



NORTH SEA BALLAST WATER

The Interreg IVB
North Sea Region
Programme



*Investing in the future by working together
for a sustainable and competitive region*



TOWARDS PARTICIPATORY AND TRANSPARENT IMPLEMENTATION OF THE BALLAST WATER MANAGEMENT CONVENTION



Ellen Ninaber
Legal mediator

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Ellen Ninaber, MA, LLM, Legal mediator

Alegria Mediation

Duitsekampweg 38

6874BX Wolfheze

Netherlands

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Executive summary

The International Convention for the Control and Management of Ship's Ballast Water and Sediments (BWM Convention) introduced the need for technologies that still had to be developed when the Convention was signed in 2004. IMO was well aware of the challenges facing implementation. Unprecedented endeavours were undertaken to develop solutions, create channels of communication, to stimulate participation in, and support for effective implementation of the Convention.

However, the conventional regulatory approach itself does not facilitate a 'phasing in' implementation process which stimulates lessons to be learned and shared and through which resistance can be overcome.

Point of departure of this study were the views, experiences and concerns of five shipping companies. Together, these companies reflect the different approaches towards innovative technology. At the one extreme there is the 'early mover' who uses the ballast water management systems on board four vessels to gain experience before the whole fleet will have to be retrofitted. On the other extreme there is the hardcore skeptic company which is opposed to any regulations that require investments and which regards the process as a game of power play.

The views of these companies and the problems they encounter have been taken as a starting point to find the 'hotspots of resistance' and analyse the underlying mechanisms.

These interviews reveal many issues that need to be addressed. The main conclusion is that too many ports and port states are presently making life very difficult for early users. Neither is it recognised that the experiences of these early users could be of great mutual benefit too, especially to ports and terminals and port state control. The prohibition to discharge ballast water treated according to the D-2 standard now, also creates great uncertainty that D-2 is robust enough in the eyes of port states to allow D-2 discharges after the Convention has entered into force.

Chapter 3 of this study is an exploration to understand the underlying mechanisms of resistance and how this can be overcome by looking at the problems through a different lens. Starting point for this is an explanation from a sociological perspective how innovative technology is gradually accepted (adopted) by a community (in this case the nautical community).

The Diffusion of Innovation model describes the acceptance of an innovation, according to characteristics of defined 'adopter groups'. The model distinguishes five categories of potential users who differ in their readiness to adopt an innovative technology.

A small group of innovators and early adopters serve as pioneers and opinion leaders. They spark the adoption process by trying out new technologies. When they are transparent about their experiences they can pave the road for the more risk-averse part of the population who need proven technology. Learning through peer to peer networks plays an important role in the acceptance of a new technology.

Within this model, organisations and the people in them do not move into another category. Rather the goal is to streamline the introduction of an innovation to meet the needs of the different categories, from pioneers all the way to the 'laggards'.

Communication as an uncertainty reducing process.

Good communication cannot save a bad project, but bad communication can certainly cause great damage and delay to a good project.

This section explores the need for a communication plan that provides for effective feedback loops to make it a transparent and participatory process. Transparency can only be successful when transparency systems provide highly relevant and accessible information that users incorporate into the considerations that determine their actions. So to be effective, the audience for whom the information is meant, is required to both access and use the information.

Managing information and designing and implementing an appropriate communication plan requires great expertise. A relatively simple tool could already make a great difference. An interactive website as a focal point for clear information about relevant issues and the possibility to ask questions.

A different approach to policy making.

In light of the global complex challenges, the UN and UN Organizations are increasingly aware that a different approach to policy making is required, one that is more inclusive and participatory. Sharing ownership and responsibility would be a recognition of the important role of the Observers in IMO and could bring renewed energy into the implementation process.

Observers who represent industry have to represent all their members, from the small group of pioneers to the skeptics at the other end of the continuum. The default position of the vast majority in the normal distribution curve is resistance to change. The recognition that these differences exist, opens the road for doing justice to these different positions and it becomes possible to explore new approaches and design new strategies for greater involvement of NGO's to assist the implementation process.

Paragraph 3.5 introduces the notion of a "pioneering reward". With Pioneering rewards are meant policy instruments and (temporary) measures by other stakeholders that show appreciation of the pioneer's role in the implementation process. The aim is making the introduction process more transparent and do-able for all parties involved. Learning should be the most important aim, including manufacturers, users, enforcers, and policy makers. For a Pioneering reward to work, the reward should not be a strangling scheme but a reason to proudly participate.

The need for organising a 'user community' is briefly discussed too. It is called a "Do It Yourself" model because the shipping community itself, possibly in cooperation with manufacturers, will have to initiate this.

There are plenty examples of online user and support communities outside the maritime industry. A user community makes it possible to ask questions which are answered by other community members and manufacturers can also be triggered to provide advice. The advantage is that it is informal way to enhance familiarisation. Writing under pseudonym lowers thresholds for participation. A few trustworthy blogs will also help attract attention. The model could be expanded to make it a truly transparent 'watchdog' or 'consumers' association', providing information about cooperative ports, terminals, feedback on sample results etc.

The resistance to implementation of the BWM Convention show the need for complementary strategies and actions to facilitate the implementation process. This study is not meant to be exhaustive by any means but intended to stimulate discussion on innovative approaches and take concrete measures to support the work of IMO. Many topics discussed here seamlessly fit into the 13 key strategic directions identified by IMO to achieve its mission objectives (See Resolution A.1061(28) High-Level action plan of the organization and priorities for the 2014-2014 biennium, adopted on 4 December 2013, agenda item 8).

1 INTRODUCTION

The discussions on the need for managing ballast started in 1988. Since then an unprecedented amount of time and energy has been spent to raise awareness and develop technical and regulatory solutions.

While many deem the time ready for implementing the BWM Convention, others still object to the entering into force of the Convention. Frustration about the process itself and seeing 'the others' as the problem may be part of the normal negotiations in IMO, but when parties tend to become more and more committed to their positions, continually restating and defending them, it is time for a break and look at the process and the resistance from a different perspective.

Organisations often create the right atmosphere for that by organising 'away days'. Those processes are greatly facilitated by log fires and good company (and booze). The participants in the IMO meetings are well aware of the importance to step away at times. During one of the countless meetings on SOx measures the debate was completely stuck. Suddenly all members of the Japanese delegation rose from their seats and started to hand out these funny Japanese 5-toe socks to everyone present.

Nothing beats the power of humour to break the ice and help us see things from a different perspective.

This study is meant to look at the problems related to the BWM Convention from different perspectives. To gain better understanding of the hotspots of resistance specifically related to the BWM Convention and to gain understanding of the underlying mechanisms of resistance to change in general. Looking at a problem through a different lens, may help us find possible routes to overcome the problems, rather than merely reacting to them.

Starting point of this study are the real concerns and perceptions of five shipping companies. Together, these companies represent different approaches towards the BWM Convention. At the one extreme there is the 'early mover' who insists on using the ballast water management system now to gain experience before having to retrofit the entire fleet. At the other extreme there is a company who believes managing ballast water serves no purpose and prefers to wait and see. The views of these companies have been taken as a starting point to analyse the concerns, and understand the reasons. Chapter 3 looks at the problem from a much broader perspective to find approaches that make use of the differences, rather than trying to find a procrustean bed. The shipping industry needs a level playing field and this doesn't have to conflict with acknowledging and respecting that different companies have different needs and views about the right management strategy for dealing with innovations and uncertainties.

A level playing field can only be achieved by ensuring that the regulations adopted are widely and uniformly accepted. The BWM Convention is a complex dynamic in which many mechanisms operate in tandem. When the process of implementation suffers 'undue delay', some port states may go ahead, which complicates matters for the shipping industry. IMO has shown a keen interest in taking measures to improve quicker action. (e.g. the tacit amendment procedure).

The BWM Convention may be a stimulus to find other means to facilitate the implementation process. While flag states are appealed to ratify the Convention, the removal of the real stumbling blocks need the active cooperation of port states and the shipping industry itself too.

In this context, special attention will be drawn to a greater role for organisations that have been granted consultative status in IMO.

This study could never have been done without the ideas of many people in the nautical community who were willing to share their views with me. The original orientation of this study was more of a legal nature, to explore what the Aarhus Convention could do to induce more transparency. I am very grateful to the project leaders that they trusted me to take another approach.

I would have liked to present the draft of this report to a 'test audience', but time constraints did not allow this. This means that the reader is the first to make sense of this report. That is a daunting feeling. But when it comes to feelings of daunt on BWM issues, I am in good company.

29th May 2014

Ellen Ninaber, MA, LLM, legal mediator

2 VIEWS AND EXPERIENCES OF FIVE SHIPPING COMPANIES

2.1 INTRODUCTION

This chapter contains the views of five large internationally operating shipping companies.

Together, the companies cover worldwide ocean transport, short sea shipping, liner services, and heavy lift transport.

All of them are affected by the global economic crisis and have suffered losses since 2008. Some are dependent on external financing, while others are able to invest without loans and mortgages.

This is their side of the story on Ballast water management. Their personal experiences and perceptions may shed some light on the decisions they made, and why they decided last year not to invest in retrofits for the time being.

Some statements reflect a lack of up to date knowledge of the Convention and what decisions or measures have been taken by IMO and other parties to solve certain problems that are mentioned here.

These views and statements may raise questions. That is exactly the purpose of this chapter: to stimulate awareness of the problems that are experienced "at the bottom of the pyramid" and also that a lot of relevant information is lacking, even though these companies have clearly done their homework. Information that could remove some unnecessary concerns.

