DCSA’s role
in the digital transformation of container shipping

This ebook contains insights and contributions from IATA
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What will it take to digitally transform container shipping?

Digitally transforming an industry requires data standards, collaboration and widespread adoption of modern, internet-based technology.

As with these industries, transforming container shipping requires a global technology framework that facilitates the seamless exchange of data. This framework must have a unified and standardised approach to data communication across all technology platforms, modes of transportation and stakeholders – from carriers and shippers, to freight forwarders and platform providers, to ports and terminals, banks and insurers, even governments and regulators.

DCSA was established to be the industry’s collective voice for driving digital transformation. Numerous industries such as banking, telecommunications and the airlines have benefitted from successful efforts to digitally transform their operations.

Recognising this need, 9 of the top 10 global container shipping carriers founded the neutral, non-profit standards body, Digital Container Shipping Association (DCSA) in April 2019. DCSA can be compared with the International Air Transport Association (IATA), which has been instrumental in digitally transforming the airline industry.

Like IATA, DCSA’s mission is to lead the industry towards systemic collaboration by creating open-source digital standards based on shared industry requirements. These standards ensure the interoperability of technology systems, and hence, the seamless flow of digital data from end to end.

Similar to what IATA, SWIFT and TM Forum did to help digitally transform the airline, banking and telecommunications industries, DCSA is actively collaborating with industry stakeholders to collect input, promote standards adoption, and achieve broad support for a common vision and approach that will benefit everyone.

Unlike inter-governmental standards bodies such as IMO and UN/CEFACT, whose standards meet the common needs of multiple modes of transportation, private organisations, such as DCSA and IATA, address the unique requirements of their specific industries and provide stakeholders with practical help on the use of modern technologies such as the application programming interface (API).

Since its founding, DCSA has made great strides in creating digital data standards to enable end-to-end interoperability and facilitate some of the most urgent and impactful needs of the container shipping industry; however, much still needs to be accomplished.

The time is now to act collectively and globally to create an effective foundation for interoperable data exchange that enables innovation, sustainability and a great customer experience in the world’s maritime industry.
Facilitating global trade requires multiple layers of standardisation

Many standards organisations have a hand in digitalisation

**DCSA, IATA enable industry-specific specialisation**

With the aim of creating data exchange standards to facilitate global trade, a number of intergovernmental authorities, standards bodies, and legislators have passed legislation or established standards for different aspects of cargo transportation (for example, the IMO (Cauwer et al., 2021) and UN/CEFACT). Standards emanating from these inter-governmental organisations normally reflect a larger purview than that of industry-based bodies such as DCSA and IATA. In general, their efforts are designed to meet the common needs of B2G (business-to-government) communication, multiple modes of transportation, and can be enforced legally, which has clear advantages. Meanwhile, industry-based organisations, such as DCSA and IATA, concentrate their efforts on B2B communications and efficiencies. Like airfreight, the container shipping industry has unique requirements for what needs to be digitally transformed (and how), that may not be addressed by the existing overarching regulations.

Industry-based initiatives can support the standardisation process by introducing domain specific knowledge, full-time resources, and a coalition of the willing to adopt and implement the standards. They can focus on the B2B component to improve the customer experience. There needs to be a commitment to continuously maintain and extend standards to cover future requirements. Building standards based on public sector models and incorporating additions into them assures easy and wide adoption. Domain specific additions should focus on customer requirements, with fast and wide adoption as the core value proposition.

Developing global industry standards is as hard as capturing a global market through a product or service. Developing specifications for digital standards requires input and support from stakeholders across the industry, and for an industry to accept these as leading or even unique standards requires their full trust and commitment.
Neutrality is a critical success factor

IATA has built its reputation over more than half a century, and its neutrality has been a key ingredient in its ability to develop accepted standards in the airline industry. Being industry-based is an important factor—it ensures that the community of stakeholders is focused on addressing common pain points. Provided that standardisation is limited to non-competitive practices to observe antitrust laws, the industry-based neutral entity can drive alignment faster among members while taking feedback from relevant parties such as customers and business partners of members. Also, private organisations are not unduly influenced by the much wider and sometimes less committed stakeholders, as with organisations in which every stakeholder, group, or even citizen, may be entitled to express their view and seek to exert influence. Intergovernmental organisations, in contrast, must consider input from virtually anyone, including citizens, and often have significant political hurdles to overcome. This mandate may lead to less-than-optimal compromises.

