Grout Lecture 2000

E-Commerce - Implications, Opportunities and Threats for the Shipping Business

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CONTENTS

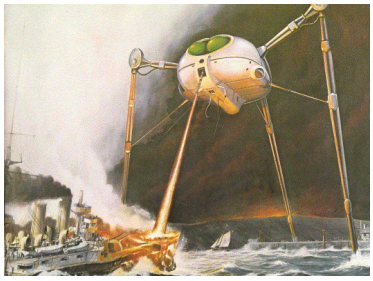
No one would have believed in the last years of the nineteenth century that human affairs were being watched from the timeless worlds of space. And yet across the gulf of space minds immeasurably superior to ours regarded this earth with envious eyes and slowly and surely they drew their plans against us

H. G. Wells "War of the Worlds"

1: A Perspective on the Future

Management must prepare for the future. What a nightmare it has become. E-commerce has rocketed into our consciousness. Forrester Associates, a US consultancy, predict that there will be $1.3 trillion of it in 2003, and anyone who does not do it is a sissy. Suddenly businessmen have to pay attention.

The cyberboom is worrying because it comes with dire warnings of what will happen to companies which do not adapt. As the Economist puts it "If you are engaged in any form of commerce, from a humble market stall to the gigantic department store, the internet is lurking, ready to blow up your business. And if you are not prepared to embrace change, to cannibalise your own sales, and disintermediate your own intermediaries, somebody else surely will"1. This disruptive technology threatens the way we conduct our business. Like War of the Worlds, capsules have landed on Horsell Common and strange creatures are getting out[2]. They are internet entrepreneurs, hunting down their targets with their death rays.



Internet entrpreneurs invade shipping

Obviously you cannot download oil from the internet. What E-commerce can do is help ship cargo better, cheaper and faster. In this paper I will discuss the effect this new technology will have on the transport chain. In addition I will look at the opportunities it will present and the threats that it poses to the existing "Legacy" businesses.

This emotive subject needs perspective, so I will start by reviewing how changing communications has altered the commercial organisation of shipping in the past. We will see that the have been some dramatic changes. Then I will discuss the opportunities and threats posed by the e-commerce revolution.

Box 1 Two Centuries of Communications in Shipping

- ***Letter:*** *One hundred and forty eight years ago when Clarksons was set up communication was by personal contact (eg at the Baltic), by letter, or by personal visit.*
- ***Telegram:*** *With the introduction of a global network of submarine cables from 1866 onwards, instantaneous communication between countries became possible. Initially sending cables was very expensive, costing $1.25 per word .*
- ***Telephone:*** *From the early 1900's the telephone became available, though to begin with there were few users, the cost was high and the service was unreliable. Until the 1950s international calls had to be booked.*
- ***Boecode:*** *In the 1930's a system for sending coded cable messages was developed. Common messages could be transmitted as a single code word. Since cables were charged by the word this was cheaper*
- ***Telex:*** *In the 1950's office telex machines became more widely available, allowing brokers to send lengthy messages much more cheaply from their own equipment. This was a great improvement over telegrams, but still cumbersome. The broker would write his message and pass it to the telex operator who typed it onto a paper tape. The recipient was dialled up, and the tape passed through the machine.*
- ***Improved Public Network:*** *During the 1960's the telephone system improved, but operations were still cumbersome. Brokers placed calls through switchboard operators. There was often a delay of several hours before a connection could be made.*
- ***Automatic Switchboards:*** *In the mid 1970's computerised telex switching system allowed brokers to type and dispatch telex messages from their desks. The telephone system improved dramatically with direct dialling to most countries.*
- ***Computer Workstations:*** *In the early 1980's computerised work stations were installed. This allowed Brokers to type and dispatch telex of fax messages using word processors. In the same systems they had access to databases containing ship details, voyage estimating program and other useful computerised software.*
- ***Computer Modems:*** *As communications got faster the time zone problem had become acute. Brokers spent long hours in the office waiting for calls from different parts of the world. This problem was solved by computer modems that enabled brokers to use the office workstation from home. More recently the introduction of cellular telephones has been a tremendous advantage.*
- ***Fax Machines:*** *As more offices installed fax machines this became a quick and practical means of transmitting documents.*
- ***Mobile Phones:*** *Calls can be taken anywhere - lunch is back on the agenda!*
- ***Company Networks & Network Driven Applications:*** *In the 1980s it became possible to arrange groups of PCs in a way that allowed everyone in the company to access the same files and software. These are used for broking information systems, procurement, ship management.*
- ***E-mail****: In the late 1980s e-mail became available. This provided the same messaging facilities as Telex at zero marginal cost and added the ability to attach files. Some security issues remain*
- ***World Wide Web:*** *In 1992 the first modern browser, opening the way to company websites and specialist web hosted applications. Free access to database driven sites offers the chance of self service information.*

Source: Collected by Martin Stopford from various sources

2. Two Centuries of International Communications

If we are to avoid being swept along by a wave of enthusiasm for e-commerce, we must start with the basics. How does information add value in shipping? Communications technology has not suddenly burst on the shipping scene. E-commerce is another step along a well trodden road.

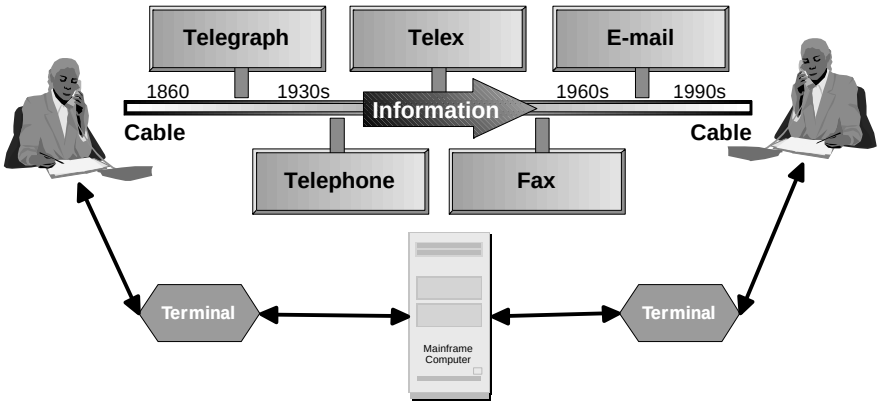


Figure 1 The evolution of shipping information systems

An overview of shipping communications

When we take a really long term view of business communications in shipping, the Web is not quite so revolutionary as it seems at first sight. Figure 1 shows the evolution of communications over a century. The central strand in the communications chain is undersea cable along which messages are sent. Over 150 years the technology for generating and receiving messages has improved, - telegraph, telephone, Fax and now e-mail - but the basic tasks are unchanged. What has changed is the cost, both in terms of communications and the labour required to use them. Both are dramatically cheaper today.