Apart from technical issues related to Ballast water management and to monitoring that need to be solved, there are other issues that hamper a smooth implementation. These barriers are not specifically related to the BWM Convention but of a more general nature. Shipping is an international business, but ports (and port states) do not always seem to be aware of the implications local or national rules and procedures have on international visitors. The role of ports and port states in facilitating implementation cannot be overestimated.

Four of the companies do not oppose the entry into force of the BWM Convention now. In fact, they would welcome it as it would restore a level playing field. These companies have already invested in management systems and have spent considerable time and money to plan retrofits. Entry into force would also provide a chance to make some necessary amendments to the Convention. And most important: it would make it possible to make the right investment decisions. The fifth company is skeptical and opposed to any regulations that involve extra investments.

The interviews took place in March and April 2014 in The Netherlands. The interview reports have been corrected and approved by the interviewed.

2.2 COMPANY 1

International shipping company with a long history. Large modern and diverse fleet of dry cargo vessels. Full fleet management.

The company was one of the first to invest in the installation of a ballast water management system.

In 2004 the Company had one expensive ballast water management system installed. It proved an utter failure and the manufacturer did not manage to get it working properly. It was a useless investment and the company did not wish to do further business with this manufacturer. Two years ago the company had a management

system fitted on one of their vessels as a test set up. This proved a great learning experience, both for the manufacturer as well as for the company.

Four ships have been fitted with management systems over the past six months. In order to gain experience, the company wants the management systems to be used for all ballast operations.

The only reason to install the ballast water management systems now were the USCG regulations.

Retrofit plans for the whole fleet have been prepared but retrofits have been postponed till ballast water management systems are type approved by the USCG and have become mandatory. On new build vessels the preparatory (pipe)work will be done but installations will not be purchased now.

The company initially regarded the 'extra' rules of the USCG as a clarification of the IMO rules. However, the combined demands from a.o. Canada, the US, and the BWM Convention makes the situation very unclear. And as long as the ballast water management systems aren't compulsory, banks refuse to finance Ballast Water Management Systems. This is especially so after many years of operating with losses.

Experience with ballast water management systems.

Unlike the manufacturer one decade ago, the present manufacturer provides much better service. There is a clear understanding that operational experiences with the four systems and the service provided will influence the company's decision on future retrofits of the large fleet. The impression of this spokesman is that the shipping company expects more than the manufacturer can offer.

Using the management installations for all ballast water operations is not as simple as it may seem.

Support from manufacturer. The manufacturer of the ballast water management systems provides support, but support at the operational level needs improvement. While there is quick response on questions from management on shore, direct questions from the crew to the manufacturer are not always answered. This is presently being discussed with the manufacturer.

Different perceptions on shore and on board.

There is a discrepancy between the views of management on shore and the crew on board. While management on shore finds the use of ballast water management systems on board quite do-able and overall not very problematic, opinions of the crew are far more negative.

The spokesman attributes the negative attitude to:

Workload. During port visits the work pressure is already high. Operation of the ballast water management systems is quickly considered as too much extra burden by the crew. The spokesman denies that the workload is too high. He acknowledges that the work is not spread evenly. Port visits are notorious peak times.

Environmental awareness. A lack of environmental awareness by the crew may influence this negative attitude.

Automatic back flushing: costly interruptions at the terminal. The ships visit many different places, including rivers. If problems arise, this is usually caused by sediment clogging the filter. Back flushing is an automatic procedure which cannot be predicted. Back flushing interrupts the flow, and hence the (un)loading operations slow down or are interrupted.

Time counts at the terminals. The crew has to work hard to keep up the pace of the terminal. Any delay on the ship side is charged by the terminal, which is a costly affair. The greatest problem is that the ballast water

management systems start to back flush automatically. While the system cleanses itself, the flow of the ballast water slows down or stops. This means the loading/unloading process is being affected or even interrupted at unforeseen moments. This happens more frequently than expected.

Less filter problems are expected on a new ship that will not sail in ice or fresh water.

Negligible operational costs. The costs of using the ballast water management systems are for the shipping company. The company charters it's own ships. The extra fuel costs for use of the ballast water management systems are negligible compared to the total annual costs of operation of the vessels. A few thousand dollars annually.

AMS not for fresh water. As it turned out, only two types of ballast water management systems have been accepted as AMS in all three types of water. This means that this company has invested in Type Approved ballast water management systems that cannot be used in the Great Lakes.

Ports and Port State Control.

No negative experiences with PSC in the US and use of AMS ballast water management systems.

The company has no bad experiences with port state control in the US, not even when there were problems with one ballast water management unit. The captain could show that everything had been done to prevent pollution but still feared serious consequences. However, no problems were encountered with the PSC officer.

Lack of knowledge by PSC Officers. In many countries PSC Officers and harbour masters lack knowledge about the details of D-1 and D-2 procedures and the difference between them.

Discharge of treated ballast water is not widely accepted. Not all ports accept the discharge of D-2 treated ballast water and insist on ballast water exchange. This is the case in a.o. Canada, Australia and in some ports in Chile. One ship visiting a Chilean port was forced to sail back to sea with the treated ballast water to perform the ballast water exchange outside the 200 miles zone. Acceptance of D-2 appears to depend largely on local harbourmasters. These are not the only countries that prohibit the discharge of D-2 treated ballast water.¹

Ports and terminals don't like Ballast Water management. Many ports and terminals don't like it and prefer 'plain' ballast water operations.

Electronic logging not equivalent to manual Record book. The ballast water management system unit monitors and records all ballast water operations. A print of this data file can be handed over to PSC but in many ports this is not accepted as equivalent to a manual log.

Unreasonable consequences for Ship Risk Profile. When PSC does not accept the electronic data file and writes out a Form B (Deficiencies Found Report), this will contribute negatively to the Ship Risk Profile. There is no room for observations in these public data, hence no clarification or correction is possible on these alleged violations.

¹ As the BWM Convention has not entered into force, most port states will have no legal provisions allowing discharge of ballast water that meets the D-2 standard.

Who is liable for an undetected failing of the Ballast Water Management Systems? The Master can be prosecuted for non-compliance. However, when a fully automatic system does not signal an alarm, how do you know whether the ballast water meets the discharge standards? One can only rely on sound performance of the control technology. Unlike a failing OWS, failures in the management of ballast water cannot be detected visually by the crew. A manufacturer may give 2 years guarantee. Buyers expect it to work properly. This is a legal question that needs to be addressed by the IMO. Liability for the proper working of ballast water management systems is not a matter that can or should be solved at the level of PSC and the Master - or in court. During the trial period that PSC will use 2-3 years after the entering into force of the Convention prosecution or detention will not happen in these circumstances but that does not solve the issue at stake here.

Why PSC needs a global convention and clear rules.

There are still many ports where corruption has not been eradicated. In such places, PSC is just another potential extra source of income for some. In these circumstances, it is of vital importance that rules and enforcement issues are clear and not open to individual or local interpretations. Also, in ports where PSC Officers lack the proper expertise, clear communications on the rules for verifying compliance with the rules for ballast water management can hopefully prevent costly delays and detentions. Port State Control procedures will be globally implemented when the Convention becomes effective.

Issues for IMO

Clarification of guidelines.

The company uses ballast ejectors for stripping operations. It objects to the proposed "Clarification on the usage of a ballast water management system during stripping operations", submitted by France and Norway (PPR 1/5 29 November 2013).

Management of the mixture of driving water and ballast water in the tanks during discharge is regarded as superfluous by the company. The ballast water has already been treated and the driving water is local water. A second management is meant for preventing regrowth. In the present case regrowth is not a relevant issue. The local water would receive a UV management 10 times the required dosis while management of local water is not necessary in the first place. Requiring such management to solve a sampling problem, seems to put the cart before the horse.²

Grandfather clause.

A period of 5 years is not an incentive to invest pro actively in the installation *and use* of ballast water management systems. If stakeholders want to profit from operational experiences, then it would help if ballast water management systems would enjoy a grandfather clause till the end of life of the Ballast Water Management Systems or the ship.

Appeal to ports: please allow discharge of D-2 treated ballast water.

The timely investment of \$ 0.5 million per ship on ballast water management systems was meant to comply with the D-2 standard **and to gain operational experience**. Ports which prohibit the discharge of D-2 treated ballast water before the entering into force of the Convention, undermine the investment and force the ship to perform riskful exchange operations at sea.

² At the time of the interview the spokesman was not aware that his problem had been solved.

Thoughts on entry into force of the BWM Convention: please ratify.

The company is in favour of implementation of the BWM Convention as soon as possible. Global shipping needs a strong and credible IMO.

According to the spokesman the ICS opposition towards ratification and implementation is not in the interest of proactive shipowners. Ballast water management systems are regulation driven, there are no economic incentives for the shipping industry to invest in them. After many years of operating with losses, shipowners like to delay costly investments and seek arguments to support their claim that the Convention is not ready for implementation. Once the Convention enters into force, the level playing field will be restored, and the rules will apply to all.

Changes may be needed in the Convention, but that can only be done after the Convention has entered into force.

A further delay will mean that the time and money that the company spent on retrofit plans of hundreds of other ships in the fleet will be wasted.

Personal observation of the interviewer: This spokesman has been open willing to share experiences with a wide audience. His willingness to have his brains picked by the larger nautical community is beginning to wane.

