



Introduction to the Coast Guard's Regulatory Approach to Novel Ship Designs/ Alternative Fuels

G-M Goal - “Protect the public, environment, and U.S. economic interests by preventing and mitigating marine accidents”

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PRESENTATION TOPICS



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- **Overview of Responsibilities of Coast Guard's Marine Safety Organization**
 - **Process for Submitting Novel System Designs to Coast Guard**
 - **Novel Design Acceptance Criteria - Safety Equivalency**
 - **Existing Regulations for CNG Application**
 - **Examples of Coast Guard Plan Review Projects for CNG Fueled Vessels**
 - **Summary/ Conclusions**



Coast Guard's Marine Safety Organization



- **Marine Safety Organization**
 - **G-M (Coast Guard Headquarters)**
 - **Drafting/ Modifying Regulations**
 - **Policy Development for Interpretation of Laws**
 - **Appeal of Plan Review Issues**
 - **Marine Safety Center (CG Centralized Plan Review)**
 - **Engineering/ Hull/ Cargo Divisions**
 - **Safety Equivalency Evaluations**
 - **Marine Safety Offices**
 - **Field Offices - Oversight for Construction & Operation**



General Process for Submitting Novel System Designs to Coast Guard Marine Safety Center

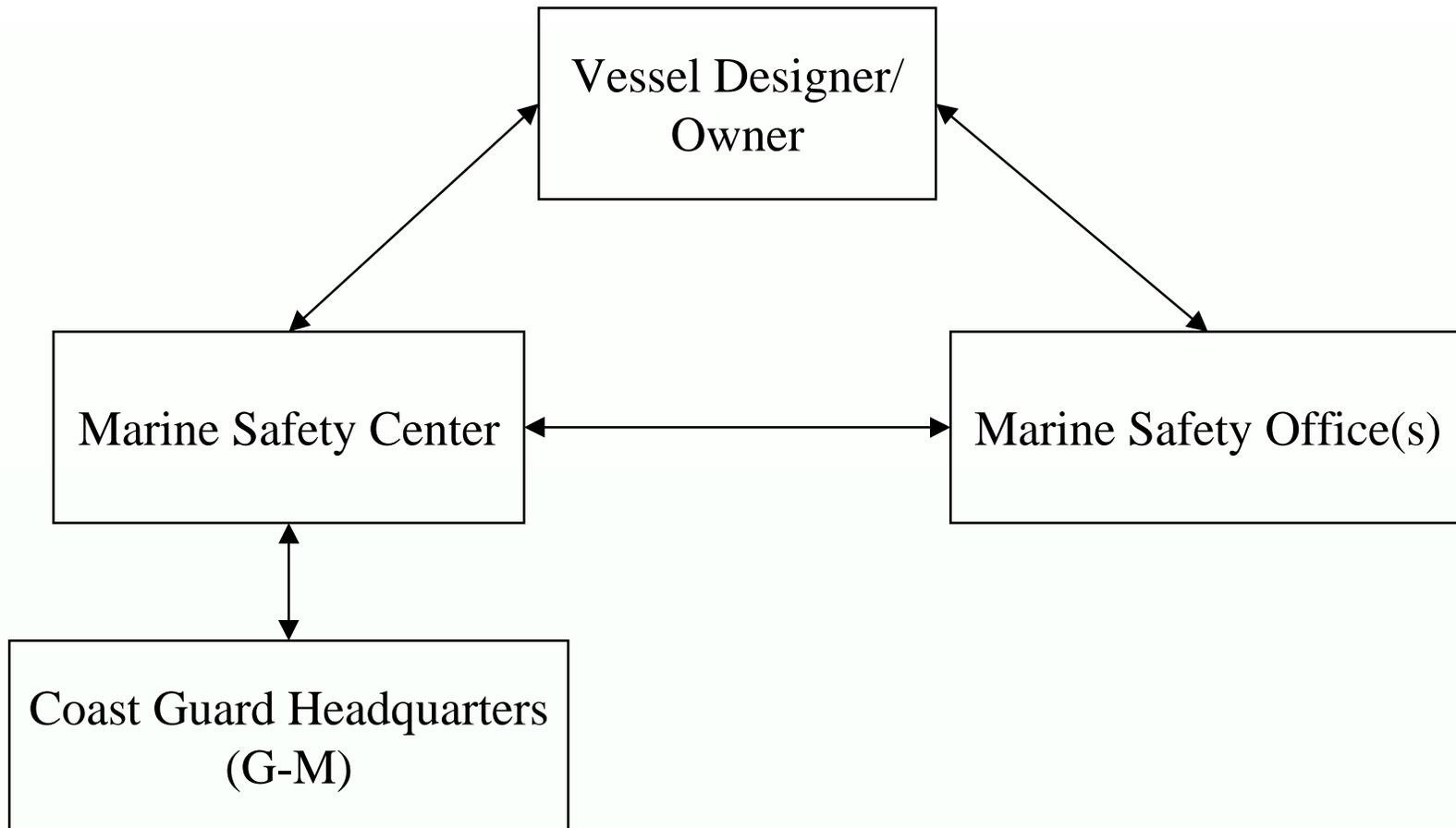


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- **Concept Proposal**
 - Design and Operation Overview of Proposed System
 - Presentation/Discussion with MSC Staff
 - Determination of Coast Guard Headquarters Role in Approval