A second revolution came in the 1960s when a computer could be "inserted" in the cable to allow information to be managed. This was a dramatic change because for the first time information could be stored and processed on its way along the cable. It opened up a whole new dimension. The internet and e-commerce are essentially a low cost development of this technology. More of this in section 4, but let me return to a more detailed account of how this system evolved.

The earliest communications system

Two hundred years ago the only international communications were by letter, so little was heard of a ship until she returned. Most trade was carried on by a system of ventures. With several owners of the ship and many owners of the cargo, a venture's success depended on how their affairs were handled while the ship was away. To this end almost every ship carried an official called the "Supercargo" to attend to the business of the ship. He would supervise the handing over of the cargo and arrange freight for the homeward voyage [3].

Phase 1 The 18th Century Personal Shipping Networks

During the 18th century a shipping information network started to form. Coffee Houses became popular meeting places for transacting this business. In 1696 Lloyds Coffee House started Lloyds News, a thrice weekly bulletin of shipping and commercial information. It only lasted a few months[4] but was soon replaced by printed lists of ships likely to be offered for insurance. In 1734 Lloyds List was published as a newspaper and in 1766 Lloyds Register of Shipping, shipping's first database, was published[5].


A LIST of SHIPS that are Sail'd from *England*, for *East-India* and *China*, and that are not Return'd or known in *England* to Miscarry, and to whom they belong.

Figure 2 The first shipping database

At the same time a commercial shipping network developed around the Virginia and Baltic Coffee House. When this establishment reopened on 24th May 1744 it was advertised as a place "where all foreign and domestic news are taken in; and all letters or parcels, directed to merchants or captains in the Virginia or Baltic trade will be carefully delivered according as directed and the best attendance given"[6] The Baltic coffee-house prospered in a modest way and by 1823 it had acquired a committee, rules and a dingy auction room upstairs where tallow was sold[7].

Phase 2 The Undersea Cable

As the European empires opened up in the 19th Century and steamships made transit times more predictable, businesses needed a better way of communicating with America and India. Enormous sums were invested. In 1841 P&O introduced a service to the Suez by sea, across the isthmus by camel and then on to India by sea[8]. This allowed a bill of lading to arrive before the ship carrying the cargo. In 1855 a cable was laid across the Atlantic, but after 40 days it stopped working. A land cable across Siberia to Bombay was opened in 1865 but still took ten days for a message to be passed along the staging posts[9]. Another effort to lay an Atlantic cable in 1865 lost the cable in mid Atlantic, along with and $3 million of its investors money (about $1 billion in today's money?).

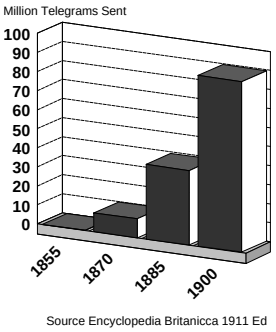


Figure 3 The cable explosion

Then in 1866 came the first trans-Atlantic cable[10]. This time they laid a new cable and retrieved the cable lost in 1865[11]. In 1871 a cable was laid to India and Hong Kong[12]and by 1897 162,000 nautical miles of cable had been laid[13]. Shipping had become a global market.

Sending messages was very expensive. The first Atlantic Cable in 1866 charged $1.25 per word (about 5 shillings UK)[14]. By 1894 rates across the Atlantic had fallen, but outlying areas such as S/E Africa still cost over $1.25 per word. At the time a clerk in the shipping office earned about $100 a year, so in today's money that equates to about $300 per word!

That confronted the industry with a dilemma. They had near instant communication (it took 2 minutes for the signal to travel along the Atlantic cable), but how could you negotiate freight at $1.25 per word?

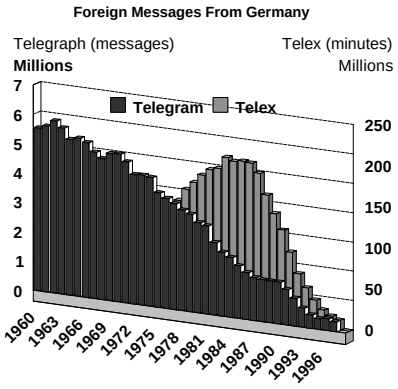


Figure 4 Telex takes over, then dies

Phase 3 The Automation of Cable Communications

The next major change came in the 1960s when cable communications were automated. Previously telegrams and the telephone had relied on operators to handle messages and calls, so messaging was too slow and expensive to run a negotiation involving several charterers/owners.

After World War II, messaging systems became much more powerful. The Teleprinter, Telex, direct dialling telephones, and fax reduced the cost of messaging (see text box above). When e-mail arrived in the 1990s sending messages became free, with the bonus that files could be transmitted over the cable, cutting messenger services.

Phase 4 Networks & On Line Systems 1960-90

In the 1960s a whole new dimension was opened up when information networks became available. Computers accessed by remote terminals allowed users to store information for access by anyone with a terminal linked to the system.

This was a major revolution. Until this time information was stored as paper documents and retrieved by indexed filing systems, a slow and labour intensive business. Computers were ideal for automating these systems and providing on line information (e.g. Reuters). To begin with the cost of the mainframe computers needed restricted these services to large organisations, but when network software became available for personal computers (PCs) in the 1980s the cost fell sharply.

Phase 5 The World Wide Web

In the 1990s the Internet appeared as a cheap and easy way of communicating between company mainframe and PC networks. Like previous developments in communications it is not a single revolution. Three related technologies are maturing in a way which is synergistic:-

1. **The World Wide Web:** This was conceived in 1989 as a seamless network in which data from any source can be accessed in a simple consistent way with one programme, on any computer. Amazingly, it happened![15] Web browsers allow anyone with a PC and an ISP to access web pages, regardless of platform, on a "self service" basis.
2. **File Transfer Protocols (FTP):** Allow data to be moved from one server to another without platform specific software.
3. **PC Software Standardisation**: Nearly all businesses now use the same PC software, and it is much easier to use. Jobs that used to need systems analysts can be planned and managed by the system users.
4. **Improved cabling**: Broad band cabling systems are almost as revolutionary as the Internet. Fast access and moving large amounts of information around, including databases, has become technically viable (though standards vary a great deal from country to country).

Most of the activities that can be carried out on the internet were possible at a price with earlier technology. The big change is the lower cost and greater user friendliness.

