Energy Efficient Safe SHip OPERAtion

Manoeuvrability Criteria

WP1 – Task 1.3. EEDI and safety criteria
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Work contents:

- Critical analysis of the existing regulatory framework to identify safety issues:
  - EEDI documents regarding minimum propulsion power
  - Submissions to IMO
- Operational experience from ship operators and other project partners

Results:

- Safety criteria for manoeuvrability in adverse conditions
- Safety criteria for intact stability (capsize, excessive roll, excessive lateral accelerations, water on deck etc.)
- Preliminary suggestions for the limits for these criteria
- Requirements to the enhancement and validation of the numerical tools
- Specification for the work to be carried out in the project to verify (and revise) the identified safety criteria and standards
### Task 1.3: EEDI and safety criteria

**Deliverables & Resources**

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<th>SHOPERA Break-Down</th>
<th>Year 1</th>
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<tr>
<td>WP1</td>
<td>Leader</td>
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<tr>
<td>Environmental conditions and requirements for different ships</td>
<td>DNV</td>
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<tr>
<td>1.1 Met-ocean description</td>
<td>DNV</td>
<td>D1.1</td>
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<td>1.2 Identification of ships and risk analysis of relevant marine accidents</td>
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<td>1.3 EEDI and safety criteria</td>
<td>GL</td>
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#### D 1.5. Report on EEDI and safety criteria (M9)

<table>
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<th>WP/Task No</th>
<th>NTUA</th>
<th>GL</th>
<th>DNV</th>
<th>LR</th>
<th>IST</th>
<th>UDE</th>
<th>RINA</th>
<th>DAN</th>
<th>CLST</th>
<th>FNK</th>
<th>CAL</th>
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**Task 1.3: EEDI and safety criteria**

**Running Action Plan**

- Analysis of the existing regulations & proposals to define
  - safety criteria & standards for manoeuvrability in adverse conditions (GL, DNV, RINA): M4 (end of January)
  - intact stability criteria & standards (GL, LR, IST): M4

- Analysis of operational experience from ship operators and other project partners
  - safety criteria & standards for manoeuvrability in adverse conditions (NTUA, DAN, CLST, FNK, CAL): M4
  - intact stability criteria & standards (DAN, CLST, FNK, CAL): M4

- Proposal for safety criteria & standards
  - First draft (GL -> to all partners for feedback): M6
  - Feedback from all partners (ALL): M7
  - Final proposal for safety criteria & standards (GL): M8

- Requirements to the enhancement and validation of the numerical tools:
  - Proposals (GL, NTUA, DNV, LR, IST, UDE, RINA): M6
  - First draft (GL): M7
  - Feedback (ALL): M8
  - Final (GL): M9

- Specification for the work to be carried out in the project to verify and (if necessary) revise the identified safety criteria and standards:
  - Preliminary for feedback (GL): M8
  - Final (GL): M9

- D 1.5. Report on EEDI and safety criteria (GL): M9
1. **Advance speed criterion** (from IACS studies): “The vessel should be able to keep a minimum advance speed of [4.0 knots] in waves and wind from any direction”

2. **Course-keeping criterion** (from IACS studies): “The vessel should demonstrate the ability to keep a prescribed course in waves and wind from any direction”

3. **[Turning] ability** (discussions during Kick-Off meeting):
   - Dynamic criterion, which should address **timing** of manoeuvres
   - Something like “The vessel should be able to perform [full turning] in wind and waves from any direction in [X minutes]”
   - Should be used at least to check whether criteria (1) & (2) are always sufficient
   - Doubts:
     - Full turning circle is rarely required in real life, especially in adverse conditions
     - Turning in adverse conditions does not look like a circle – how to evaluate?
     - Complexity
   - Alternative: Z-manoeuvre or X°- (e.g. 90°-) course changing (relevant for avoidance of grounding/collision, weather-vaning)

4. **Criteria for restricted water**: Course-keeping during overtaking or in strong wind:
   - Reduced speed from navigational reasons (frequent practical situation) => rudder becomes inefficient
   - External moment is imposed by overtaking ship or by strong wind (container ships)
   - Possible criterion: “The rudder should provide yaw moment defined as $f(L_{pp}, B_{wp}, A_{lw}, \ldots)$ at forward speed of [X knots] in calm water of depth [X m]”
   - Doubts: these criteria will not lead to the restriction of the minimum installed power, only to rudder efficiency requirements
Questionnaire

- Developed in a national research project (GL, UDE, TUB, ...)
- Distributed to several shipping companies
- Very insightful results for
  - Manoeuvrability criteria
  - Environmental conditions
  - Specific problems for specific ship types
- But: response rate is rather low => some efficient ways to get response are to be found
Way Ahead (2)

- Provide input to the running actions by end of January (GL, DNV, RINA, LR, IST, NTUA, DAN, CLST, FNK, CAL, DAN, CLST, FNK, CAL):
  - Analysis of the existing regulations & proposals to define
    - safety criteria & standards for manoeuvrability in adverse conditions (GL, DNV, RINA): M4 (end of January)
    - intact stability criteria & standards (GL, LR, IST): M4
  - Analysis of operational experience from ship operators and other project partners
    - safety criteria & standards for manoeuvrability in adverse conditions (NTUA, DAN, CLST, FNK, CAL): M4
    - intact stability criteria & standards (DAN, CLST, FNK, CAL): M4

- Next actions:
  - Proposal for safety criteria & standards: First draft (GL) -> all partners for feedback: M6
  - Requirements to the enhancement and validation of the numerical tools: Proposals (GL, NTUA, DNV, LR, IST, UDE, RINA): M6
  - Specification for the work to be carried out in the project to verify and (if necessary) revise the identified safety criteria and standards: Preliminary for feedback (GL): M8