Shipping KPI Project
Past, present and future
Today's topic

• Shipping KPI Project Goals
• Shipping KPI Project Methodology
• Shipping KPI Project Achievements
Current industry situation

- Too many different indicators (KPIs)
- Comparison of performance between companies is difficult due to lack of standardization
- Difficult to mobilize organizational focus on quality improvement
- Additional manpower required to present the same information in many different ways (onboard, in office and to externals)
- Emerging new reporting requirements (On environmental performance & Corporate Social Responsibility (CSR))
The KPI Project objectives

In order to:

- boost performance improvements internally

- provide an efficient communication platform about ship operation performance information to internal and external stakeholders through increased transparency

Develop tools to measure company and vessel performance and get these recognized as “the Standard of the Industry”
The project

Norwegian Research Council

Project Responsible
Wilh. Wilhelmsen ASA

Project Partner
MARINTEK

Project Partner
InterManager

Stakeholders

Shipping Companies

InterManager members

Trade Organisation
Regulators e.g. IMO
EU DG-TREN
Labour Organisations
Insurance
and many more
Shipping KPI Phase 1 & 2 - Content

2006-2008

Shipping KPI Phase 1
- KPI definitions
- Aggregation principles and SPI definitions
- KPI depository and awareness in industry

2009-2011

Shipping KPI Phase 2
- Validation of Shipping KPI Standard
- Develop communication models for performance information
- Develop tools for benchmarking

- Increased transparency of performance to external stakeholders
- Internal improvements and performance management processes
- Developments towards “process output” regulations
## Shipping KPI Phase 2 WG Participants

<table>
<thead>
<tr>
<th>Company</th>
<th>Name</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bernhard Schulte Shipmanagement</td>
<td>Bill Lunn</td>
<td>Group Director - Loss prevention, safety &amp; quality</td>
</tr>
<tr>
<td>Columbia Shipmanagement</td>
<td>Dietrich Wulff</td>
<td>Q.A. Manager</td>
</tr>
<tr>
<td>ConsultISM</td>
<td>David McFarlane</td>
<td>Project Manager</td>
</tr>
<tr>
<td>EMS Ship Management</td>
<td>Ranjith Cheerath</td>
<td>Marine, Safety &amp; Quality Director</td>
</tr>
<tr>
<td>Epic Asia</td>
<td>Sanjay Mittal</td>
<td>Assistant General Manager, DPA</td>
</tr>
<tr>
<td>Epic Europe/Meridian Marine</td>
<td>David Turner</td>
<td>Manager Risk, Safety and Security</td>
</tr>
<tr>
<td>Hoegh Fleet Services</td>
<td>Alv Johan Erikstad</td>
<td>Controller, Fleet Management</td>
</tr>
<tr>
<td>Maersk Ship Management</td>
<td>Terry Cornick</td>
<td>Managing Director</td>
</tr>
<tr>
<td>Marfin Management S.A.M.</td>
<td>Alexandre Albertini</td>
<td>Director</td>
</tr>
<tr>
<td>NovoShip</td>
<td>Alexey O. Khaydukov</td>
<td>Quality Assurance Director</td>
</tr>
<tr>
<td>NYK Shipmanagement Singapore</td>
<td>Hemant Pathania</td>
<td>Managing Director &amp; COO</td>
</tr>
<tr>
<td>Seaspan Ship Management</td>
<td>Peter Curtis</td>
<td>Vice President</td>
</tr>
<tr>
<td>Thome Ship Management Singapore</td>
<td>Bjorn Hojgaard</td>
<td>Managing Director</td>
</tr>
<tr>
<td>V.Group</td>
<td>Simon Pressly</td>
<td>Chief Information Officer</td>
</tr>
<tr>
<td>Wilhelmsen Ship Management</td>
<td>John-Christen Jensen</td>
<td>Vice President Shipmanagement</td>
</tr>
<tr>
<td>NewsLink</td>
<td>George Hoyt</td>
<td>Founder</td>
</tr>
<tr>
<td>Tsakos Shipping Hellas</td>
<td>A. Rozakis</td>
<td>General Manager</td>
</tr>
<tr>
<td>Interorient</td>
<td>Steve Hardy</td>
<td>Manager HSEQ</td>
</tr>
<tr>
<td>MMS Japan</td>
<td>T. Ajay</td>
<td>Managing Director</td>
</tr>
</tbody>
</table>
Requirements for Shipping KPIs

