INTERNATIONAL MARITIME ORGANIZATION

IMO

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AD HOC COUNCIL WORKING GROUP ON
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Agenda item 2

CWGSP 10/2(b)
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REVIEW OF THE ORGANIZATION'S PERFORMANCE INDICATORS

(b) Further development of the performance indicators

Note by the Secretariat

SUMMARY	
Executive summary:	This document provides suggestions on the development of the performance indicators and highlights associated data population issues
Strategic direction:	1 to 13
High-level action:	4.2.1 and 4.3.1
Planned output:	4.3.1.1
Action to be taken:	Paragraphs 63 to 65
Related documents:	C 101/D (paragraph 3.2(iii); C 101/3 and CWGSP 8/5

INTRODUCTION

1 At its eighth session (September 2008), the *Ad Hoc* Council Working Group on the Organization's Strategic Plan (hereinafter the Working Group) considered document CWGSP 8/5 and agreed that the Secretariat should continue measuring organizational performance through the current performance indicators (PIs); examine ways of rationalizing them; and further analyze the possibility of more fundamental changes to performance measurement in the context of developments in the Strategic and High-level Action Plans, including for the purposes of gauging progress towards the achievement of IMO's mission, taking into account the preliminary work presented in annex 3 of document CWGSP 8/5 (see document C 101/3, paragraph 11.3). The Working Group further noted, in the light of its discussions on the PIs, that there would be a need to undertake, at a future session, a further comprehensive discussion on the current arrangement of the Strategic Plan's performance indicators (C 101/3, paragraph 15).

2 In view of the foregoing, this document provides a set of proposed Key Performance Indicators (KPIs) to rationalize the current 42 PIs; provides examples of possible performance measurements in the future; and sets out related recommendations to improve data population in the Global Integrated Shipping Information System (GISIS). It builds on the decisions made during CWGSP 8 on rationalizing the current performance indicators and on developing alternative methods to measure performance, as proposed in annex 3 of CWGSP 8/5. It also addresses current data limitations within IMO and presents an overview of the development of GISIS which is essential for data population and dissemination in the future. GISIS should provide the backbone for the development of the PIs if more sophisticated methods

to measure performance are to be used in the future. In this context, the future for IMO means a timeframe of at least 5 years of data population to provide a dataset which might be used for statistical analysis using more sophisticated methods.

3 This document is accordingly divided into five sections as follows:

.1 findings of CWGSP 8/5 and starting position for discussion;
.2 proposed rationalization of current PIs to KPIs;
.3 proposed methods for measuring performance;
.4 observations on data limitations and current status of GISIS; and
.5 action requested for the working group.

SECTION 1 – FINDINGS OF CWGSP 8/5 AND STARTING POSITION FOR DISCUSSION

4 The following short summary recalls the major points considered at CWGSP 8, which provide the starting position for the development of alternative methods:

.1 there is a high number of PIs (42), which can only partly measure progress towards the agreed strategic directions(SDs) and only a few of which are used frequently; most existing indicators concentrate on the promotional role of IMO in fostering compliance with the global standards it adopts, but do not measure the actual level of compliance;

.2 the statistics collated by IMO have a low level of complexity and greater emphasis is put on the inputs/outputs of the system rather than on measuring effects, to see whether objectives are being achieved;

.3 only a low number of PIs is under the direct control of IMO (31%), which does not allow for an appropriate level of measurement of progress towards the SDs;

.4 there is a need to further develop GISIS as the Organization's central data management system for the population of data, to be complemented also with sources from external data providers;

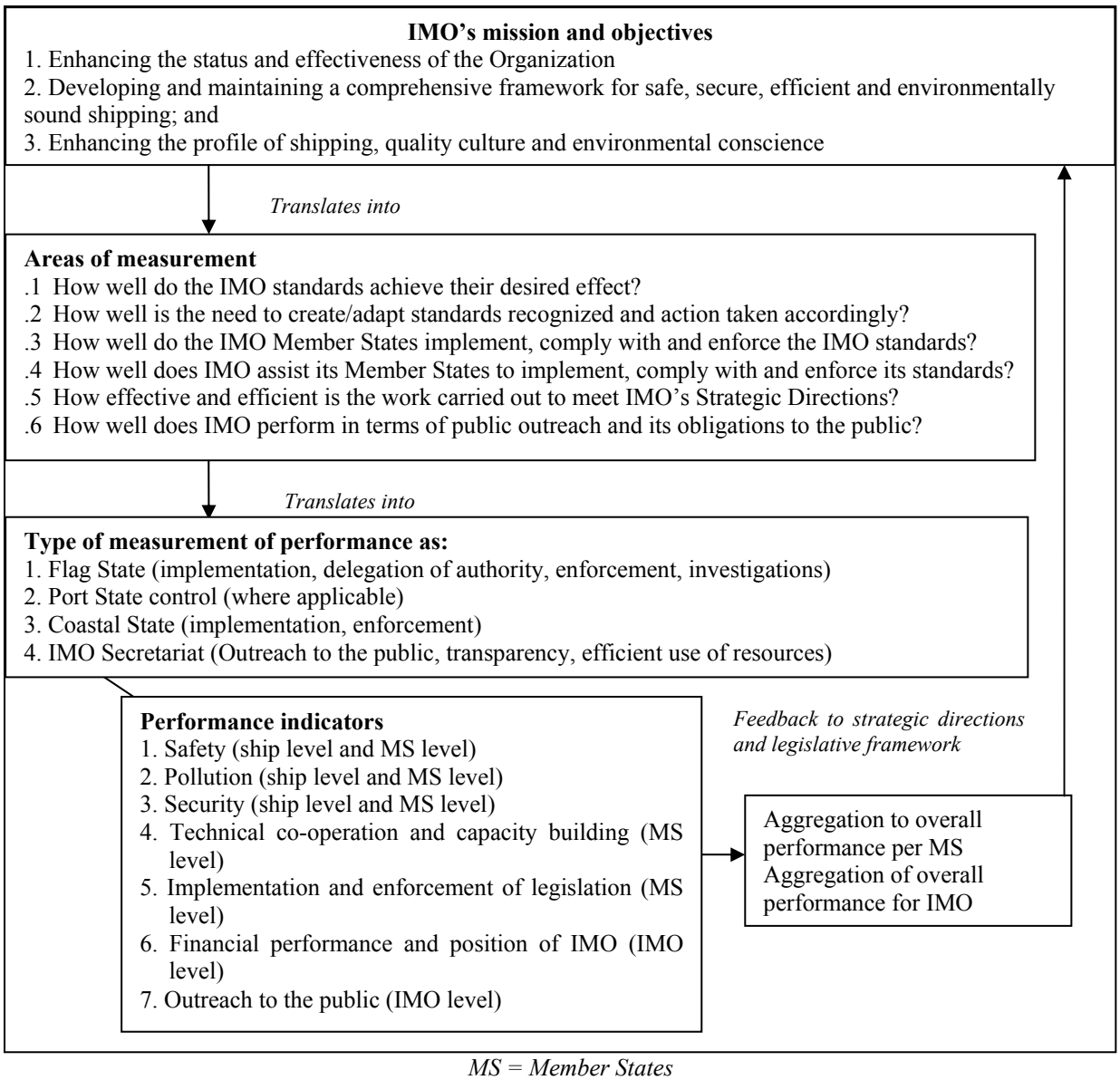
.5 only a low amount of raw data is currently available to IMO due, in part, to insufficient reporting by Member States, in particular on mandatory requirements, and data extraction facilities are limited; and

.6 there is a need for a more holistic approach towards the development of the PIs, integrating them with other relevant or more recent processes of the Organization such as Formal Safety Assessment (FSA) or the Risk Management Framework (RMF), in particular to identify acceptable levels of risk.

5 Given the points above, CWGSP 8/5 presented an alternative way of translating IMO's mission and objectives, which is reproduced in Figure 1 below, with a slight adjustment to the list of performance indicators (as compared to the figure presented in CWGSP 8/5) to simplify the areas of measurement and synchronize them with the proposed KPIs. Figure 1 thus presents IMO's mission and objectives, which are then translated into six questions – one for each main area of measurement. This compares favourably with the current 13 SDs, which are broad statements and for which metrics cannot be developed to measure performance against them. In principle, one needs to look at more precise questions and concentrate on the most relevant portion.

6 Each of the six questions is then translated into types of measurements, in this case four areas where performance is measured at the level of a flag State, port State, coastal State and a separate category for the IMO Secretariat. Given these four types, the performance indicators should preferably be developed at the ship level or Member State (MS) level, whenever possible, so that a refined measurement can be accomplished.

Figure 1: Proposed process for the development of performance indicators



MS = Member States

7 As indicated throughout this document and also highlighted in GWGSP 8/5, the more sophisticated the method to produce statistics, the higher the level of accuracy that can be achieved. GWGSP 8/5 provided some examples on the level of sophistication in order to demonstrate this concept but no decision was taken specifically on what level of sophistication would be desirable for IMO. The same document provided two options, namely:

.1 *keep the current level of sophistication:* if the PIs are kept at the current level of sophistication, then no action is required; and

.2 *improve the level of sophistication:* if a more sophisticated method of generating statistics which can measure performance is desirable, then one way forward is to first decide on the level of performance measurement to be exercised by IMO, and then concentrate on fewer indicators which can measure performance but use more sophisticated methods based on combined datasets over longer time frames (e.g., every 3 to 5 years instead of every year) and which can represent a more accurate state of the shipping industry and the effectiveness of IMO's legislative framework.

8 Given this starting position, a combination of the two options is proposed. This entails a two tier approach, where the first part is the rationalization of the current 42 PIs into a set of KPIs and the second part is the introduction of some statistical methods to present answers to the questions given in Figure 1.

