

UNIVERSITY OF THE AEGEAN

Department of Shipping, Trade,Transport

Erasmus Group Assignment

Maritime Risk Management

A Loaded Oil Tanker at the Strait of Hormuz

Integrated Safety, Security, Environmental and Financial Risk

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Team: three Erasmus students | **Language of report and examination:** English | **Case date:** 13 October 2026, with a clearly stated later cut-off if the team updates the evidence.

1. Purpose and research question

Your task is to write a teaching case and teaching note that supports a real decision under uncertainty. A loaded crude-oil tanker is inside the Arabian/Persian Gulf and must decide whether and when to make an outbound passage through the Strait of Hormuz. The ship may be exposed to deliberate attack or interference, navigational accidents, injury to its crew, oil pollution, loss of cargo, and commercial disruption. The operator, registered owner, time charterer, cargo interests, crew, coastal communities, insurers and public authorities need not bear the same risks or prefer the same decision.

Central research question: Under which plausible circumstances does the voyage create a level of residual risk that the owner or charterer should not accept, and to what extent do applicable regulation, charterparty terms, insurance arrangements, and documented industry practice address the resulting safety, security, environmental and financial exposures?

This is a question to investigate, not a conclusion to assume. Define what you mean by *unacceptable*, *disproportionate* or *excessive* risk, whose perspective is used, and whether any threshold is legal, contractual, corporate, or proposed by your team. Show separately any risk borne by people or the environment rather than by the party receiving the commercial benefit.

The output should be suitable for development into a journal-style case study. Its original contribution should be an **integrated decision model and evidence-based gap analysis**, not a compilation of press reports.

2. Bounded case and available decisions

Construct one transparent, hypothetical vessel case. Specify and document the assumptions: tanker type and size, whether the cargo is persistent crude oil, cargo quantity and approximate value, registry and manager, approximate crew complement, loading location inside the Gulf, destination outside it, contractual position and insurance assumptions. Use a real ship only if you have verifiable, non-sensitive public information; do not imply that your hypothetical voyage describes the conduct of a named ship.

Model at least three **feasible** decisions at the same decision point, for example:

1. transit within a defined time window with a specified package of risk controls;
2. defer departure until defined conditions improve, with a trigger for re-evaluation;
3. a different timing/control package, or a verified and contractually feasible unloading, cargo transfer, or substitute loading option.

A ship already loaded **inside** the Gulf cannot bypass Hormuz simply by 'rerouting around Africa'. If you propose an alternative logistics chain, demonstrate its physical availability, cargo-handling capacity, legal permission, commercial terms and exposure to other risks. Do not turn an operational assumption into a fact.

3. Questions the paper must answer

Operations and human consequences. Who authorises and implements the voyage decision? What are the master's, manager's, owner's and charterer's roles? How do a security incident and the resulting fire, collision, grounding or hull breach form a causal chain to an oil spill? What are the emergency-response, reporting, crew welfare, safe-manning and pollution-control implications? Which precautions could reduce risk, and could any create a new navigational hazard?

Security and safety. Distinguish deliberate aggression from accidental harm. Include at least one direct-strike branch and one non-strike disruption branch (for example detention, interference or impaired navigation). Discuss why an adversarial threat may adapt to measures taken by the ship. Do not infer a probability of attack on a particular tanker directly from a count of reported incidents; assess the denominator, reporting quality, vessel selection, route, time and policy changes.

Regulation, contracts and insurance. Identify the scope and status of SOLAS/ISM, SOLAS/ISPS, MARPOL Annex I and the shipboard oil pollution emergency plan. Examine the 1992 CLC and, where applicable, the 1992 Fund for persistent-oil pollution, including war/hostilities exceptions and the geographical and factual conditions of application. Compare the applicable time-charter war-risk clause, if incorporated, with the actual parties' obligations; use CONWARTIME 2025 as a clearly labelled reference clause unless you establish different terms. Test Hull and Machinery, standard P&I, primary War P&I, additional war risks, cargo and loss-of-hire cover separately. An insurance certificate or clause should be interpreted according to its **actual wording, exclusions, limits and dates**, not treated as a guarantee of payment. Where terms are unavailable, record the gap in evidence.

