



# Finding Information in the Maritime Ecosystem<sup>1</sup>

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Co-financed by the European Union  
Trans-European Transport Network (TEN-T)



*"Why can I never get any information out of those guys!" complained Dan Bidwell, Manager of Supply Chain at Modern Meters (MM), to no one in particular.<sup>1</sup> "I send our shipments off to the US but as soon as they get on the darned boat no one can tell where they are and when they will arrive! I wish I could send them by a courier like FedEx but it's too expensive to ship by air." He punched a button on his phone to summon his secretary, Alice. "Get me that new guy we just hired, what's his name?" "Murray Johnson," she supplied. "Yes, get him here asap!"*

Five minutes later Murray Johnson, rushed in, hastily tightening his tie and running his fingers through his rumpled hair. "Have a seat," Dan invited him. "How are you getting on at MM? Have they given you a good orientation? What do you think of our little operation?" The "little operation" was in fact a very high tech operation building specialized meters for all types of businesses. Although it had been in operation for more than 100 years in the UK, it had recently refocused its entire business strategy on building "smart" meters and sensors. Business was booming and now MM was aggressively going after markets across Europe and North America and manufacturing components in plants based in Asia.

After a few minutes of chat, Dan got down to business. "Murray, I understand you're a smart guy – with a PhD in informatics no less." Murray inclined his head modestly. "I know you want to get your hands on some of our new sensor systems, but I have a more important job for you to do first." Murray looked up with interest. "Here's the problem we have..." He quickly sketched out how difficult it was to get information about MM's overseas cargo shipments – whether coming from China or going to Europe or North America. "We have a reputable freight forwarder – Global Logistics (GL) – who we've worked with for years and who have always provided us with end-to-end service. But since we started shipping overseas, it's been impossible to track our shipments. We can get this information but only by calling GL and waiting while they do whatever it is they have to do to get me an answer. And then half the time it's not right and I'm getting calls from my customers or the plant about their missing shipments. What I want to know is why is it so hard to get this information and is there something we can do to help? Maybe some sensors or other device that could send out location data periodically? If we're having this problem, I bet everyone else is too and this could be a real business opportunity for us. I've called Carlos Fernandez over at GL in Bigglestowe and I want you to work with him and see what you can find out. Keep me informed!"

Murray left Dan's office with his head spinning and two days later he was sitting in Carlos' office in London! (Well, very close to it anyway.) "My job is to integrate the whole process of shipping for our customers," he explained in his soft Spanish accent. "We need to track every detail from pick up to delivery. We need cargo information, land transport information, port and terminal information, and ship information, and then port and terminal information, land transport information and cargo information on the other end of the shipment. We need to crunch this information for every shipment and then add in business information to calculate our bill. It's challenging because there are so many steps, types of information, and systems involved, particularly in the maritime transport portion. Perhaps it would be easier if I showed you. Let's go down to our operations centre."

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<sup>1</sup> This case focuses in the information needed by various stakeholders in the maritime transport ecosystem. Information is a compilation of various pieces of data provided in a specific context for a particular need. The maritime transport ecosystem is data-rich, in that it produces much data, but information-poor in that it is difficult to connect pieces of data in context on a just-in-time basis to provide information that is useful to any of the stakeholders involved.

The second floor of GL's office was filled with cubicles and terminals. Carlos expertly wended his way through the maze, Murray following in his wake, until he found the one he wanted. "Hi Reggie!" he said to a sandy-haired young man wearing a headset and surrounded by several monitors. Reggie Finch, one of GL's shipping agents, grinned when he heard what Carlos wanted him to do. "Sure, I'm happy to show him around our systems," he said. "I've got some interesting ships coming in. Perhaps he could tag along with me." Murray nodded in agreement and the tour began.