2.3 COMPANY 2

Large shipowner, operating worldwide (including liner services and short sea shipping). Vessels: mainly multi-purpose, heavy lift, ro-ro and two semi-submersible vessels in the fleet. Recently many new build vessels added. The company changed its position on environmental issues and has been investing in strict waste management for quite a number of years.

The company does not depend on external financing for its investments in BWMS.

Primary reason for installing Ballast Water Management Systems.

Ballast Water Management Systems are installed on all new build vessels (since 3 years).

Local/regional requirements, especially from the US were the driving force for doing this as the period for which exemptions have been granted in the US ends already on 1-1-2016.

Two different systems have been fitted, both with a USCG AMS notation. A UV system for the conventional vessels and a chloride management for the heavy lift vessels. Two heavy lift vessels are currently under construction, these are not semi-submersible, but share the characteristics (extreme capacity) of ballast water management systems of semi-submersible vessels.

No decision has been taken on retrofit for other types of vessels. For a few old vessels the decision may have to be made not to use them to US ports anymore.

Choice of manufacturer.

For the heavy lift vessels with a large capacity of ballast water there is not much choice on the today's market. Only one system can handle 20.000 m³ per hour.

The company would prefer to have a ballast water management circulation system, but in order to have this approved under class and USCG is difficult.

The problems with an internal circulation method are not being solved yet. It would be much easier to ballast and deballast unfiltered water which is treated by ballast water management systems during the voyage via a

circulation system. Filters clog up quickly and create a bottleneck in the time and power required for (de)ballasting.

Unfortunately, the IMO Type Approval does not take into account different needs of different types of vessels.

Guarantee: the shipyard provides the guarantee on the whole vessel + machinery, so a guarantee on the installed ballast water management systems is not a separate issue.

Operational experience with BWMS.

UV systems. Currently the company has most experience with UV systems only. For these ships ballast water exchange is still by far the preferred option. The exchange method saves fuel as the UV ballast water management systems are large power consumers. The company doesn't regard the exchange method as possibly hazardous. There are no stability problems for the vessels involved, but attention is needed for torsion and bending moments, and exchange should of course only be performed in good weather conditions.

The advantage of the UV system is that it does not need chemicals and it is easy to use. Drawback of UV is the energy consumption of the system, the vulnerability and lifetime of the lamps.

Operating a ballast water management system does not differ from other typical engineering tasks and with a comprehensive manual no extra training is needed for a senior engineer.

The almost semi-submersible heavy lift ships will likely use a chloride management system with a USCG AMS notation. Circulation of ballast water would be the preferred option on these heavy cargo vessels, but that is currently not possible.

Record keeping has proven to be near to impossible during (de-)ballasting while performing heavy lifting with a ballast control system on the heavy lift vessels. A reconstruction of the precise ballast operations (internal shifts from ballast water in different tanks) has to be traced back afterwards.

Treatment versus exchange. Once the Convention enters into force, management of ballast water on some routes is the only option as it would take too much time to change the route to meet the requirements for distance to shore and water depth to exchange the ballast water. Despite the clause in the BWM Convention that this should not be necessary, local administrations have made this water depth a hard requirement in their current national legislation, and will not approve ballast water to be discharged if not meeting this requirement.

Port reception facilities.

Adequate port reception facilities for ballast water and for ballast water sediments are lacking almost worldwide. The Convention requires only port reception facilities for the disposal of sediments, but in certain areas or circumstances the disposal of ballast water may be necessary too, e.g. when the management system is temporarily inoperative/under maintenance.

Port State Control

(n.b. with a large and globally operating fleet, the average of this fleet is 200 PSC inspections annually).

- In some ports PSC is regarded as an extra source of income for the inspectors. That will not be any different with ballast water requirements. The global rules for monitoring compliance need to be unambiguous in such ports.

- In ports with proper functioning PSC no problems have been met with the ballast water management requirements. Usually PSC involves compliance with administrative requirements before ETA, and an initial inspection where record books are being checked. In some ports PSC officers also take samples on board (Australia and a salinity test / refractometer in Canada) but no problems have been encountered with these sampling procedures. N.b. the same goes for the sampling of low sulphur fuel in some ports. Samples are being taken but feedback on the outcomes is never given.
- The detailed laboratory test procedure has not been solved. It takes time to have the results of the tests. With bunker samples this is easy: the bunkers may not be used for the two days that it takes for testing. How will this be solved for ballast water?
- The reason for some requirements is not well understood. E.g. in Canada it is possible to comply with the ballast water discharge rules by raising the salinity of the ballast water, i.e. by adding salt.

Unsolved problems and questions

- If the ballast water management system is not performing well despite best efforts will this be interpreted similar like ports treat violations of Marpol (fines/imprisonment etc?)
- What are the options if vessels cannot treat the ballast water on board due to malfunction and cannot discharge to a land-based facility?
- How many UV lamps can be defective before it can be concluded that the system does not function properly?
- Monitoring on board/overboard discharge of the ballast water quality when performing an internal circulation procedure. No live monitoring system to D-2 standard exist, only measurement systems of chlorine concentrations.
- The company sees it as a great problem that it is not clear which ballast water management systems will be accepted by all port states. IMO Type Approval does not guarantee a USCG approval / AMS notation and an AMS notation does not guarantee that the system will also receive a final USCG Type Approval. Nor does it guarantee that it will be approved by countries that presently only accept D-1 procedures. E.g. In Chile and Australia only ballast water exchange is presently accepted, D-2 treated water is not.
- Type Approval does not cover all relevant situations, most notably for ships other than the conventional type of vessels. For instance heavy lift and flo-flo vessels where ballast water is used for loading and unloading purposes. Internal circulation is currently not covered in the Type Approval procedure.
- Ballast water exchange procedures within Europe are currently not aligned. No exemptions have been given so far for vessels sailing between two ports in the same area, e.g. from Rotterdam to Antwerp. If the BWM Convention would come into force now without these exemption schemes on certain routes we face a major problem. As long as exchange is accepted as an interim method there is a need for clarity how to handle such situation.
- The Energy Efficiency Design Index (EEDI) of the relatively smaller vessels is negatively affected by the ballast water management systems requirements. Extra generators are needed both for cranes and for the ballast water management systems. Regardless whether they are actually being used, this 'overkill' of generators counts for the EEDI.
- The administration required for the Energy Efficiency Operational Index is a monstrosity.

Administrative burdens.

As a general remark, the company wishes to express its frustration about the lack of standardisation in forms and procedures. Ballast water forms, like FAL forms, are not accepted everywhere. Even the wrong logo on a clearance form (IMO instead of the logo of the local authorities) can cause costly problems.

The company would welcome standardisation and mandatory use of IMO forms. It would prevent the abuse of forms by local administrations and ports and would save the shipping industry a great amount of time, frustration and money.

(n.b. All company spokesmen agreed on this point).

Thoughts on the entry into force of BWM Convention

A global Convention is welcomed by this company. It hopefully ends the confusion of different national and regional rules and regulations, and will restore a level playing field.

Clarity on Type Approved management systems that will be accepted worldwide (including the USA) are urgently needed.

A known date of entry into force of the Convention would make it easier to make the right investment decisions.

2.4 COMPANY 3

The shipping company operates a modern fleet of semi-submersible, heavy transport vessels.

The company wants to operate in an environmentally friendly manner but does not regard itself as a frontrunner in terms of investing in ballast water management systems before it has become mandatory.

Nevertheless, the company is actively engaged in the research and development of technical solutions for their special purpose vessels. The actual equipment installation and commissioning will take place when the BWM Convention enters into force.

The company acquired two ships from a Chinese yard which had already been fitted as new builds with a ballast water management systems. The systems are totally inadequate for these special purpose vessels.

At one vessel the preparation work (pipework) has already been undertaken for a test setup but the final choice of ballast water management system has not been made yet.

Ballast Water management systems for semi-submersible vessels.

The semi-submersible vessels have large ballast pumps. Ballasting and de-ballasting operations take place in the same area, which means that this water does not need to be treated. A relatively limited amount of ballast water is required for the transportation between port states. This water needs to be treated. The best solution would be a management system that treats the water to D-2 standards by means of circulation during the voyage. Circulating ballast water should be kept to a minimum as it is an energy-consuming operation.

Issues that are not solved yet:

Logging device. The present bottleneck for the company is finding a monitoring system that automatically logs all ballast water operations, including the internal shifting of the water from one tank to another. This logging device should be able to substitute the manual Ballast Water Record Book and provide the necessary data for PSC.

On board monitoring compliance. How will the crew be able to know that the treated water does not contain viable organisms anymore?

Port State Control and ballast water management

The vessels of this fleet are usually on anchorage instead of at the quayside. The vessels are rarely subject to PSC inspections and if so, inspections seldom create problems.

A ballast water management plan is on board all vessels.

Thoughts on entry into force of the BWM Convention

The company has no objections to the entering into force of the Convention.

2.5 COMPANY 4

Large, sophisticated tanker fleet, operating worldwide.

In 2013 the company has investigated in depth the best strategy for retrofit and what systems would be the best choice for their ships (both retrofit as well as new build).

The company has no ballast water management installations on board the present fleet but will have two new tanker this year fitted with management systems and for another eight tankers that are being built or ordered management systems have been bought.

Thoughts on the entry into force of the BWM Convention.

In the eyes of the spokesman, the Convention has lost its relevance at the moment.