SECTION 2 – PROPOSAL FOR RATIONALIZATION OF CURRENT PERFORMANCE INDICATORS

9 The term key performance indicator is used frequently today but without reference to a common definition, hence the following definition is used as guidance: *"Key Performance Indicators (KPI) are financial and non-financial measures or metrics used to help an organization define and evaluate how successful it is, typically in terms of making progress towards its long-term organizational goals. KPIs are frequently used to "value" difficult to measure activities such as the benefits of leadership development, engagement, service, and satisfaction. KPIs are typically tied to an organization's strategy using concepts or techniques such as the Balanced Scorecard"* [1].

10 Table 1 provides a list of proposed KPIs for IMO in order to rationalize the current 42 PIs. Long-term goals are also provided for each area as suggested by the definition above. The proposed KPIs concentrate on the main areas of IMO work and could be produced each year subject to the availability of data and, in this regard, the statistics to be collected should preferably be based on raw data where the IMO Secretariat has control over the quality of the data. Some proposed KPIs are new in the area of technical cooperation and capacity-building and in the area of financial position and performance of IMO.

Table 1: Proposed Key Performance Indicators to replace the current 42 performance indicators

Area of measurement	Key Performance Indicators
1. Safety *Long-term goal: decrease in loss of lives and ships subject to IMO conventions*	1. Lives lost (seafarers and passengers) due to safety-related accidents and incidents on ships subject to IMO conventions and other instruments, to total number of lives at risk (based on current PI 4b – per million lives) 2. Ships subject to IMO conventions lost for any safety-related reason, other than those declared constructive total losses for insurance purposes, to total number of ships subject to IMO conventions (based on current PI 5b – per 1,000 vessels)
2. Pollution *Long-term goal: decrease tonnes of oil discharged and grams of CO_2 released from international shipping*	3. Tonnes of oil discharged per tonne mile (variant of current PI 8c - per million tonne miles) 4. Grams of CO_2 released per tonne mile of cargo carried by sea (variant of current PI 9c but only for CO_2)
3. Security *Long-term goal: enhance the security of ships and contribute towards decreasing piracy incidents*	5. Number of security-related incidents on ships subject to SOLAS chapter XI-2 (based on current PI 6) 6. Number of piracy incidents to total number of vessels engaged on international voyages (based on PI 7 – per 1,000 vessels)
4. Implementation and enforcement of legislation *Long-term goal: promote ratification and enhance compliance and enforcement of IMO conventions*	12. Average ratification rate for all MS and all conventions (variant of current PI 1a – percentage rate) 13. Average ratification rate for world tonnage and all conventions (variant of current PI 1a – percentage rate) 14. Average PSC detention rate for all PSC regimes (based on current PI 11 – percentage rate) 15. Average PSC non-compliance rate for all PSC regimes (based on current PI 12 – percentage rate)
5. Technical co-operation and capacity-building *Long-term goal: respond to technical assistance needs of IMO Member States and increase co-operation with relevant stakeholders and donor partners*	7. Number of advisory missions (new) 8. Number of training events (new) 9. Number of trainees in IMO institutions and IMO-sponsored training events (current PI 14d) 10. Number of partnerships with governments, organizations and industry (current PI 14c) 11. Total expenditure (new)
6. Financial performance and position *Long-term goal: provide income stream and ensure healthy financial status for the work of IMO*	16. Member State collection rate (percentage of current year assessments received from all Member States) (new) 17. Assets less liabilities in the General Fund, Printing Fund, Working Capital Fund, Training & Development Fund, Termination Benefit Fund and Technical Co-operation fund (new)
7. Outreach to the public	Not yet defined

[1] Source: http://en.wikipedia.org/wiki/Key_performance_indicator.

11 For financial performance, the Member State collection rate is proposed, which is simple to calculate and focuses on a key income stream. The financial position is best represented by the excess of assets over liabilities for the Organization's core funds, including all the funds for which the primary inflows are under the direct control of the Organization, namely the General Fund, Working Capital Fund, Printing Fund, Training & Development Fund, Headquarters Capital Fund, Termination Benefit Fund and Technical Co-operation Fund.

12 A difficult area to develop KPIs for is in relation to technical co-operation and capacity building and, following discussion within the Secretariat, five indicators were identified as possible KPIs which reflect the work performed through technical co-operation and are areas that can be measured. In this respect, the actual number of advisory missions, training events and trainees, best reflects the deliverables of IMO's technical co-operation work. This is complemented by the Organization's efforts to establish partnerships with governments, organizations and industry to enhance technical co-operation and the total amount of expenditures, irrespective of the geographical area or technical area where it is spent, which can be highly influenced by donors and is mostly not in the control of the IMO Secretariat.

13 To demonstrate the use of the KPIs proposed above, Table 2 provides the results when applied to data that is currently available to the IMO Secretariat for a time period of 2002 to 2008 for all indicators, except financial performance. The latter is excluded since the introduction of IPSAS in 2010 will produce a significant change in the net asset position as of that date, and it is proposed to begin tracking this indicator from 1 January 2010 forwards. The values can be converted into an index with the base year being 2002, when possible, to indicate trends over time. As examples, Figures 2 to 5 below visualize some of the proposed KPIs in index version. The indicators can be made available via the IMO dashboard in electronic format when data feeds have been automated.

14 For the KPI dealing with tonnes of oil discharged into the sea, data from ITOPF was compared with data received from ENSAD (which was introduced in CWGSP 8/5). The period 1970 to 2008 showed a difference in the ITOPF and ENSAD figures in almost every year, adding up to a total of 829,000 tonnes of oil. The ENSAD figures are therefore used for the calculation of this particular KPI. In this regard, the KPIs could further be extended to cover other areas such as loss of fishermen's lives and chemical pollution, which is not possible currently due to the lack of data.

Table 2: Proposed Key Performance Indicators applied to data available to IMO

Proposed new KPIs	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
1. Safety							
Lives lost to total number of lives at risk (per million lives)	1.14	0.18	0.45	0.33	1.11	0.31	0.61
Ships lost to total number of ships (per 1,000 vessels)	1.62	1.60	1.26	1.62	1.26	1.38	1.35
2. Pollution							
Tonnes of oil discharged per tonne mile (per million tonne miles)	29.96	13.18	5.13	1.12	6.28	4.44	0.45
Grams of CO_2 released per tonne mile of cargo	33.23	35.12	35.08	34.63	32.05	32.01	33.41
3. Security							
Number of security related incidents – SOLAS Chapter XI-2	nil	nil	nil	nil	nil	nil	nil
Number of piracy incidents to total number of vessels engaged on international voyages (per 1,000 vessels)	4.30	5.03	3.67	2.90	2.68	3.18	3.30
4. Implementation and enforcement of legislation							
Average ratification rate (all MS, all conventions, %)	n/a	n/a	n/a	n/a	38.82	40.41	41.07
Average ratification rate (world tonnage, all conventions, %)	n/a	n/a	n/a	n/a	n/a	55.61	58.47
Average PSC detention rate (all PSC regimes, %)	0.086	0.080	0.059	0.054	0.052	0.069	0.047
Average PSC non-compliance rate (all PSC regimes, %)	0.485	0.531	0.435	0.464	0.506	0.555	0.444
5. Technical co-operation and capacity building							
Number of advisory missions	91	119	97	74	36	72	41
Number of training events	110	105	115	109	93	166	76

Proposed new KPIs	2002	2003	2004	2005	2006	2007	2008
Number of trainees in IMO institutions and IMO-sponsored training events	3362	3405	4460	3372	2433	1977	1923
Number of partnerships with governments, organization and industry	22	22	28	33	54	62	61
Total expenditure (in million US$)	12,3	13,2	14,0	13,0	12,0	13,5	10,3
6. Financial performance and position							
Member State collection rate (% of current year assessments received from Member States)	97.98	97.64	96.48	99.03	97.64	99.33	98.02
Assets less liabilities in the General Fund, Printing Fund, Working Capital Fund, Training & Development Fund, Termination Benefit Fund and Technical Cooperation fund.	n/a	n/a	n/a	n/a	n/a	n/a	n/a