"The first thing I have to do when someone has a cargo to ship, like your boss," he said. "is to understand the cargo and how it is to be transported. We usually start about six months in advance to determine the nature and dimensions of the cargo, where it's going, and what our options are for transportation. Although we can often choose between rail and truck for land transportation, shipping is usually the only choice for intercontinental travel for larger cargos. I do this by calling around to see what's available and then, depending on the nature of the cargo, where it's going, and how fast it has to get there, we will charter a ship, or a place on a container ship. This means negotiating a contract with the ship owner or charterer that will cover all aspects of the voyage from where, when, and how the cargo will be picked up to where, when and how it will be delivered and everything in between. Depending on the companies involved and the cargo, there may be many other terms and conditions, such as penalties for delays (on both sides), inspections, and qualifications for insurance. Although there are standard terms for doing this type of business (see box) every contract can be somewhat different."

### What are Incoterms?<sup>1</sup>

Incoterms is the abbreviation for International Commercial Terms, the rules that define the responsibilities of sellers and buyers for the delivery of goods under sales contracts for domestic and international trade. Incoterms provide a common set of rules to clarify responsibilities of sellers and buyers for the delivery of goods under sales contracts. They apportion transportation costs and responsibilities associated with the delivery of goods between buyers (importers) and sellers (exporters) and reflect modern-day transportation practices. Incoterms significantly reduce misunderstandings among traders and thereby minimize trade disputes and litigation. Incoterms are organized by modes of transport. Some Incoterms apply to any mode of transport, while others apply to sea and waterway transport only.

<sup>1</sup><http://en.wikipedia.org/wiki/Incoterms>

"Then we negotiate with the shipper, the receiver, and the transporters to set the terms of the shipment and get agreement on the costs involved..." Murray's eyes and mind wandered to the panoramic view out the windows of the office to the port spread out almost as far as he could see. To his far right were the tall multi-storied Ro-Ro ships with their rows and rows of cars. Just beneath him was the container terminal with fields of full and empty containers, train tracks leading into it, and lines of trucks entering and departing – some with containers and some without. Giant automated cranes busily moved up and down the rows, selecting and loading containers according to a predetermined loading plan that would not only balance the load on the ship but also enable containers to be offloaded at different ports without unpacking the whole vessel. To his left, a few general cargo ships were at berth and to his far left was the oil terminal where giant tankers glided into pumping stations.

"So, it's my job to keep track of every piece of data related to a shipment so that we can calculate the costs involved," continued Reggie. "That also includes any customs charges, penalties levied, and fairway dues for going through narrow straits."

"Wow, that's a lot to collect," exclaimed Murray.

"That's only a small portion of what we collect," said Reggie. "That's just the business information that relates to the cost of transporting the cargo we pick up, carry, and deliver. There's lots more!" "Hold on," said Murray. "I'm getting confused!" "Let me show you then," said Reggie, grabbing a piece of paper and some colored markers and quickly sketching some slightly intersecting ovals.

"The stuff I've just told you about is the information we need for business and financial purposes. That's how we figure out what to charge MM and what to pay to the various companies and entities that transport your cargo, or process it, or allow it to move through their territory... whatever. It's the beginning and the end of the transportation chain." "I think that's what our accountants and clerical staff take care of," said Murray. "I don't think that's what my boss wants me to focus on."

"I know," said Reggie, "but as you can see, some of this data intersects with what's used in other parts of maritime transport so it's important to be clear about what *information* you want as the data's all over the place in various systems and databases. It would be great if it were all in one place but it's not. And much of this information is paper or email-based, which means that it's not easy to look up with a computer."

"Let's look at a supply chain that most people know about." Reggie went on to explain that when shipping a parcel by courier, each package was assigned a bar code number that was scanned when it was accepted, when it reached a sorting point, when it reached its regional destination,