This company invests 600 – 800 k\$ per ship on ballast water management systems on 8 new-builds and that is a lot of money for complying with a Convention that isn't expected to enter into force in the foreseeable future. Retrofitting would cost up to \$ 1 million per ship.

The relaxation of the installation schedule by IMO doesn't feel fair to those companies who already invested in management installations. This has made the company recently decide not to invest at all anymore in ballast water management systems on both new build and as retrofit and will wait for more solid ground.

Regional requirements: US.

The options that were considered by the company last year:

- Retrofit now with Management Installations which are 'only' accepted as an AMS. With a grandfather clause of only 5 years, this was not regarded a wise decision. \$400.000 - \$ 1.000.000 per retrofitted ship is a lot of money if you don't have the guarantee that it can be used till either the end of life of the ship or the ballast water management system.
- Dry docking survey before 18th December 2013 would provide the company with about 8 years extra time. This was decided to be the most sensible decision under the present circumstances. (Many other shipowners followed the same strategy).
- For one ship that could not be surveyed in time, an exemption was applied for and has been granted. This will give the company time till 1-1-2016. The company expects the USCG to have approved management systems by then, which will make future investments in installations more reliable.

Negative consequences of US regulations.

Exemptions have been granted till 1-1-2016. If ballast water management systems have been approved by then, this will create an enormous peak in the demand of ballast water management systems and docking in 2016-2017. Vessels with 1500-5000 m³ will share the same timeframe for compliance with the bigger ships. The company foresees great problems and log jams.

The spokesman had heard that as soon as one ballast water management system has been type approved by the USCG, the law will enter into force. This raises questions about a fair playing field for competitors and does not mean that systems will be available for all types of ships.

Port State Control and Ballast Water Management.

All ballast water exchanges are recorded in the Ballast water record book and no problems have been encountered with PSC.

Observations on management systems and ballast water exchange.

- The company experiences no problems with ballast water exchange at sea and neither is the 200 miles zone a problem. Captains know this and adhere to this requirement.
- Ports differ greatly in water quality. In some areas river water is so dirty, full of sediment and contaminated that you do not wish to take it in. Auto-clean filters don't work under such extreme circumstances in e.g. Africa and India. Cyclone filters that rely on gravity are expected to prevent problems with clogging of filters.
- "We will expect for sure problems on filters. Filters are 40 mu, Pre-filters are 4 mm square. You have problems with pre-filters already at several awful ports, imagine 40 mu !! Clay and the particles smaller than 5 to 25 mu, are the problem in the tanks. They pass the filters and also 'plastify' and clog the filters. Inside the tanks we will still have clay which has organisms inside. That is why we prefer cyclone filters when new investments have to be made. They work on gravity and do not need auto-clean. In principle most organisms will not pass, however there is a fear that organisms smaller than 40 mu will pass.
- Container vessels usually have no filter problems. They can shift their ballast during loading and unloading and can do their ballast operations outside port. Tankers, however, have to ballast and deballast in port and are thus far more prone to filter problems in ports with poor water quality.

2.6 COMPANY 5

Medium-sized company, full ship management of dry cargo vessels and container feeders, specialised in short sea shipping. Parent company also owns gas tankers, bulk carriers and container vessels and operates worldwide. The relatively young company had to change management practices related to compliance issues. After many years of operating with losses, the company has not enough flesh on the bones to make non-mandatory investments.

Experience with ballast water management systems.

The parent company owns six new build vessels which had been fitted with an inert gas system for \$1,5 Million each. During the sea trials it proved impossible to get the systems working. The company decided to leave this issue for the time being. The problems will be addressed once the use of ballast water management systems has become mandatory.

The possibilities for retrofits have been studied but no decisions have been taken yet.

The spokesman does not see the need for managing ballast water: "Ships have transported ballast water for so long, all the harm has already been done, so what's the point in regulating it now?"

The company has not much confidence in the information provided by manufacturers. It is not proven technology and manufacturers are not transparent about the costs of operation and maintenance of the management systems.

A few years ago at the maritime trade fair there were many manufacturers of ballast water management systems. At the latest trade fair only three manufacturers showed up. Not one of them has sold many systems and some companies have stopped production or have been sold.

Experience with exchange method.

The trading routes of the fleet cause no problems for ballast water exchange. The only problem will be Rotterdam - England. He knows that the necessity of exchange is presently being studied.

Port State Control.

All Ballast water management plans have been approved. Keeping a Ballast water Record Book is no problem. The spokesman adds "One can only hope that the crew complies with the rules".

Regional requirements: the US.

The company has three vessels on routes to the US. The dry docking survey has been planned in time. Exemption has been received from USCG/EPA till 1-1-2016 due to fact that no approved equipment was available. If ballast water management systems become mandatory in the US these vessels will be transferred to other trading routes.

The spokesman regards the position of the USCG as a simple matter of power play. When shipowners refuse to invest in ballast water management systems, the US will have to give in. US trading depends on the foreign vessel fleet. He notes that the same happened with single hull VLCC's which were given an extension of 5 years.³

Thoughts on the entry into force of the BWM Convention.

The company will not invest in management systems before the BWM Convention has been ratified. It realises that this strategy will cause log jams for retrofits, but it is not up to the shipowners to solve that problem.

General remarks

Shipowners will wait and see as long as there is no clarity about the date of entry into force of the Convention and of management systems that will be approved by all port states.

³ See also Double-Hull Tanker Legislation: An Assessment of the Oil Pollution Act of 1990, National Academies Press, Washington D.C., 1998, p. 47-48

2.7 DISCUSSION - HOTSPOTS OF RESISTANCE

2.7.1 The invisible gorilla.

The interviews show how shipping companies are affected by the delayed ratification of the BWM Convention and the uncertainty caused by US State and Federal regulations. That is nothing new, it is already at the centre of attention. What these interviews reveal is that selective attention for these problems make it easy to overlook other important problems.

The BWM Convention requires a 'phasing in' process which allows lessons to be learned. Many stakeholders are working hard to develop and try out solutions. But there is a lack of appreciation how early users of ballast water management systems can facilitate learning processes for all parties involved or affected by the BWM Convention. Regulation D-4 has not been written with an awareness how this on board testing may facilitate the whole implementation process.

The challenge is how ports and terminals, port states and port state control can become actively engaged participants in the learning opportunity that early users of ballast water management systems provide.

The gorilla that goes unnoticed⁴ is that too many ports and port states are not facilitating the early users and do not realise how the experiences could be of great mutual benefit.

2.7.2 Issues that need to be addressed and solved by ports and port states.

Many concerns relate to one question: is the D-2 standard robust enough in the eyes of all port states?

The USCG requirements were initially seen as a clarification and a great stimulus for companies to study in depth their options. The present lack of clarity makes it virtually impossible for companies to invest in new systems. However, companies need clarity too on the position of other port states in relation to D-2.

Prohibition to discharge ballast water treated according to D-2.

A number of port states or ports presently prohibit the discharge of ballast water treated according to the D-2 standard. National rules of the port state often require the exchange of ballast water. This means that early movers (like the first company) who want to use the ballast water management systems, cannot do so. Pro-active movers do not understand this and begin to wonder if port states will accept the D-2 standard after the entry into force of the Convention.

Not allowing the ships to use the ballast water management system also means that ports and terminals and port state control miss a great opportunity in gaining experience too.

There is no certainty that the D-2 standard will be accepted by all port states when the Convention enters into force.

Port states need to provide clarity on their position whether they will allow the discharge of ballast water that has been treated in accordance with the D-2 standard after the entry into force of the BWM Convention.

⁴ The 'invisible gorilla' refers to experiments which prove how selective our attention is and how blind we may be. For an example, see https://www.youtube.com/watch?v=IGQmdoK_ZfY

As the Convention has not entered into force yet, port states might consider to facilitate or even reward early users. Temporary waivers for these early users can help in overcoming prohibitive national regulations.

Port reception facilities.

The BWM Convention requires ports to have reception facilities for the disposal of sediments. There may be situations where ships need to dispose of ballast water too. Ports need to provide clear information to the shipping community how ships can dispose of their sediments and what to do in case ballast water management cannot be performed.

Legal consequences of undetected failures of ballast water management systems.

The fears about undetected failures of the management system relate to uncertainty about unpredictable consequences when PSC detects violations of the discharge limits that could not be known by the crew. "Will we be punished for something that is beyond our control?" It is felt unreasonable if a strict liability regime would apply to the company and members of the crew. These concerns are especially associated with ports where PSC are not well-trained or where port state control is regarded as an alternative source of income or where port states have a strict liability approach or an ambiguous allocation of the burden of proof.

Strict liability in criminal law is the liability for which criminal intent does not have to be proven in relation to the guilty act. Defendants will be convicted even though they were genuinely ignorant of one or more factors that made their acts or omissions criminal. The defendant may not be culpable in any sense.

In civil (tort) law strict liability means liability for causing damage by a hazardous activity without having to prove that the defendant was negligent or directly at fault. Wrongdoing does not have to be proven; the liability arises from the fact that the activity or product is inherently hazardous or defective. It is most commonly associated with defectively manufactured goods.

Port states and the legal Committee of IMO are advised to shed light on this issue.

Different formats and procedures for ballast water management.