Note: A KPI for outreach to the public has not yet been defined

Figure 2: KPIs for safety and security: base year 2002

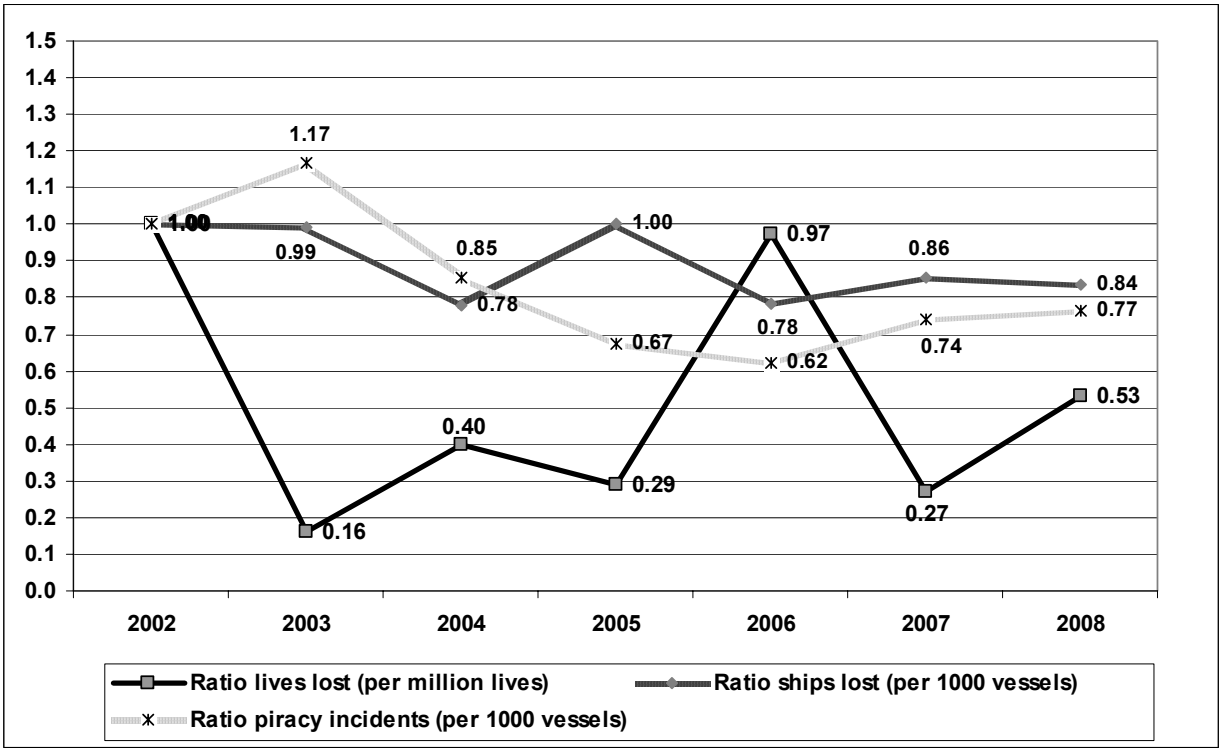


Figure 3: KPIs for pollution: base year 2002

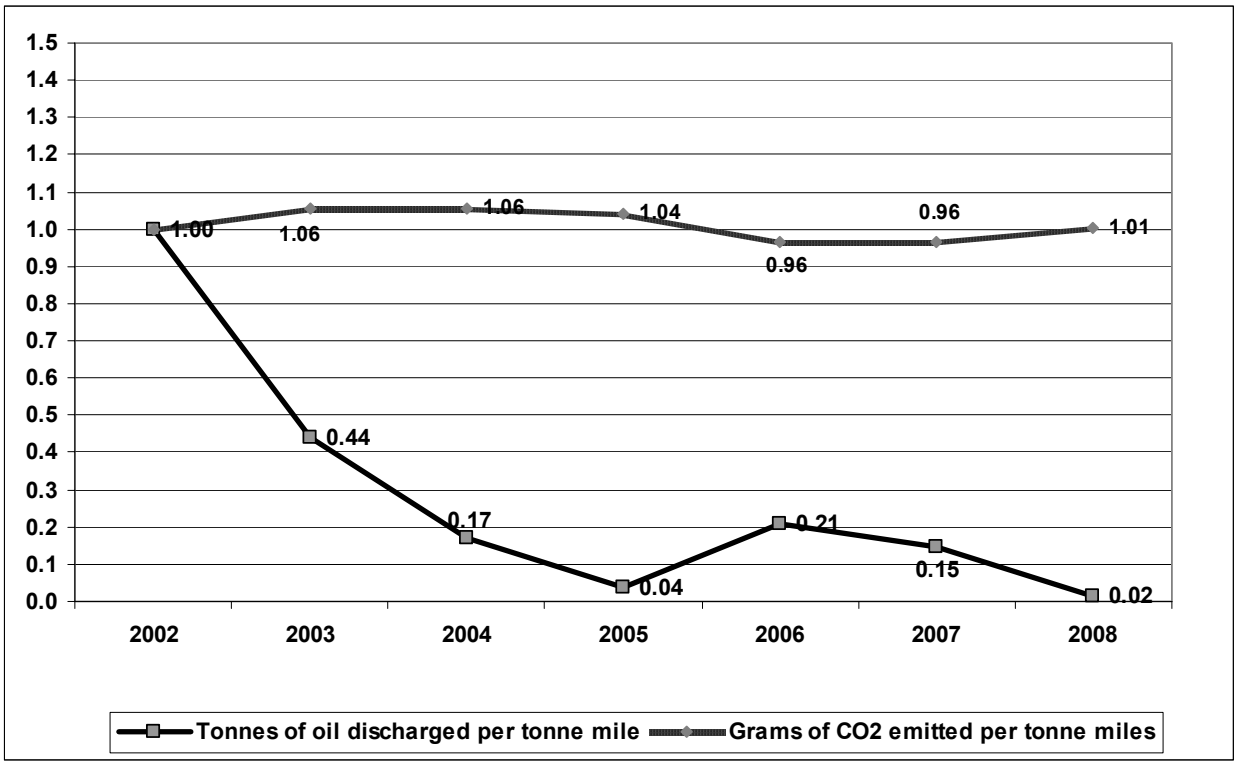


Figure 4: KPIs for implementation and enforcement of legislation: base year 2002

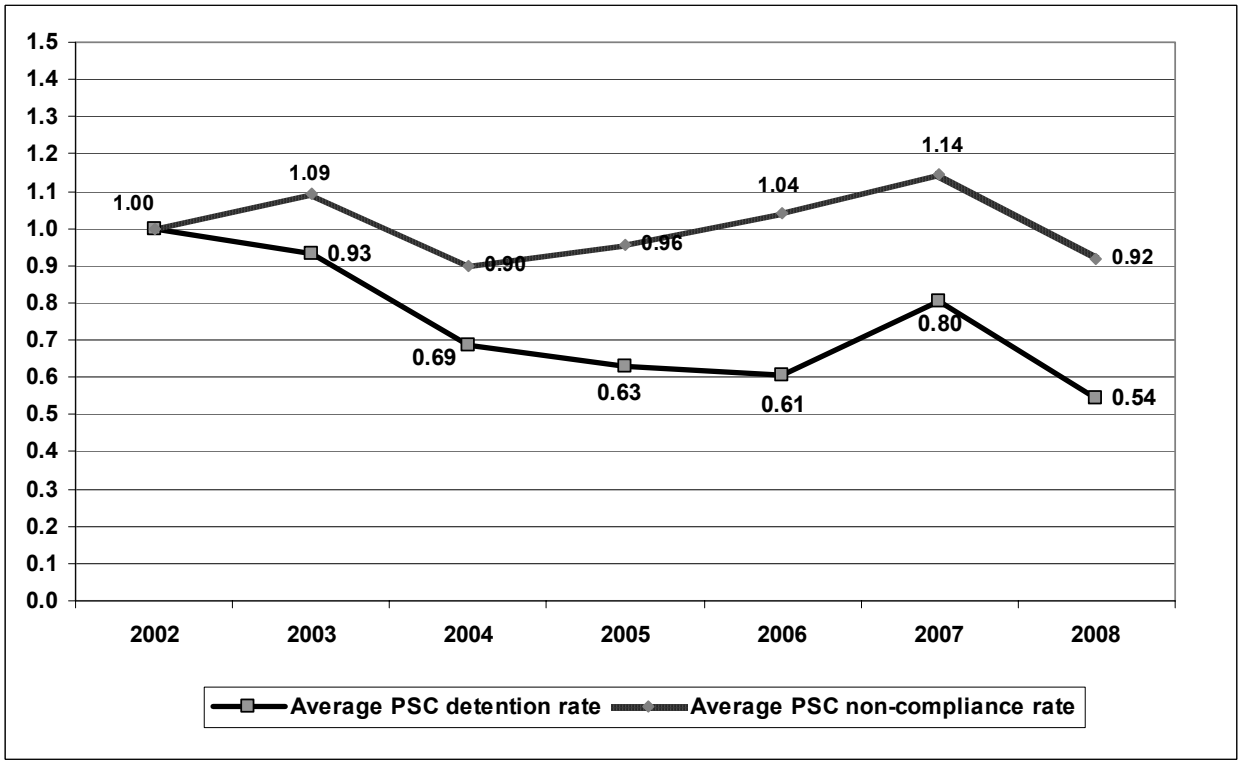
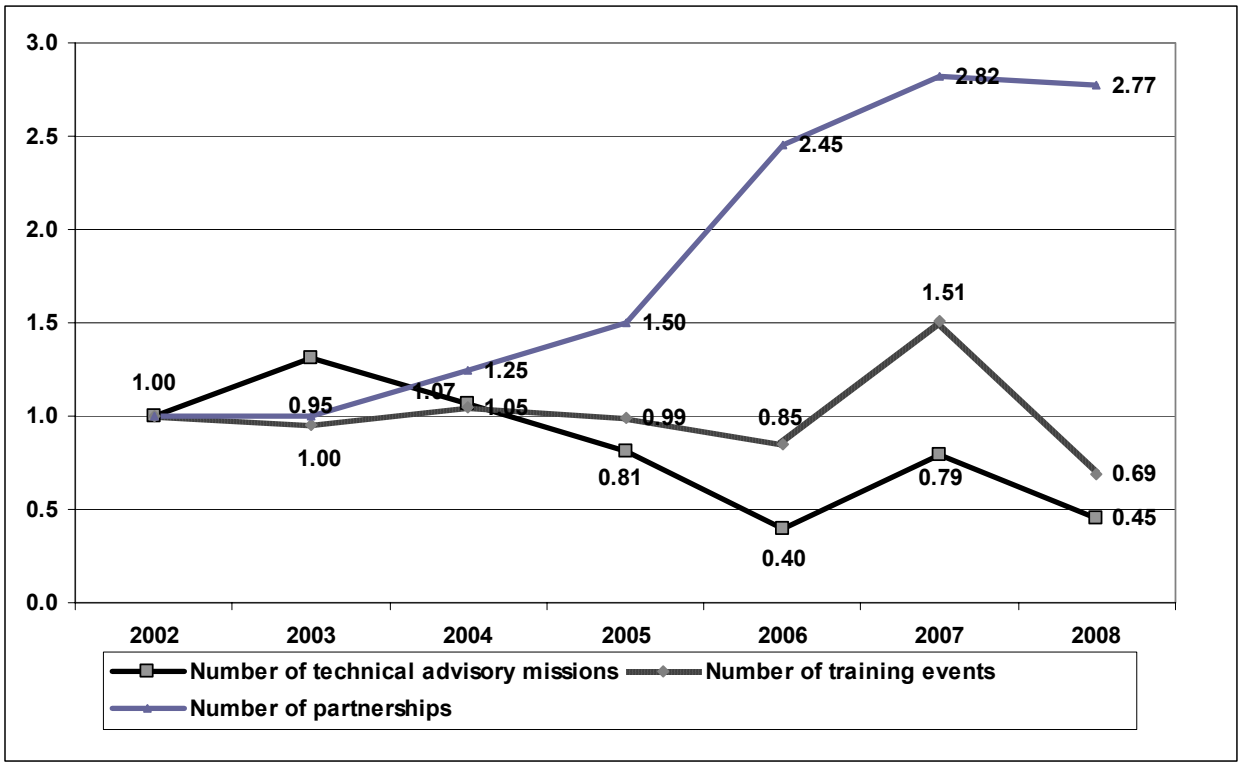