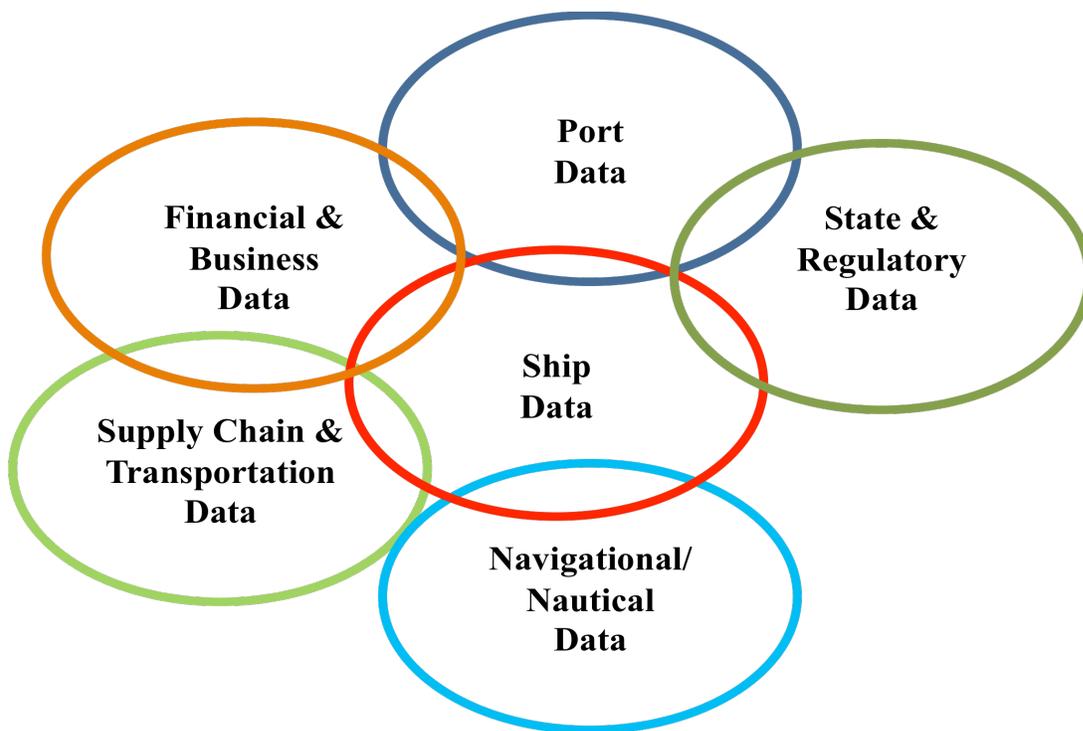


Figure 1. Shipping Data is Created and Needed by Many Sectors of the Maritime Transportation Industry

when it went on the truck for delivery, and when it was delivered. Customers could then track their packages along their routes. "We do something similar for containers and other bulk shipments when they go by land," Reggie said. "Each one gets a bar code we can scan at different points of its journey... pickup at the factory, delivery to the terminal, loading on the ship, unloading from the ship, pickup from the terminal, and delivery to the buyer. But once it's on the ship, we can't track the shipment itself, we have to track the ship."

"So, what's the problem? Can't you track the ship?" asked Murray. "Let me show you, rather than tell you," Reggie replied. "Let's go see some ships." They went down some back stairs and through a security gate. It was a rare sunny day and Murray enjoyed the opportunity to get some fresh sea air. The terminal was pretty grungy and more like a giant factory than anything else but you couldn't beat ocean air, in his opinion.

Reggie led them up a gangway of a medium-sized cargo ship, with the name *Eleni*, painted on the side. The mate recognized him and led him to a small office adjacent to the bridge. Captain Anders Haraldson was at his computer surrounded by stacks of paper. He looked up, saw Reggie, and smiled. "What now? Don't I have enough paperwork? I'm drowning in the stuff already!" he groused.

Reggie stepped back and allowed Murray to squeeze into the office and introduced him. "Murray's on a mission to find out how he can get information about his company's shipments. I thought you might be a good person to explain how you use information on a ship and what information you provide to others. Could I leave him here with you for an hour? I've just got to check on that cruise ship coming in and then I'll be back." Accepting a nod and a gesture from the captain, he scurried off.

Captain Anders grabbed a pile of papers from the office's sole visitor's chair and invited Murray to sit. "You've taken on a big job," he commented. "Nothing in this business is streamlined or designed for sharing and your information need, while important, is not the only factor I have to balance when doing my job. As captain, safety of the ship, crew, and cargo is of paramount concern. And it's foundational to almost every aspect of the maritime transport ecosystem. No one wants to see lives lost, pollution, collisions, groundings, and cargo destroyed. Everyone's goal is to prevent these things (see box). The problem's not the goal, it's how we go about it."