As a general remark, several companies wish to express their frustration about the lack of standardisation in forms and procedures. Ballast water forms, like FAL forms, are not accepted everywhere. Even the wrong logo on a clearance form (IMO instead of the logo of the local authority) can cause problems. Standardisation would save the shipping industry a great amount of time, chagrin and money. Mandatory use of IMO forms and greater alignment of reporting procedures would be a more than welcome saving for the shipping industry and would also help to prevent abuse.⁵

2.7.3 Other issues.

The interviews show that there are other issues that need to be addressed. Some of these issues relate to basic problems, like corruption and lack of transparency on the way Port State Control operates in different ports. Three issues that specifically relate to the BWM Convention:

⁵ Note: An illustrative example is given in IMO News 3-2013, page 13 and 14. If it is correct that these forms take up 80% of the Master's time, standardisation could mean a very substantial cut in costs.

- A lack of up to date information. The interviews show that the spokesmen sometimes lack sufficient knowledge and information. They have legitimate concerns but also concerns that could be removed by receiving information that is already available. These companies all try to be as well informed as possible. This issue will also be addressed in the next chapter.
- A lack of awareness about the hazards associated with ballast water. The urgency for ballast water management is not recognised by everyone in the shipping industry. On board the vessel, the transfer of non indigenous species and pathogens is usually an invisible and statistically improbable threat.
- The role of manufacturers. As the interviews show, trust is hard to gain and easy to lose. Most ballast water management systems are not proven technology yet. Shipping companies know this and those who are willing to invest, need to be certain of the support from the manufacturer. Some manufacturers clearly invest in building customer loyalty. There may be discrepancies in what the shipping company expects and what a manufacturer is prepared to give. This requires good negotiation, sound contracts and open communication on both sides.

3 UNDERSTANDING AND OVERCOMING RESISTANCE TO THE BWM CONVENTION

"Men are generally incredulous, never really trusting new things unless they have tested them by experience"
N. Machiavelli, The prince, 1513, Chapter VI

3.1 INTRODUCTION

The BWM Convention introduced the need for treatment systems that still had to be developed when the Convention was signed in 2004. IMO was aware of the challenges facing implementation. Paving the road towards implementation was a pioneering endeavour which involved a shared responsibility by more different parties than ever before. Together with GEF and UNDP IMO set up the Global Ballast Water Management Programme (GloBallast). The programme is comprehensive and innovative in its approach to enhance global knowledge, assist developing countries and prepare for the new Convention. The Project spurred global efforts to design and test technology solutions. The partnership involved global, regional and country-specific partners, representing government, industry and NGO's. Private sector participation was achieved through establishing a Globallast Industry Alliance with partners from major maritime companies (GIA). Under the auspices of the GIA a GloBal TestNet Memorandum of Understanding was established to harmonise technology testing and approval processes worldwide. Another important partnership was the North Sea Ballast Water Opportunity Project (NSBWO project), set up in 2009 with the aim to overcome barriers to ratification and implementation by finding practical technical and regulatory solutions. The EU Interreg-funded project ignited an innovative hands-on cooperation between industry, policy and science. The project created a bandwagon effect and extended from 40 to nearly 200 co-operating organisations.

In consultation with ship owners, scientist, and policy makers a thorough scientific basis was provided for validation of BWM systems, as well as a robust basis for compliance enforcement. On top of this a ballast water exemptions and exchange strategy was developed. As a result the project contributed considerably to the regulatory processes in IMO, OSPAR/HELCOM, EMSA, while addressing concerns of the shipping industry.

So here we have on the one hand unprecedented endeavours to develop solutions, create channels of communication, to stimulate participation in, and support for effective implementation of the Convention, and on the other hand still resistance to the Convention. How can this resistance be overcome?

This chapter looks at the problem from different perspectives. The exploration is not meant to be exhaustive by any means, but intended to stimulate thinking about the complex problems in a broader context. Looking through a different lens may help to detect approaches that will make the process more transparent and will facilitate the implementation of the BWM Convention and Conventions to come. Most topics discussed here seamlessly fit into the 13 key strategic directions identified by IMO to achieve its mission objectives (See Resolution A.1061(28) High-Level action plan of the organization and priorities for the 2014-2014 biennium, adopted on 4 December 2013, agenda item 8).

3.2 THE ACCEPTANCE OF INNOVATIVE TECHNOLOGY SEEN FROM A SOCIOLOGICAL PERSPECTIVE

3.2.1 Differences in readiness to accept an innovative technology.

It is often stated that the BWM Convention is regulation driven. Unlike e.g. investments in reducing fuel consumption, there would be no other motives for the shipping industry than compliance with those regulations to invest in ballast water treatment systems. While regulations and the expected dates of entry into force for different types of ships are certainly the driving forces for taking investment decisions, it is also true that organisations differ in their assessment of what degree of certainty they need to take these decisions and which moment seems right to act.

Organisations and the people in them are not automata responding mechanically to changes. A stimulus-response model (legal requirements > investments) is too simple to explain the process. What happens between the moment that new regulations loom on the horizon - regulations that require innovative technology - and the moment that the whole shipping community is ready for compliance?

Organisations, like individuals, differ in their attitude towards innovations. Executives have to make decisions to invest in expensive technology with no proven track record (apart from the next challenge to convince banks and other investors it is time to step in). There are always people and companies who are first in adopting a new technology and others who will follow later.

Or as the proverb goes: If one sheep leaps over the ditch, all the others will follow. The last sheep doesn't follow the first one who leaps over the ditch but rather the ones right in front of her. Differences in readiness is not unique for the maritime industry or for ballast water management systems, but applies to the adoption of any innovative technology by any group of potential users.

When investments in ballast water treatment technology do not differ in many respects from any other investment decision in innovative technology it becomes possible to explore how innovations in general are being adopted, and what this implies for the implementation process of the BWM Convention.

Companies do not install treatment systems all at the same time. Rather, they invest in a time sequence. This sequence is not a coincidence. Companies have developed strategies and ways of doing things, including how to deal with changes and their disposition will also guide their decisions in relation to ballast water management.

How innovative ideas and technologies spread, how they are being diffused from early adopters to more widespread adoption, has been explored extensively from a sociological and psychological perspective. One of the first examples studied comes from the maritime industry and is called the "sailing ship effect". Gilfillan noted in 1935 that in the maritime industry some market segments did not replace old technology with new technology. They preferred the sailing ships even after the emergence of steam ships in the nineteenth century, and the same happened when diesel ships entered the scene in the twentieth century. Shipbuilders of the 'old technology' continued commercialisation and accelerated innovation in response to the threat of the new technology⁶.

⁶ S.C. Gilfillan, "Inventing the ship", Chicago, Follett Publ., 1935 and "The sociology of Invention", MIT Press 1970.

3.2.2 The diffusion of innovation model.

The basis for many studies is the diffusion process model, first developed in the fifties to explain agricultural purchase patterns by farmers⁷. Everett Rogers extended the theory and describes the process that occurs as people and organisations adopt a new technology, practice, or idea.

The model spawned a wide range of adaptations that extend the concept to different domains of interest.

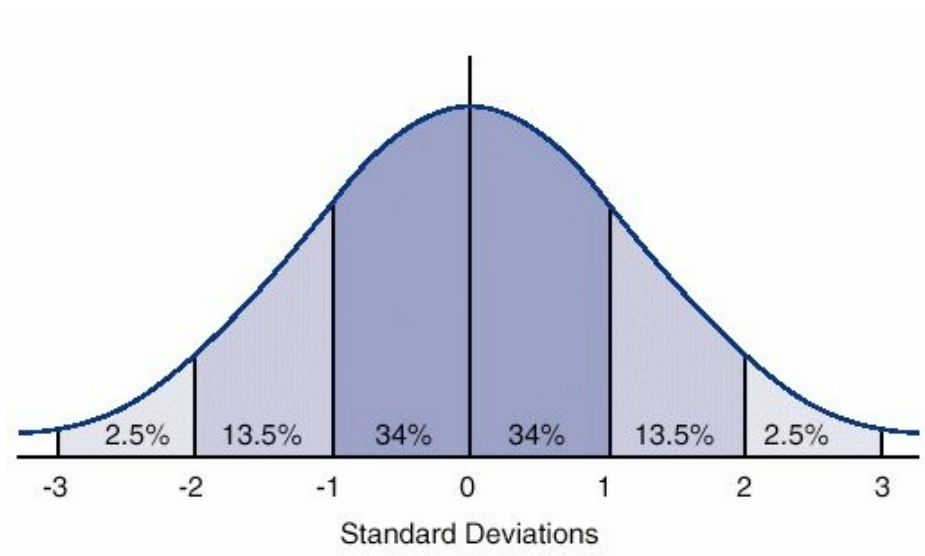
"Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system. Diffusion is a special type of communication concerned with the spread of messages that are new ideas".⁸

The Diffusion of Innovation model describes the adoption or acceptance of a new product or innovation, according to psychological characteristics of defined adopter groups. The model distinguishes five different categories of potential users ("adopters") who differ in their readiness to adopt an innovative technology. Each category contains individuals and companies with a similar degree of innovativeness.

In most cases, a small group of early 'innovators' are the true pioneers in adopting a new technology.

When they spread the word, more and more people and organisations will follow their example which eventually leads to the development of a critical mass of users.

The introduction of a new technology follows the normal distribution of a bell-shaped curve.



The five categories of users of an innovation are described as:

1. Innovators (2.3%)⁹
2. Early adopters (13.5%)
3. Early majority (34%)
4. Late majority (34%)
5. Laggards (16%)

⁷ Bohlen, J.M., Beal, G.M (May 1957), "The Diffusion process", Special Report No. 18 etc.