Figure 5: KPIs for technical co-operation and capacity building: base year 2002



15 It may be noted that information from other UN bodies on performance indicators was collected and is given in Table 3 for easy comparison with IMO. One can easily observe the different approaches, including the various terminologies to measure performance and the number of indicators. ICAO, which is an organization close to IMO, is the only organization that has developed a set of KPIs which follows a similar line of reasoning as suggested in this paper for the rationalization of the current indicators into a set of KPIs. ICAO realized early on in the development of its business plan that measuring performance is not an easy task, especially without data, and therefore created only a set of KPIs. It is, however, working on other methods, including statistical analysis, to deal with more complex issues such as measuring the environmental impact of the airline industry. The present document follows the same line of reasoning where a two-way system is proposed by rationalizing the current 42 PIs into a set of KPIs for IMO and by also developing methods to measure the various effects of interest to IMO, examples of which are presented in the next Section.

Table 3: Comparison of performance measurement in other UN organizations

Organization	Type of measurement	Nr. PIs
IMO	13 strategic directions	42
United Nations	670 expected accomplishments, 44,000 outputs	1119
UNCTAD	7 objectives, 26 expected accomplishments	29
WMO	5 strategic thrusts, 11 expected results	32
ICAO	6 strategic directions	7 (KPIs)

SECTION 3 – EXAMPLES OF MORE SOPHISTICATED METHODS TO MEASURE PERFORMANCE

16 Based on the examples which were presented in CWGSP 8/5 and the recommendations made in that document, a more sophisticated performance measurement method is presented here. At this stage, the demonstration of the method should facilitate the decision to be made on the level of sophistication that is required for the development of performance measurement in the future. It should be mentioned, however, that IMO is not yet able to apply such methods due to the lack of data that is available to the Secretariat (data-related issues and the status of GISIS will be discussed in the Section 4). The methods proposed will address the questions listed in Figure 1, which are an alternative approach to translating IMO's missions and objectives into expressions that can be measured and are:

.1 How well do the IMO standards achieve their desired effect?
.2 How well is the need to create/adapt standards recognized and action taken accordingly?
.3 How well do the IMO Member States implement, comply with and enforce the IMO standards?
.4 How well does IMO assist its Member States to implement, comply with and enforce its standards?
.5 How effective and efficient is the work carried out to meet IMO's Strategic Directions?
.6 How well does IMO perform in terms of public outreach and its obligations to the public?

Question 1: How well do the IMO standards achieve their desired effect?

17 Table 4 provides a list of examples of alternative methods that will be presented, in comparison to the current methods used by IMO, their measurement variable, level of complexity and benefits and drawbacks.

Table 4: List of methods for Question 1

Method	Measurement variable	Benefits (B) Drawbacks (D)	Feasibility and timeframe
Question 1: How well do the IMO standards achieve their desired effect?			
Method currently used: Various PIs (e.g., 1, 2, 3, 12, 16) but no direct measurement *Low complexity*	Cycle time % ratification PSC non-compliance rate	B: simple D: does not provide any information on the effectiveness of regulations and only a very high-level overview of enforcement	No restrictions
Method 1: Regression analysis *Medium complexity*	Measurement based on monthly time series on: casualty types casualty seriousness loss of life tonnes of pollution	B: can test effects (either positive, negative or non significant) and relationships based on aggregated levels B: can account for other effects that influence safety D: based on aggregated data (monthly time series) and cannot measure the effect on individual ships or account for timeframes	Feasible within 2-3 years if aggregated data is available and with substantial reclassification of data currently available
Method 2: Duration models *High complexity*	Same as for Method 1 but based on individual ship level	B: can filter out desired effects on an individual ship level for timeframes D: requires large datasets	Feasible within 5 years as individual ship level data is required and needs to be populated and integrated (GISIS)

Method 1 – medium level complexity

18 The first method is an example based on a methodology used by Knapp and Franses (2009)[2] where standard econometric techniques are used to measure the effect of various legislative measures (conventions, protocols, important amendments). The method distinguishes between two types of variables or factors in the model as follows: (a) factors of interest such as entry into force of a legislative measure, the number of countries which had ratified a convention or interim time periods between adoption and entry into force; and (b) other events which can affect safety such as ship profiles, seasonality in general, unilateral legal instruments, port State control inspections, industry vetting inspections and ship economic cycles.

[2] Knapp S, Franses PH, Does ratification matter and do major conventions improve safety and decrease pollution in shipping?, Marine Policy, 2009, 33: 826-846.

19 For the selection of the legislative framework, 45 milestones were selected dealing with the major conventions of IMO (e.g., SOLAS, MARPOL, COLREG, Load Lines, STCW) and ILO, which are reproduced in the annex to this document for information. For each of these milestones, entry into force or the time period between adoption and entry into force (for relevant measures such as single hull phase-out) is indicated as well as the number of countries that had ratified a convention.

20 A standard regression model can be used, as presented in Equation 1, to measure the effect of the variables of interest which can be positive, negative or not significant. The dependent variable (*DV*) changes according to the type of legislative measure to be measured. The method allows for various combinations based on seriousness, ship type, casualty type or amount of pollution as indicated in Table 5. Using a simple model allows comparison across conventions and facilitates the interpretation of the results.

Equation 1: suggested model for Method 1 for measuring the effect of legislation

$$\log(1+DV)_t = \beta_0 + \beta_2\,\mathrm{AGE_t} + \beta_3 \log(\mathrm{GRT})_t + \sum_{k=1}^{n_4} \beta_{4,k}\,\mathrm{IN}_{k,t} + \sum_{k=1}^{n_5} \beta_{5,k} \log(1+\mathrm{CR}_k)_t$$
$$+ \sum_{k=1}^{n_6-1} \beta_{6,k}\mathrm{SEAS}_{k,t} + \beta_7 \log(1+DV)_{t-1} + \beta_8 \log(1+DV)_{t-2} + \beta_9\,\mathrm{PSC_t} + \beta_{10} \log(1+\det)_t$$
$$+ \beta_{11}\,\mathrm{SIRE_t} + \beta_{12}\,\mathrm{RS_t} + \beta_{13}\,\mathrm{CDI_t} + \beta_{14}\log(\mathrm{EARN})_t + \sum_{k=1}^{n_{15}} \beta_{15,k}\,\mathrm{AD}_{k,t} + \varepsilon_t$$

where

DV = dependent variables as listed in table 5
AGE, GRT = mean age (grt) or mean GRT of all ships
IN = dummy variable indicating when legal instrument entered into force where $n_\ell = 31$
CR = number of countries which have ratified a certain convention (amount per month) where $n_\ell = 13$
SEAS = seasonal dummies for months (January as the benchmark) where $n_\ell = 12$
$Log(1+DV)_{t-1}$ and $Log(1+DV)_{t-2}$ = lags 1 and 2 of the dependent variable
PSC, SIRE, RS, CDI = indicators that mark the start of port State control and industry inspections depending on the model
Det = number of detentions (per month) for all ships or respective ship type
EARN = earnings per month for all ship types or respective ship type
AD = dummy indicating time between adoption and entry into force for certain measures where $n_\ell = 14$

21 The parameters of interest in this case would be the betas denoted by *ß* of the model, in particular for the parameters *IN* (indicators for entry into force of legal instruments), *AD* (indicators for the time between adoption and entry into force), and *CR* (the number of countries which have ratified a convention). The effect can be positive, negative or not significant depending on the significance level (typically 1%, 5% or 10%).