"First of all, I plan my route with safety in mind, as well as getting to my next port as quickly and efficiently as possible, of course. I consult navigational charts – both online and paper – and meteorological data – weather, tides, icebergs – too. I get this from a variety of sources – online from our subscription services, from regional radio broadcasts that give me coastal warnings, from VTS (Vessel Traffic Service) in busy areas – and then I use it to plan my route and also update it as the voyage progresses. This works reasonably well – for me – but no one else knows where I am or where I'm going from this. Because my route data isn't shared with anyone, it can't be accessed by other ships, our next port, the ship owner, or the cargo owner and so it's an informational dead end."

"So how do people know where you are and when you plan to get to port?" asked Murray. "There are several ways," Anders explained. "First, all medium-large ships have an Automated Identification System or AIS, that contains its id number, destination, and ETA, as well as other information about it (see box). You can use this to see all the other ships in your immediate

### EU Maritime Safety Facts 2013<sup>1</sup>

- 2550 accidents
- 54 ships lost
- 2852 ships involved
- 74 fatalities
- Accidents involved collisions (48%) and groundings (22%)
- 45% of incidents involved cargo ships.

<sup>1</sup><http://www.emsa.europa.eu/emcip.html>

vicinity." He turned to his computer and in a few clicks found the Eleni and a map of all the other ships in port at this time. It even showed the cruise ship coming in." "Wow, what's the ship's name?" asked Murray, impressed. "The *Southern Dancer*," replied Anders. "It's based in Panama."

"So, what's wrong with AIS?" Murray wondered. "It's good as far as it goes," replied Anders. "A lot of us use it to identify and contact other ships and VTS uses it to monitor ships in their coastal waters. In fact, anyone can log in and monitor how ships are moving around. But this is another informational dead end. The data is collected and in a database somewhere, but it doesn't connect anything else. So I can see it if I want or VTS can, but to track your cargo, you have to know what ship it's on and go looking for it. It doesn't update some real time tracking system somewhere. And while it gives a destination port, it doesn't show the route the ship has planned so I still pretty much have to rely on calling the ships around us to find out whether we're going to cross paths. It's not like Air Traffic Control where everyone files a flight plan and then controllers approve and monitor all the traffic. Here, you're pretty much on your own – at least until you get to a congested fairway or a port."

"So no one's watching your route and keeping you at a safe distance from other ships?" "No one except me, and various coastal authorities if you're in their territory," laughed Anders. "It's pretty much up to me to keep an eye out. That's why we have so many windows in our bridge! But AIS is helpful. You should get Reggie to take you to the VTS station to see how they use it to manage traffic in ports and congested fairways. They monitor AIS all the time and give guidance to us captains if there's a situation that might affect us, but they have no advance knowledge of who's coming in and where they're going – just like the rest of us."

"If AIS is a dead end as far as I'm concerned, how do I get your data to track my cargo?" asked Murray frowning. "Don't laugh!" said Anders, "but every day at noon, I send a report to the ship's owners. It acts as an official history of the voyage and helps us to determine what supplies, like water and fuel, and repairs and maintenance we need at port. I'm also in communication with our agent at the next port – at least 72 hours out – and he in turn informs the charterers, cargo owners, port authority, and various other agencies about my ETA. I'm not sure who they all are, but Reggie can fill you in. So if you're tracking my cargo, you could always watch for my emails!"(see box).

"Well, that's not a very efficient way to do it!" said Murray. "If I've got numerous cargos like Carlos has, it would be an incredibly time-consuming job!"

"How's it going?" asked Reggie, popping his head in the doorway. "Seen enough or do you want to come with me to see the captain of the tanker that's just come in? He may be able to give you some help

## AIS Data<sup>1</sup>

- IMO ship identification number
- Radio call sign
- Name
- Type of ship
- Destination
- Dimensions of ship
- Draught, length and breadth of ship
- Destination – max. 20 characters
- ETA (estimated time of arrival) at destination.

