently approved with development work starting soon. We strongly believe that setting international benchmarks on uniform specifications, processes and procedures is important to facilitate fair trade for the benefit of the international bunkering community.

The marine industry is adopting new technologies such as LNG bunkering and solutions, autonomous ships, etc. How does PIL see the role of standards in supporting some of these emerging areas?

Standardizing safety practices is of paramount importance in the marine industry, especially since the use of liquefied natural gas (LNG) fuel is relatively new in Asia. ISO 20519, *Ships and marine technology*



## Benefits for bunkering

For decades, the traditional method of measuring the fuel transfer from a bunker tanker to a receiving vessel has been manual tank dipping. The traditional tank measurements provide a number of challenges:

- Manual measurements are time-consuming and not transparent for the counterparty
- Distrust is prevalent throughout the industry
- Adverse weather conditions can affect the accuracy of measurements
- Sounding of the fuel tank is subject to the condition of the sea. In choppy waters, accuracy of readings by sounding will be affected. Barge or vessel trim and list may provide an inaccurate quantity
- Outdated measuring equipment may no longer provide desired accuracy
- Manual dipping, or tank sounding, uses volumetric measurements while invoicing is based on mass transferred. The volume of fuel in a bunker tank is measured by sounding the depth of the fuel and has the potential for human error
- Air entrainment in the fuel compromises sounding accuracy as "froth", or "cappuccino" as it is commonly called, tends to increase the level of fuel inside a tank when sounding or manual dipping is used

A study by a major shipping line concluded that the gap between supplier quantity and vessel quantity measured with traditional tank soundings is on average 1.5% of the vessel quantity, with the vessel receiving less than what was paid for. This was based on data of USD 7 billion spent on 13 million tonnes of bunker fuel and 12 000 stems.

The MFM system under TR 48 provides unparalleled accuracy and transparency, eliminating the hassle and haggling between vessel chief engineer and barge operator. Extensive tests using MFM suggest that bunker deliveries to vessels with a flow meter record a discrepancy of less than 0.5% between the invoice and flow-meter readings. To quantify the impact on PIL as a bunker buyer, a 1% reduction in the gap would translate to about USD 3.5 million in savings at today's bunker price of about USD 300 per metric tonne.

– Specification for bunkering of liquefied natural gas fuelled vessels, and Singapore's technical reference on LNG bunkering (TR 56) are essential to support the growth of the LNG bunkering industry. They are critical to help the local LNG bunkering sector follow a uniform set of good practices, thereby enhancing efficiency, safety and transparency. The standards also support the adoption of LNG as a bunker fuel to meet international requirements for environmental sustainability.

Standards will ensure that, no matter where bunkering activities take place, there is a common set of requirements that is understood across the board. This allows ship operators to set out clear guidelines to the Master of Vessels when bunkering LNG fuel.

**Besides tapping into new technologies, where do you see the future of bunkering standards heading?**

With more business contracts and local regulations incorporating ISO standards, we foresee bunkering standards being progressively adopted in other countries besides Singapore. Bunkering centres will strive to stay ahead of the competition and using standards will help to promote quality and reliability. ■

## What it means?

A glossary of bunkering terms

### Bunkering

Supplying a ship with fuel, lubricating oil or potable water, which usually takes place in a port. It can also be done at sea, but this does not happen often.

### Tank sounding or manual dipping

Manual fuel measurements to check the level of the fluid in a tank. The final sounding value of the tank is the total quantity of fluid (oil, bilge, sludge or water), in cubic metres, inside a ship's tank.

### Mass flow metering

Automated fuel measurements to calculate the amount of fuel delivered. The automated and fully calibrated system reduces the risk of human error and eradicates the potential effects of changing environmental conditions.

### Ship trim

Ship trim is the difference between the forward draught and the aft draught. Measuring the depth of oil inside a tank is challenging. Apart from the trim, the vessel is subject to movement (rolling) at sea. A slight list of the vessel will affect the oil cut when sounding is taken.