Financial decision. Calculate, for each decision, the incremental costs of delay, hire/off-hire as applicable, fuel, security measures, crew costs, insurance premiums, possible loss of earnings, repair, cargo exposure, salvage and response. State **who initially pays**, **who may recover** and **who ultimately bears** each item. Avoid adding payments between owner and charterer to the total economic loss twice. Include a low-frequency/high-consequence case and compare private expected cost with crew/environmental consequences shown separately.

Gaps and judgement. Which risks are reduced by mandatory rules, voluntary practices and commercial contracts? Which losses may be transferred or insured? Where do exposure, incentives, information or compensation remain uncertain or potentially misaligned? Your conclusion may find a gap, a conditional gap or adequate coverage on the assumptions. Make the evidence and the uncertainty visible.

4. Minimum method and calculations

1. **Evidence register.** For each material factual assertion record source, publication date, incident date, retrieval date, geographic scope, vessel type and confidence. Freeze a version of the source list at the case cut-off.
2. **Risk register and causal diagram.** Identify at least eight distinct scenarios, including accidental collision/grounding, deliberate strike without spill, strike with conditional spill, injury/death, detention/delay, cargo loss and disruption of communications or navigation. Draw at least one event tree or decision tree that connects decisions, hazard, damage, pollution and consequences.
3. **Quantitative decision model.** State the time horizon and units. Use a small number of mutually exclusive terminal states and show the probabilities summing to one. For each decision `d`, calculate private expected net value or cost: $\mathbb{E}[C_{\text{private}} \mid d] = \sum_s P(s \mid d)\, C_{\text{private}}(s, d)$. Model the spill branch conditionally, for example $P(\text{spill}, \text{attack} \mid d) = P(\text{attack} \mid d)\, P(\text{spill} \mid \text{attack}, d)$. Do not add that spill branch to an 'attack total' if the latter already includes it.
4. **Risk beyond a single mean.** Show a plausible range for poorly observed security probabilities, at least one break-even value at which the preferred decision changes, and one tail-loss metric or credible worst-case range. Present crew fatalities/injuries and spill quantity or environmental harm as separate measures, not merely as dollar amounts.
5. **Cost and allocation ledger.** Provide one table per decision or one consolidated table separating total resource cost, owner cash flow, charterer cash flow, insurance recoveries, and third-party/uncompensated harm. Insurance reimbursements redistribute costs but do not eliminate the underlying loss.
6. **Gap matrix.** For each major risk pathway compare: (a) mandatory requirement and its precise scope, (b) voluntary guidance or observed practice, (c) charterparty allocation, (d) relevant insurance/compensation route, (e) the responsible decision maker, and (f) residual or undocumented exposure. Mark each as *addressed*, *conditional*, *unaddressed*, or *insufficient evidence*, and justify the classification.

A spreadsheet is sufficient for calculations. Supply formulas and an editable file. A compact decision tree and a single scenario table are preferable to a complex model built on invented precision. A short methodological explanation should show how the analysis adapts the risk and decision methods of Devanney, Kristiansen and the maritime FSA literature.

5. Required submission structure: Teaching Case and Teaching Note

The submission comprises two separate documents: (a) a student-facing **Teaching Case**, and (b) an instructor-facing **Teaching Note**. Both documents must be written in English.

Use numbered exhibits, consistent terminology, page numbers and a consistent author–date citation style. Clearly distinguish verified facts, anonymised information and hypothetical assumptions.

5.1 Teaching Case

Length: 3,000–4,500 words, excluding exhibits, source notes and references.

The case should place the reader in the position of a decision maker facing a consequential choice under uncertainty. It should provide enough evidence to support competing, reasoned recommendations.