⁸ Everett M. Rogers,(1995, 4th ed) "Diffusion of Innovations", New York, Free Press, page 35.

⁹ Note: in this model the first and last category both make up 2.5%. Why Rogers uses 2.3% instead of 2.5% did not seem relevant to find out for the purpose of this study.

Innovators are quick in adopting a new technology. They are willing to take risks and are motivated by the idea of being a change agent. They are the gatekeepers for the next group of adopters: the Early adopters.

Early adopters are often natural 'opinion leaders'. They are respected by their colleagues and serve as role models within their social group. These persons and organisations like to be trendsetting and are excellent tester subjects to try out the new technology.

The **Early majority**, is a much larger group - about one third of the total population of potential users. This early majority differs from innovators and early adopters in some important aspects. They are more pragmatic, want proven technology and a reliable service. Avoiding risks, both budgetary and in terms of user-friendly technology are decisive considerations for this group. When taking a decision on when and what to buy, this group relies on references from trusted colleagues.

This early majority will in due course also serve as opinion leaders for the next group of users, the late majority.

The **Late majority** is the fourth category, and also makes up about one third of the total population, This late majority is rather skeptical and will resist making the necessary investments till investments in the innovative technology become inevitable. This group is extremely cost-sensitive, demands bullet-proof solutions and is easily influenced by the hard-core skeptical opinions of laggards. Peer-group pressure and a single trusted advisor will help this group to take the necessary management decisions.

The **laggards** are the last group to move. This 16% remains skeptical to the very end and prefers to maintain the status quo. They don't trust the new technology and regard it as hindrance to operations. Investments will only be made when no alternative is left. In the time sequence it means that by the time the new technology has become mainstream, adopted by 84% of the population, this 16% is still regarding it as an innovation which should not be trusted.

A model is by definition a simplification of reality, needed for clarification. The categories in the normal distribution curve will not be so visibly divided as they form a continuum. Each category contains individuals that share some characteristics in the way they approach innovations. The differences between two companies belonging to an adjacent category, e.g. an innovator and an early adopter, may hardly be distinguishable. Both innovators and early adopters have a pioneer mentality. The model does not make a distinction at the other end of the continuum and describes the last 16% as one category. However, the differences between e.g. an early adopter, a typical pioneer, and a company belonging to the late majority should be clear at first sight.

Some studies have explored variations on the original lifecycle. E.g. Geoffrey Moore suggests that for disruptive innovations, there is a gap or chasm between the first two adopter groups (innovators and early adopters) and the early majority¹⁰.

Rayna and Striukova¹¹ have studied how this chasm may be crossed. The choice of the initial market segment is crucial in this process. The initial market segment has to contain a large proportion of visionaries, has to be small enough for adoption to be *observed* from within the segment and from other segments and be sufficiently

¹⁰ Geoffrey Moore, *Crossing the Chasm* (2006) HarperBusiness.

¹¹ Rayna, T. and Striukova, L. (2009) 'The curse of the first-mover: when incremental innovation leads to radical change', *Int. J. Collaborative Enterprise*, Vol. 1, No. 1, pp.4-21.

connected with other segments. If this is the case, the adoption in the first segment will trigger adoption by the next group of adopters.

Within this model for the diffusion of innovations, people and organisations do not move into another category. It's in their DNA.

Rather, the goal is to streamline the introduction of an innovation to meet the needs of the different categories, from pioneers all the way to the laggards.

3.2.3 The role of peer networks.

One way to model technology adoption, is to understand that people's behaviours are influenced by their peers and how widespread they think a particular action is. Social learning through peer networks plays an important role in the diffusion of a new technology.

Innovators and early adopters serve as pioneers and opinion leaders. They are the change agents who spark the adoption process by trying out new technologies and thus paving the road for the more cautious part of the population. By communicating peer to peer in their network and by serving as a role model, these first movers form the basis for creating a critical mass. Learning from peers becomes easier when those peers are perceived as operating under similar conditions (e.g. type of ship, routes, market etc.). Policies designed to promote peer to peer learning should take into account the diversity in the shipping industry.

3.2.4 Characteristics that influence the readiness to adopt an innovation.

The Diffusion of Innovation theory also explores the question why some innovations are adopted more readily than others.

Apart from problems typically related to the BWM Convention, there are also characteristics common to any introduction of an innovative technology. Five characteristics have been identified in the literature that may also shed some light on the implementation of the BWM Convention.

1. **Observability.** The degree to which the results of an innovative technology are visible to potential users. This is one of the major objections heard, that there is no information on operational experiences with Ballast Water treatment systems. This is an indication that the communication in the peer-to-peer network does not function well because there are operational experiences.
2. **Relative advantage.** The degree to which the innovative technology is perceived to be superior to current practice. In the case of ballast water management, this would relate to a comparison between D1 practices, i.e. ballast water exchange and D2, using a Treatment System. While ballast water exchange may be more dangerous, D2 may be perceived as more problematic and expensive.
3. **Compatibility.** The degree to which the technology is perceived to be consistent with the values, needs and ideas of the potential users. Does ballast water treatment fit in with the ideas and values of the shipping company and the crew on board? Do they perceive it as their responsibility to do their part in managing this environmental threat?
4. **Trialability.** The degree to which an innovation can be experienced on a limited basis. The trial is a means to dispel uncertainty. Relatively early adopters perceive trialability as more important than do later adopters as they have no precedent to follow when they adopt. Later adopters do not need trials as they are surrounded by peers who have already gained experience. The early adopters act as a kind of vicarious trial for later adopters.
5. **Complexity.** The degree to which a new technology is perceived as difficult to use, or simple and fool-proof. This may also refer to the timing of the operation. As one ship manager noted: during port visits the work

pressure is already perceived as high and operation of the ballast water management system is quickly considered too much extra burden by the crew.¹²

6. **Re-invention.** The more versatile and adaptable a technology is seen to be, the more likely becomes its adoption. Instead of re-invention one can think also of bonus effects. A good example of this is a first generation Treatment System that was withdrawn from the market by the manufacturer because the environmental degradation of the active substance at very low temperatures was too slow. The crew at one vessel refused to have the hydrocyclone unit of this system removed because they were so happy that they never need boots anymore to go into the ballast tanks. Being freed from the sludge problem is an appealing perspective for many, but has not drawn special attention.

¹² This was mentioned by the spokesman of Company 1 in the previous chapter.

3.3 COMMUNICATION: AN UNCERTAINTY REDUCING PROCESS

The concert was performed on the basis of a half-written score. Different conductors were on stage. Most musicians had never played together and some didn't show up as they were not aware of their role in the concert. Meanwhile the public jumped on stage to play their own tunes.

The development, implementation and enforcement of the BWMC requires pioneering work for many different parties. It can be seen as an uncertainty reducing process. One of the greatest challenges in the implementation process is how to ensure good communication, within the project as well as with those that will be affected it, given the many challenges and shortcomings of global governance.¹³

3.3.1 Good communication cannot save a bad project but bad communication can certainly cause great damage and delay to a good project.

Communication needs a planned and structured approach and a clear understanding of the potential roles and contributions of the many different parties involved and where they need to interact. The first step is an analysis of who these actors are and how important they are in the development, implementation and enforcement of the BWMC. The term 'actor' in this context comprises not only those parties whose interests are affected by the BWMC and who are already formally participating in the rule making process at IMO. Also included should be those whose activities strongly affect the development, implementation and enforcement of the BWMC; those who possess information, resources and expertise and who control relevant implementation instruments.

The purpose and strategy of the communication should be clear to all that are involved.

With whom, what for, how, and when is communication is needed and from there, the communication can be organised and realised.

Development, implementation and enforcement can only be seen and experienced as a joint effort and a shared responsibility, when the communication plan provides for enough effective feedback loops to make it a transparent and participatory process. It will enable actors to become aware of the questions and perceptions of other actors ¹⁴.

¹³ See also T.G. Weiss and R. Thakur "Global Governance and the UN: An Unfinished Journey", Bloomington, Indiana University Press 2010. Weiss and Thakur assert that when the need for global governance emerges, five kinds of gaps in global governance present themselves. There are knowledge gaps (that is, about the nature of the problem or the extent or intensity of a global challenge), normative gaps (the rules guiding appropriate responses are contested), policy gaps (in terms of who should respond and how), institutional gaps (insufficient clarity about lead actors or a mismatch between policy and the capacity to act), and compliance gaps (particularly relating to reactions of non-compliance). A summary can be found at <http://www.unhistory.org/briefing/15GlobalGov.pdf>

¹⁴ See also <https://www.gov.uk/government/publications/best-management-practice-portfolio/about-the-office-of-government-commerce> and <http://www.p3m3-officialsite.com> P3M3 is designed to enable organisations to understand their current level of maturity and highlight areas that can improve performance in the short and longer terms. Project maturity models are not an appropriate solution but may serve as inspiration for a more structured approach to the challenges of implementing the BWM Convention.

3.3.2 Communication: strategy, channels and skills.

To illustrate the need for a good communication strategy, take the following list, copied from a presentation about shipowner's challenges ¹⁵.

- What if... the EPA changes their stance on 'low enforcement priority?'
- What if... the PSC does not stick to the agreed trial period for sampling and enforcement?
- What if... sampling results show violation even though BWMS are operated as designed?
- What if... after five years the installed system with AMS approval is not granted US Type Approval?
- What if... UV-based treatment systems are deemed unacceptable by USCG?