Table 5: Examples of combinations of models and dependent variables

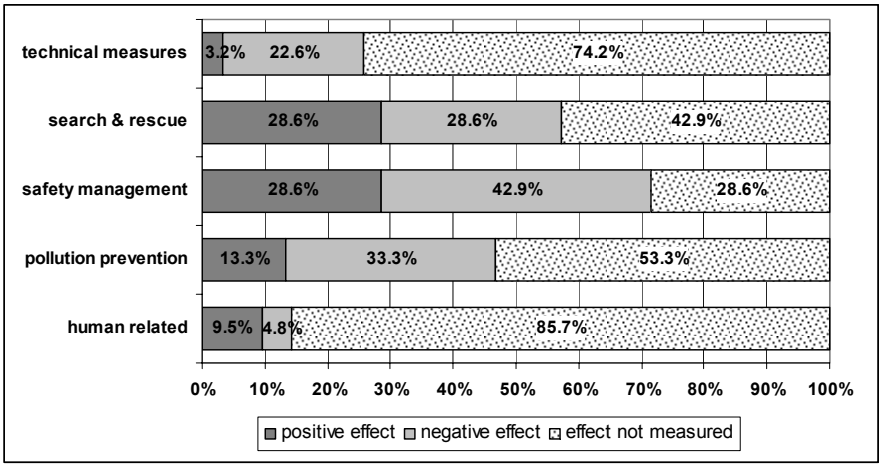
Model	Convention	Ship types	Description of dependent variable (DV) – values per month
A1:	SOLAS	all ship types	sum of very serious casualties/total ships
A2:	SOLAS	all ship types	sum of serious casualties/total ships
A3:	SOLAS	all ship types	sum of less serious casualties/total ships
A4:	SOLAS	dry bulk	sum of casualties – dry bulk/total ships
A5:	SOLAS	general cargo	sum all casualties – general cargo/total ships
A6	SOLAS	tanker	Sum of casualties – tanker/total ships
A7:	SOLAS	container	sum of casualties – container/total ships
A8:	SOLAS	passenger	sum of casualties – passenger ships/total ships
B1:	MARPOL	all ship types	sum of casualties with pollution/total ships
B2:	MARPOL	tankers	sum of very serious casualties of tankers/total ships
B3:	MARPOL	tankers	tonnes of chemical pollution (LRF)
B4:	MARPOL	tankers	tonnes of oil pollution (ENSAD, LRF and ITOPF)
C1:	SAR	all ship types	sum of total loss of life
C2:	COLREG	all ship types	sum of collisions and contacts/total ships
C3:	LOADLINE	all ship types	sum of hull related failures*)/total ships

Model	Convention	Ship types	Description of dependent variable (DV) – values per month
C4:	TONNAGE	dry bulk	sum of hull related failures*) for dry bulk carriers/total ships
C5:	TONNAGE	tanker	sum of hull related failures*) for tankers/total ships
C6:	TONNAGE	general cargo	sum of hull related failures*) for general cargo vessels/total ships
C7:	STCW	all ship types	sum of very serious casualty types/total ships
C8:	STCW	all ship types	sum of serious casualty types/total ships
C9:	STCW	all ship types	sum of less serious casualty types/total ships
C10:	ILO	all ship types	sum of very serious casualty types/total ships
C11:	ILO	all ship types	sum of serious casualty types/total ships
C12:	ILO	all ship types	sum of less serious casualty types/total ships
D1:	Fire/Explosion	all ship types	sum of fire & explosions/total ships
D2:	Fire/Explosion	tankers	sum of fire & explosions for tankers/total ships
D3:	Hull related*)	tankers	sum of hull related failures*) for tankers/total ships
D4:	Hull related*)	dry bulk	sum of hull related failures*) for dry bulk/total ships
D5:	Machinery failure^	all ship types	sum of engine machinery related failures/total ships

Source: Knapp S, Franses PH, Does ratification matter and do major conventions improve safety and decrease pollution in shipping?, Marine Policy 2009, Vol 33, pp 826-846.
**) hull related failures: flooding, foundering, other hull related failures, wrecked and stranded.*
^ machinery related failure: contains all casualties in relation to engine failures and electrical failures.

22 For the purpose of this document, the detailed results of the 29 models produced by Knapp and Franses (2009) are not presented here but a short summary of high level results are reproduced to demonstrate the outcome of this method. High-level results of the 260 possible outcomes from the 29 models are presented in Figure 6 below where the 45 individual milestones were grouped into areas to make aggregation of the results possible (details of the allocation of the areas is given in the annex listing the milestones used in the analysis). Out of the 260 outcomes, 87 are significant (33%) and 45 (17%) show a negative effect. Human related areas are primarily for ILO measures.

Figure 6: Effect of legislation per area based on seriousness



Source: Knapp S, Franses PH, Does ratification matter and do major conventions improve safety and decrease pollution in shipping? Marine Policy 2009, Vol 33, pp 826-846.

23 Other high-level results of the individual models show that the immediate effect of entry into force presents a mixed picture, where most negative effects can be found with legislation in the area of safety management and pollution, followed by technical areas. The effect of legislation in the areas related to working and living conditions and certification and training is smallest. Finally, seasonality can be found with peaks in December and January for all conventions but are less important for pollution.

Summary of benefits and drawbacks for Method 1

24 As indicated earlier, the main benefit of this method is that it can be classified as medium complexity given that the data is available to IMO and it could be reproduced in 3 to 5 years within the Secretariat using better quality data and assuming the necessary software is available. It can test effects

(either positive, negative or not significant) and correct for other effects which influence safety. Its major drawback is that it is based on aggregated data (monthly time series) and can therefore not measure these effects on the individual ship level. In particular for the variable indicating the number of countries which had ratified a certain convention, the input variable at the moment is an aggregated number and therefore cannot account for the individual effects of each flag State, or possibly coastal State, if the method is extended to other areas. The method further cannot account well for timeframes and time sequences. A more refined approach would be to perform a similar analysis on the individual ship level using Method 2 given in the next example.

Method 2 – high level complexity

25 The example for the second method presents a more refined and sophisticated method than used in Method 1 which can extend the analysis to measure effects of interest on the individual ship level and can take timeframes into account. The dependent variables would be similar to the ones in Method 1 but the proposed method called duration analysis can model the data to describe the length of time spent in a given State before transition to another State. In this case, the measure of the effect of legislation will be in terms of an increase of the survival probability of a vessel. The method is characterized by two main functions, namely, the hazard function and the survival function. The hazard function $\lambda(t)$ is the instantaneous probability of leaving a State conditional on survival to time t.

26 An example of applying duration models to the shipping industry is given in Bijwaard and Knapp (2009)[3] where the relationship of ship economic cycles and the effect of inspections towards the level of safety of ships were investigated. In this case, the variables used in the models are split up into groups as follows: (a) time varying ship particulars; (b) ship safety inspections (port State control and industry vetting inspections); (c) casualties and demolitions; and (d) economic data representing ship economic cycles. The effect of interest in the cited article was related to ship economic cycles and to safety inspections but the method could be extended to include the milestones or any other relevant legislation identified in Method 1 and described earlier.

27 Again, as in Method 1, the combination of these variables is necessary in order to account for the various parameters which can influence safety – in this case, a new parameter would have to be included to indicate entry into force of legislative measures, while the status of ratification can be measured on individual flags States. The proposed base model is presented in Equation 2.

Equation 2: suggested model for Method 2 for measuring the effect of legislation

$$\lambda(t \mid X,Y,Z,\tau) = \lim_{dt \downarrow 0} \frac{\Pr(t \le T < t+dt \mid T \ge t, X(s), Y(s), 0 \le s \le t, Z(\tau))}{dt} = \lambda_0(t;\alpha) e^{X(t)'\theta + Y(t)'\beta + Z(\tau)'\gamma}$$

28 The parameter λ is the hazard rate and is measured at an individual ship level at a given point in time. It is expressed in terms of the age of the vessel t; ship particular characteristics $X(t)$; time-intervals (6 or 12 months) since an inspection or ship particular changes $Y(t)$; and the current value of some economic indicators $Z(\tau)$. Finally, τ denotes the current calendar time and λ_0 represents the baseline hazard, which in this case is the age dependence.

Summary of benefits and drawbacks of Method 2

29 Once the hazard rate is known, one can easily calculate the probability of survival of a vessel since there is an inverse relationship between the hazard rate and that probability. In concrete terms, this means that if the incident rate increases the probability of survival decreases and vice versa. If the model is applied to measure the effectiveness of legislation, one can measure how this probability of survival changes if a certain flag State had ratified a convention or a legal measure had came into force. It can

[3] Bijwaard G and Knapp S, Analysis of Ship Life Cycles – The Impact of Economic Cycles and Ship Inspections, Marine Policy 2009, 33: 350-369.

measure this on the individual ship and flag level, which is its major benefit. It can further account for time varying dependent variables (e.g., such as changes in ship particulars over time) which all have an effect on safety.

30 A drawback of this method is that it requires large datasets and the construction of the dataset is complex and time consuming. Bijwaard and Knapp (2009), for instance, used a dataset of 52,130 ships which contains 748,621 observations over a time period of 29 years (1978-2007). Such data is not available to IMO at this stage, along with the statistical knowledge and software to construct the duration models. The method would only be feasible if it could be reproduced from time to time (every 5 to 10 years). While the shortcoming of statistical software and specialized knowledge to produce these models can be rectified by working with academia, the question of lack of data and data quality for IMO will be addressed in Section 4.

Question 3: How well do the IMO Member States implement, comply with and enforce the IMO standards?

Method 3 – medium complexity method

31 The next example deals with the question of implementation, compliance and enforcement, which is currently not measured at the flag State level by IMO. However, the concept of measuring flag State performance is not new to the shipping industry and various lists are produced either by regional bodies or industry. The subject of measuring the performance of flag States has been a topic of policy discussions in recent years at the regional level due to the recast of the European Union port State control directive (*refer to Directive 2009/16/EC of the European Parliament and of the Council of 23 April 2009 on port State control, Annex II for more details*). The directive introduces the concept of high, medium and low risk vessels where only ships with white-listed flags can be considered in the low risk category and will therefore benefit from fewer inspections. Table 6 provides a summary of the current method used at IMO in comparison with Method 3, its associated measurement variable, complexity and benefits and drawbacks.

Table 6: List of methods for Question 3

Method	Measurement variable	Complexity	Benefits (B) Drawbacks (D)
Question 3: How well do the IMO Member States implement, comply with and enforce the IMO standards?			
Method currently used: Various PIs but no direct measurement at flag State level	Number of MS which are willing to undergo an audit	Low complexity	B: simple D: does not provide information on compliance
Method 3: Performance indicator for flag States	Based on detentions, deficiencies, very serious casualties and possible other factors (e.g., audit information); could also correct for other factors such as ship type, age and tonnage	Medium complexity	B: combines various data sources and can handle smaller data samples than what was is currently used (e.g., Excess Factor Method of Paris MoU or Tokyo MoU) B: can measure performance on flag State level B: data can be made available to IMO and can be based on totals for 3 years B: allows weight factors by policy makers

MS = Member States

32 This document suggests an example of a new methodology based on standard statistical methods which addresses some of the shortcomings of the various current methods used and presents a more

refined, less biased approach of measuring performance. Perepelkin *et al.* (2009)[4] presents a formula to measure flag State performance introducing *Q* as being the quality of a flag which can also be interpreted as the level of compliance or enforcement by a flag State of the requirements of IMO conventions.

