ISO TC8 SC2 NWIP
Measurement of Hull & Propeller Performance

Presentation to stakeholders at London Workshop
London, 09.05.2013

Objectives & outline.

Present the NWIP, answer any questions
and secure input from participants.

1. Brief outline of the ISO NWIP: proposed objective, scope and approach.
2. Is achieving a standard realistic?
3. Questions, comments & suggestions.

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Proposed objective.

- The objective for the proposed work on this standard:
  - *To make commonly accepted methods for measuring ship specific hull and propeller performance available to the industry for use on a voluntary basis.*
  - *The underlying effect target is to contribute towards a reduction in world fleet energy cost and carbon emissions – as much as possible and as soon as possible.*

- The objective <u>IS NOT</u> to create methods that can be used for regulatory purposes – simply because developing such methods would be far too difficult and take far too long.
  - *Methods would need to be generally applicable to all ships.*

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General applicability vs. time to availability and vs. purposes covered.

- Need to balance general applicability vs. time to availability.
  - Problem: More generally applicable → greater complexity → longer time to availability.
  - Response: First develop a standard that is applicable for the most common ship designs and trades and later to expand the standard to include also less common designs and trades.

- Need to balance measurement purposes covered vs. investment need.
  - Problem: More purposes covered → additional requirements → greater investments needed.
  - The standard will be divided into parts (and potentially for each part; two or more tiers) that each deliver on a specific set of purposes.

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Proposed scope.

Part 1: General principles for measurement of hull and propeller performance.

Part 2: Measurement of hull and propeller performance with the purpose of enabling performance based contracts and inter-company documentation / benchmarking.

Part 3: Measurement of hull and propeller performance with the purpose of enabling a company internal learning curve (and if possible day-to-day decision support on hull and propeller maintenance).

In order to save time and enable synergies, work on the 3 parts is planned to take place in parallel and within the same working group.

This will also contribute towards the 3 parts being fully aligned upon completion.

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Proposed approach to standardizing methodology.

For each part:

1. Detailed definition of measurement purpose(s)
2. Development of resulting requirements, including accuracy requirements
3. Assessment of different approaches to manage measurement noise and collection of data given the requirements
4. Design of methodology
5. Assessment (limitation) of applicability

Stakeholder interests

- The directly affected stakeholders are:
  - Ship owners/operators and their customers.
  - Suppliers of various solutions with the potential to improve hull and propeller (“eco-technology suppliers”)
  - Ship performance monitoring solution providers.

- The standard is expected to enable all stakeholders to work more closely together towards improving hull and propeller performance.
  - Offering mutual economic benefits as well as considerable benefits to the global environment.

Waiting to be regulated?

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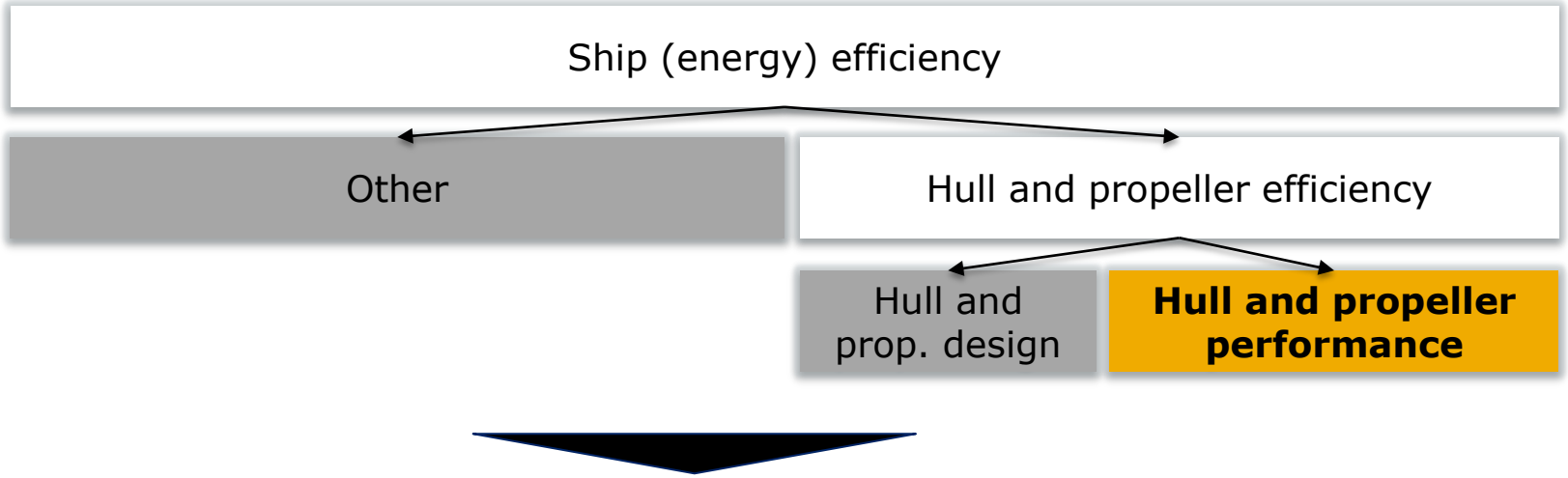
The object of measurement - what are we seeking to measure?