<sup>1</sup> <http://www.marinetraffic.com>

## What's in a Noon Report?<sup>1</sup>

- Ship's Name
- Voyage number
- Date and time of the report
- Position of the ship
- Average speed since last submitted noon report in knots
- Average RPM
- Wind direction and wind force
- Sea and swell condition
- Distance to next port of call/ destination:
- Estimated time of arrival
- Remaining oil and water supplies

<sup>1</sup> <http://www.marineinsight.com/marine/marine-news/headline/what-is-noon-report-on-ships/>

since he's been around for a long time!" After thanking Captain Anders, Murray hurried along after Reggie to the oil terminal. There, a confusing array of equipment and structures awaited him. The *Schengen*, based in Germany, was just being berthed, tugboats hovering around it to make sure it was in the proper position. Crew and linesmen started the process of mooring it to the giant bollards at the jetty.

It was an impressive sight. "Captain Muller is going to be annoyed because I couldn't get him a berth right away. He had to wait at anchor for four hours until one was available," said Reggie. "Didn't you know he was coming?" asked Murray. "Sure but that doesn't mean a berth, or a pilot, or a tugboat, for that matter, will be available. There are lots of things that can happen to slow these down so ships have to wait about 30-40% of the time. I always request a berth as soon as I know a ship's ETA and then update the terminal by email on a daily and then hourly basis when I get the information -- same with the pilots and the tugboats. But ETAs aren't always accurate and because most of our communication with these groups involved is by email or updating a slew of different systems, the data isn't always as accurate or timely as we'd like. This often results in poor coordination of services, and when one isn't available, the ship and the other services have to wait. Then, too, problems with unloading another ship or with its paperwork can cause delays. There are a lot of documents and measurements that have to be completed and signed off before a ship can leave, particularly a tanker. Everything has to be checked and double-checked to make sure we know that the statement of facts is accurate for the payment of fees, and that the proper bill of lading and waste reports have been completed for the port authority. But, the best way to understand this is to see it in action."

He led Murray up the gangway and found Captain Muller on the bridge. After the initial greetings and introductions, Reggie handed Muller a sheaf of papers, which he routinely started to read and sign. "Look at this," he muttered, "There's a new form in here I've never seen." "That's a new security form," explained Reggie. "The UK just started requiring it." "But it's requesting exactly the same data that I'm filling out on half these other forms!" protested Muller. "I know, but it's going to the Department of Security and they want things their way," said Reggie. Muller grudgingly completed and signed the forms, stamping them with the ship's stamp.

He turned to Murray. "What you have to know about the paperwork in this business is that it's a nightmare!" he said. "Most of these documents I've already sent to Reggie 24 hours in advance, but they want them again and signed and stamped. Sometimes, they need five copies of the same document!" (see Tables 1 and 2). And every port is a little bit different so I can't store these forms and just print them out. Practically every country uses a different waste reporting document and even something as simple as a crew list often means that I usually have to change the format. Sometimes it's Muller, Chrisian L. or Muller Christian L. without commas, or Christian L. Muller or Mr. Christian L. Muller. One country even wants it in a spreadsheet! There are different security forms, different health forms, even in the same country, and sometimes they're in a language other than English. Then there are the 'oddball' requirements. Canada wants to know what pornography is on board and one port in the Far East wants a pregnancy report on all females on board! I've even been asked to sign a blank document! Even when you're going from one port to another *within the same country* you have to do the paperwork all over again. And just travelling within the EU, there are 42 documents I have to send in advance to every port! It's ridiculous!"

Pre-Arrival Documents	Zeebrugge, Belgium	Gdansk, Poland	Aarhus, Denmark	Rotterdam, Netherlands	Southampton, England
Arrival crew list	X	X	X	X	
Arrival passenger list	X	X	X	X	
Departure crew list			X	X	
Departure passenger list			X	X	
Crew effects declarations	X				
Passenger effects declarations	X				
Stores list	X				
Int'l Maritime Dangerous Goods info	X	X*			
Dangerous Goods in transit		X			
Waste Declaration	X	X	X	X	X
crew change information			X		
Port of call list		X			
List of visitors & suppliers			X		
Int'l Ship & Port Security Form					X*
Time Frame	48 hrs	24-48hrs	48hrs	24hrs	24hrs
Receiver	Agent	Agent	Agent/Port /Police	Agent/ Immigration	Agent