# *ALL ABOARD for quality rail!*

Taking quality management a step further in the rail industry can lead to only one destination: better and safer trains. A recently published ISO technical specification promises to help keep the world's trains on time and on track for efficient and sustainable development.





by Clare Naden

The rail industry has been shaping our world since its birth in the 1800s – from the Puffing Billy steam locomotive, which chugged around England hauling coal wagons during the Industrial Revolution, to Japan’s sleek, super-fast maglev train, which reached 603 km/h in a test run in 2015. Trains are now a principal form of transport of people and goods the world over. While their purpose remains largely unchanged, technology in the sector has developed faster than a TGV, with modern trains tipped to reach up to 800 km/h by 2020.

Like other industries, rail has had to adapt and evolve in a rapidly changing and increasingly interconnected world. In order to survive and grow, however, it must develop strategies and initiatives to improve business performance. To meet the challenges this poses, UNIFE, the European Rail Industry Association, promotes “rail market growth for sustainable mobility”, with a view to driving innovation and shaping an interoperable and efficient European railway system.

In this new era of smart technology, UNIFE and its members are focused on “providing the best technology to meet the challenges of growing transport volumes and the demand for sustainable and environmentally friendly transport”.

Contributing to economic development and innovation, standardization is an essential tool in their strategy. Thus,

UNIFE and its members “also work on the setting of interoperability standards and co-ordinate EU-funded research projects that aim at the technical harmonization of railway systems”.

### Standardizing rail

For UNIFE, targeted action on standardization is a means of greatly increasing the economic impact of an innovation or an industrial property right. In this respect, standardization is also an essential element of innovation policy. It is clear that creating innovative and sustainable technical solutions for the railway industry – from digital communications to electrification schemes – will help to increase its competitiveness.

But how do you keep quality on track? Holding pace with technology advancements – along with the volume and reach of the rail industry – requires a firm focus on quality at every step of the supply chain. For more than ten years, that focus has been supported by IRIS (International Railway Industry Standard), UNIFE’s European-led standard based on ISO 9001:2008, *Quality management systems – Requirements*, which sets certifiable quality guidelines. First launched in 2006, the IRIS certification scheme grew quickly and, at the last count, there were more than 1500 certificates issued in 50 countries worldwide.

The rail industry  
has been shaping  
our world since  
its birth.

“In less than ten years, it has become very well known globally,” says Bernard Kaufmann, IRIS General Manager at UNIFE, “with, increasingly, many large rail companies requesting that their suppliers everywhere certify to the standard.”

He adds: “But we knew we needed to ensure the standard continued to grow and would be even more widely used, recognized and trusted. So the decision was made to take it that step further and make it an ISO International Standard.”

### Fast track to quality

Thus the standard development process was set in motion, with many of the world’s biggest train manufacturers, system integrators and operators including Alstom, Bombardier, Siemens, Faiveley, Knorr-Bremse, Nabtesco, Voith, DB, CR, SBB, SNCF and various rail research organizations getting on board. But knowing that ISO 9001:2008 was up for revision and that existing certificates to the IRIS would soon expire, time was running thin. “So we opted for a technical specification, which can be produced in a much shorter time period, with the intention of evolving into a full standard further down the track,” Kaufman explains.

And so ISO/TS 22163, *Railway applications – Quality management system – Business management system requirements for rail organizations: ISO 9001:2015 and particular requirements for application in the rail sector*, was developed by ISO technical committee ISO/TC 269, *Railway applications*, whose secretariat is held by DIN, ISO’s member for Germany, with input from 35 rail industry and standardization experts from 11 countries.

The key difference between ISO/TS 22163 and the previous version of IRIS, says Kaufmann, is an increased focus on safety and project management. “Train builders these days build mainly to individual specifications – there are no two trains the same for the same customer. At the same time, there are large differences in each train, to meet cultural, geographical and customer-led demands and requirements. Therefore, the rail industry is very much a ‘project business’, with safety being key. So the technical specification was developed very much with this in mind.”

### The end of the line

Gilles Chopard-Guillaumot, Director of BNF, the French organization for railway standardization, who is heavily involved in ISO/TC 269 and led the project for the new standard, said another key benefit is a reduction in costs. “[Rail industry] organizations certified to ISO/TS 22163 can avoid additional assessments, including by purchasers or against ISO 9001, which means higher quality and greater confidence for lower certification costs.” This is good news for all players in the supply chain, not to mention those at the end of the line: the passengers.