How much more (or less) energy is required to achieve a given speed attributable to changes to the condition of the hull and propeller over time?

- given unchanged hull and propeller design

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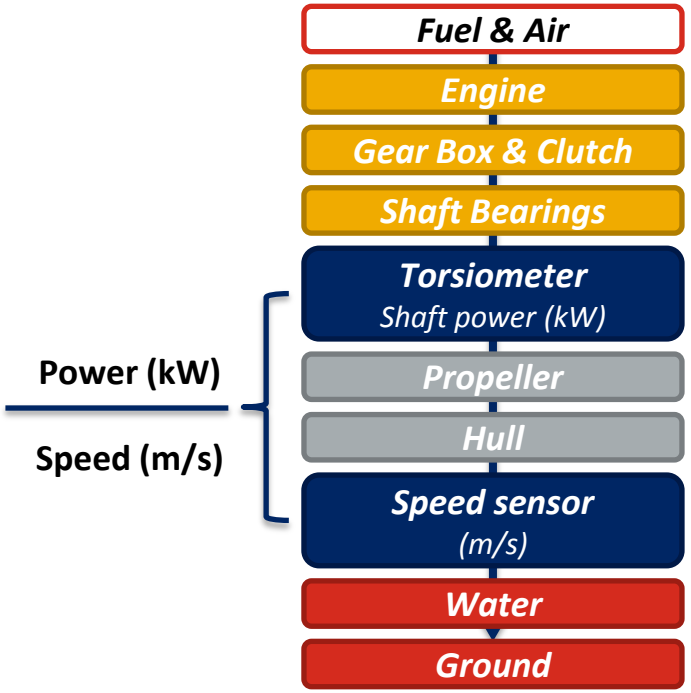
First and obvious step is to isolate the object of measurement by choosing the best available measurement points.

- The ideal way to isolate hull & propeller performance is by tracking changes in the relationship between shaft power and speed through water over time.
  - Also possible to get a good, but less reliable, indication by using alternative measurement points (e.g. fuel and speed over ground).

- Measuring also thrust (shaft compression) would enable accurately separating hull from propeller, but sensor technology is not yet mature enough.
  - Possible to get an indication of propeller performance by looking at relation between RPM and Shaft Power, but hull performance also affects propeller performance.

Vessel engine train and best available measurement points for Hull & Propeller Performance.



Still have to find a way to deal with sensor, environmental and human noise (scatter).