- **KPI accepted as part of the Shipping KPI performance hierarchy must be:**
  - **Observable and quantifiable**
    - Mathematical formula on basis of unambiguous, observable measurements
  - **Valid indicator of performance**
    - Express performance within an area which the Ship Manager needs to perform well as well as having complete control of the factors affecting the performance
  - **Robust against manipulation**
    - To a large extent related to unambiguous descriptions of the needed measurements
    - No room for “favourable interpretations”
  - **Sensitive to change**
    - Will actual changes in the Ship Manager’s performance be reflected well (by increase/decrease) in the KPI Value over time?
  - **Transparent and easy to understand**
    - Would all of the “users” of the KPI interpret the KPI in the same manner
    - If the KPI can be said to be context-dependent, a high KPI Rating for one Ship Manager is not necessarily a positive thing while for another Ship Manager a high KPI Rating on the same KPI is to be interpreted as very positive indeed

- **Compatible**
  - Is the KPI harmonized with the rest of the performance hierarchy?
  - The KPI must be compatible with other KPIs to prevent the decision-makers receiving contradictory control signals
The Shipping KPI Standard - Concept

- SPI
- Extended Balanced Score Card for internal improvement
- Aggregated indexes for external communication
- Corporate measurements

- KPI
- Financial
- Processes
- Customer
- Learning
- HSE
- Others

- PI
The Concept of the Shipping KPI Standard

**SPI** – mathematical definitions (linear calculation using weighted sum of KPI Ratings)

**KPI** – mathematical definitions based on the PI Values. Two concepts are defined

The **KPI Value** (natural number calculated directly from PI Values)

The **KPI Rating** bringing the KPI Value into a 0-100 range)

**PI** – textual definitions of measurements (**PI Values**) and guidelines for data collection
The Shipping KPI Standard - SPIs

- Environmental performance
- HR performance
- Safety performance
- Security performance
- Technical Performance
- Navigation Performance
- Operational Performance
# Shipping KPIs in the BSC Perspectives

## PROCESS *(internal)*
- Cargo damage ratio
- Condition of class
- Drydocking planning performance
- Environmental deficiencies
- Failure of critical equipment and systems
- Flawless port state control performance
- HR deficiencies
- Navigational deficiencies
- Navigational Incidents
- Operational cargo incidents
- Operational deficiencies
- Port state control deficiency ratio
- Port state control detention
- Safety deficiencies
- Security deficiencies

## CUSTOMER *(customer)*
- Budget performance
- Vessel availability

## HR *(innovation and learning)*
- Crew disciplinary frequency
- Crew planning
- Officers experience rate
- Officer retention rate
- Training days per officer
- Cadets per vessel

## HSE *(new)*
- Accidental releases of substances as def by MARPOL
- Ballast water discharge violations
- CO2 efficiency
- Contained spills
- Fire and Explosions
- Lost Time Injury Frequency
- Lost Time Sickness Frequency
- No of violations of MARPOL Annex 1-6
- NOX efficiency
- Passenger injury ratio
- SOX efficiency

*(text in italic refer to Kaplan Norton perspectives, HARVARD BUSINESS REVIEW Jan-Feb -92)*

For an updated list of KPIs please visit [www.shipping-kpi.com](http://www.shipping-kpi.com)
### The Shipping KPI Standard - PIs