“The technical specification was published initially in English and French, and more languages will come soon. Its wide use by the industry will positively impact the safety and reliability of trains and networks,” adds Chopard-Guillaumot, who is also involved in the standard’s revision work, which has already begun. “With the help of even more industry experts from more countries, we will now develop [it] into a full International Standard.” ■



# ***Boxing clever***

How standardization  
built a global economy

by Barnaby Lewis

Elia Kazan's 1954 film *On the Waterfront* is probably best known for the line "I coulda been a contender". In the role of Terry (a longshoreman<sup>1)</sup> and failed boxer), Marlon Brando sums up perfectly the passing of something that was, or might have been. While the film remains one of the undefeated greats of modern cinema, it's ironic that the eponymous waterfront was KO'd by one of the 20<sup>th</sup> century's most influential inventions.

---

1) Also known as a docker, a longshoreman loaded and unloaded cargo from ships. These would be bales, boxes, rolls of wire, barrels, etc., each differently shaped and requiring substantial time and manual labour to move.





There is an impressive list of contenders for the title of “World’s most Influential Invention”: the 1900s began with automobiles and radio, and ended with the Internet. Somewhere in between, antibiotics were invented. But as a long-time supporter of underdogs of almost any pedigree, I’m going to make a case for the humble shipping container.

It was the container that put an end to manual labourers like Terry on docksides. And while the loss of jobs to technical progress is a downside, no one misses trans-

An invention that stacks up  
nicely alongside  
the greatest innovations  
of the 20<sup>th</sup> century.



ferring cargo from ship to quayside by hand. It was low-wage, back-breaking labour in dirty and dangerous conditions; one generation later, you’d be hard-pressed to find anyone willing to do it.

Just how did such a simple idea change the face of freight, and the world? After all, putting things into boxes or bags in order to shift them around more

efficiently is pretty obvious. Moving house or a trip to the supermarket would be unthinkable if each item had to be carried individually, and yet shipping containers weren’t in international use until the mid-1960s. So why did they take so long to catch on?

### Cutting container complexities

The answer is standardization, or rather the lack of it. Created in 1961, ISO technical committee ISO/TC 104, *Freight containers*, has since standardized almost every aspect of containers from their overall dimensions to how they can be stacked, to the twistlocks that securely fasten them to ships’ decks or truck trailers, to the terminology used to describe them.

It’s almost 40 years since the first of these International Standards, ISO 668, *Series 1 freight containers – Classification, dimensions and ratings*, was published, but as the Chair of ISO/TC 104, Dick Schnacke, explains, there is an ongoing need to develop new standards in the area. “Shipping in containers has been a major driver of globalization. It led to a huge reduction in the cost of shipping and allowed many countries that were previously isolated from global trade to put their products on the world market. And today there are more consumers, and more goods to be shipped, than ever before, and that means that ISO/TC 104 is kept busy.”

As we move to an increasingly virtual world, where e-commerce is becoming the norm, it is easy to forget the massively intricate physical networks that link our online shopping baskets to our real-world homes and businesses. By providing an inexpensive way of moving goods around the planet, the end cost of those same products is substantially reduced. In most cases, the consumer is the clear winner. They have greater choice than ever before, and more products in their shopping baskets for the same cash. In fact, consumer choice, as we understand it today, is a post-freight-container concept.

### From hot-house hero to family favourite

Here’s an example. If you were to visit any well-maintained English stately home from the 18<sup>th</sup> century, you might not have to look far to find pineapple motifs in the decor. Whether carved into a stair post or as a ceramic object, pineapples were an emblem of luxury. Back then, few people had ever eaten one and they symbolized an exotic lifestyle and massive wealth, something like a private jet today. The landed gentry would wow their dinner guests by serving them pineapples



grown by the country's best horticulturists, specifically recruited for the task. Each fruit had to be coaxed to ripeness in specially designed heated glasshouses and required an inordinate amount of labour, time and fuel to grow.

Today, I can go online and buy a pineapple for a couple of dollars. When grown in tropical climates, pineapples don't require greater know-how than any other crop, and they certainly don't need heating. Harvested green, they will withstand a journey by land and sea, and the economies of scale achieved when planted by the hectare, combined with the low cost of efficient, containerized shipping, have made this sweet luxury available to everybody.