3. The Impact of Communications on Shipping Organisation

3.1The Information Requirements of the Sea Transport System

3.1.1 The sea transport system

Each change in communications effected shipping. To understand how we must look at the structure of the sea transport business. Figure 5 is a flow chart of the manufacturing processes, outlining the different transport operations. The transport system that has developed since mechanisation in the 1950s and 1960s has three separate sectors[16] :-

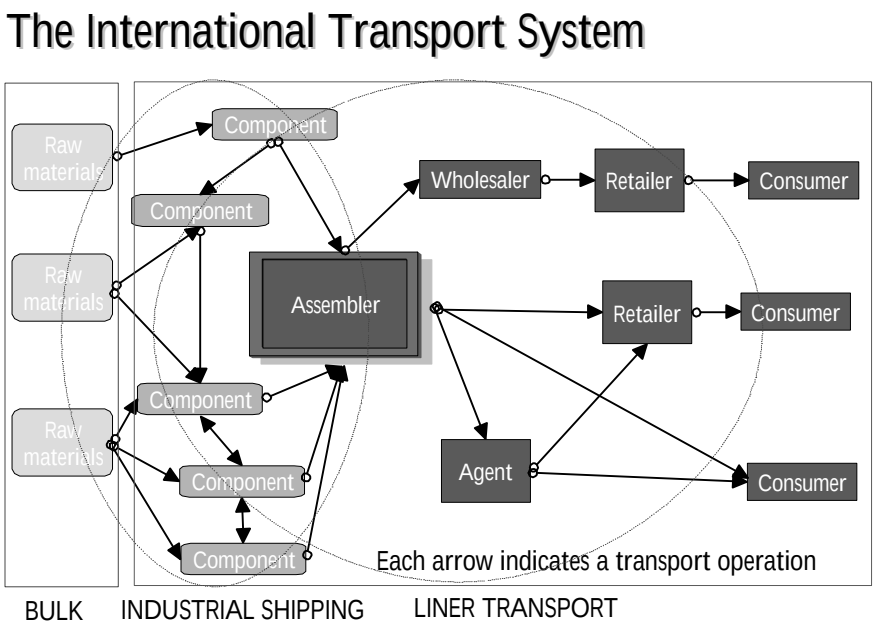


Figure 5 The transport system, showing bulk, industrial and liner sectors

- Raw materials transport (left). These are shipped once, usually in the largest parcels possible to reduce transport costs.
- Semi-manufactured cargoes (centre). Materials are shipped around the world from one fabricator to another for processing and re-processing.
- Wholesale and retail distribution system (right). Finished goods are transported from the final assembler to the wholesaler, retailer and the consumer.

Bulk shipping operates on the left of the chart, carrying large parcels of raw materials and bulky semi manufactures. Liner straddles the centre and the right, shipping small parcels of manufactured and semi-manufactured goods. Industrial shipping which straddles the two and specialises in the transportation of large consignments of difficult cargoes such as motor cars, steel products, chemicals, forest products and gas. The three sectors of the business have different information requirements

3.1.2 Information requirements of bulk shipping

Bulk vessels handle few transactions. They complete about six voyages a year, carrying one cargo a voyage, so their annual revenue depends on half a dozen negotiations per ship each year. This means that handling transactional information has lower priority and the real focus is on market intelligence to assist in the all important negotiations. The problem is the volatility of rates. A survey of the average weekly movement in the spot grain rate from the US Gulf to Japan shows that the rate moved by more than 1% in 90% of weeks and more than 25% in 5% of weeks. A 5% move is worth $55,000 loss of revenue for the voyage. So the focus is on the system that will help in handling the negotiation.

Liner Tasks Using Information

- Receive freight bookings
- Construct rate quotes
- Issue bills of lading
- Track and manage equipment
- Plan routings
- Determine load sequencing
- Manage documentation
- Trace shipments in transit
- Monitor equipment utilisation
- Respond quickly to failure situations
- Co-ordinate consolidated loads
- Multiple-point distribution
- Confirm pickup and delivery
- Generate performance, accounting, and other reporting
- Issue freight bills

3.1.3 Information requirements of liner shipping

In contrast a containership handles 10-50,000 revenue transactions each year. For a fleet of six ships that is 60,000 to 250,000 transactions per annum. With so many transactions the business relies on published prices. In addition cargo liners are involved in through transport of containers. The text box opposite lists the main information based activities into which this leads the liner companies. This is a business where transaction costs are very high.

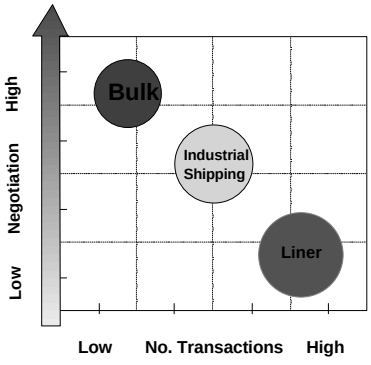


Figure 6 Information intensity matrix

3.1.4 Information requirements of Industrial Shipping

Industrial shipping falls between the two. A sophisticated chemical tanker carries 4-600 parcels a year, often on short voyages. In addition some of the operators have become involved in terminal operations. All the bulk industrial shippers work with clients who are pressing hard to rationalise and streamline their distribution chain. The motor manufacturers and the chemical companies are placing very high priority on this. Ford's AutoXchange, which will put its whole procurement and distribution operations onto web based systems is just one example. So in this sector the pressure for change will come from sophisticated clients.

3.1.5 The "Information Intensity Matrix"

Pulling this together, we have the transactional hierarchy shown in Figure 6 The bulk industry has a small number of transactions with a high negotiation content. The liner industry has many complex transactions to handle, but with a lower negotiating element. So now let's look at how these different sectors have responded to the changes in communications discussed above.

3.2 Impact of the Cable Network on Tramp Shipping

3.2.1 The undersea cable centralises tramp shipping

When the undersea cable arrived in the 1860s it changed the whole shape of the tramp shipping business. It gave the industry instant communications, but at too high a price to handle the negotiations involved in fixing a ship. In response tramp shipping developed a central market, the Baltic Exchange, where deals were negotiated face to face and the terms were then cabled back and forth in the briefest form possible (see Figure 7).

