Appendix 1

Structure of the 25th ITTC

Technical Committees and Group

1. STRUCTURE OF THE TECHNICAL COMMITTEES

The structure of the Technical Committees remains in principle unchanged from the 24th ITTC. Thus there are 5 General Committees, 8 Specialist Committees and 1 Group.

2. TERMS OF REFERENCE FOR THE GENERAL AND SPECIALIST TECHNICAL COMMITTEES AND GROUPS

2.1 General Committees

Each General Committee will be responsible for a general subject area. It will review the state-of-the-art, identify the need for research and development, and carry out longer term studies with broad impact.

An important part of the work of the General Committees will be to establish Procedures and Guidelines to help the ITTC Member Organizations maintain their institutional credibility with regard to quality assurance of products and services such as predictions, evaluation and project assurance of designs. The Committee will develop detailed plans in accordance with Conference Recommendations and its work should be directed towards the techniques and understanding of physical and numerical modelling as a means of predicting full-scale behaviour. While maintaining an awareness of progress, fundamental theoretical studies and fundamental aspects of numerical fluid computation should be covered by other forum.

Each General Committee will submit a report on the results of its work to the Full Conference. The conclusions and the recommendations of the General Committee should be structured as follows:

1. General technical conclusions.
2. Recommendations to the Conference, which require Conference actions such as adopting ITTC Procedures.
3. Proposals for future work of the General Technical Committee and identification of tasks, which may be appropriate for Specialist Committees. These proposals shall be submitted to the Advisory Council. The Council will compile these proposals and present them to the Full Conference.

2.2 Specialist Committees

The ITTC Advisory Council will propose Specialist Committees. Each Specialist Committee will be responsible for studying a specific technical problem. The Specialist Committees will be appointed for a limited duration. It is expected that they will complete their tasks within maximum two ITTC periods

(6 years). They shall interact closely with the appropriate General Committees. The tasks of a Specialist Committee can include to establish and/or review Procedures and Guidelines.

Each Specialist Committee will present a final report on the results of its work to the Full Conference and interim reports on progress if the duration of the Committee spans more than one Conference. The conclusions and the recommendations of the Specialist Committee should be structured as follows:

1. General technical conclusions
2. Recommendations to the Conference, which require Conference actions such as adopting ITTC Procedures.
3. Proposals for future work and identification of tasks, which may be appropriate for Specialist Committees. These proposals shall be submitted to the Advisory Council. The Council will compile these proposals and present them to the Full Conference.

2.3 Groups

Groups may be established from time to time by the Executive Committee to carry out specific tasks for the Conference, which are not technical issues. Membership of a Group should not exceed three consecutive terms of three years, but the Executive Committee may make exceptions. Also normally Groups shall have fewer members than the Technical Committees. Such Groups shall be disestablished upon completion of their respective task objectives.

3. MECHANISM FOR IDENTIFYING NEW SPECIALIST TECHNICAL COMMITTEES

As part of their Terms of Reference, the General Committees shall consider the need for new tasks and include appropriate proposals in their technical reports. If the Advisory Council identifies a need for a new Specialist Committee when it reviews the draft recommendations of the General Committees, the Council will prepare and agree a statement of the technical aims and objectives for the work of the Specialist Committee.

Independently of the proposals of the General Committees, the Advisory Council will keep under continuous review the requirement for Specialist Committees.

When the Advisory Council has agreed the need for a new Specialist Committee, the draft statement of technical aims and objectives will be presented to the Executive Committee for endorsement. If the Executive Committee approves the formation of a new Specialist Committee, it will present the proposal to the Full Conference for approval.

4. PROPOSED STRUCTURE OF THE TECHNICAL COMMITTEES AND GROUP FOR THE 25th ITTC

4.1 Technical Committees for the 25th ITTC

General Committees.

- Resistance,
- Propulsion,
- Manoeuvring,
- Seakeeping,
- Ocean Engineering.

Specialist Committees.

- Azimuthing Podded Propulsion,
- Cavitation,
- Ice,
- Powering Performance Prediction,
- Stability in Waves,
- Uncertainty Analysis,
- Vortex Induced Vibrations,
- Wake-Fields.