<table>
<thead>
<tr>
<th>Actual drydocking costs</th>
<th>Number of collisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Actual drydocking duration</td>
<td>Number of conditions of class</td>
</tr>
<tr>
<td>Actual off-hire</td>
<td>Number of crew not relieved on time</td>
</tr>
<tr>
<td>Agreed drydocking costs</td>
<td>Number of damaged or lost cargo units during cargo operations</td>
</tr>
<tr>
<td>Agreed drydocking duration</td>
<td>Number of damaged or lost cargo units during voyage</td>
</tr>
<tr>
<td>Average number of officers employed</td>
<td>Number of dismissed crew</td>
</tr>
<tr>
<td>Emitted Mass of CO2</td>
<td>Number of environmental related deficiencies</td>
</tr>
<tr>
<td>Emitted Mass of NOx</td>
<td>Number of explosion incidents</td>
</tr>
<tr>
<td>Last year’s AAE (Additional Authorized Expense)</td>
<td>Number of failures of critical equipment and systems</td>
</tr>
<tr>
<td>Last year’s actual running costs and accruals</td>
<td>Number of fatalities due to injuries</td>
</tr>
<tr>
<td>Last year’s running cost budget</td>
<td>Number of fatalities due to sickness</td>
</tr>
<tr>
<td>Number of absconded crew</td>
<td>Number of fire incidents</td>
</tr>
<tr>
<td>Number of accidental releases of substances covered by MARPOL, to the environment</td>
<td>Number of groundings</td>
</tr>
<tr>
<td>Number of allisions</td>
<td>Number of HR related deficiencies</td>
</tr>
<tr>
<td>Number of ballast water discharge violations</td>
<td>Number of logged warnings</td>
</tr>
<tr>
<td>Number of beneficial officer terminations</td>
<td>Number of Lost Workday Cases</td>
</tr>
<tr>
<td>Number of cadets under training with the ship manager</td>
<td>Number of navigational related deficiencies</td>
</tr>
<tr>
<td>Number of cargo operations</td>
<td>Number of officers onboard</td>
</tr>
<tr>
<td>Number of cargo units transported</td>
<td>Number of officer months onboard</td>
</tr>
<tr>
<td>Number of cases where a crew member is sick for more than 24 hours</td>
<td>Number of officers onboard all vessel under technical management (DOC)</td>
</tr>
<tr>
<td>Number of charges of criminal offences</td>
<td>Number of officer terminations from whatever cause</td>
</tr>
<tr>
<td>Number of contained spills of bulk liquid</td>
<td>Number of officer trainee man days</td>
</tr>
<tr>
<td>Number of operational related deficiencies</td>
<td>Number of passengers injured</td>
</tr>
<tr>
<td>Number of passengers transported</td>
<td>Number of Permanent Partial Disabilities</td>
</tr>
<tr>
<td>Number of Permanent Total Disabilities</td>
<td>Number of PSC deficiencies</td>
</tr>
<tr>
<td>Number of PSC inspections</td>
<td>Number of PSC inspections resulting in zero deficiencies</td>
</tr>
<tr>
<td>Number of PSC inspections resulting in a detention</td>
<td>Number of recorded external inspections</td>
</tr>
<tr>
<td>Number of safety related deficiencies</td>
<td>Number of security related deficiencies</td>
</tr>
<tr>
<td>Number of severe spills of bulk liquid</td>
<td>Number of cases where drugs or alcohol is abused</td>
</tr>
<tr>
<td>Number of cases where drugs or alcohol is abused</td>
<td>Number of unavoidable officer terminations</td>
</tr>
<tr>
<td>Number of vessels under technical management (DOC)</td>
<td>Number of violations of MARPOL Annex 1-6</td>
</tr>
<tr>
<td>Number of violations of MARPOL Annex 1-6</td>
<td>Number of violations of rest hours</td>
</tr>
<tr>
<td>Planned unavailability</td>
<td>Total Exposure Hours</td>
</tr>
<tr>
<td>Total Exposure Hours</td>
<td>Transport Work</td>
</tr>
</tbody>
</table>

For an updated list of PIs please visit [www.shipping-kpi.com](http://www.shipping-kpi.com)
Application of theory to develop the Shipping KPI Model

Applying theory

+ Industry KPIs + KPI Definitions

Validating and balancing the indicators

Identifying Stakeholder needs

Creating an aggregation hierarchy

Creating the mathematical model

Publishing the Shipping KPI Standard

Own development
**KPI: Cargo damage ratio**

**DESCRIPTION:**
The KPI expresses the ship manager’s ability to run a reliable operation in regards to delivering the cargo undamaged at the port of discharge.