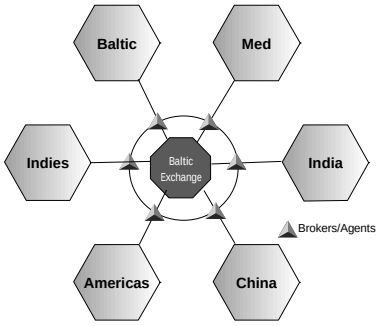


Figure 7 Tramp market 1890s

Shipbroking companies in London were the intermediaries in the system[17]. The Clarkson history records that in the 1870s Leon Benham, the company's leading broker, "was in constant attendance at the Baltic Exchange. Several times a day he would return to the office to despatch telegrams, invariably drafted from jottings on the stiff cuff of his shirt"[18] The 1869 accounts show that the company spent more on Telegrams than on wages[19]. The Baltic reached a peak in 1903 when it opened the exchange building in St. Mary Axe. As long as international messaging remained cumbersome and expensive the Baltic held its unique position as shipping's marketplace[20].

Figure 8 Bulk market model 1990s

3.2.2 Automation of communications allows bulk markets to fragment

When communications were automated in the 1950s & 1960s the system changed.

Owners, brokers and cargo agents formed networks using telex messages to distribute cargo/position lists and handle negotiations by phone. In the 1970s computerised work stations allowed telex or fax messages to be sent by the user. They also provided access to databases of ship details and voyage estimating programs. PC networks, which appeared in the 1980s, made these facilities available cheaply to even the smallest companies.

As communications improved the time zone problem became acute. Brokers spent long hours in the office waiting for calls from different parts of the world. This problem was solved by computer modems that enabled them to access the office workstation from home, taking the information network a step wider. More recently the introduction of cellular telephones has been a tremendous advantage.

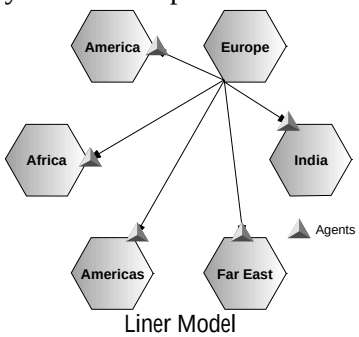
3.2.3 The "specialist knowledge" role of the market

This process added value by allowing the industry to apply information more efficiently to the cargo matching process. Brokers played a positive part in this process. As the independent networks developed, the market specialised by ship type - VLCCs, Products tankers, Handy bulkers, Panamax, Capesize, Chemicals etc. Small teams of specialist brokers developed an in depth knowledge of their sector - its ships, charterers, ports and cargoes- and combined this with the "soft" information gained from daily networking to gain negotiating leverage. The new bulk shipping market model is shown in Figure 8. By allowing market specialisation, cheap, fast communications took the business a step forward in terms of logistic efficiency.

3.3 Impact of the cable network on Liner Shipping

3.3.1 High cost communications dictate decentralised liner system

In the liner business, communications had a very different impact. Undersea cables arrived just as steel-hulled merchant ships with propellers made it possible to offer a regular liner service. However the expensive cables were not much help in handling the immense number of transactions involved in transporting general cargo. Liner companies set up offices or agencies in the ports they served and left day to day management of the service to them. So the liner business evolved as a system of geographically segmented routes (Figure 9).



Fiaure 9 Liner market model 1890s

3.3.2 The key role of communications in containerisation

When containerisation arrived in the 1960s, the pendulum swung to the other extreme and the liner business moved to a centralised model. Container movements relied on information systems to handle the complex logistics (see the text box on page 9). Containerisation "could not have been accomplished without computer control: systems for controlling the

movement of containers, taking bookings, printing out bills of lading and invoices and transmitting advice and information"[21].

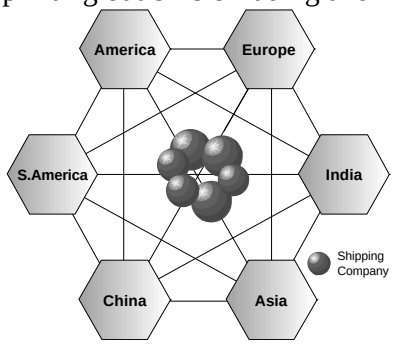


Figure 10 Liner market model 1990s

In the 1960s and 1970s only very big companies could afford the mainframe computer systems needed to run a container service. "The dominance of the mainframe computer, development of data bases and rationalisation of systems predicated central control for a major operator"[22]. Containerisation concentrated capacity in a few hands and produced businesses run by central management organisations (Figure 10).

3.3.3 Value added by communications in the liner business

By the mid 1990s the system for handling containers had become very sophisticated and was squeezing more value out of the transport business, as shown in the text box on page 9. These systems have been immensely productive, reducing cycle times by 40%, errors by 30% and saving $5 per document [23]. A massive step forward for those big enough to afford it.

3.4 Lessons from History of IT In Shipping

Information technology has changed the shipping business over the last century and each step forward has tightened the transport chain. There are three principles to be learnt from the past.

1. Changes in communications are only part of a model. In looking ahead we consider the whole system and in particular the way information is used in each industrial sector

2. Because we are dealing with systems which work at the lowest common denominator, changes tend to evolve over decades, not overnight.

3. In an information management system the major costs are labour and hardware. Relative cost changes effect the model. In the 1870s the cost of labour was low and the cost of communication was high. Today professional labour is very expensive and communications are cheap.

4. The Challenge of E-Commerce For Shipping

So now we come to e-commerce. How big a change is it and what opportunities and threats does it pose?

4.1 What's new about the internet for business

E-commerce is trade over the internet. Instead of placing an order by phone, letter, fax, or in person, the buyer transacts his business via a web page linked to a database (in the case of an auction site the buyer makes an offer).

The first point to make is that the web technology is much less novel for e-business users than it is for consumers. The diagram in Figure 11 below (which is a development of Figure 1) shows the internet as a variant of the mainframe information systems that have been in use for twenty years. It is a cable network (radio communications are not quite there yet!) with computers (servers) managing the traffic passing along the cable. Most businesses in shipping have been using computerised networks for at least ten years. Office networks with their servers, information systems like Reuters, the EDI used in the liner business, and a web based logistics system all belong to the same family. A server linked to terminals allows users in remote locations to store, process and retrieve data within an open environment.

The "revolution" of the web is its capacity to offer this service a fraction of the cost of the mainframe systems. Three developments have worked together to facilitate this revolution.

1. The Web Browser. Until now access to any computer system was on the terms laid down by the system designer. Web browsers (and the standard protocols such as HTML which they support) have established an international standard for accessing online information at a negligible cost (free in most cases).
2. PC Software. 10 years ago the database software available to PC users were feeble and difficult to use. A decade later the power, speed and storage capacity has reached mainframe standards. Implementing systems is still expensive and difficult (having problems with your company IT department?) but now small companies can do big things in the information management area.
3. Broad band Cables. The As fibre optic cables are laid the cost of transferring information is falling dramatically and the speed of transfer is increasing up.