4.2 Group

- Quality Systems Group.

5. TASKS OF THE TECHNICAL COMMITTEES AND GROUP OF THE 25th ITTC

5.1 General Terms of Reference

All Committees shall observe the terms of reference and general obligations.

All Committees shall identify areas of mutual interest for the Committees and the concerned Committees shall establish active co-operation in these areas.

In their work on Procedures the Committees should co-operate with the Quality Systems Group.

Procedures must be in the format defined in the Manual of ITTC Recommended Procedures and they will be included in the ITTC Quality Manual published by the Quality Systems Group. Symbols and terminology should agree with those used in the current version of the ITTC SaT List (Symbols and Terminology List). If necessary new symbols should be proposed in collaboration with the Quality Systems Group.

The Committees' Reports to the Conference should be structured in line with the terms of reference of the Committee.

5.2 Terms of Reference for the General Committees

Resistance Committee.

1. Update the state-of-the-art for predicting the resistance of different ship concepts, hull design methods and hull optimisation emphasising developments since the 2005 ITTC Conference,

a) Comment on the potential impact of new developments on the ITTC.
b) Emphasise new experimental techniques and extrapolation methods and the practical applications of computational methods to resistance prediction and scaling.
c) Identify the need for R&D for improving methods of model experiments, numerical modelling and full-scale measurements.

2. Review ITTC Recommended Procedures 7.5-01-01-01 and 7.5-02-02-01 to 7.5-02-02-06,

a) Determine if any changes are needed in the light of current practice.
b) Identify the requirements for new procedures.
c) Support the Specialist Committee on Uncertainty Analysis in reviewing the procedures handling uncertainty analysis.

3. Critically review examples of validation of prediction techniques. Identify and specify requirements for new benchmark data.

4. Complete the ITTC worldwide comparative tests for establishing benchmark data to identify the facilities biases.

5. Identify developments in computational and experimental methods for prediction of far field waves and wash.

6. Review experimental and computational methods to describe the airflow around the superstructure of vessels.

Propulsion Committee.

1. Update the state-of-the-art for propulsion systems emphasising developments since the 2005 ITTC Conference,

a) Comment on the potential impact of new developments on the ITTC.
b) Emphasize new experimental techniques and extrapolation methods and the practical application of computational methods to performance prediction and scaling.

c) Identify the need for R&D for improving methods of model experiments, numerical modelling and full-scale measurements.

2. Review ITTC recommended procedures 7.5-01-02-01 (harmonize with ISO Standard), 7.5-02-03-01.1, 7.5-02-03-02.1, 7.5-02-03-02.3, 7.5-02-05-02,
a) Determine if any changes are needed in the light of current practice.
b) In the review and update of the existing propeller open water test procedure 7.5-02-03-02.1 its applicability to new types of propulsors should be taken into account.
c) Identify the requirements for new Procedures.
d) Support the Specialist Committee on Uncertainty Analysis in reviewing the Procedures handling uncertainty analysis.

3. Critically review examples of validation of prediction techniques. Identify and specify requirements for new benchmark data.

4. Review the development and progress in unconventional propulsors such as tip-rake, trans-cavitating and composite propellers (hydro-elasticity and cavitation erosion susceptibility taken into account).

5. Review propulsion issues in shallow water and formulate recommendations for research.

6. Review the methods for predicting the performance of secondary thrusters and compare with operational experience.

7. Finalise the benchmark tests for waterjets and analysis of the data.

Manoeuvring Committee.

1. Update the state-of-the-art for predicting the manoeuvring behaviour of ships, including high speed and unconventional vessels, emphasizing developments since the 2005 ITTC Conference,
a) Comment on the potential impact of new developments on the ITTC.
b) Emphasize new experimental techniques and extrapolation methods and the practical application of computational methods to manoeuvring prediction and scaling.
c) Identify the need for R&D for improving methods of model experiments, numerical modelling and full-scale measurements.