Industry-based organisations, like IATA and the DCSA, also have significant and well-established stakeholder members that actively participate in the development, testing, and deployment of new standards, bringing significant weight to the standards through their endorsement and usage. It is often the critical mass of the combination of these companies that provides the required momentum to ensure the success of any standard.

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DCSA & IATA – different industries, similar purpose

Transport sectors have comparable challenges and opportunities

IATA’s history and success show the path forward for DCSA

Both air and maritime transport are global, as freight and passengers are carried across borders, continents, and regulatory boundaries. Like IATA, DCSA envisions its industry as a fully digitally interconnected ecosystem. IATA’s hundred-year history exemplifies the challenges and opportunities presented along the path towards achieving such a vision.

IATA’s roots lie in the earliest organisation of air transport in the 1920s when aircraft were first being used for passenger transport, airmail, and the transport of goods. Since most transport required more than a single air operator, the early IATA

agreed on common standards for ‘interlining’ – the concept of joint transportation. This included common transport document formats, service standards, and the financial processes for settlements between airlines and their agents.

The jet age introduced the challenge of rapid global transport with the need for information exchange that matched that speed. This coincided with the evolution of digital computers. IATA reacted by coordinating and disseminating digital standards for passenger, freight, and mail transport. Unsurprisingly, this revolutionary move at the time has now created a technology legacy which has become an ongoing challenge — replacing old electronic standards like Cargo-IMP that hail from the telex era to modern data sharing standards, like ONE Record. This is something to try and guard against wherever possible in future standards. Past technology legacies are a significant burden on change management and upgrade costs.

The importance of regulatory influence

The balancing act between providing common business standards across a wide group of companies and cooperation with regulators has been central to the longevity and success of IATA. For example, both the conditions of carriage

E-commerce will account for 20% of airfreight volume by 2024

2024

volume

by

2024

20%
of passengers and freight (governed by the UN) and the format of air tickets and waybills (governed by IATA) are important issues to be addressed if air transport is to be successful.

The success of IATA in coordinating, facilitating and implementing standards among its air transport members is at least as much due to its cooperation with regulatory authorities as it is with standards development itself. The ability of airlines to speak with one voice through IATA facilitates regulatory developments. Equally, IATA is able to inform its members of changes in legislation that require their regulatory compliance.

**Freight forwarders, the common customer for air and maritime carriers**

The key parallels between air and maritime transport are obvious, but the shared connection between them may be less clear. What brings air and maritime carriers together is that they share the same customer — the freight forwarder. Acting on behalf of shippers, these forwarders require access to all modes of transport, and one of their challenges is that the various transport modes currently operate under different regulatory frameworks and use different documents, digital standards, and processes.

Although forwarders are expected and are willing to handle such incompatibilities, it is in the interest of all stakeholders to move towards using tools and standards that best support the planning and execution of transport across different transport modes. As global trade becomes increasingly agile due to globalisation, increased e-commerce, advanced digital technologies, and disruption (such as the COVID-19 pandemic), the need for rapid adaptation and flexibility within the transport supply chains is an urgent requirement, if we want to retain a network of independent transport and logistics operators. The alternative could well be a consolidated network that would be less competitive and likely more costly.

For freight forwarders to innovate their digital capabilities they need standards that are common across transport modes. The flexibility created by standards-driven innovation will benefit both shippers and carriers.

**The rapidly rising demand for e-commerce**

E-commerce deserves a special mention. In 2019, an estimated 10% of air freight volume was e-commerce, and that number is expected to double by 2024. Currently, the big e-commerce providers rely on the global logistics and transport infrastructure for their freight needs. Consumer demand is pushing these e-commerce providers to ever more demanding service quality, and this creates an opportunity and a necessity for the established transport and logistics providers to deliver, or to risk seeing business go elsewhere. The indications are that e-commerce providers are not primarily interested in running their own logistics and transport, but it is also clear that they will step in if this is the only way for them to meet their customers’ expectations.
How DCSA drives standardisation and adoption within container shipping

Collaboration with stakeholders and open-source standards are key

Alignment and agreement move the industry forward

DCSA standards are the result of an agile, iterative and collaborative process carried out by DCSA in close conjunction with key stakeholders and subject matter experts from member carriers, who share their non-commercial processes and data requirements during the development phase. Common and conflicting data and processes across carriers are identified and mapped, and baseline standards are built. These are then validated, aligned and agreed to by all carriers. Industry feedback is solicited continually and the standards are iterated if necessary.