**Table 1. Pre-Arrival Documents for Selected EU Ports<sup>1</sup>**

\*Special form;

<sup>1</sup> <http://www.soefartsstyrelsen.dk/SiteCollectionDocuments/Nyheder/2013/IMO%20Fal%20April%202013%20official.pdf>

Muller took a calming breath and continued. "Then you have to know where and when to send these documents. Most often it's the agent but sometimes, the police, immigration, the coast guard and/or the military want copies. It's up to me to have these documents ready and sent to the right people in the right format or there will be delays and penalties. Agents like Reggie help – a lot – but at the end of the day, it's me that has to prepare and sign all these forms. It's time-consuming and frustrating when there's so much duplication of information."

Murray looked stunned. "Why is there so much paper and email? Haven't they heard of systems in this business?" "Actually, we do have systems," answered Reggie. "Lots of them! But that's a big part of the problem. There are so many systems that don't talk to each other, data has to be transferred manually. We've made some small steps forward with Safe Sea Net, which is a European database that tracks ships, hazardous goods, waste, and safety-related incidents retrospectively. But getting this data from the captain to the agent is still manual and then the agent has to enter it all again into SSN. And every time there's a single update, the agent has to go through the whole set of screens again. It's not very user friendly and it can cause coordination delays and mistakes that ripple throughout the whole supply chain."

*Murray looked stunned. "Why is there so much paper and email? Haven't they heard of systems in this business?"*

Muller added. "The problem is every port and state has a myriad of different forms and systems so they all add up into a big headache for the captain. Although there are common laws and regulations set by the IMO and the EU, each country interprets and applies them differently. The result is a situation where every port and state has set up systems and procedures in a way that works for *them* but it doesn't work for the captain or for the transport system as a whole. There are so many stakeholders with their own systems, they don't see the forest for the trees!"

Port Documents <sup>1</sup>	Zeebrugge, Belgium	Gdansk, Poland	Aarhus, Denmark	Rotterdam, Netherlands	Southampton, England
Arrival crew lists	4	4	1	5	5*
Arrival passenger list	4	4	1	5	4
Departure crew list	3		1	2	1*
Departure passenger list	3		1	2	2
Crew effects declarations	2	1	1	2	2*
Passenger effects declarations	2	1		2	2
Stores list	2	1	1	1 <sup>2</sup> *	3*
Stores list (deck & engine)		1			
Port of call list			1		
List of visitors and suppliers to Port					
Int'l Ship & Port Security Form					
Ship Currency declaration		1 <sup>2</sup>			
Medial Narcotics Declaration				1	
General Declaration					4*
Receiver	Agent	Agent	Agent	Agent	Agent

**Table 2. Port Documents Required for Selected EU Ports<sup>3</sup>**

\* special form, <sup>1</sup> must all be signed and stamped by the Captain, <sup>2</sup> in a language other than English

<sup>3</sup><http://www.soefartsstyrelsen.dk/SiteCollectionDocuments/Nyheder/2013/IMO%20Fal%20April%202013%20official.pdf>

"So, we're drowning in paperwork and data and have no information? Is that right?" asked Murray. "Pretty much," answered Muller. "We need to get everyone together to look at the maritime transport ecosystem as a whole and see where efficiencies in paperwork and data sharing could benefit everyone. The way I see it is that much of the same data is replicated over and over – to ports, agents, terminals, freight forwarders, VTS, owners and port services. It's not just the captains who would benefit from this type of sharing – we all would!"

Murray was thoughtful as he walked back to Reggie's office with him. "There's no one who has an overview of the whole process from end-to-end!" he muttered. "And nothing talks to anything else, though most of the data is the same." "That's pretty much right," agreed Reggie. "If we had that overview and everyone could access the data they needed just-in-time the way they do it with land transport, there would be a lot better collaboration between everyone. Today, if a vessel is late or early, service providers and freight forwarders will only know if the captain or the agent tells them. Then, the ship has to adapt to the availability of the service providers instead of the other way around."