2. Review ITTC recommended procedures 7.5-02-06-01, 7.5-02-06-02, 7.5-02-06-03 and 7.5-02-05-05,
a) Determine if any changes are needed in the light of current practice.
b) Identify the requirements for new procedures.
c) Support the Specialist Committee on Uncertainty Analysis in reviewing the procedures handling uncertainty analysis.

3. Rewrite the sea trials procedure for manoeuvring 7.5-04-02-01 to make it more self-consistent,
a) Give attention to: IMO requirements, new elements such as high-speed craft, podded propulsors (liaise with the Specialist Committee on Azimuthing Podded Propulsors) and new technologies such as improvements to GPS.
b) Include the limiting environmental conditions for sea trials, and how to correct for non-optimum environmental conditions.

4. Critically review examples of validation of manoeuvring prediction techniques. Identify and specify requirements for new benchmark data.

5. Help to organise the workshop on verification and validation of ship manoeuvring simulation methods. Assist the workshop organisers in the collection of data for validation of ship manoeuvring simulation methods and make this available to ITTC Members.

6. Monitor developments in manoeuvring criteria at IMO and clarify their implications on ITTC.

7. Give support to the Specialist Committee on Azimuthing Podded Propulsion on reviewing methods for the prediction of manoeuvring of ships with podded propulsion and in investigating manoeuvring criteria for them.

8. Continue to review the state of the art for prediction methods and possible criteria for slow speed manoeuvring in shallow and confined water.

Seakeeping Committee. *Note:* The Seakeeping Committee is primarily concerned with the behaviour of ships underway in waves. The Ocean Engineering Committee covers moored and dynamically positioned ships and the modelling and simulation of waves, wind and current.

1. Update the state-of-the-art for predicting the behaviour of ships in waves including high speed and unconventional vessels, emphasizing developments since the 2005 ITTC Conference,

a) Comment on the potential impact of new developments on the ITTC.

b) Emphasize new experimental techniques and extrapolation methods and the practical applications of computational methods to seakeeping prediction and scaling.

c) Identify the need for R&D for improving methods of model experiments, numerical modelling and full-scale measurements.

2. Update the Procedure for experiments on rarely occurring events, 7.5-02-07-02.3, with separate sections for: water on deck, slamming, propeller emergence and aft body slamming. Liaise with the Ocean Engineering Committee.

3. Update the procedure 7.5-02-07-02.1 for model tests on linear and weakly non-linear seakeeping phenomena. Include information on how long the runs in irregular waves should be, compared to the way (repeat time, method, etc) the irregular waves are generated. Liaise with the Ocean Engineering Committee.

4. Rewrite the procedure 7.5-02-07-02.2 for added resistance and power increase in irregular waves. Liaise with the Powering Performance Committee.

5. Update the procedure 7.5-02-07-02.4 for the validation of codes in the frequency domain so that it is independent of the method used. The information dealing with the pitfalls of making the code should be put in an appendix, concentrating on the main parameters important for validation, with acceptance criteria if possible. Ensure that the procedure is consistent with the one being developed by the Ocean Engineering Committee. The work should be carried out in cooperation with the Ocean Engineering Committee, and should essentially be based upon the review and update of earlier work by the 24th ITTC Seakeeping and Ocean Engineering Committees.

6. Develop a procedure for the validation of codes in the time domain so that it is independent of the method used, and the part dealing with the pitfalls of making the code should be put in an appendix. The procedure should concentrate on the main parameters important for validation, with acceptance criteria if possible. Ensure that the procedure is consistent with the one being developed by the Ocean Engineering Committee.

7. Support the Specialist Committee on Uncertainty Analysis in reviewing the procedures handling uncertainty analysis.

8. Critically review examples of validation of prediction techniques. Identify and specify requirements for new benchmark data.

9. Determine requirements for benchmark tests for seakeeping in oblique waves such that these benchmark tests could be conducted in the future. Investigate whether any non-proprietary data exists, and can be made available for seakeeping of high-speed craft in oblique seas, that can be used for benchmarking in the future.

Ocean Engineering Committee. *Note:* The Ocean Engineering Committee covers moored and dynamically positioned ships and the modelling and simulation of waves, wind and current.