**RATIONAL FOR THE KPI:**
One of the main objectives for any ship manager is to ensure that the vessel arrives at the port of discharge with the cargo in the same shape as when loaded at the port of loading. The issue of timeliness is more under the responsibility of the commercial operator and no such KPI therefore exists in the Shipping KPI performance hierarchy.

**EXTERNAL REFERENCE:**
No external reference is made in this KPI.

**DEFINITION:**
This KPI represents a ratio between the total quantity of damaged or lost cargo (during the actual sea voyage) relative to the total quantity of cargo transported. By defining the KPI as a ratio, benchmarking is feasible even between different vessel sizes.

**BACKGROUND:**
Due to the different nature of different vessel types, this KPI is not suitable for comparison across vessel types. A contaminated tank on a VLCC will result in a much bigger contaminated cargo volume as opposed to a damaged single container on a container carrier. Even though both incidents are single incidents, the VLCC’s performance will come off much worse on this KPI than the container carrier.

During the definition phase of this KPI we contemplated about only counting the number of incidents instead of registering the actual volume/quantity of damaged cargo but it was decided that we would lose valuable information if only the number of incidents were counted.

For updated version refer to [www.shipping-kpi.com](http://www.shipping-kpi.com)
# KPI: Cargo damage ratio

**MEASUREMENT PERIOD:**
Expressed on a quarterly basis (2009/Q1 = 2009.01.01 - 2009.03.31).
Expressed per vessel for internal improvement and benchmarking as well as external communication.

**PIs USED FOR CALCULATION:**
- Total number of damaged or lost cargo units during voyage
- Total number of cargo units transported

**KPI Value Formula:**
\[
\text{Total number of damaged or lost cargo units during voyage} \div \text{Total number of cargo units transported}
\]

**KPI Rating Formula:**
\[
KPI_{Rating} = 50 \times \left(1 - \frac{KPI_{Value} - KPI_{Average}}{2\sigma}\right)
\]

- **KPIaverage** is the average KPI value of the vessels in the data base
- **σ** is the standard deviation for the KPI value of the vessels in the database

For updated version refer to [www.shipping-kpi.com](http://www.shipping-kpi.com)
The history of the KPI Rating (0-100)

- **The linear z-scaling**
  \[
  KPI_{Rating} = 100 \times (1 - Z \times KPI_{Value})
  \]
  Insensitive and sensitive to ships particulars

- **The statistical approach**
  \[
  KPI_{Rating} = 50 \times (1 - \frac{KPI_{Value} - KPI_{Average}}{2\sigma})
  \]
  Distributions not normal distributed, sensitive to ships particulars

- **An hybrid approach**
  \[
  KPI_{Rating} = 100 \times \left(\frac{KPI_{Value} - KPI_{MinRequirement}}{KPI_{Target} - KPI_{MinRequirement}}\right)
  \]
  Requires Target and MinReq set per ship cluster
Validation of standard (number of vessels)
Validation of standard (type of vessels)

Shipping KPI
Reported Vessels per type

- Container Carrier: 43
- Oil/Chemical: 31
- Gas carrier: 23
- Oil tanker: 19
- LPG: 17
- Bulk carrier: 14
- LG Tanker: 10
- Chemical: 8
- LNG: 4
- Vehicle carrier: 4
- Product Tanker: 2
- Bulk/CC: 2
- Asphalt Tanker: 1
A benchmarking prototype application is developed.
A conceptual model for the Shipping KPI System Interfaces

- **Corporate SW (3rd party)**
  - Corporate end-user
  - XML PI report
  - XML Benchmark report

- **Web client**
  - Corporate end-user

- **Shipping KPI Database System**
  - XML PI report
  - “www.shipping-db.org??”

- **Shipping KPI Depository**
  - Web client
  - Corporate end-user
  - General end-user

- **www.shipping-kpi.com**

- **www.shipping-db.org??**
Utilisation of the Shipping KPI Standard

- A voluntary industry initiative
- Proactive relative to regulators
- Meeting future transparency requirements
- Used in relation to TMSA - evidence tracking
- Informing the public opinion
- Provide consistent external performance communication
- Indicating policy and regulatory implementation effects
- Internal improvement
- Fleet/industry benchmarking
- Performance based contracting
Thank you for your attention!