This is a list of questions and complaints which indicate a lack of trust and fear about unreasonable outcomes. It is also a clear indication that communication channels are not functioning properly to reduce, where possible, uncertainties, restore trust and encourage informed discussions.

Is it possible to design communication channels through which worries, complaints and criticism "from the bottom of the pyramid" are translated into specific requests for action to a specific addressee together with an explanation of the reason for the request? And how can the response in turn be fed back as usable information to those who need it?

3.3.3 Communication structure is also a transparency system.

Transparency is a notion that is used in a wide range of different contexts and subject areas. Two general definitions:

"Transparency is concerned with the quality of being clear, obvious and understandable without doubt or ambiguity".

"Transparency means the processes through which public authorities make decisions should be understandable and open, the decisions themselves should be reasoned and as far as possible, the information on which the decisions are based should be available to the public"¹⁶.

Transparency systems have been studied by Archun Fung (co-founder of the Transparency Policy Project at the Harvard Kennedy School¹⁷). He argues that transparency can only be successful when transparency systems provide highly relevant and accessible information that users incorporate into the considerations that determine their actions. So to be effective, the audience for whom the information is meant, is required to both access and use the information.

3.3.4 Disclosure versus transparency.

Also, disclosure of information is not the same as transparency.

Disclosure itself is not the solution to any problem and it is not the same as transparency.

"One fundamental problem is that disclosure requirements merely get information onto the table, but themselves demand no further action. According to political theory, disclosure is both a citizen's right and a tool to ensure good government and consumer protection, because it provides information that leads to informed

¹⁵ Quoted from the presentation of Katharina Stanzel, Managing Director Intertanko at Bimco Ballast water summit in Hamburg 25-26 Feb. 2014

¹⁶ S. Prechal and M.E. de Leeuw in General Principles of EU Law in a Process of Development. Reports from a Conference in Stockholm 23-24 March 2007. Kluwer Law International 2008, page 202.

¹⁷ <http://www.transparencypolicy.net/assets/whatnakesdisclosureeffective.pdf>

decisions. Instead, disclosure has often become an endpoint in the chain of responsibility, an act of compliance with the letter of the law rather than the spirit of transparency”.

“Many disclosure programs today cloud rather than clarify a particular situation. As disclosure statements have become more numerous and more complicated, “consumers just ignore them or don’t understand what they say,” said Jeff Sovern, an expert in consumer law at St. John’s University.

To illustrate how few people actually read its terms and conditions disclosure, the online retailer Gamestation, on April Fools’ Day 2010, replaced the usual text with what it called an “immortal soul clause,” which read: “By placing an order via this Web site on the first day of the fourth month of the year 2010 anno Domini, you agree to grant us a non-transferable option to claim, for now and forever more, your immortal soul.” Eager to get on with their online purchase, 88 percent of customers clicked the box to sell their souls. (The 12 percent who opted out were rewarded with a cash credit for their diligence.)”¹⁸

3.3.5 A relatively simple tool.

Managing information and designing and implementing an appropriate communication plan requires expertise. It also requires awareness of the needs who seek information¹⁹. Relevant in this context is the notion of E-governance. This refers to a government’s use of electronic technology, particularly web-based internet applications to enhance access to and delivery of government information and service to citizens, business partners, employees, other agencies, and government entities²⁰. Finding the right model should be based on a user perspective (effectiveness), rather than a technical perspective (efficiency). The concept is equally important for IMO. It could greatly contribute to the work of IMO and allow more direct channels of communication and transparency to the ‘outside world’. A shipping company seeking an answer on BWM issues is presently dependent on information intermediaries, e.g. Class societies and representative organisations. To establish an information clearing house for one-stop access would have major impact on transparency and uncertainty reduction. To understand what a ‘user perspective’ means, it may help to visit the IMO or GloBallast site as an ordinary visitor with a ‘straightforward’ question. Count the time before you begin to feel like Arthur Dent in the Hitchhiker’s guide to the Galaxy²¹.

¹⁸ Elizabeth Rosenthal, “I Disclose ... Nothing”, New York times, January 21, 2012 at: http://www.nytimes.com/2012/01/22/sunday-review/hard-truths-about-disclosure.html?_r=3&hp&

¹⁹ T. Almarabeh and A. AbuAli, A General Framework for E-Government: Definition Maturity Challenges, Opportunities, and Success’, European Journal of Scientific Research, ISSN 1450-216X Vol.39 No.1 (2010), pp.29-42, <http://unpan1.un.org/intradoc/groups/public/documents/apcity/unpan045348.pdf>

²⁰ K. Layne & J. Lee, “Developing fully functional E-government: A four stage model”, Government Information Quarterly, vol. 18, no. 2, pp 122(15) 2001

²¹ The Hitchhiker’s Guide to the Galaxy has several great scenes depicting how disclosure is not the same as transparent information. One of those scenes describes a government official (Mr. Prosser) justifying his surprise appearance to demolish Arthur Dent’s house: Mr Prosser: “You were quite entitled to make any suggestions or protests at the appropriate time, you know?” Arthur: “Appropriate time? The first I knew about it was when a workman arrived at my home yesterday.” Mr Prosser: “But Mr. Dent, the plans have been available in the local planning office for the last nine months.” Arthur: “Oh yes, well, as soon as I heard I went straight round to see them, yesterday afternoon. You hadn’t exactly gone out of your way to call attention to them, had you? I mean, like actually telling anybody or anything?” Mr. Prosser: “But the plans were on display...” Arthur: “On display? I eventually had to go down to the cellar to find them.” Mr Prosser: “That’s the display department.” Arthur: “With a flashlight.” Mr Prosser: “Ah, well the lights had probably gone.” Arthur: “So had the stairs.” Mr Prosser: “But look, you found the notice didn’t you?” Arthur: “[Y]es I did. It was on display in the bottom of a locked filing cabinet stuck in a disused lavatory with a sign on the door saying Beware of the Leopard.” (R. Adams, ‘Hitchhiker’s Guide to the Galaxy’, 1980, pp 9-10).

A relatively simple tool could make a great difference: an interactive website with clear information about relevant issues and the possibility to ask questions. These questions must be distributed to the organisations and persons who are able to give answers which in turn can be fed back to the site.

“What if” questions may be hard to answer, but a question like “How can I be certain that PSC will stick to the agreed trial period?” should be easy to answer. There may be questions that need to be addressed by industry itself too. E.g. the question “What if after five years the installed system with AMS designation is not granted US Type Approval?”. That could also be a contractual matter to be negotiated with the manufacturer.

Complexity reduction sometimes needs an easy measure

The implementation of the complex Dutch nature protection laws had created so much confusion that even the competent authorities didn't always know what to do. The image in the press was clear: the law was too strict and enforcement unreasonable and ridiculous.

The information desk of the Dutch Society for the Protection of Birds made overtime. The questions covered everything, from 'what to do with a wounded bird' to “My neighbour wants to chop a tree where an owl is roosting, is that legal?” and “According to Article 6 of the Habitat Directive, would this project be an imperative reason of overriding public interest ?”

Many of these questions landed on the desk of the in-company lawyer who was getting very frustrated by having to spend so much time on understanding the underlying concern of the question and phrasing answers that were helpful to those who asked them, i.e. understanding the amount of detail needed.

The lawyer initiated a website with Frequently Asked Questions for the general public. A contact form enabled visitors to ask questions and leave comments. The site became a popular focal point of information for a much wider audience and is frequently consulted by industry, farmers and enforcers too.

The secret of the success can largely be contributed to the transparent design and user-friendliness. The designers of the site were aware that different people need different amounts of detail. Layers of increased detail allow a visitor to go from the general question and answer to more detailed questions and answers.
www.vogelsendewet.nl

3.4 A DIFFERENT APPROACH TO POLICY MAKING

In light of the global complex challenges, the UN and UN Organisations are increasingly aware that a different type of approach to policy making is required, one that is more inclusive and participatory.

The Secretary General of the UN reported in 2009 on Enhanced cooperation between the United Nations and all relevant partners, in particular the private sector. The report issues a strong call for the continued care-taking of the UN-business relationship by the Global Compact Office. "Because of its extended network, understanding of business interests and public-private structure, the Global Compact Office plays a central role in facilitating and strengthening the United Nations partnership agenda at the system level," the report states.

The report concludes that the UN is 'well-positioned to bring private sector engagement to the next level and significantly enhance its contribution to the goals of the Organisation'²².

3.4.1 A greater role for observers at the IMO²³.

The 'private sector' is well represented in the IMO. Observers are active participants and have made substantial contributions to the work of IMO. They are the vital links between the rule making in the IMO and their members, the organisations that are affected by these rules and regulations.

The implementation of the BWM Convention shows the limits of the conventional regulatory process when the topic requires innovative technology and pioneering work for different parties. An implementation strategy that incorporates observers 'project partners' in the implementation phase, giving them ownership, could facilitate that process. Making the implementation a shared responsibility would be a recognition of the important role of the observers in IMO and could bring renewed energy into the implementation process.

3.4.2 Recognising differences in readiness.

Observers who represent industry at the IMO do not have an easy task. In the light of what has been described about the adoption of innovative technologies, they have to represent all their members, from the relatively small group of innovators and early movers to the skeptics at the other end of the continuum. The normal distribution curve clarifies that innovators are by definition a minority. The default position of the vast majority is resistance²⁴.