## Up to size

The pineapple has also played a direct role in the thorny history of pre-standardized containers. Marc Levinson, transport expert and author of *The Box – How the Shipping Container Made the World Smaller and the World Economy Bigger*, says “today the standard container is 40 ft long (12.192m), but it wasn't that way at the beginning”. Referring to Malcom McLean, self-made man and containerization pioneer, Levinson points out that “McLean's initial containers were 33 ft<sup>2)</sup> long”, mainly so that they would be easy to manoeuvre on the narrow and winding roads that led to his HQ in New Jersey. McLean then developed a second-generation container of 35 ft<sup>3)</sup>.

Meanwhile, his competitors operating in Latin America favoured a 17 ft<sup>4)</sup> model suited to mountainous areas. While the biggest player, Matson, on the West Coast, developed a model 24 ft<sup>5)</sup> in length. This last configuration was partly decided by the nature of the principal cargo: pineapples. “If you had a large container, coming from Hawaii, filled with canned pineapple, it would be too heavy to lift. So there was no reason to have a larger container because you couldn't do anything with it!” Levinson explains. Lack of compatibility between different models meant that each shipping company had to install its own handling facilities specific to the proprietary design of container. It meant that a business or a port would have to make a commitment to a particular manufacturer's design. That reduced certainty and stifled competition. Levinson describes the problem of non-standardized containers: “You were losing all of the efficiencies. It was not a network; it was just individual companies doing their thing. It wasn't convenient for the shipper, and it wasn't saving money. The question then became: How do you standardize this?” It was about that time that International Standards came to the rescue.

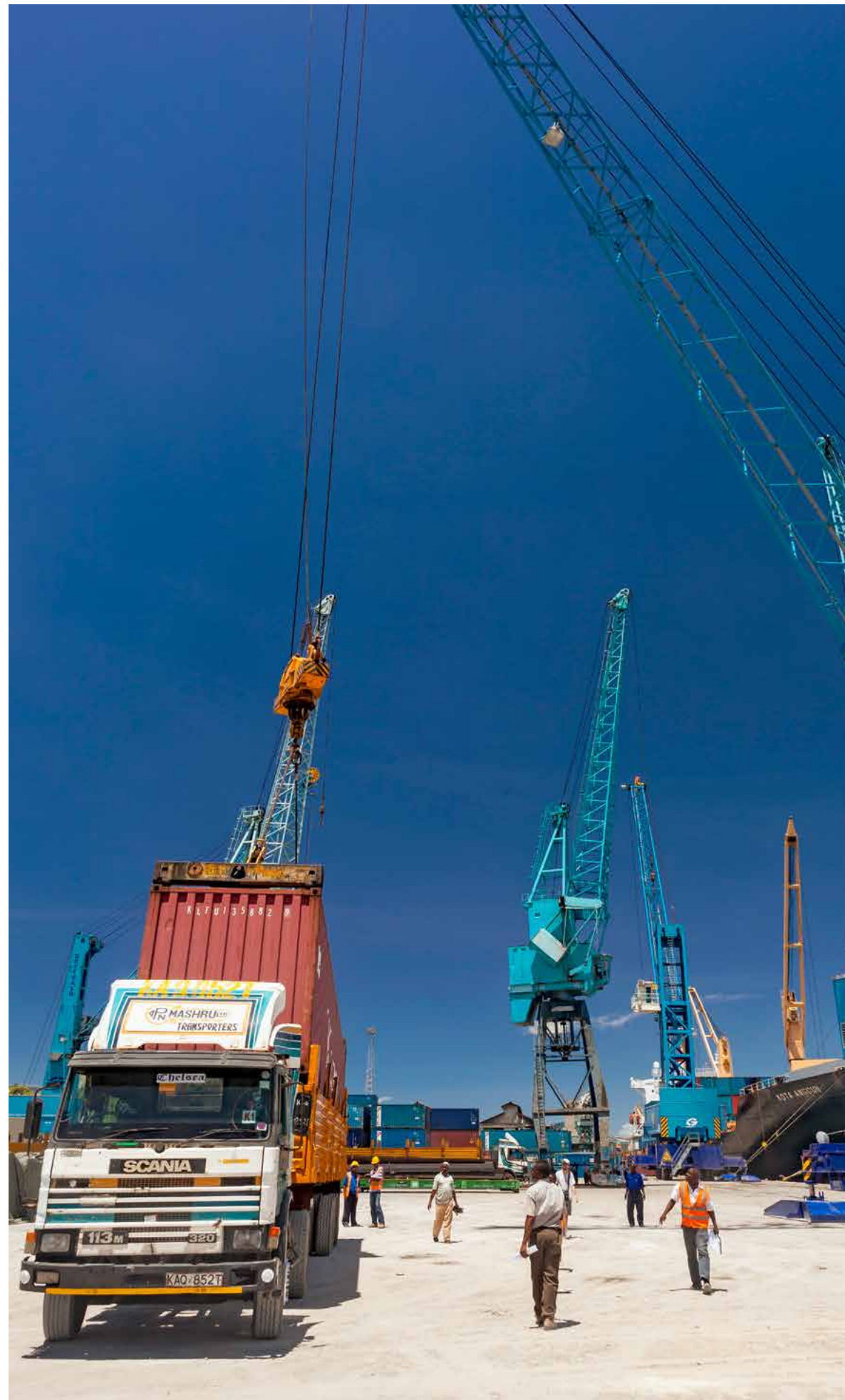
The patents developed by McLean were made available to ISO free of charge; from the beginning, the industry saw the