33 The proposed method ranks flag States based on one characteristic (*Q; or the quality of a flag)* which facilitates comparisons across flags. The method would use data from port State control inspections from all PSC regimes, casualty data from GISIS (very serious casualties) and could be extended to include other parameters such as, for instance, data from audits from the IMO Voluntary Audit Scheme. The basic formula is presented in Equation 3. At present, *Q* reflects the quality of a flag and is defined as the expected ratio of the number of detentions (*D*) to the number of inspections (*N*). It is further corrected in such a way that deficiencies and very serious casualties are also taken into account.

Equation 3: Suggested method 3 for measuring flag State performance

$$Q = \frac{D}{N} + k_Z \cdot Z \cdot (H - L) + \left(\frac{Def}{N \cdot Def_{Mean}} - 1 \right) \left(\frac{H - L}{2} \right)$$

where

D and N are the numbers of detentions and inspections during a three-year period
k_z – casualty "significance" factor to be determined by the policy maker
Z – number of very serious casualties during a three year period
Def – total weight of D/NCs where weight factors are determined by the policy maker
Def_{Mean} – mean weight of D/NCs for all flags per one inspection during a reference period
H, L – bounds of the (Low , High) range

34 For Equation 3, two types of factors need to be determined by the policy makers which are the significance factor for casualties, k_z and the weight factors for the deficiencies found during an inspection. Perepelkin *et al.* (2009) offers some possible values for these factors. For the purpose of this document, these detailed results are not presented but emphasis is put on the underlying idea of the method.

35 It is also worth noticing that other parameters such as ship type, age and tonnage are not accounted for but could be incorporated in such ways that flags which have older tonnage operating in a particular segment of the market (e.g., general cargo) are not punished. It has been demonstrated that the risk in shipping varies depending on the ship type and many other parameters such as age and tonnage. A further extension to the method could be to correct for such factors.

36 The method is based on the ratio of detentions over inspections, in the sense that *D*/*N* is an estimate of the (unobserved) probability of detention, for which a normal probability distribution is assumed and which is an often used assumption in statistics and, in general, very accurate. The lower and upper limits of a confidence interval for this probability are derived (denoted by *H* and *L*). The limits are then combined with deficiencies and casualties for each flag State and adjust *D/N* to a final value of *Q*.

Benefits and drawbacks of Method 3

37 The proposed method is based on common assumptions in statistical literature (namely that the probability of detention follows a normal distribution) and presents a more refined method to compare flag performance (based on PSC data, casualty data and possible other data). The new approach constructs confidence intervals for the probability of detention, thereby stating that the true value will be contained within such intervals, without the need to know or assume the exact value. Another benefit of this method is that it can be used with smaller sample sizes. Finally, the method allows the determination of weight factors by the policy maker. No significant drawbacks can be determined for this method and it would be feasible to implement it within 2 to 3 years and once IMO receives PSC data from all PSC regimes.

[4] Perepelkin M *et al.*, A method to measure flag performance for the shipping industry, Econometric Institute Report 2009-04, Econometric Institute, Erasmus University, http://repub.eur.nl/publications/index/258895215/.

Question 4: How well does IMO assist its Member States to implement, comply with and enforce its standards?

38 The area of technical co-operation is different from others since most work is conducted by the IMO Secretariat in conjunction with experts to provide technical assistance and training to Member States. Once the assistance is delivered, it is up to the Governments to use the advice provided. At this stage, no specified variable to measure the effect of the assistance has been identified, which is different from the situation of safety or pollution where one can identify a dependent variable (such as the amount of pollution or number of casualties to measure the effect based on data modelling). In the area of technical co-operation, the portion of the effect due to the delivery of the assistance cannot be filtered out in the same way as with the other methods presented so far. Given this situation, this document will concentrate on methods which can perhaps provide a better insight into how well the assistance is delivered but not necessarily to measure the effect of the assistance itself at this stage.

39 Information on the kind of assistance that is delivered, to whom it is delivered, and what kind of possible impact the assistance has in improving implementation and compliance is assessed every four years through the impact assessment exercises (IAEs) carried out under the Integrated Technical Co-operation Programme (ITCP) – the next one will be conducted in 2011. In this respect, the most recent ITCP and IAE reports present as their main conclusions (see document TC 58/4) that the assistance delivered by IMO on matters related to MARPOL, OPRC, maritime security and the strengthening of national maritime Administrations was found beneficial to achieving IMO's mission. The report, however, does not contain statistical data to underline the conclusions. A suggestion for the next IAE is to design questionnaires which allow for data collection in electronic format for the purposes of statistical analysis in measuring how well the relevant programme goals are being achieved.

Q2: How well is the need to create/adapt standards recognized and action taken accordingly?
Q5: How effective and efficient is the work carried out to meet IMO's Strategic Directions?
Q6: How well does IMO perform in terms of public outreach and its obligations to the public?

40 The remainder of this Section addresses the remaining questions from Figure 1 and presents possible approaches for the development of a methodology in the future. At this stage, no methods have been identified to address them directly.

41 Questions 2 and 5 are related and could be combined in one area dealing with the recognition of the need for standards and the reaction in dealing with such needs efficiently and effectively. At the moment, the only indication to address this question is the cycle time (current PI 16) which has been calculated to be 3.1 years (average time from adoption to coming into force based on all main legislative instruments and amendments) and 7.6 years (average time from initial authorization of the work to coming into force). However, these figures alone do not give any indication of how well the need to create and adapt standards is recognized by IMO. It merely presents an average figure of how long the process takes. One can observe that most legislative changes follow major disasters and still are rather reactive then preventive.

42 One possible way forward would be to investigate whether the use of Method 2 (the duration analysis), when re-applied to question 1, can also provide answers for questions 2 and 5 since the method can deal with timeframes. In doing so, one would also have to incorporate a variable indicating the amount of resources involved in the work that has been carried out to meet IMO's strategic directions, but it is unclear at this stage how this could be accomplished. Perhaps in the future, with results-based budgeting, it may be possible to cost the process of creating legislation.

43 An alternative method would be to see how recommendations based on FSA studies have led to changes in the regulatory framework versus traditional approaches following a disaster. This in itself is not an easy task since IMO currently does not keep records of this data and it would have to be populated. This may perhaps be considered during the development of the planned GISIS module on the High-level Action Plan and the Risk Management Framework.

44 Question 6 is related to the work of the Secretariat and is intended to provide some measurement of its performance with respect to public outreach and obligations to the public. At the moment, no specific method has been identified to address this question as it covers a very broad spectrum of activities, including co-operation and liaison with other United Nations bodies, intergovernmental and non-governmental organizations; delivery of information through the Secretariat's Public Information Services, External Relations Office and Maritime Knowledge Centre; the celebration of World Maritime Day and its Parallel Event; the conferral of the International Maritime Prize and the IMO Award for Exceptional Bravery at Sea and their attendant media coverage; and, not least, the provision of information through the Organization's various websites. With respect to the provision of information on performance indicators, a comparison was made with other UN bodies or specialized agencies and a high-level overview was presented earlier (see paragraph 15 and Table 3).

45 With respect to the outreach to the public in terms of providing data access, IMO has developed GISIS, some modules of which are publicly accessible; however, most information can only be seen on the screen and is not downloadable. Compared to other UN agencies, however, IMO's system can be considered innovative and provides the basis to enhance transparency in the future. The World Meteorological Organization, for instance, does not have a database system at all and UNCTAD's system is primarily based on combining data from various other sources without direct data collection from Member States. GISIS is a combination of data collection from Members, the display of this data to the wider public and other needs.

46 On the other hand, IMO does not yet produce publications containing data that can be provided to the public at large or to academia; this can be either because data is obtained from external sources under strictly limited sharing conditions, or the facilities are not yet available to extract data from the various existing IMO systems (this is addressed in Section 4). ICAO produces a very comprehensive environmental report each year including a chapter on modelling and databases, while UNCTAD publishes its yearly Maritime Transport Review where some data is now also accessible to the public. Comparable publications have not yet been produced by IMO but the possible creation of maritime profiles for each country, in the future, might provide a means to make maritime data more easily available and to become a reference point for the industry, academia and public.

SECTION 4 – OBSERVATIONS ON DATA LIMITATIONS AND CURRENT STATUS OF GISIS FOR THE DEVELOPMENT OF THE PERFORMANCE INDICATORS

47 As indicated in CWGSP 8/5, the current data sources used for the PIs are limited and statistics are not produced based on raw data but primarily on aggregated data from various sources where the population of the data is not fully known nor in control of IMO. This can have various implications such as, for instance, the level of quality of the data (already highlighted in CWGSP 8/5) or that the indicators do not reflect the best possible method which can be used to filter out effects of interest.

48 One of the outcomes of the 2009 risk management exercise carried out by the Secretariat led to the recommendation on the need to ensure that the Organization has in place robust information and communication technology (ICT) infrastructure and systems with the capability of responding to changing requirements by both internal and external users. In this regard, and in the absence of unlimited funding, a holistic approach was recommended, with a coherent package of costed options being presented to the Council for consideration (see document C 102/3(b), paragraph 6.5.2).