"The way I understand it is that cargo shippers and planners, port authorities, ship captains and owners, and other shore-based services, like berths, tugs, and pilots, all need the same understanding of the status of the voyage," said Murray. "But even though the data is out there it's not getting out to the right people in the right format. Everything's one-on-one sharing so there are a lot of information dead ends, where we're creating the same data over and over."

"That's true, but it's also worse than that because a lot of confusion results and that can cause delays and loss of revenue," said Reggie. "For example, at Bigglestowe, when a ship sends me an ETA, I send the vessel's information to the Maritime Authority and the State Authority and to the Directorate of Merchant Shipping. Then, I have to report it to the Port Authority and the port will assign a berth and send me a berthing authorization, with a copy to the State Authority. The Port Authority also sends the information to Customs. Every time a document is sent, its receipt has to be acknowledged. So everything Captain Muller sends me, I have to send off to the proper authority and get a receipt. I do the same with port services, such as pilotage, tugs, waste removal, electricity, water supply and any other services they need. The berth authorization is given to the pilots, who then contact the captain by radio. VTS and the coast guard are also in touch regarding weather conditions, traffic, and vessel coordination because there are some conditions under which we won't let certain ships into our harbour. And now, with increased security concerns, there's a whole new set of document exchanges! If there's a slip up, there can be a domino effect of misunderstandings that cost time and money. As well, because every country – even every port – does things a little differently, it prevents us from developing systems with straightforward flow through processes. And no one wants to change how they're collecting data to create more useful information for other stakeholders in the ecosystem."

*"The way I see it," said Murray, "is that we could do a lot better than this. We do in land transport and we do it in the air. What's so different about shipping?"*

When they reached his office, Reggie pulled out the diagram he'd drawn of the different sets of data involved in transporting MM's cargo across the ocean. "I think we've covered it all," he said. "Financial and business information needs, navigational and nautical information, ship information, port information, state and regulatory information, and cargo information. These are mostly separate worlds that intersect only minimally and with a lot of manual support but for your purposes, you need some data from each of these areas, and so do a lot of others working in maritime transport – port services, VTS, other ships, and terminals – just to name a few."

"The way I see it," said Murray, "is that we could do a lot better than this. We do in land transport and we do it in the air. What's so different about shipping?"

"Well, I don't know about all the laws involved," admitted Reggie, "but it seems that shipping has evolved over several hundred years without this coordination, while air transport started off being coordinated less than a century ago. As that industry grew, additional levels of coordination developed with it. That hasn't been the case with shipping. And in land transport, the coordinated systems have also evolved with the industry. Both use technology in a much more integrated and standard fashion than maritime transport."

"So is *nothing* being done to improve this situation?" Murray asked. "It's hard to believe that some smart people aren't trying to do something about this." "Well, I don't know much about this, since I'm just a lowly agent," admitted Reggie, "but I know that some of the major shipping companies and cruise lines have got fed up with the slow pace of change and are trying to do something about this. Those guys have much better systems

*"There's such a dog's breakfast of regulations, expectations, documentation, processes and systems out there. Someone has to take the lead in cleaning it up!"*

than the small and medium operators, but still they're just looking at their own needs and not the needs of the whole ecosystem. Imagine if British Airways optimized its own flights and didn't worry about anything else in the air!"

"I could see why they'd want to," admitted Murray. "There's such a dog's breakfast of regulations, expectations, documentation, processes and systems out there. Someone has to take the lead in cleaning it up!" "Well, the EU is also trying," said Reggie. "Safe Sea Net and Clean Sea Net have been set up to do some reporting and I think by next year, these documents will be able to be filed electronically. The problem is the documents will still be different in different ports and states and it takes literally years to implement these types of things. And even then compliance can be spotty, especially in some countries and some smaller ports. And that's just to do with reporting. It still doesn't address some of the real-time information you and others are looking for."