1. **Title and opening dilemma.** Introduce the protagonist, the immediate decision, the deadline and the stakes.
2. **Company, vessel and commercial context.** Describe the tanker, cargo, crew, ownership and management arrangements, charterparty and intended voyage.
3. **Situation at the decision date.** Present the relevant security developments, operational constraints and information available at that time. Maintain a clear cut-off date and avoid hindsight.
4. **Stakeholders and competing interests.** Present the perspectives of the master, owner, charterer, crew, insurers and other relevant parties. Explain where their objectives or responsibilities differ.
5. **Feasible alternatives.** Describe at least three operationally and contractually feasible choices, including their timing and conditions. Explain the constraints facing a loaded tanker already inside the Gulf.
6. **Evidence for the decision.** Provide the operational, financial, contractual and insurance information needed to compare the alternatives. Place detailed data in the exhibits.
7. **Closing decision point.** Return to the protagonist and the decision deadline. End with a clear question requiring a recommendation, its justification and any conditions for implementation. Do not disclose the preferred solution in the case.

Expected case exhibits: (i) voyage map and decision timeline; (ii) vessel, cargo and contractual particulars; (iii) dated incident and threat evidence; (iv) relevant regulatory, charterparty and insurance provisions; (v) costs, potential consequences and parameter ranges needed for the analysis.

Exhibits should supply evidence rather than completed calculations or a predetermined conclusion.

5.2 Teaching Note

Length: 3,000–5,000 words, excluding references, worked calculations and supplementary appendices.

The teaching note should enable another instructor to use the case and assess the quality of students' recommendations.

1. **Case synopsis.** Summarise the situation, decision and central tensions.
2. **Target audience and learning objectives.** Identify the appropriate course level, prerequisite knowledge and the concepts students should learn.
3. **Preparation questions.** Provide four to six questions guiding students through risk identification, operational choices, financial exposure and regulatory or contractual responsibilities.
4. **Teaching plan.** Propose a 90-minute discussion plan, including the opening question, sequence of analysis and final synthesis.

5. **Risk and decision analysis.** Provide the risk register and a worked event or decision tree. Explain conditional probabilities, assumptions and the connection between security events, safety consequences and oil pollution.
6. **Financial analysis and allocation of losses.** Calculate the costs and consequences of each alternative. Distinguish owner and charterer cash flows, insurance recoveries and losses borne by third parties. Avoid double-counting transfers between stakeholders.
7. **Sensitivity and risk acceptance.** Identify thresholds at which the preferred choice changes. Discuss probability uncertainty, severe outcomes and alternative definitions of acceptable residual risk. Present crew and environmental consequences separately.
8. **Regulatory and business-practice gap analysis.** Compare applicable mandatory requirements, voluntary practices, charterparty allocation and insurance or compensation arrangements. Distinguish an established gap from conditional coverage or insufficient evidence.
9. **Alternative defensible recommendations.** Explain how different assumptions and stakeholder perspectives can support different decisions. Identify weak arguments, common calculation errors and the evidence needed to resolve disagreements.
10. **Limitations and further research.** Discuss data quality, case-specific assumptions, transferability and the work required before publication.
11. **References and appendices.** Include the source register, editable calculations, supporting evidence and team contribution statement.

Expected teaching-note exhibits: (i) worked security-to-spill event tree; (ii) decision and scenario payoff table; (iii) cost and loss-allocation ledger; (iv) sensitivity plot or threshold table; (v) regulation/contract/insurance gap matrix.

Each exhibit must be interpreted in the teaching note and connected to a preparation question or learning objective.

6. Sources and access

Use **at least 18 substantive sources**, including **at least 8 peer-reviewed articles or research books**, plus the primary regulatory, contractual, insurer and incident sources necessary for your claims. These are minimums for a serious literature search, not a target for citation padding. Record DOI or a stable URL and the exact edition of a book or clause.

Start with the HEAL-Link portal using University of the Aegean institutional access; use journal/ebook search, publisher platforms, the university library and open repositories. Off-campus access depends on the institution's supported IP/proxy or AAI route and on the title's licensed coverage. A useful search string is `("Strait of Hormuz" OR "Persian Gulf") AND (tanker OR oil spill) AND (security OR war risk OR insurance)`, followed by focused searches for `maritime risk analysis`, `Formal Safety Assessment`, `pollution compensation`, `war risk charterparty` and `risk transfer`. Record what you found, read the full texts available to you, and trace their references. Do not assume that every suggested book is licensed through HEAL-Link.