The recognition that these differences exist, opens the road for doing justice to these different positions and it becomes possible to explore new approaches and design new strategies for the greater involvement of NGO's that assist the implementation process.

When IMO sets technology forcing standards to solve an urgent environmental problem, as is the case with the BWM Convention, this inevitably meets resistance. Resistance can be overcome by making a clear analysis of the causes of resistance and designing a comprehensive strategic approach towards acceptance and implementation that engages all parties involved. A comprehensive strategy that:

²² http://www.unglobalcompact.org/NewsAndEvents/news_archives/2009_11_05.html

²³ See also Resolution A.1061(28) High-Level action plan of the organization and priorities for the 2014-2014 biennium, adopted on 4 December 2013, agenda item 8).

²⁴ Georg Kell, Executive Director United Nations Global Compact recently put it far more bluntly: "Lobby responsibly. Business must align their public policy engagement with sustainability principles. Too many companies are individually or through trade associations taking lobbying actions that are in direct conflict with their stated values. They are doing so in ways that are not transparent and take a lowest-common-denominator approach. Too many trade associations are built on ideologies of the past. The time has come for these powerful organisations to embrace the future, moving from a defensive stance to one defined by proactive, pragmatic leadership" http://www.unglobalcompact.org/docs/issues_doc/Peace_and_Business/B4P/Kell_Oslo_15May14.pdf

- recognises that information exchange and communication play a pivotal role in providing transparency, which is essential for reducing uncertainty and bridging gaps in perceptions and
- facilitates pioneers who are willing to act as change agents in the global implementation process
- builds an enabling framework for partnerships,
- assigns active roles to observers in the implementation strategy.
- enhances cooperation between all parties and stakeholders involved.

3.5 RECOGNITION FOR THE ROLE OF PIONEERS

The shipping community doesn't need a Diffusion of Innovation model to know the value of sharing operational experiences. There are more than enough ships where treatment systems are used or tried out. So why are the experiences not shared with the rest of the shipping community? What do these companies need, how can they become motivated to facilitate the implementation process?

Innovators and early adopters are willing to take a certain amount of risk and are motivated by the idea of being a change agent or an 'opinion leader'.

But their role as change agent and opinion leader can only be played well when they are motivated to share their experiences. Not only with the manufacturer, but with their colleagues and other stakeholders too.

While shipowners welcome the idea of this sharing of experiences, they also fear that there may be reasons for these pioneers not to share their experiences. They expected that shame would be involved about wrong investments and there may be competitive reasons too for withholding information.

That is a conception that needs to be addressed by the shipping community itself if it wants to have access to this information.

Shipowners may compete each other on just about anything but they do have common interests too and sharing experiences, gaining knowledge about ballast water management is definitely one of these common interest. Respect for 'first movers' should be the first reward.

Some have suggested that early movers should be rewarded with a grandfather clause. As described here, pioneers have a special role to play for the introduction of an innovative technology. In that respect, they certainly deserve special consideration. The Grandfather clauses have proven important for phasing-out undesirable practices. They are designed to protect existing ships from the impact of amendments in the regulations which involve major changes to existing construction or equipment. Shipowners are protected from having to carry out expensive alterations to their fleet every time the regulations will change. At this stage of the process, where measures are sought to facilitate not the phasing out but rather the phasing in process, a grandfather clause seems not the appropriate incentive.

To reward the early movers with a grandfather clause may at best be an incentive policy to stimulate the purchase of a treatment system, but is definitely not an incentive for its use.

What the implementation process needs right now is a 'diffuser incentive', an incentive to increase the observability of the innovative technology. An incentive for those who not only have the treatment systems installed before the entry into force of the Convention, but who are also willing to use them and share their operational experiences.

3.5.1 Exploiting synergies and fostering linkages: the pioneering reward.

"Pioneering reward" is a term coined for the purpose of this study because the existing term "Innovation waiver" is used for exemption schemes with a less integrative approach. Traditional innovation waivers exempt industry from penalties during trial periods, while a pioneering reward is meant to give an appropriate reward to those who are truly pioneers and who are willing to participate in a trial that sets in motion learning processes that other actors may benefit from.

Innovation waivers often suffer from short inflexible deadlines and shortcomings in the way the programme is administered and fail to provide an incentive for innovation.

Pioneering rewards require a different type of approach to policy making, one that is more inclusive and participatory. Pioneering rewards are meant as a policy instrument that involves:

- real use of the ballast water management systems
- allowing lessons to be learned and shared
- recognising the interconnectedness between a.o. manufacturers, ship management, crew, port state control, ports and terminals, charterers and the role each plays in either encouraging or discouraging a phasing-in process.
- innovative rewards provided during the participation phase;
- if needed, these can be intertwined with robust strategies for implementation.

The Pioneering reward is meant as an addition to existing policies with the aim of making the introduction process more transparent and do-able for *all* parties involved. Learning should be the most important aim, including manufacturers, users, enforcers and policy makers.

For a Pioneering reward to work, there should be sufficiently long time allowances in the participation programme and the eligibility criteria should be clear and not involve one-sided burdens and discomfort for a participant. For making it work, the Pioneering reward should not be a strangling scheme but a reason to proudly participate. Participants can only receive the Pioneering reward before the entering into force of the Convention and hold the reward during the participation phase.

With Pioneering rewards are meant (temporary) measures by other stakeholders that show the appreciation of the pioneer's role. What these rewards could involve is something to be worked out by e.g. manufacturers, ports and terminals, port state control, environmental award systems, voluntary Class notations and in charter parties. Charter clauses do not seem to make a distinction between 'normal' operational costs and environmental costs. Some 20 - 30% of the ships would be needed to give the desired impetus.

3.5.2 Port State Control: another pioneer.

A major problem expressed by representative organisations of the shipping industry is the fear about monitoring compliance and enforcement of the discharge standards. This led IMO to agree a trial period of two years which will commence once the BWMC has entered into force. During this trial period PSC will refrain from detaining the vessel or criminal sanctions should the sampling show that the ballast water discharge does not meet the standards of the BWMC.

Taking into account that Port State Control does need time for trying out and agreeing on the best procedures, how can this be shaped in such a way that the shipping community trusts that process?

Is it possible to couple the pioneers onboard the ship with the pioneers of port state control in such a way that this will be of mutual benefit and ultimately of benefit to the whole shipping community?

Port State Control will normally not take samples if there are no clear grounds that something may be wrong. It may be more appealing for the participating ships as well as PSC when they cooperate. Instead of not being visited, they could be visited each time when they visit a participating port. Of course, this can only work if both the company as well as the crew will feel voluntary participants instead of subjects. Samples, both for indicative as well as well as detailed analysis can be taken with the aim of a mutual learning experience instead of monitoring and enforcement.

This experimental phase could start as soon as possible and these experiences too need to be communicated to a broader community.

There are ports where sampling already takes place. So they are already in a position to provide feedback and communicate their findings to the nautical community.

3.6 USER COMMUNITY: THE DO IT YOURSELF MODEL

The Ballast Water Management Convention has spurred industry to develop and market many treatment solutions. The potential opportunities from sales of these treatment systems has attracted vendors of different backgrounds. For the shipping industry it is a challenge to find the right solutions.

Conferences, workshops, and trade fairs provide opportunities for the shipping companies to get their questions answered. Except for sufficient operational experiences.

The Treatment Systems market is still in an early phase of development and many vendors are chasing a market share. There are various ways to carve your niche and a good marketer needs to know how to motivate potential customers. The ultimate reward for a vendor is that customers will promote you through word of mouth.

Bad news always travels faster than good news. And there are more than enough bad stories around. Juicy stories of expensive Treatment Systems that never worked and are rusting away, systems that weren't fit for the type of ballast operations on a particular ship, etcetera. With new technology failures may not come as a surprise; any new technology involves a process of trial and error. The real surprise is that there are stories that end with the remark that the manufacturer didn't go out of his way to sort out the problems in a satisfactory manner for both customer and vendor.

Such manufacturers not only run the risk of losing that customer, but many potential new customers.

Shipping companies who are using the acquired treatment systems are a goldmine of information for both manufacturers as well as other users and potential buyers.

When it comes to treatment installations there is a common interest in trustworthy equipment from trustworthy vendors.

A manufacturer who wants to invest in building customers loyalty, can give users a feeling of being part of a community. A user community with an online platform for sharing experiences, both good and bad.

Such a platform of users needs to accommodate for different needs and may require different channels. The engineers on board will have different questions, perceptions, expectations, needs and experiences than management on shore.

Manufacturers may want to facilitate such a platform, either for their own product or together with other manufacturers.

There are plenty examples of these user and support communities outside the maritime community (e.g. Apple), and to some degree also within the maritime community. The impression is that the latter are not user communities in the strict sense, but rather platforms where questions can be dropped on any engineering topic.

A user community makes it possible to ask questions which are answered by other community members and manufacturers can also be triggered to provide advice. The advantage is that it is an informal communication where no thresholds exist for participation and where critical remarks are not removed or punished otherwise. Allowing to write under pseudonym is an important feature. A few trustworthy blogs will also help attract attention.

A user community may be initiated by one or more manufacturers, but it can also be set up as an initiative by members of the nautical community (integrated or linked to existing online informal communication channels) In that case, manufacturers could draw attention to the platform by putting a link on their website.

The model could be expanded by the shipping industry to make it a truly transparent platform that could also act as a „watchdog“, or ‚consumers‘ association‘ providing information about cooperative ports, terminals, feedback on sample results etc.



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