49 For the measurement of performance through indicators, the most relevant ICT infrastructure is – now and for the foreseeable future – the data management system provided by GISIS. However, ICT alone cannot ensure proper data population within GISIS for the production of statistics. This is because most GISIS modules were not designed to populate data for statistical purposes and were rather intended as electronic reporting systems, but not in the context that the data would then be extracted or used for statistical analysis in the future. By way of example, when the European Maritime Safety Agency begins to feed GISIS with data from its European Marine Casualty Information Platform (EMCIP) some of that data may be lost to IMO during the data transfer as the corresponding GISIS module was not originally designed to capture some of the important data aspects. The various GISIS modules therefore need to be designed and managed in such a way that they not only provide the required reporting mechanisms, but also always ensure the capture of data for statistical analysis purposes.

50 In addition to the foregoing, most indicators are currently based on descriptive statistics (e.g., tables with numbers that change over a certain time period) and not inferential statistics, which try to draw some conclusions or inferences about characteristics of populations based on a sample. However, any more sophisticated method will require more detailed data and, for this reason, this document also addresses the data limitations for IMO, which consists of the following aspects:

.1 the competing resources for funding the further development and continuous improvement of GISIS, which is needed to ensure the population of data for statistical analysis; and

.2 the lack of quality data which is needed to produce statistics.

51 The two aspects are closely linked. Statistics cannot be developed without data and data cannot be populated without proper data management systems to permit the control of data population, data integration and data dissemination. It is worth noticing that, at present, IMO would not be able to use any of the performance measurement methods presented in Section 3 due to its data limitations. In order to do so, the two points listed above need to be addressed and, as indicated in paragraph 48, this is a matter now being pursued by the Secretariat in line with the recommendations of CWGRM 4 (C 102/3(b)) and the consequent decisions of C 102.

Historical development of GISIS and links to the Strategic and High-level Action Plans

52 Following the official discontinuation, in the mid-1990s, of the project to establish a central Internet-based server at IMO (i.e. the International Ship Information Database), the development of GISIS was initiated in 2003 as a way of putting in place a more effective data management system to better serve the Member States and facilitate the Secretariat's work. The need for such a system arose principally because IMO did not then have a centralized electronic reporting system but, rather, numerous individual databases with no central data repository; no common taxonomy; a loose control of the various maintenance processes; and very limited data quality assurance.

53 GISIS has been developed within approved appropriations rather than on the basis of a stand-alone project with separate financing, such as the ERP/SAP project. In spite of these constraints and compared to other UN agencies, IMO's GISIS can be classified as innovative and a unique accomplishment which now merits upgrading of its facilities to better serve the many analytical purposes of the membership, the Secretariat and the industry. The historical development of GISIS is thus reflected in the Organization's Strategic Plan (resolution A.989(25)) which:

.1 identifies ICT as providing opportunities to develop knowledge management so as to increase transparency and accessibility to information;

.2 further identifies the resultant challenge for IMO as being "to ensure the proper application of information technology within the Organization and to provide enhanced access to that information for the shipping industry and others"; and

.3 sets out consequential strategic directions calling for IMO to make effective use of ICT in management and administration (SD 4); and to take the lead in improving quality shipping by promoting and enhancing the availability of, and access to, information – including casualty information – relating to ship safety, security and environmental protection (i.e. transparency) (SD 12.3 and SD 13.2).

54 These challenges and directions are complemented by related high-level actions (HLAs) and planned outputs for the 2008-2009 biennium, which require IMO to:

.1 create a knowledge and information-based Organization through improved management and dissemination of information, making use of appropriate technology (HLA 4.2.1);

.2 enhance transparency in the Organization's operations (HLA 4.3.1);

.3 promulgate information on prevention/suppression of acts of piracy and armed robbery against ships (HLA 6.2.1);

.4 encourage the use of ICT related to facilitation (HLA 8.3.1); and consider the wider dissemination of information, analyses and decisions (HLA 12.3.1);

.5 arrange for data exchange protocols with external data providers (Outputs 1.2.1.1 and 4.2.1.3);

.6 promote inter-agency information sharing through the Environmental Management Group (Output 1.1.2.3); and

.7 generate guidance on the establishment and further development of information systems (databases, websites, etc.) as part of the GISIS platform (Output 4.2.1.1), on a pollution incident information structure (Output 7.1.1.2) and on the development of GISIS and access to information (Outputs 12.3.1.1 and 13.2.1.1).

55 Today, GISIS is an integrated information system for the collection, processing and sharing of ship-related data to assist the Members and Secretariat in carrying out their respective and complementary duties to generate reports and provide information about shipping to the public. It has over 20,000 registered users and an estimated 4,500 pages viewed per day. Table 7 provides an overview of its current status. Since its launch, 16 modules have been developed, three are under development and two are under consideration. GISIS can be considered as an innovative solution to cope with increasing data requirements of today, either within IMO or towards increasing data availability to the public in the interest of increasing transparency. This can be concluded despite the current limitations on the population of data for the use of statistics described previously.

Table 7: List of GISIS Modules with status of development and data access

Name of Module	Status of Module	Data Access
Maritime Security (ISPS)	On-line, 2004	MS, Secretariat, Public
Ship particulars (SHIP)	On-line, 2005	MS, Secretariat
Maritime Casualties and Incidents (MCI)	On-line, 2005	MS, Secretariat, Public
Recognized Organizations (RO)	On-line, 2005	MS, Secretariat, Public
Port Reception Facilities (PRF)	On-line, 2005	MS, Secretariat, Public
Condition Assessment Scheme (CAS)	On-line, 2005	MS, Secretariat, Public
Piracy and Armed Robberies (PAR)	On-line, 2006	Secretariat
Status of Treaties (ST)	On-line, 2006	Secretariat
Simulators (SIM)	On-line, 2006	Secretariat
Bulk Chemicals (BC)	On-line, 2006	Secretariat
Pollution Prevention Equipment (PPE)	On-line, 2007	MS, Secretariat, Public
Dangerous Goods Carriage Difficulties (DGCD)	On-line, 2007	Secretariat
Greenhouse Gas Emissions (GHG)	On-line, 2008	MS, Secretariat, Public
Contact Points for PSC/Casualties, Harmful Waste, Bulk Chemicals (CP)	On-line, 2008	MS, Secretariat, Public
LRIT Data Distribution Plan (DDP)	Online, 2008	MS, Secretariat
Communications and Search and Rescue (COMSAR)	Online, 2008	Secretariat
Port State Control (PSC)	Under development	
Reported Illegal Immigrant Incidents (RIII)	Under development	
Reported Stowaways Incidents (RSI)	Under development	
Module on HLAP and Risk Management	Under consideration	
Module on Requirements	Under consideration	

Note: status as of May 2009, MS = Member States

56 To overcome the limitations previously identified the following functional and technical areas of GISIS have so far been identified as requiring development or improvement so as to enhance data

population and data extraction for the development of the PIs or the wider use of the system for the benefit of its stakeholders:

.1 development of data extraction modules and graphical representation;

.2 development of interfaces with other systems (e.g., external interfaces might include data feeds from regional MOUs/Agreements on PSC, EMSA's casualty database or other data providers in general, while internal interfaces might include SAP, where appropriate);

.3 possible inclusion in GISIS of all other existing Access databases established by IMO such as: CMTI (information on maritime training facilities), fraudulent certificates, IMDG Code database, Martecaid (technical assistance) and Member State Audit Scheme (pre-audit questionnaire and post-audit reports);

.4 extension of the current module on Contact Points to include all other contact details such as for search and rescue, technical and diplomatic focal points and mailing addresses for document distribution;

.5 inclusion of all other reporting questionnaires. A special GISIS area could hold all such questionnaires and answers – for example, on the ITCP impact assessment data, the maritime capacity checklist (A.1006(25)), FAL Convention questionnaires; responses to evaluation questionnaires in electronic format following training events delivered through the technical co-operation programme, etc.;

.6 the revision of the structure of the data that is populated to see whether it is fit for the production of statistics and to improve data quality;

.7 possible upgrading of hardware, software and manpower to accommodate increasing demand for, and use of, the system.

Usage of GISIS by Member States and data population to GISIS

57 With respect to the paucity of data, CWGSP 8 recommended and C101 agreed to urge Member States to meet their reporting requirements, particularly mandatory ones, and to do so, where practicable, through the direct entry of data into the relevant GISIS modules. At this stage, there is little evidence that data population increased significantly since the Council's decision and there is no consistent mechanism in place to identify whether Parties to conventions comply with mandatory reporting requirements (see, however, annex 1 to FSI 17/4 regarding reporting under MARPOL).

58 In order to gain some insight into the usage of GISIS and reporting to GISIS, some statistics were created based on the number of web-accounts, submissions of casualty reports, the number of port reception facilities, the number or authorizations of recognized organizations, the number of ISPS-compliant facilities and the number of contact points. The information is presented in Table 8 as of May 2009, and can only be used as a best estimate and high-level insight into the usage of GISIS – it does not contain any information about reporting requirements which have not been met since full data is not always available to IMO to make this comparison.

59 In order to bring this in relation with the total number of IMO Member States, the percentage is calculated for each category and is presented at the bottom of Table 8. The highest amount of usage seems to be within the area of web-accounts (which also includes other systems and not just GISIS) and contact points, followed by ISPS-compliant facilities. The two weakest areas in terms of countries using GISIS compared to total IMO Member States are casualty investigations and port reception facilities.

60 A possible remedy in increasing mandatory reporting would, in first the instance, be to reiterate efforts to increase the awareness of GISIS amongst Member States and, possibly, to provide training sessions on how to use the system during IMO meetings. A second remedy, at least for casualty data, would be to compare data from other (external) sources and to then follow up on casualties which require

an investigation and consequent reporting. In order to do so, however, the data from outside would need to be acquired in a format which fits the corresponding IMO definitions (e.g., the classification of seriousness).