Research starting points (verify access and edition):

- Devanney, J. W. (1971), *Marine Decisions Under Uncertainty*, MIT Sea Grant Report MITSG 71-7, public NOAA copy.

- Kristiansen, S. (2005), *Maritime Transportation: Safety Management and Risk Analysis*. Elsevier.
- Kontovas, C. A., and Psaraftis, H. N. (2009), "Formal safety assessment: A critical review," *Marine Technology*, 46(1), 45–59.
- Psaraftis, H. N. (2012), "Formal Safety Assessment: An updated review," *Journal of Marine Science and Technology*, 17(3), 390–402, doi:10.1007/s00773-012-0175-0.
- Goerlandt, F., and Montewka, J., "A framework for risk analysis of maritime transportation systems: A case study for oil spill from tankers in a ship–ship collision," *Safety Science* (publisher record); inspect its scope before transferring its accident estimates to deliberate attacks.
- Keeney, R. L., and Raiffa, H. (1993), *Decisions with Multiple Objectives: Preferences and Value Trade-Offs*. Cambridge University Press (use if you develop an explicit multiobjective decision rule).

Primary sources to test, with precise applicability: IMO Hormuz information and incident list; UKMTO incident reporting; IMO ISM; IMO ISPS FAQ; IMO SOPEP; IMO Formal Safety Assessment; IOPC Funds 1992 CLC and claims guidance; BIMCO CONWARTIME 2025; and publicly available International Group P&I updates. Flag-state and insurer documents must be added for the particular hypothetical case.

In the source register distinguish **observed**, **unconfirmed**, **assumed** and **interpreted** claims. Use primary texts for rules, insurance terms and incidents.

7. Collaboration, checkpoints and examination

Assign initial leads: **Student A** - operations, safety/security pathways and evidence register; **Student B** - regulatory, charterparty and insurance analysis; **Student C** - financial model and uncertainty analysis. All three must jointly choose the case and decisions, check each other's assumptions, and co-write the discussion and conclusion. Include a one-page contribution statement with each person's substantive work and cross-checks.

Submit four checkpoints through eClass: **(1)** a one-page case definition and initial 10-source list; **(2)** a risk register, three feasible alternatives and draft event tree; **(3)** a working calculation file and first gap matrix; **(4)** the final case and teaching note, editable spreadsheet and an evidence/assumptions appendix. Deadlines will be posted separately.

The group will give a **20-minute presentation, including a brief trial of the case discussion**, followed by **10 minutes of individual questions per student** in English. During the trial, the group should facilitate a short discussion using the opening question and selected prompts from the teaching note, invite participants to compare the feasible decisions, and conclude with a brief synthesis linked to the learning objectives. Each student should be able to explain the complete model, defend the core assumptions, calculate one conditional probability or threshold, and interpret a legal/insurance caveat beyond their own lead section.

Assessment criteria: research framing and sources 10%; coherent risk model and uncertainty 25%; operations, law, contracts and insurance 20%; financial analysis and incidence of losses 20%; gap analysis and defensible conclusion 15%; individual oral examination 10%. The oral component allows individual assessment even though the report is jointly written.

8. Research integrity and publication path

Label simulated numbers as assumptions. Keep a dated archive of downloaded source metadata and calculations; do not upload licensed articles to a public repository. No confidential Ship Security Plan, live tactical route or sensitive crew information is needed. Cite figures and paraphrases and disclose any permitted use of generative tools under the course's academic-integrity rules. A claim of 'current business practice' must be supported by dated public documents, interviews conducted with permission, or explicitly described secondary evidence.

After the examination, a publishable article would require a tighter research question, independently checked data, verified legal/insurance terms, a stronger literature review and genuine revision by all authors. Any authorship or external submission would be discussed with the three students **after** assessment, according to actual scholarly contribution and consent; publication is an opportunity, not a condition of the grade.