In short, the entry level for business communications has fallen sharply. Shipping, which is very communications intensive, but with many companies too small

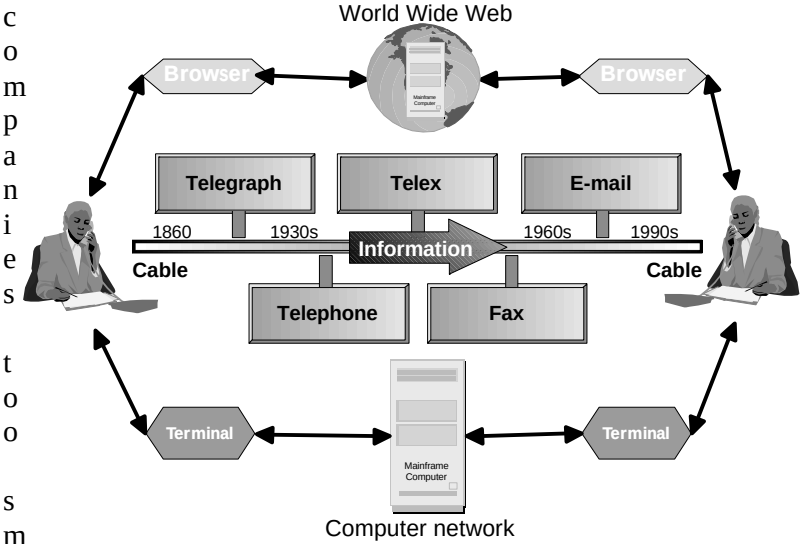


Figure 11 The web adds a new dimension to the shipping information system

ll to afford the mainframe systems, stands to gain as a result.

4.2 Five benefits of web communications

What the web does is to make networking with other companies astonishingly easy. It performs the same sort of networking tasks that the shipping business has been struggling with on mainframes and PCs, but it cuts the cost and provides easy access for people outside the immediate business unit[24]. That brings five advantages:-

1. Compatibility: The web browser provides a common denominator in system development. A system front end written in a browser readable language can be accessed by anyone. No need for a row of terminals accessing different systems.

2. Convenience: Demand driven access to information with no man-hour cost involved. When you want information, you go and get it. In a business working across time zones this offers real benefits.

3. Simplicity: There is an easy learning curve and an open culture. Staff familiar with a web browser can find their way round most systems without training. An easy way to post, view, modify and check information.

4. Integration: Standardisation of PC software (e.g. Microsoft Access) makes it very easy to pass information between systems developed independently by different companies.

5. Affordability: It costs much less to support a web system than a comparable EDI/Reuters type information system. Smaller companies are now Information empowered.

4.3 Web success stories and their implications

So far the dramatic successes have been in the consumer area. Amazon and Dell use the web for retailing; e-bay hold on line auctions. Charles Schwab sell shares by reducing the transaction cost for the small investor to the same nominal level.

It has been a bumpy ride. Amazon, the most successful, lost over $700 million in 1999 on a turnover of $1,760 million. Although the books they sell are cheaper, it now looks as though they are really in home delivery - pretty well what Sears, Roebuck did with catalogue retailing a century ago. Sears built its catalogue business around the American farmer who could not get to the shops[25]. Amazon are retailing to busy professionals who haven't got a decent local bookshop and haven't the time to search. The web catalogue is free, but unfortunately order processing and distribution are not! A warning that in e-commerce we have to think hard about what the core business really is.

4.4 The risks of extrapolating technical change

Applying the same technology to a business like shipping needs careful thought. Extrapolating from embryonic technology is a risky business. In

the 1950s experts looked at the first nuclear power stations and predicted free electricity. In the 1960s they looked at the Harrier jump jet and Concorde and predicted vertical take off supersonic airliners. In both cases the outcome was much more mundane. But major changes seem likely. We know that changing communications have reshaped shipping in the past and nobody can doubt that the Web represents a major change in communications.

5. Opportunities in Bulk Shipping

First, bulk shipping. This industry deals with a small number of transactions and already has fairly well developed company networks, remote access terminals, and company information systems handling chartering information. Although not always state of the art, the existing systems have usually been developed by the people using them to meet the unique needs of their work, so let's not write them off too quickly.

So how will the web add value? I would like to answer this question under four headings, chartering, cost management and strategic decisions.

5.1 Company Web Sites & Intranets

Two easy opportunities to make the web work in bulk shipping are a company web site and an Intranet.

5.1.1 The benefits of a working website

Bulk shipping companies often have few staff but an extensive international network of people they work with. A web site is a wonderful opportunity to post public information about the company - contact information, bank details, ship tracking information (speed, position, itinerary etc. This information is useful to charterers, but also everyone involved in the voyage - pilots, agents, tugboats, suppliers, receivers and terminals. If a system is set up to update the pages, the company is one step along the road to a logistics system (see below).

5.1.2 Intranets help companies work together

A step further along the road is a company Intranet. Essentially a company network, run off your own server. The great advantage is that it can be accessed easily from anywhere in the world. Overseas offices, agents, supervisors in shipyards or travelling staff can get in and find the information they need.

5.2 The Impact of Web Technology on Chartering

The basic procedures for transacting bulk shipping business have not changed in 200 years. There are three steps. First the owner/shipper offers his ship/cargo, interested parties exchange bids, and a deal is struck at agreed price and terms.

5.1.1 On line auctions?

Auction systems have been very successful with consumers. Ebay.com is one of the most successful internet companies, so the process obviously works. Business to business sites like ChemMatch, which auctions parcels of industrial chemicals, have had a fair bit of success. On line share dealing has driven down commissions from 1.5% (with advice) to around .2% for the transaction only. If the same thing could be done for chartering, the industry would save over 1% of its total costs. So it works for some businesses, but will it work for shipping?

A string of Venture Capitalists think it will. Shipbrokers.com, One-Sea.com, Spokanet.com, Maritime Global Net, Seanet, ShipBuySell, Internet Shipbrokers and a host of others are targeting this market. Brokers are under threat. A popular view is that "Until recently, advances in IT made life simpler for brokers. E-Commerce looks set to kill them off, along with other intermediary roles"[26].

The example of Amazon demonstrates that we need to be clear about the functions that are being automated. There are two very different activities involved in chartering a ship. The first is the transaction administration. The terms of the charter have to be recorded in the charter party, progress of the contract monitored and the hire collected and paid out. The second is the negotiation. A deal has to be struck. My guess is that the internet sites will do best in the trades where the trade is pretty standard and the negotiation element is weak. Let me enlarge on these points.