To reach alignment regarding data definitions and data exchange methods across the industry, DCSA has developed a shared data language and logical data model for container shipping, called the DCSA Information Model. This will serve as the foundational data language for the industry. The Information Model is based on the business terms defined in the DCSA Industry Blueprint and has been mapped by DCSA against other popular data models and IT standards. This mapping is key because it will ensure that the same business and data language is spoken across standards. The Industry Blueprint also provides standardised process maps for all processes commonly used in container shipping. This enables customers of shipping lines to have a consistent workflow when doing business with multiple parties, instead of having to adjust their processes to adapt to each carrier.

On their own, DCSA data and process definitions help standardise and align existing processes to enable some gains in efficiency. However, achieving digital transformation requires standards for data digitisation and communication. The question then becomes, what is the best approach/technology for standardising the exchange of digital data? In container shipping, EDI (electronic data interface) is still widely used for digital data exchange. However, EDI was developed in the 1970s, and as a result, is ill-suited for...
EDI is now out of date

In container shipping, EDI has been the dominant method for exchanging digital messages between stakeholders for decades. It was designed to eliminate much of the human error that occurs with manual, paper-based processes, and it does so quite effectively. But like many 40-year-old technologies, EDI has some drawbacks in terms of keeping up with modern customer demands for visibility and responsiveness.

The limitations of EDI stem from the fact that it is designed for one-way communication of one type of message from one participant to another and requires bespoke development of each connection. There must be agreement between the participants on data transmission formats and methods before the connection can be implemented, which can take multiple engineers a number of weeks. A cargo owner needs multiple EDI connections with each carrier they work with to communicate all the messages involved in, for example, a booking request. And if any of the data in any of the messages changes on either end, or a new type of data is needed, the EDI connection has to be reconfigured, or a new one has to be created.

As a result, the development and maintenance of EDI systems is extremely labor-intensive and expensive. But even if companies have the money and time to spend, it’s becoming increasingly difficult to find people who can do the job. Technology is moving forward, and technologists are trained on modern technologies. EDI is a dead end for companies that need to innovate while maintaining a sustainable workforce.

APIs—real-time interactions, lower costs

The API is the modern standard for interoperable digital communications. It is a set of programming instructions and data exchange standards that allow different web-based systems to communicate with each other in real time. Virtually all APIs that exchange data over the internet (including DCSA standards-based APIs) use common data formats and protocols. This means that all it takes to connect with a partner via an API is for each party to implement the API. In addition, APIs can handle billions of interactions every day.

With new technologies like smart container tracking devices, real-time data exchange volumes will grow exponentially, necessitating a shift to API technology.
The value of API technology is well recognised in business, and it has been a lynchpin for digital transformation in many digitally advanced industries, such as banking and e-commerce.

Think about when you use a credit card to purchase something online. The data required to complete the transaction is exchanged and validated instantly over the web using APIs. Many standards organisations are embracing APIs as a way of improving information sharing and interoperability. For example, UN/CEFACT has launched efforts to ensure proliferation of web APIs to support international trade and transport processes.

The two-way, real-time data exchange enabled by APIs is what’s needed to increase visibility into container shipping processes and events. Think about the benefits for exception handling in particular. With EDI, shippers have to wait for carriers to notify them about agreed-upon events. But with APIs, shippers can query the carrier’s system or subscribe to automatically receive status updates for any relevant event. If there are delays or other types of exceptions, shippers can learn about them as they happen and work to resolve them immediately.

Not surprisingly, DCSA has chosen the API as the preferred method of data communication for its standards. All DCSA digital standards are released with interface standards that include freely available API definitions to facilitate implementation and compliance. All API definitions are available to download on the SwaggerHub open development platform. DCSA also publishes API reference implementations on GitHub which can be freely downloaded for immediate use and adjusted as needed.
The proven benefits of digital transformation

IATA’s work has saved billions for the airline industry

Digitally transformed industries provide a superior customer experience

As IATA has shown, the shift to digitalisation is well worth the effort. IATA’s biggest impact in digitalisation is in passenger transport. When IATA developed e-ticketing and stopped printing paper ticket stock in 2008, it reduced the industry ticket management cost by an estimated USD 3 billion by avoiding the need for printing, global distribution, collection and processing of tickets and boarding passes. The introduction of self-printable baggage tags, smartphone boarding passes, and self-service terminals provided similar cost reductions, but more importantly, it changed the customer travel experience forever. It is now common practice to plan and execute air travel on a single digital platform — your mobile phone.