Murray thanked Reggie for his help and headed back to his hotel to pack. There *had* to be a way to get better data sharing across the different pockets of information in the ecosystem without forcing everyone to buy and install an expensive system that would force them all to work in the same way (something he now realized would be impossible, given all the entities involved). With all the new technology out there, surely there would be a way to utilize what ships and ports and freight forwarders were *already* producing without adding *further* administrative burdens on them. In fact, there should be a way to make this burden *less* onerous. He thought about his PhD thesis in energy informatics, where he had installed sensors that would passively collect energy usage from thousands of homes so that he could inform each participant in the study about their patterns of consumption over a day and compare it with their (anonymized) neighbors. Was there a similar model that could be used here?

He pulled out Reggie's diagram and a fresh piece of paper. What if.....? What if there were a service that could access AIS and other ship data, cargo data, and route data and then provide it securely in the format needed when requested by an authorized user? What if captains and freight forwarders and port services could obtain this information in real time to make decisions without all the back and forth of emails and faxes and radio calls that happened now? What if each state and each port could also get the information it needed, in the format it needed, when it needed it? (Well, maybe not the oddball stuff but most of it.) The data was already there. All it would take would be some standard data sharing and access protocols (much like AIS already provides) and agreement that it could be shared as needed. He quickly drew a new diagram. Captains could authorize the release of their information to their next ports, the proper state authorities, freight forwarders and cargo owners. Port services and agents could be dynamically informed of the progress of every ship headed into and out of their ports to improve traffic flow and services planning and coordination. And this information could also be used to help compute final bills.

*What if there were a service that could access AIS and other ship data, cargo data, and route data and then provide it securely in the format needed when requested by an authorized user?*

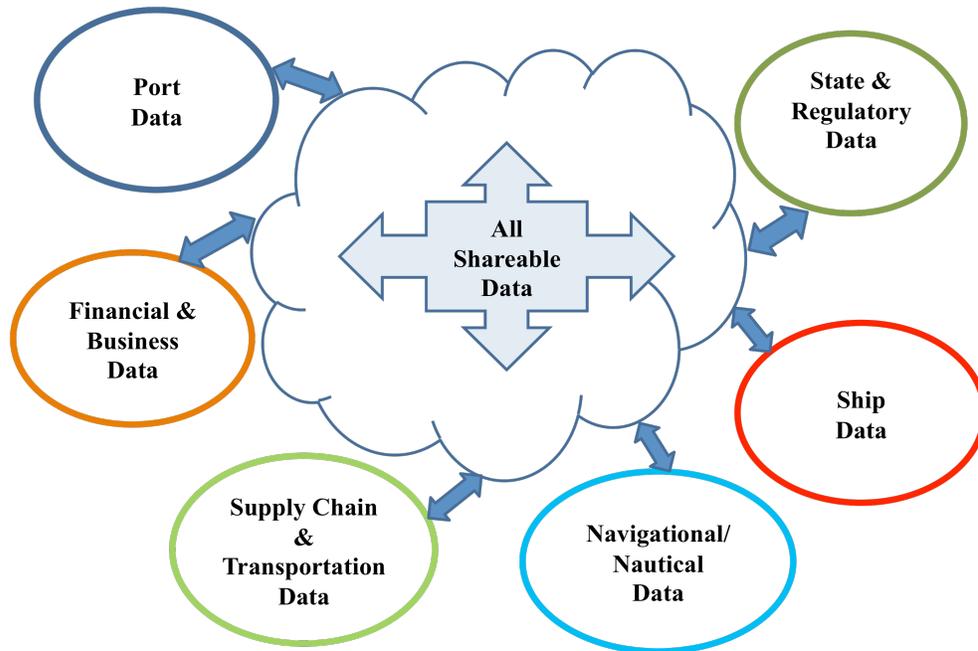


Figure 2. Creating Shareable Data

"That's it!" he thought excitedly, hurriedly throwing items randomly into his suitcase. "It could work! I know it! I can't wait to tell Dan about this. It's a great business opportunity, a great chance to help our customers, and it will be a win-win for everyone in maritime transport."

### Acknowledgements

The author would like to thank Knut Anderson, Ingela Bernstson, Carlos Garcia, Per-Erik Holmberg, Dimitrios Lyridis, Roger Kulberg, Burkhard Muller, and Sten Terje Falnes for their insights in preparing this case. For the sake of anonymity, all persons and organizations cited in this case study have been made anonymous, unless officially referenced.