5.1.2 On Line charter party (transactional information)

Putting the charter party and transactional information onto the web has to be a winner. It offers a cheap and easy way of streamlining the operations process. Web forms (in effect on-line charter parties) linked to a database allow the details of the trade to be recorded as it is agreed. The parties enter the terms on the form and the charter is agreed. This brings many advantages. Automatic checks for errors and inconsistencies can be built into the system and transaction information generated in digital format can be fed into the operations systems of the parties for processing.

Charter party & recap - on line opportunity

Developing the software for on-line charter parties is not particularly demanding. The real challenge is agreeing a standard, linking the forms into the existing operations systems, and persuading the participants that it is worth doing. To achieve this the web forms (in effect on line charter parties) must be well thought out by people who understand the business. This is a task that industry associations such as Intertanko, BIMCO, or the Baltic Exchange would normally undertake. The various "on-line marketplace" systems on offer could also provide this facility, and maybe

one of them will establish a standard. Although the capital markets arepumping funds into this sort of venture, I doubt if many fortunes will be made from supplying on-line charter parties. The operations element of shipbroking is less than 10%, so even if all of this was saved, it would not amount to a great deal.

5.1.3 On Line negotiation aspects of chartering

Adapting the freight negotiation to the web, where this is important, is more difficult. Bulk shipping is a very competitive market place and there is a lot of money to be won if you play the game well. Shipbroking is a very competitive business. If brokers do not "perform" they soon lose their clients, and if shipbroking companies do not perform they soon lose their brokers. It is easy for charterers to go direct, and it happens all the time, so we must assume that brokers are adding value. But what value do they add?

I believe the answer is "expert knowledge". The best analogy I can think of is the Pilot used to take a ship into port. The Master may have entered the port before, but the Pilot enters it every day. He knows the wrinkles. Putting charts and port information on the web would not put the Pilot out of work. Local knowledge is crucial because conditions change all the time. So a Pilot is used.

Roughly the same is true of navigating specialised markets. The broker may not be an MBA, but he is a knowledge worker. He works his specialist market round the clock and, if he is any good, he knows everything about it. He knows where it is today, what the charterers are up to, what the owners think, how sentiment is moving and who's in trouble. He knows because he spends his whole working life following it. With this knowledge the broker, like the Pilot, is a reliable guide. You call him and he tells you your options.

Charterers or owners who "go direct" lose this information source, so they have to follow the market themselves, which is quite a big job. That means reviewing offers, deciding which destinations offer the best follow-on position, and negotiating their preferred cargo against other bidders. Only a very big owner will work as many ships as a broker, so he is always likely to be less well informed than a team of four or five brokers sitting together and working a market. He could just accept the first offer, but the stakes are big - he can easily lose $20-50,000 on a Panamax if he fixes below market. The market is always on the lookout for a "stuffee", so the ill informed are vulnerable. So conventional "with advice" shipbroking is likely to do best in complex and volatile markets.

All of this is a long way from bidding for a $200,000 Ferrari on Ebay! Shipbroking works because of the economies of scale in knowledge management and there is no software in sight that will do this as well as the human mind.

5.1.4 Supply chain management systems

One of the most promising cargo related applications of the web is the web based logistics system. The technology for tracking cargoes is already very well established in the container business, where clients can locate their container through the carrier's web site. This offers particular benefits for commodities such as chemicals which travel in small parcels, but web based systems are so easy to implement that I imagine it will become routine for all cargoes.

There is a lot of competition to establish the "industry platform". For example the supply chain management system offered by Optimum Logistics, an on line logistics system that monitors all stages in the supply chain by incorporating information from every party that touches the shipment - from producers, to transportation and storage providers, to freight forwarders and surveyors. This allows the whole transport process to be tightened up, with benefits to industries managing inventories. Clarksons are involved with LevelSeas.com, which will do the same sort of thing.

It may turn out that there is room for everyone. The great thing about the web is that it allows users to work between platforms.

5.1.5 Real time information services

Brokers as a breed may not be wiped out by the web, but the nature of the business is bound to change. One opportunity created by the web is the provision of information to clients on to a real time basis. Currently brokers send out daily or weekly lists and talk to their customers on the phone when they can. The potential is there to provide a real time information service on line which the client can access when it suits him.

The web delivery system is easy enough, but managing the information could be quite a challenge, especially in small organisations. With more information available quicker, someone has to filter it. The pace of broking is about to change gear, just as it did when communications were automated in the 1970s.

5.3 Operations & Cost Management on the Web

The second area where the web creates an opportunity is cost management. Supplying ships is quite a complex business. A merchant ship is like a floating factory, so the whole process of supplying the materials needed to keep that ship at sea to 6000 ports around the world is bound to benefit from rationalisation. The internet provides information for better stock control and slicker procurement. In recent years shipping industry costs have been squeezed very hard, but there is more to go. Many routine administrative systems have been "computerised", and the web offers a way to work these systems a little harder. This is an area where the start up projects are focussing.

This is one of the areas where there are gains to be made. My estimate is that, excluding crew costs, the industry spends about $4-14 billion a year running ships in the deep sea cargo trades (depending on how much labour

you include in your definition of cost). The main areas are shown in Figure 12. Organising the supplies is a complex business. There are many ways that web systems can assist.

The simplest is for the existing manufacturers and suppliers to put their catalogues on line and accept and process orders through this channel. This is already happening. The ability to check prices, specifications and inventory at will must help tighten up the procurement process.

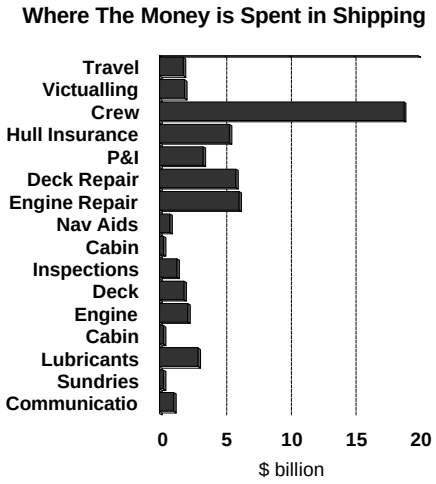


Figure 12 Shipping expenditure by type

Various web based systems like ShipVertical and Applestar are being set up to provide a "one stop" procurement service for shipowners. These businesses are claiming that users of the systems will save 10-15% in procurement costs. Like the online consumer stores they must demonstrate that they can book orders, provide status tracking systems, deliver the goods reliably and still undercut the existing suppliers. This is a very demanding task and it will be interesting to see if any of the contenders manages to develop enough critical mass. It will demand excellent management, but if a couple of big suppliers could be established that would be to the benefit of the industry.