61 In this regard and in line with the related strategic directions, high-level actions and planned outputs identified in paragraphs 53 and 54, the Secretariat is exploring data exchange arrangements with several external providers of the public and private sectors – UN bodies, IOPC Fund, PSC regimes, EMSA, IUMI, P&I Clubs, as well as commercial entities (Lloyd's Register Fairplay, Lloyd's Maritime Intelligence Unit, Clarkson's, RightShip, to name a few). Such arrangements could improve data population within GISIS, help to identify if data is missing due to the lack of reporting, generate cost savings by not requiring data to be otherwise purchased, and facilitate access to combined casualty data for use in FSA studies, as previously suggested by several Members.

62 One of the related items of importance is the quality of data. IMO currently has no consistent mechanism in place to gain an overview of the quality of data in general and to improve it in the future. The Secretariat is nevertheless seeking improvements in this area by determining data validation criteria.

Table 8: Overview of GISIS usage and reporting to GISIS – top 20 users per category (May 2009)

Nr. of Web Accounts		**Nr. of Casualty Investigation submissions**		**Number of Port Reception Facilities**		**Nr. of Recognized Organizations authorizations**		**Nr. of ISPS Facilities**		**Nr. of Contact Points**	
Singapore	43	IMO Secretariat	12956	United States	2909	Belize	29	United Kingdom	2154	Italy	103
Australia	37	Panama	1345	United Kingdom	1406	Panama	28	Japan	1945	United States	94
Bulgaria	37	United Kingdom	1090	Denmark	614	Georgia	22	Norway	896	Greece	63
Ukraine	37	Denmark	611	Australia	578	Honduras	20	Spain	833	United Kingdom	50
Denmark	27	Japan	462	Turkey	419	Saint Vincent and the Grenadines	17	Russian Federation	726	Indonesia	46
Norway	24	Australia	428	Belgium	415	Comoros	16	Singapore	671	Russian Federation	45
Mexico	22	China	384	Japan	405	Cyprus	15	China	657	Japan	45
Germany	21	Canada	370	Italy	392	Cambodia	14	Australia	569	IMO Secretariat	45
Chile	20	Germany	250	Norway	286	Marshall Islands	14	Germany	549	Canada	42
United Kingdom	20	Sweden	204	New Zealand	277	Malta	13	Sweden	545	China	40
United States	20	Bahamas	170	Spain	276	Sierra Leone	13	Finland	544	Spain	36
China	17	Netherlands	151	Canada	250	Saint Kitts and Nevis	11	Canada	527	France	36
Japan	17	Italy	130	Sweden	215	Vanuatu	11	Netherlands	501	Republic of Korea	30
Marshall Islands	17	France	126	Germany	215	Tuvalu	10	Italy	475	Thailand	29
Spain	17	Liberia	117	Greece	206	United Arab Emirates	10	Denmark	452	Mexico	28
Bolivia	16	Ireland	110	Brazil	192	Philippines	10	Turkey	377	Brazil	28
Canada	16	Hong Kong, China	104	Finland	180	Greece	10	Ukraine	292	Norway	27
Panama	16	Republic of Korea	88	China	168	Liberia	10	Greece	286	Cuba	27
Portugal	16	Malta	82	Mexico	99	Jamaica	10	France	278	Iran, Islamic Republic of	25
Netherlands	15	Spain	54	Netherlands	98	Bahamas	10	Republic of Korea	251	Peru	23
Number of total MS per category and % to total IMO Member States											
165 MS	**98.2%**	**62 MS**	**36.9%**	**68 MS**	**40.5%**	**114 MS**	**67.9%**	**164 MS**	**97.6%**	**167 MS**	**99.4%**

SECTION 5 – ACTION REQUESTED OF THE WORKING GROUP

63 The Working Group is invited to note the information provided in Sections 1 to 4 of this document and, in particular to:

.1 consider and decide on the proposed two tier approach (see paragraph 8), where the first part is the rationalization of the current 42 PIs into the set of KPIs set out in Table 1 and the second part is the introduction of the statistical methods set out in Section 3; and

.2 consider and decide on the desirable level of sophistication to measure organizational performance in the future – i.e. medium (feasible within the Secretariat over time) or high (would require collaboration with academia).

64 Alternatively, should the Working Group decide to maintain the current performance indicators, it is invited to:

.1 request the Marine Environment Protection Committee (see a related earlier request in document C/ES.24/3(a), paragraph 24.1) to provide a definition for harmful substances for *PI 9(a) Tonnes of harmful substances discharged into the sea operationally or accidentally from ships subject to IMO instruments*[5];

.2 agree on changing the current definition of PI 18 to a more accurate definition as follows: *Progress towards development of goal-based standards for ship construction*[5]; and

.3 agree on replacing current PI 14(b) with PIs for the number of advisory missions and the number of training events, irrespective of whether such activities are planned or not[5].

65 Irrespectively of the foregoing alternatives, and with a view to increasing data population and data quality in GISIS, the Working Group is further invited, to:

.1 reiterate its call to Member States to meet their reporting requirements, particularly mandatory ones, by increasing the frequency and by improving the quality of such reporting and to do so, where practicable, through the direct entry of data into the relevant GISIS modules; and

.2 note and endorse the functional and technical areas of GISIS identified as requiring further development and improvement (paragraph 56) and the actions being undertaken to explore data exchange arrangements in line with relevant provisions of the Strategic and High-level Action Plans (paragraph 61).

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[5] Refer also to document CWGSP 10(a).

ANNEX

Summary of milestones used by method 1

Nr.	Main Events of interest	in response to	Adoption date	Entry into force date	Milestone area
1	LOAD LINES 66 Conv.		05/04/1966	21/07/1968	Technical
2	TONNAGE 69 Conv.		23/06/1969	18/07/1982	Technical
3	COLREG 72 Convention		20/10/1972	15/07/1977	Navigation
4	SOLAS 74 Convention	Titanic (1912)	01/11/1974	25/05/1980	Technical
5	ILO 147 MinSt 1976		29/10/1976	28/11/1981	human related
6	MARPOL 73/78 AI	Torrey Can. (1968)	17/02/1978	02/10/1983	Pollution
7	MARPOL 73/78 AII	Torrey Can. (1968)	17/02/1978	06/04/1987	Pollution
8	MARPOL 73/78 AIII		17/02/1978	01/07/1992	Pollution
9	SOLAS Protocol 78		17/02/1978	01/05/1981	Technical
10	STCW 78 Convention		07/07/1978	28/04/1984	human related
11	SAR Convention.		27/04/1979	22/06/1985	search & rescue
12	SOLAS 81-11 Amend	Amoco Cadiz (1978)	20/11/1981	01/09/1984	technical
13	Paris MoU starts	Amoco Cadiz (1978)	26/01/1982	01/07/1982	safety/pollution
14	IBC Code mandatory		05/12/1985	06/04/1987	technical/pollution
15	SOLAS 88 11 Amend		11/11/1988	01/02/1992	search &rescue
16	SOLAS 88 Protocol		11/11/1988	03/02/2000	safety mgtm
17	LOAD Line 88 Protocol		11/11/1988	03/02/2000	safety mgtm
18	OPA 90	Exxon Valdez (1989)	01/08/1990	01/08/1990	pollution
19	MARPOL 92 Amend	Exxon Valdez (1989)	06/03/1992	06/07/1993	pollution
20	Viña del Mar starts		05/11/1992	05/11/1992	technical/pollution
21	SIRE starts	Exxon Valdez (1989)	n/a	01/01/1993	technical/pollution
22a	SOLAS 93-11 Amend1	Herald of FE (1987)	01/11/1993	01/07/1998	safety mgtm
22b	SOLAS 93-11 Amend2	Herald of FE (1987)	01/11/1993	01/07/2002	safety mgtm
23	Tokyo MoU starts		01/12/1993	01/01/1994	technical/pollution
24	USCG emphasis on PSC		n/a	01/01/1994	technical/pollution
25	CDI starts inspections		n/a	10/01/1994	technical/pollution
26	SOLAS 94-05 Amend		01/05/1994	01/01/1996	technical
27	STCW 95 Amend	Estonia (1994)	07/07/1995	01/02/1997	safety mgtm
28	SOLAS 95-11 Amend	Estonia (1994)	29/11/1995	01/07/1997	technical
29	SOLAS 96-06 Amend		04/06/1996	01/07/1998	safety/technical
30	SOLAS 96-12 Amend		06/12/1996	01/07/1998	safety/technical
31	Caribbean MoU starts		09/02/1996	09/08/1996	technical/pollution
32	ILO 147 Prot 1996		22/10/1996	10/01/2003	human related
33	Mediterranean MoU starts		11/07/1997	23/02/1998	technical/pollution
34	SOLAS 97-11 Amend	Derbyshire (1980)	27/11/1997	01/07/1999	technical
35	Indian Ocean MoU starts		05/06/1998	22/01/1999	technical/pollution
36	MARPOL 99 Amend		01/07/1999	01/01/2001	technical/pollution
37	STCW White List published		n/a	06/02/2000	human related
38	Black Sea MoU start s		07/04/2000	07/10/2000	technical/pollution
39	MARPOL 01 Amend	Erika (1999)	27/04/2001	01/09/2002	pollution
40	RightShip starts vetting		n/a	01/10/2001	technical
41	EC Regulation 417/2002	Erika (1999)	18/02/2002	01/09/2002	pollution
42	SOLAS 02-12 Amend	Derbyshire (1980)	12/12/2002	01/07/2004	technical
43	EC Regulation 1726/2003	Erika, Prestige (2002)	22/07/2003	21/10/2003	pollution
44	MARPOL 03 Amend	Erika, Prestige (2002)	04/12/2003	05/04/2005	pollution
45	SOLAS 04-12 Amend		01/12/2004	01/07/2006	technical

Source: Knapp S, Franses PH, Does ratification matter and do major conventions improve safety and decrease pollution in shipping? Marine Policy 2009, Vol 33, pp 826-846, a full list of the major development of the legislative framework can be found in the publication.