1. Update the state-of-the-art for predicting the behaviour of bottom founded or stationary floating structures including moored and dynamically positioned ships, in emphasizing developments since the 2005 ITTC Conference,

a) Comment on the potential impact of new developments on the ITTC.
b) Emphasize new experimental techniques and extrapolation methods and the practical applications of computational methods to prediction and scaling.
c) Identify the need for R&D for improving methods of model experiments, numerical modelling and full-scale measurements.

2. Review ITTC Recommended Procedures 7.5-02-07-01.1, 7.5-02-07-03.1, 7.5-02-07-03.2, 7.5-02-07-03.4 and 7.5-02-07-03.45,

a) Determine if any changes are needed in the light of current practice.
b) Identify the requirements for new procedures.
c) Support the Specialist Committee on Uncertainty Analysis in reviewing the procedures handling uncertainty analysis.

3. Critically review examples of validation of prediction techniques and,

a) Identify and specify requirements for new benchmark data.
b) Outline a benchmark study using a simple geometric form for the application of unsteady RANS codes to wave load problems. The study should include validation against experimental data.

4. Develop a new procedure for the validation of frequency-domain codes predicting wave loads and responses of offshore structures. The work should be carried out in co-operation with the Seakeeping Committee, and should be based upon the review and update the work done by the 24th ITTC Ocean Engineering and Seakeeping Committees.

5. Develop a new procedure for the validation of time-domain codes predicting wave loads and responses of offshore structures. The work should be carried out in co-operation with the Seakeeping Committee.

6. Review scaling issues associated with multiple-scale model tests in which some components become extremely small if proper geometric scaling is used.

7. Carry out a review of wind modelling in model basins, including the physical modelling, simplified mathematical models and flow code analysis. The review should include scaling problems; inhomogeneous wind fields, turbulence, coherence, wind spectra, wind-induced motion damping, and waves / wind interaction.

5.3 Terms of Reference for Specialist Committees for the period 2005-2008

Specialist Committee on Azimuthing Podded Propulsion.

1. Review and update Procedure 7.5-02-03-01.3 “Propulsion, Performance-Podded Propulsor Tests and Extrapolation”. Give special emphasis on how to scale housing drag and to the validation of full-scale propulsion prediction.

2. Continue the review of hydrodynamics of POD propulsion for special applications

including fast ships, ice going ships (Liaise with the Ice Committee) and special POD arrangements like Contra-rotating Propellers (CRP) and hybrids. Include the practical application of computational methods to prediction and scaling.

3. Review and analyse the cavitation behaviour of podded propulsors. Emphasize high pod angles and normal steering angles including dynamic behaviour. Include the practical application of computational methods to prediction and scaling.

4. Review methods for the prediction of manoeuvring of ships with podded propulsion (including scale effects) and investigate the application of manoeuvring criteria for them. Liaise with the Manoeuvring Committee.

Specialist Committee on Cavitation.

1. Review the application of computational methods and new experimental methods to the prediction of cavitation including cavitation dynamics and its influence on pressure fluctuations.

2. Review advances in multi-phase flow modelling of cavitation and its potential to predict inception, erosion and induced pressure fluctuations.

3. Review methods and develop guidelines for the prediction of cavitation and erosion damage for unconventional rudders or rudders behind highly loaded propellers.

4. Review methods of modelling the cavitation behaviour of waterjets (inlet and pumps) including scale effects. Develop guidelines or procedure. Liaise with the Propulsion Committee.

Specialist Committee on Ice.

1. Develop a procedure for testing of podded propellers in ice. This should be based on the experiments on propeller-ice interaction carried out by the 24th ITTC Ice Committee. The Committee should work in conjunction with the Specialist Committee on Azimuthing Podded Propulsion.

2. Review existing testing procedures used to determine loads and responses of off-shore structures in ice with the objective of developing a Guideline.

3. Develop a procedure for ship tank testing in brash ice. Attention should be paid to the mode where the stern of a ship fitted with podded propellers is used for breaking brash ice.