Finally as search engines improve and more web based utilities become available, going shopping for parts and equipment should become much easier. Tracking down hard to find spare parts, disposing of second hand equipment and all sorts of other things become possible now that we have such a low cost way of cataloguing products and providing technical details on a self service basis. It could well be the niche suppliers that were too small to market internationally that gain most.

5.4 Strategic Decisions

Finally there are the strategic investment decisions. Whether to order, buy second hand, scrap, timecharter, or make himself useful to a particular client group. These decisions determine the profitability of the company. They are information intensive. Bulk shipping companies spend relatively little on these activities, possibly because they feel there is little that careful analysis can add. I think this is true of traditional research - telephone book surveys have been the research currency over the last thirty years.

One obvious application of the web is to provide information to clients on a real time basis. Currently brokers send out daily lists and talk to their customers on the phone when they can. The potential is there to provide a real time information service on line.

5.4.1 Conclusion on bulk shipping

So how will the web effect bulk shipping organisation? I believe all this information technology will favour bigger units needed to collect and use the information. Consolidation is already going on bulk shipping companies. As the information flow improves, the local small brokers will be bypassed, channelling activity towards the bigger groups who have a wide enough spread to support an information system. Well, that's my theory. You must judge for yourselves!

6. Opportunities in Liner Shipping

The liner business is a serious information user and it has a great deal to gain from the web. Already there is a flood of web sites aimed at the liner business, provided by existing companies who were quick to see the potential of this development and newcomers with new ideas for cargo matching.

The 1960s information revolution which facilitated containerisation centralised the business. I think we could find that the web gradually dilutes this central structure in the same way that, over a very long period, better communications undermined the Baltic Exchange. Central organisations are all very well, but they can never be as responsive to customer needs as small groups of specialists working niche markets.

Late 1990s Liner Transport Information System

1. The shipper, using a PC and a spreadsheet, accesses the providers system for a price quote. In the database prices are adjusted for route, taxes and other charges. The shipper uses a template to submit his load.
2. After reviewing the information the transport provider checks availability, transmits confirmation, and generates an electronic bill of lading.
3. The transport provider searches on line and arranges a truck and equipment to pick up the shipment. It receives confirmation electronically, and relays pickup schedule to customer.
4. The trucking company's dispatcher keys in the pickup information, which is added to the stop sequence on the driver's hand-held terminal.
5. After the freight is picked up the vehicle tracking system using wireless communications (VTS) monitors the shipment status on the road.
6. Shipment documents are relayed between modes and transfer points electronically .
7. Each transfer is entered in the transport providers tracking system. Shipment status is reported real time.

I am not suggesting that the big companies with their arterial services will suddenly disappear. A visit to their web sites shows that they are already there in terms of the web. Booking cargo, tracking containers, downloading Bills of Lading and supply chain management solutions are all available, so their role is secure. So what will change? I believe it is the small and medium sized companies on the fringe of the market who have most to gain from the internet revolution.

6.1 Transactional Cost Reductions

Electronic data interchange (EDI), which has occupied a central place in the liner business in recent years, is expensive, inflexible and not very consumer friendly. Each liner company developed a system, supported by a large and very expensive IT department ($10-15 million per annum spend). Compatibility is as much of a problem as cost. Carriers building networks through mergers have found it difficult to bring affiliated companies under a common information management network. This complexity and cost has created a barrier to entering the deep sea container trade[27]. As the web takes over as the medium for handling information the whole problem will be simplified and one of the major barriers to entry in the liner business will disappear.

For liners the opportunity is to make the best possible use of this. Over the next 20 years customers will take low prices for granted and the key competitive arena will be speed of delivery. As volume grows, I expect a network of direct services aimed at specific niche markets to make inroads into the established arterial hub system. There are many more small container terminals than there used to be and pressures on the inland transport system should help this trend.

Five trends will support this change.

- Firstly growing trade volume will create sufficient volume on many secondary routes to operate a direct service with reasonable sized ships.
- Secondly information technology will allow medium sized liner companies to offer effective door-to-door services without the complex overhead structure of today's giants.
- Thirdly the growth of the containership fleet will create a pool from which smaller operators can obtain ships on charter when they need them.
- Fourthly there are now many small ports with container terminals who are keen to attract new business with competitive rates that compensate for their limited ship capacity.
- Fifthly There will be pressure from the public and the environmental lobby to divert distribution of containers by land to a waterborne option where this is available.

These developments set the scene for a new tier of medium sized companies that exploit "knowledge intensive" technology (see Figure 13). They will be highly focussed, customer responsive, fast, flexible and, most importantly, cheap. It's roughly what happened in bulk shipping. Anyone who doubts that this is possible should look at the recent success of niche operators in the airline market.

The value added for customers will be flexible direct services geared to their specific transportation requirements. The market can do this. Global companies will have to work even harder to hold their dominant position.

6.2 Competition Will Intensify

Difficult to believe, given the intense competition which already exists in the liner business, but the web could make the business even more competitive in future. One of the main advantages of the Web is its capacity to allow customers to shop around. Today the process of developing rates quotes is sufficiently complex to give carriers some protection, especially in fringe markets. It seems likely that soon there will be systems capable of comparing quotes and recording the experiences of customers. These systems already exist in the consumer sector.

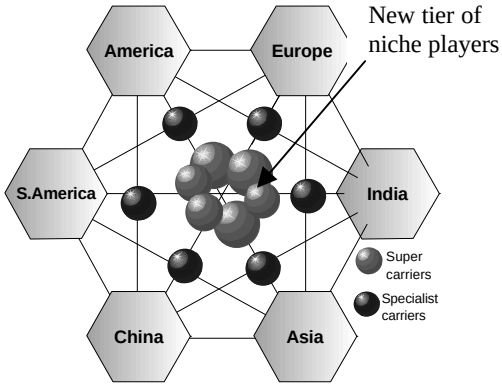


Figure 13 The new two tier container market?

This new competitive framework will allow customers to be more responsive to differences in rates

7. Opportunities in Managing Ships & People

7.1 The Impact on Ship Management

One of the most crucial issues in any international business is "Should we control everything from the centre, or do we push control to the local operating units"[28]. Two hundred years ago the issue was clear for shipping companies. The Master and the Supercargo were the commercial mangers of the ship. If the ship needed stores, repairs, or ran into legal difficulties the Master handled it. Shipping companies were decentralised organisations.