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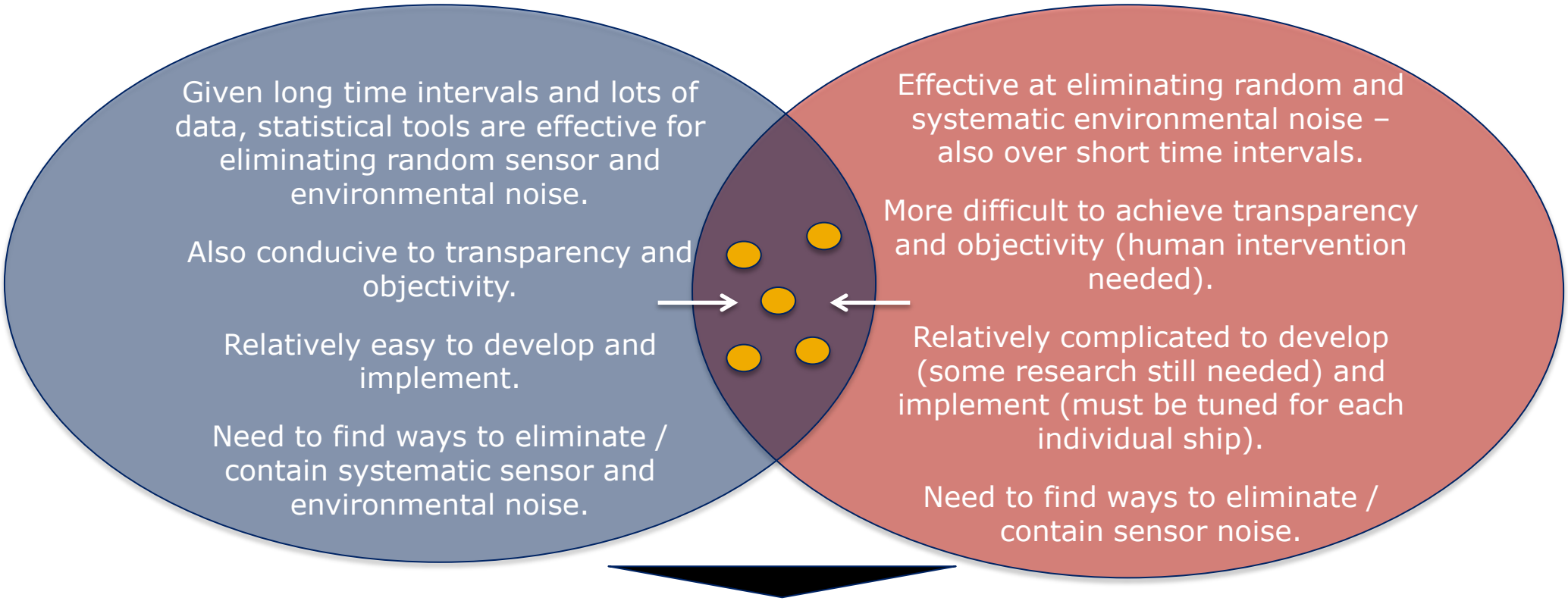
2 main schools on how to eliminate sensor and environmental noise – using statistical tools or normalization – that are increasingly converging.



Using a blend, possible to eliminate environmental noise and random sensor noise.

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Also systematic sensor noise and human noise can be contained – it is just a question of cost / effort.

- Systematic sensor noise (e.g. drifting or malfunction).
  - Can be reduced trough investing in better quality sensors and maintenance procedures.
  - Can further be contained through tracking correlations between different sensors over time.

- Human noise (e.g. human error or fraud).
  - Can be reduced trough investing in better reporting procedures and tracking correlations in the data.
  - Can be fully contained by implementing automated data logging and data transfer.

The question is what level of investment
and effort is justified.

The right measurement points, the optimal blend of statistics and normalization and what level of investment is justified, depends on purpose.

	E.g. performance based contracting on long term hull and propeller performance.		E.g. company internal day-to-day decision support on hull and propeller maintenance.
REQUIRE-MENTS.	Must be very accurate and reliable (over long time periods) and fully transparent.		Must be fairly accurate in real-time, while reliability and transparency is not an absolute requirement.
POSSIBLE SET-UP	Tracking changes in the relationship between shaft power and speed through water over time, to the extent possible relying on statistical tools to eliminate sensor and environmental noise (using transparent normalization procedures and tracking of correlations to contain the rest), based on automatically logged and transferred data.	vs.	Tracking changes in the relationship between shaft power and speed through water over time, relying on advanced normalization procedures to eliminate environmental noise and relying on statistics to contain as much sensor noise as possible, if necessary based on manually logged and transferred data.

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Summary.

- Measuring hull and propeller performance involves selecting the right measurement points, finding the optimal blend of statistics and normalization and deciding on investment level in sensors, procedures and automation.

- The right measurement points, the optimal blend of statistics and normalization and what level of investment is justified, depends on the purpose to which the measurements are to be used.

- The starting point for work on a standard must be clarity of purpose – once the purpose is clear we are convinced an ISO standard is realistic to achieve.

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