2) 33 ft is approximately 10 m.

3) 35 ft is approximately 10.67 m.

4) 17 ft is approximately 5.18 m.

5) 24 ft is approximately 7.32 m.



benefits of standardization. The initial uptake was rapid, spurring a shipping boom, and a massive growth of global ports and handling facilities.

## Connected cargoes

Today, progress is slower, as Schnacke remarks: “The industry is under significant economic pressure, with fragile margins and some even operating at a loss. The result is that there isn't much capacity to invest in new technology, even though there are clear benefits.” In some ways, the industry is a victim of its early enthusiasm for standards. Schnacke again: “Rapid standardization did such a good job of getting the basics right that there has been little need to change.”

But surrounding technology has moved on, and few people are better placed than Dick Schnacke to see the bigger picture since he holds down a second ISO job as Chair of technical committee ISO/TC 204, *Intelligent transport systems*. “Most freight containers get to their final destination by road, so there are crossovers. In ISO/TC 204, we're developing a unified approach that prepares freight containers to play an ongoing role in future transport systems.”

One of the most significant developments is technical specification ISO/TS 18625, *Freight containers – Container Tracking and Monitoring Systems (CTMS)*, which is currently under development. Envisaged as the first of several CTMS standards, the ultimate goal is to unify diverse technologies, including radio-frequency identification or RFID, to improve tracking and monitoring of goods in transit. Enabling real-time connectivity would be a boon to the entire industry: companies shipping high-value cargoes (and their insurers), vendors managing their shop-floor stock while it's in transit, vaccines or food products that require an uninterrupted cold chain, and customs and border agents accessing and managing information that keeps people safe.

## The case for the case

Far from being left behind with Terry, shipping containers are keeping up with progress as they, and even their contents, become connected to the Internet of Things. And that, in a word, is the case for the shipping container: connection.

Revolutionary in its simplicity, the freight container enabled a global network capable of handling unprecedented quantities of cargo. It connected us to the furthest-flung ports and brought us new foods, fast-moving fashions, affordable tech, and a sense of global citizenship. From Antwerp to Shenzhen, the extraordinary growth of global freight handling and distribution capacity can be explained by one thing only – the standardized freight container. An invention that stacks up nicely alongside the greatest innovations of the 20<sup>th</sup> century. ■





Photo : David Pias

# ISO welcomes **its new Secretary-General**

ISO is happy to announce the arrival of its new Secretary-General, Sergio Mujica, effective July 2017. Here's introducing Mr Mujica.

Sergio Mujica took office as ISO's new Secretary-General – the equivalent of a chief executive officer in a business corporation – on 17 July 2017. For the last seven years, Mr Mujica has been the Deputy Secretary-General of the World Customs Organization (WCO), prior to which he spent 15 years working for the Government of Chile with the Ministry of Agriculture, the Ministry of Economic Affairs and as the Director-General of the Chilean National Customs Authority.

We spoke to Sergio Mujica as he took the helm at ISO's headquarters in Geneva. Here, the new Secretary-General shares his goals and aspirations for the organization and how he hopes to take ISO to new heights.