The pendulum has now swung to the other extreme. The business is conducted from the centre, with agents playing a smaller part and the ship's officers no part. As port times have shortened to a few hours[29], going to sea is a long way from life ashore. The demands on the Master have escalated. Modern radio communications mean that he is deluged by demands from the office, but he does not really know what is going on[30].

As shipboard communications improve, and costs fall the way will be open to give on board management access to the same web based information systems available to management ashore. These systems will handle every aspect of their business from chartering the ship to provisions, crew and dry docking. Surely this will effect the way the ships and their officers/crew interface with the rest of the company. I do not know how this will develop, and it is an emotive issue, but shipping companies will soon have a very powerful new management tool at their disposal, if they can find ways to use it.

8. Conclusions

So that's it. Managing information on the web is a lot easier than the clumsy mainframe and PC networks we are used to. We are all using roughly the same software (in my book that really is a revolution), and there are lots of things we can do with it on the World Wide Web. Working Web Sites and Intranets are a quick and easy way to put this technology to work.

In bulk shipping chartering transactions are a prime candidate to go on line, reducing operations costs. The next step is integrated logistics. This is easy to do for bulk shipping because of the small number of parcels and it brings practical benefits. Brokers seem likely to continue as knowledge workers, piloting their clients through the murky waters of the shipping markets. But the business will speed up and successful brokers will be offering real time information systems and more sophisticated strategic advice.

The liner business, a big information user, will see IT costs fall with a bang. Customers will get better service and the greater transparency of information will tighten competition, if that is possible. In the long term my guess is that the web will open up the highly centralised liner business. Customers in fringe locations want to be looked after and big companies are not always able to do this. Cheaper IT will make it easier for a second tier of specialist companies to target niche markets.

Finally, maybe some of these fancy new communications will in due course bring the people on the ships back into the game. Masters used to fix the ship in the old days. Why not today?

So maybe it's not all bad. In War of the Worlds the Martians catch a nasty disease and die. Judging by the papers in the last few days, some of the internet entrepreneurs are looking a bit sick. So if you have e-fatigue, you can relax, take a big breath, and remember that the good guys always win in the end. Happy surfing!

"The only sound a distant cry from a single Martian:"Ulle-e-e..!

The invaders are indeed dead, destroyed by the one thing against which they have no defence – no cashflow"

War of the Worlds

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[1] The Economist 26th Feb 2000 Survey E-Commence, page 42

[2] In H.G. Wells's novel "War of the Worlds" the earth is invaded by hideous creatures from Mars armed with death rays. The Martians take over the earth and feed off the inhabitants, only to die eventually from bacterial diseases, to which they are not resistant.

3 Kircaldy A.W. (1914) British Shipping Kegan, Paul, Trench, Trubner & Co, London P. 159

[4] Blake, George 1960 Lloyds Register of Shipping 1760-1960 page 3

[5] Blake, George 1960 page 4.

6 Barty-King, Hugh 1994 "The Baltic Story – Baltic Coffee-house to Baltic Exchange 1744-1994" Quiller Press Ltd., London page 3.

[7] Barty-King (1994), page 10

8 Jennings, Eric 1980 Cargoes: A Centenary Story of the Far East Freight Conference Meridian Communications, Singapore, page 20. This service meant that a ship could be despatched from London for the East and orders sent out by this service would reach the ship's destination before her arrival.

[9]9 MacGregor, David 1961 The China Bird The History of Captain Killick and the firm he founded Killick Martin Chatto & Windus, London page 44 Grant's Trans Mongolian Telegrams advertised a 10 day delivery for cables to the Far East.

[10] Dugan, J 1953 The Great Iron Ship Harper & Brothers, New York Page 167. The cable company raised $3 million. The Great Eastern, Brunel's massive iron ship, was chartered for the job . Daniel Gooch offered the ship free if she failed to lay the cable. If she succeeded he asked for $250,000 cable stock.

[11] The 1865 cable lasted until 1877 and the 1866 cable lasted until 1872.

[12] MacGregor, D (1961) p45. The submarine cable ran from Falmouth, across the Bay of Biscay to Gibraltar; then along the Mediterranean to Alexandria from where it went across to Suez; down the Red Sea to Aden and Bombay and across India to Madras; thence to Penang, Singapore and Hong Kong, the last end being taken ashore at Hong Kong in June 1871. A cable took 7 hours from Falmouth to China.

[13] The 1911 edition of Encyclopaedia Britannica quotes Sir Charles Bright as stating that by 1887 107,000 miles of submarine cable had been laid, whilst ten years later 162,000 miles of cable were in existence, representing a capital of £40 million 75% of which had been provided by the UK. Most of the cable was manufactured on the Thames.

[14] Dugan J 1953 page 187. The submarine cable to China opened in 1871 charged £7 per message. In 1872 the charge was reduced to £4 6s. for 20 words.

[15] The concept was developed by Tim Berners-Lee of CERN, the Swiss particle physics institute. They wanted to share physics research, but the various institutes had different computers which could not communicate. The WWW was the result.

[16] Stopford Martin (1997) Maritime Economics Routledge London page ..

[17] Horace Clarkson, aged 28, joined the Baltic in 1858

[18] The Clarkson Chronicle, 1952, p. 20

[19] In that year the expenditure on Telegrams was £5,300 and on wages £5,000

[20] One of the techniques was the Boecode, a system which reduced lengthy messages to a few words.

[21] Graham M.G. Hughes D.O. 1985 Containerisation in the Eighties LLP London pages 19, 95

[22] Graham M.G. Hughes D.O. page 95

[23] Intermodal Information Technology: A Transportation Assessment, APL May 1997 page 7

[24] Three definitions will, I hope clarify some of the issues I will be discussing. Network: A group of people working together for the purpose of transacting business, especially markets. Database: A data store with a classified index that allows rapid storage and retrieval of data. System: A set of procedures designed to execute routine tasks more efficiently.

[25] Drucker, Peter Management: Tasks, Responsibilities and Practices Harper's College Press 1977, page 47

[26] Shipping faces the dot.com stampede, Lawrence Royston, Tradewinds 8th April 1999

[27] The difficulty of developing an a reliable information system was one of the factors that contributed to the short life of U.S. Lines

[28] Handy, Charles (1993) Understanding Organisations 4th Edition, Penguin Books, London, page 355

[29] The average time in port has shrunk from 6 days in 1970 to 16 hours

[30] Recently I was told recently by a Mission to Seamen Chaplain who spends a lot of time talking to Masters "I've not met a sea captain who is happy with the future of his profession". Similar comments were made in discussion with the Merchant Marine Academy