Specialist Committee on Powering Performance Prediction.

1. Review and update the Speed/Power Prediction procedure (7.5-02-03-01.4),

a) Make use of the dataset of over 120 ships, which has been collected.

b) Complete the outstanding set of resistance, open water and load varying self propulsion tests initiated by the 24th ITTC.

2. Make the Speed/Power Prediction (7.5-02-03-01.4) and the Predicting Powering Margins (7.5-02-03-01.4) procedures consistent with the Analysis of Speed/Power Trial Data (7.5-04-01-01.2).

3. Review and update the procedures for predicting the resistance and propulsion of high speed marine vehicles, including multihull vessels (7.5-02-05-01 / 02) to assess power requirements, taking into account drag reduction, hull appendage interactions, hull/propulsor interaction and hydrodynamic loads in waves.

Specialist Committee on Stability in Waves.

1. Develop a procedure for tank testing to predict the onset and extent of parametric rolling.

2. Further develop the procedure 7.5-02-07-02.5 for intact stability testing, to include extreme motions such as broaching and

deck diving, in irregular waves, wind and breaking waves. Liaise with the Ocean Engineering Committee.

3. Identify experimental techniques and data for validation of time domain capsize codes, emphasising the selection of the important parameters that influence the capsizing behaviour of intact and damaged ships. Liaise with the Ocean Engineering and Seekeeping Committees.

4. Assess the state of the art for,

a) Practical application of numerical methods for the prediction of capsizing and experiments for assessment of safety/risk against capsize.

b) Make recommendations as to what scientific progress is required to move stability regulations from those based on hydrostatic calculations to those based on dynamic predictions, either using capsize codes or physical model experiments.

5. Establish the importance of the following issues in predicting the dynamic behaviour of damaged vessels, including sinking and capsizing, coupling between floodwater dynamics and ship dynamics, influence of flow coefficients for openings and flooding of complex spaces (multiple compartments, stair wells, failing watertight doors).

6. Review numerical methods for assessing the length of time to sink or capsize for damaged passenger ships and associated validation techniques.

7. Continue to review developments, relevant to ITTC, in stability safety assessment, with special attention on performance and risk-based approach and relevant developments at IMO.

Specialist Committee on Uncertainty Analysis.

1. Develop procedures for uncertainty analysis methodologies for experiments of captive model tests, free running model tests, LDV/PIV flow measurements and full scale measurements, taking into account the usual bias errors and precision errors, fairing, and human factors such as comparing coefficients. The Committee shall endeavour to find as generally applicable methodologies as possible without losing essential factors influencing the different hydrodynamic test procedures.

2. Review and revise the Uncertainty Analysis procedures 7.5-02-01-01; 7.5-02-01-02; 7.5-02-03-01.2; 7.5-02-03-02.2; 7.5-02-07-03.2 and also take into account fairing, and human factors such as comparing coefficients.

Specialist Committee on Vortex Induced Vibrations.

1. Conduct an in-depth review of Vortex Induced Vibration (VIV) and Vortex Induced Motion (VIM), including experimental and numerical modelling. Identify and report on technology gaps and make recommendations for future work.

2. Conduct an assessment of different prediction methods, and make recommendations on their application and limitations.

3. Define and initiate a specific benchmark case study to be used to compare different experimental techniques. This could be based upon existing or new experiments.

Committee on Wake-Fields.

1. Conduct a survey of numerical methods for prediction of wake-fields at model and full-scale.

2. Review the experimental methods of determining the velocity distribution in the wake.

3. Develop procedures for measuring the velocity distribution in the wake at model and full-scale.

4. Review and update the existing guidelines for the simulation of the wake-field for cavitation testing.

5.4 Group

Quality Systems Group.

1. Revise and update the ITTC Recommended Procedures. Modify and re-edit the existing procedures according to the comments of the Conference and the Technical Committees.

2. Update the ITTC Symbols and Terminology List.

3. Cross - check the ITTC Symbols List and the Dictionary with other standards e.g. ISO Standards.

4. Stimulate, monitor and support validation work within the Technical Committees.