The impact of digitalisation on airfreight is harder to quantify since almost all freight has some documents that still need to be in paper format. Typically, these are certificates and documents associated with the freight rather than the transport itself. It is estimated that paper air waybills incur an expense of USD 10. The global cost savings from using e-Air Waybills (e-AWB) would be over USD 100 million per year. Increasingly, customs in the largest markets are enforcing the use of electronic documents for advanced cargo information. This allows them to undertake

Cost Savings comparison: e-AWB/eBL

Compare the electronic bill of lading (eBL) in container shipping and the e-Air Waybill (e-AWB) for freight in the airline industry. In 2010, IATA introduced e-Air Waybills for airfreight. As of May 2021, adoption of e-AWB was at 75%. In December 2020, DCSA released its first set of eBL standards. If the container shipping industry starts adopting eBL standards in earnest, DCSA projects that a 50% adoption rate is feasible by 2030. At 50% adoption, it is estimated that the industry can potentially save more than USD 4 billion per year, considering a global economic growth rate of 2.4% through 2030, as forecasted by the OECD.¹

¹Source: The Organisation for Economic Co-operation and Development (OECD) Economic Outlook database
risk assessment in advance and pre-clear goods.

Not only in the airline industry, but in banking, telco, entertainment, retail and media, the wide adoption of digital standards has been creating value for decades. As a result, these industries have also produced a better customer experience and a higher degree of efficiency and innovation. DCSA strongly believes that container shipping will achieve similar success by following the proven path of digital transformation.

DCSA is uniquely positioned to drive industry collaboration and accelerate container shipping’s transition into the digital age.

DCSA’s deep connection to the industry, combined with the collaborative and open way in which its standards are developed, has garnered interest from many prominent stakeholders. Carrier members have committed to implementing DCSA standards as part of their digitalisation strategies, especially as a means to better serve their customers.

As a result of this collaboration, DCSA has already established standards in a number of key areas including: Track & Trace, Internet of Things (IoT) for smart containers, Operational Vessel Schedules, Just-in-Time Port Call, and Electronic Bill of Lading as the first step towards end-to-end documentation.

DCSA standards are free and available for anyone to use to ensure widespread adoption is achieved as rapidly as possible.

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DCSA – serving the needs of container shipping

While tech giants and various intergovernmental organisations are eager to exert their influence over container shipping’s future, no one knows what needs to be done to transform the industry better than the industry itself. As an independent, non-commercial organisation backed by 9 of the top 10 ocean carriers, DCSA is uniquely positioned to drive industry collaboration and accelerate container shipping’s transition into the digital age.

global cost savings using e-Air Waybills

$100 Million per year
Take an active role in driving digital transformation in shipping

By demanding digital standards and adopting DCSA standards...

...you can make a difference.

As highlighted by the COVID-19 pandemic, the need to replace antiquated shipping processes with efficient, digital processes is more urgent than ever. And a standardised, scalable approach is the only way to future-proof such a fragmented, complex and global industry. Collaboration among industry stakeholders is crucial to transforming the industry, and DCSA is actively seeking involvement and input from all stakeholders. Interested parties can engage with DCSA by subscribing to DCSA updates and making contact through the website, www.dcsa.org.

Shippers who wish to have more visible and reliable shipping services can start by urging their carriers and service providers to adopt DCSA standards, which will create a foundation for accurate, real-time data that is consistent across carriers. With standards in place, shippers can have instant access to the information they need to make informed, data-driven decisions about cargo transportation management. Technology solutions and service providers that adopt DCSA standards can offer a fast path to seamless data exchange with carriers, while supporting more customers with less effort. Logistics participants such as ports and terminals will be able to differentiate themselves by offering their customers more efficient, innovative and sustainable operations.

The aim of digital standards is greater transparency, which will foster a higher level of trust between stakeholders. Once trust through transparency is established, real innovation can occur—innovation that will enable reliable, easy to use, secure and environmentally friendly container transportation services.²

² Excerpts of this ebook were originally published in a chapter of the Maritime Informatics book: https://maritimeinformatics.org/2021/03/maritime-informatics-additional-perspectives-and-applications/