**ISOfocus: Tell us a little bit about yourself.**

**Sergio Mujica:** I am very proud to say that I come from Chile, which is a small but wonderful country in Latin America, located at the very end of the world. I also lived for two years in the US (1997-1999) and I have spent the last seven years in Europe. I am a lawyer by academic training, with a master's in International Law and a diploma in Management Skills.

From a personal perspective, I can tell you that I have been married for 23 years with a great woman and we have a beautiful family composed of seven children, six boys and a little princess who is 12 years old.

**When did you first become involved with standards?**

I have spent my entire professional career working in highly regulated sectors, where compliance with national and international standards is an indispensable requirement for success and, in many instances, even for the survival of your business. This is the case for agriculture, forestry, fisheries, and also for customs where I have spent the last 11 years of my career. All these activities are deeply connected with international trade, which is a real engine for economic and social development. In my opinion, there is no international trade without good-quality, consensus-based and well-implemented standards.

My role as Deputy Secretary-General of the WCO also gave me the opportunity to work with and to visit many countries in all regions of the world, including many developing and least-developed countries. I think this has given me a good understanding of the global community, which is at the very heart of any international organization, including ISO.

**Based on background and experience at the World Customs Organization, what are some ways in which standards can overcome the challenges facing the transport industry and the movement of goods? To what extent can standards set up the course for future growth?**

From the customs perspective, most of the challenges faced by the transport industry and the movement of goods relate to the necessity of facilitating legitimate trade and concentrating the control and enforcement capacity only on high-risk consignments. The best way to address this challenge is by establishing multilayer risk management systems, based on high-quality standards and international cooperation. As I said before, standards are an indispensable component of the international trading system and should be at the very heart of the strategy for economic and social development of all countries.

**What is so enticing about being the Secretary-General of ISO?**

I truly believe that ISO is a great organization, and I am proud and honoured to have been appointed as its Secretary-General. Leading an organization such as ISO is also a concrete opportunity to contribute to the well-being of millions of people around the world, and here is where this opportunity becomes a responsibility. If we believe that ISO has the power to boost international trade, to improve the safety and security of people and to provide a unique platform for international cooperation, then we all have the responsibility to do our best to further enhance this already great organization.

Another very interesting feature of ISO is its diverse membership. Some members come from the public sector, others from the private sector, and others are of a semi-public nature. This diversity gives a very rich perspective to ISO, which represents the best of the public and private worlds, working together to create consensus-based standards. Naturally, the diversity also comes with its share of complexities. It is never an easy task to take account of everyone's interests – but that's what makes ISO a unique organization – and I look forward to constructive discussions with all members.

Finally, I have to mention that the brand “ISO” is very well known worldwide, so it is a real privilege to have the opportunity to lead an organization with such a great reputation.

**Do you have a vision for ISO, things you want to focus on?**

ISO has a very clear, well-structured and ambitious strategic plan, so my first priority will be the full implementation of this plan, with a high level of participation and engagement from all stakeholders, especially our members.

In addition, in my view there are three components which are necessary for any international organization to be successful, including of course ISO. First, we should remain relevant and even indispensable. As I said before, the brand “ISO” is very well known worldwide and our core business, i.e. the development of high-quality standards used everywhere, is what makes us relevant. However, I believe we can always do more to connect this core business with the strategic agendas for economic and social development. It is not only about having great numbers that demonstrate our contribution to economic growth, employment, innovation, etc. It is also about creating the necessary narrative and engagement with the political leaders and relevant industry and standards users – as well as civil society – to ensure that standardization is at the very heart of their countries' strategic agenda.

Second, we have to be visionary in a world that changes exponentially and every day. We are a technical organization but we live in the real world, so we are exposed to new challenges on a daily basis, including technological advances, social developments and changing consumer expectations. ISO must have the capacity to understand – and even anticipate – these changes in a timely and effective manner. This is the only way we can be prepared to proactively respond to our customer's needs and to effectively adapt and thrive in this fast-paced and ever-changing world.

Last but not least, as any member-based international organization, ISO should support its members, respond to their needs and deliver on its promises. Members expect leadership from the Secretary-General, but also clear and concrete mechanisms to allow participation, input and influence regardless of their economic power or level of development. I look forward very much to contributing to the diverse and inclusive “ISO system”. ■



Photo: David Plus

I truly believe that ISO is a great organization and I am proud and honoured to have been appointed as its Secretary-General.