 - **Detailed Plan Submittal**
 - Plan Review Details Submitted
 - Risk Analysis
 - Failure Mode and Effects Analysis
 - Preliminary Hazard Analysis
 - Fault Tree Analysis

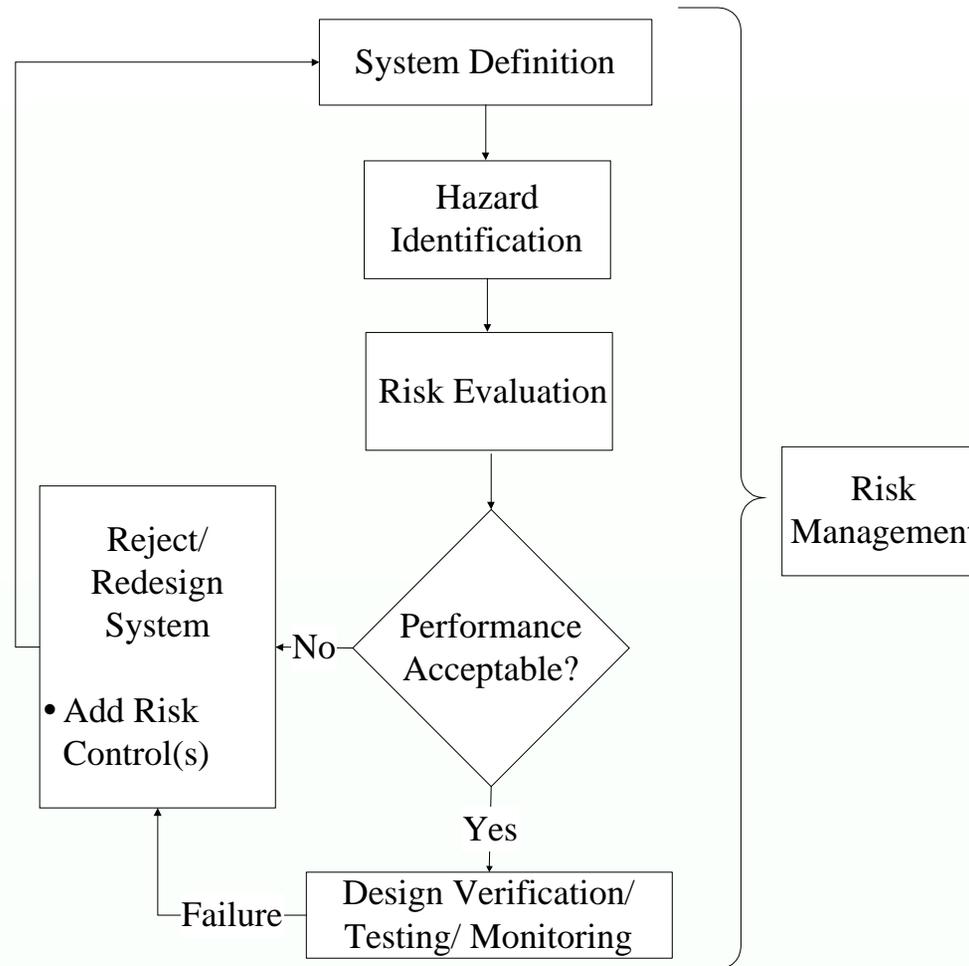


Communication on Regulatory Issues



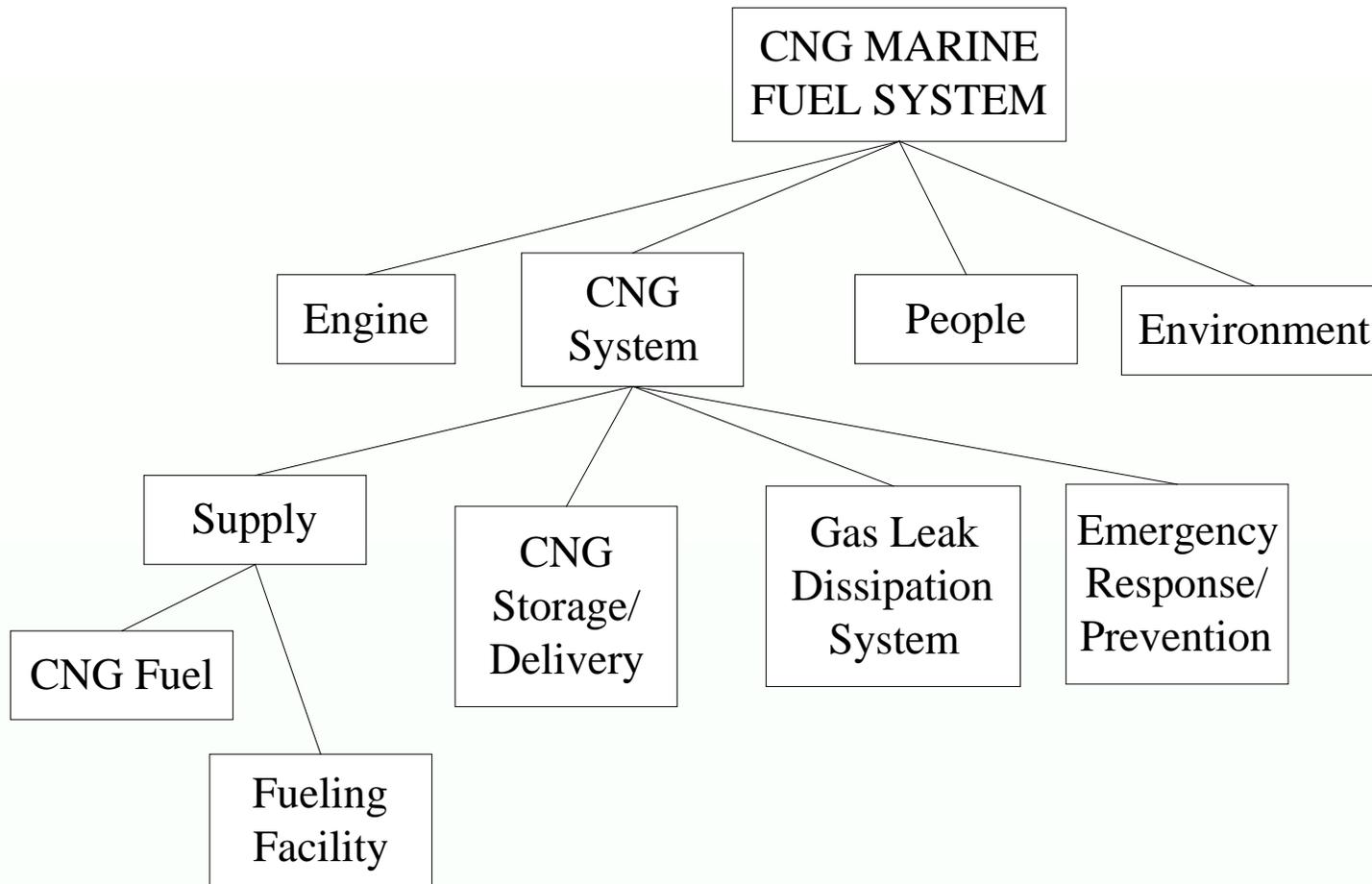


RISK -BASED APPROVAL PROCESS FOR SYSTEM SAFETY





CNG SYSTEM BREAKDOWN - SYSTEM DEFINITION





RISK ASSESSMENT QUESTIONS



What can go wrong?

- Hazard Identification
- Scenario Identification

What is the likelihood?

- Subjective/ Probabilistic

What is the consequence(s)?

- People
- Property
- Environment



RISK CONTROLS



- **Reduce Risk:**
 - Preventing Unfavorable Scenario
 - Reducing the Likelihood of an Event
 - Reducing the Consequence of an Event

- **Possible Means of Controlling Risk**
 - **Engineering Controls**
 - Alternate Design
 - Improved Reliability
 - Additional Safety Systems
 - Warning Devices
 - **Administrative Controls**
 - Training
 - Operating/ Emergency Procedures



Existing Regulations for CNG Application



- **Existing Regulations (Source for Risk Control)**
 - **Code of Federal Regulations**
 - **46 CFR Part 154 - CNG for LNG Tankers Boiloff**
 - **46 CFR Part 54 - ASME PV Code**
 - **46 CFR Part 56 - Piping Standards**
 - **Other Sources of Standards**
 - **ABS/ Classification Society - Main Propulsion Machinery**
 - **NFPA52/ ANSI NGV2**



Examples of Coast Guard Approval of CNG Fuel Systems



- **Marine Applications of CNG Fuel**
 - **LNG Tankers (Auxiliary Machinery)**
 - **JAMES C. ECHOLS (Norfolk Ferry)**
 - **KINGS POINTER (Kings Point Training Vessel)**



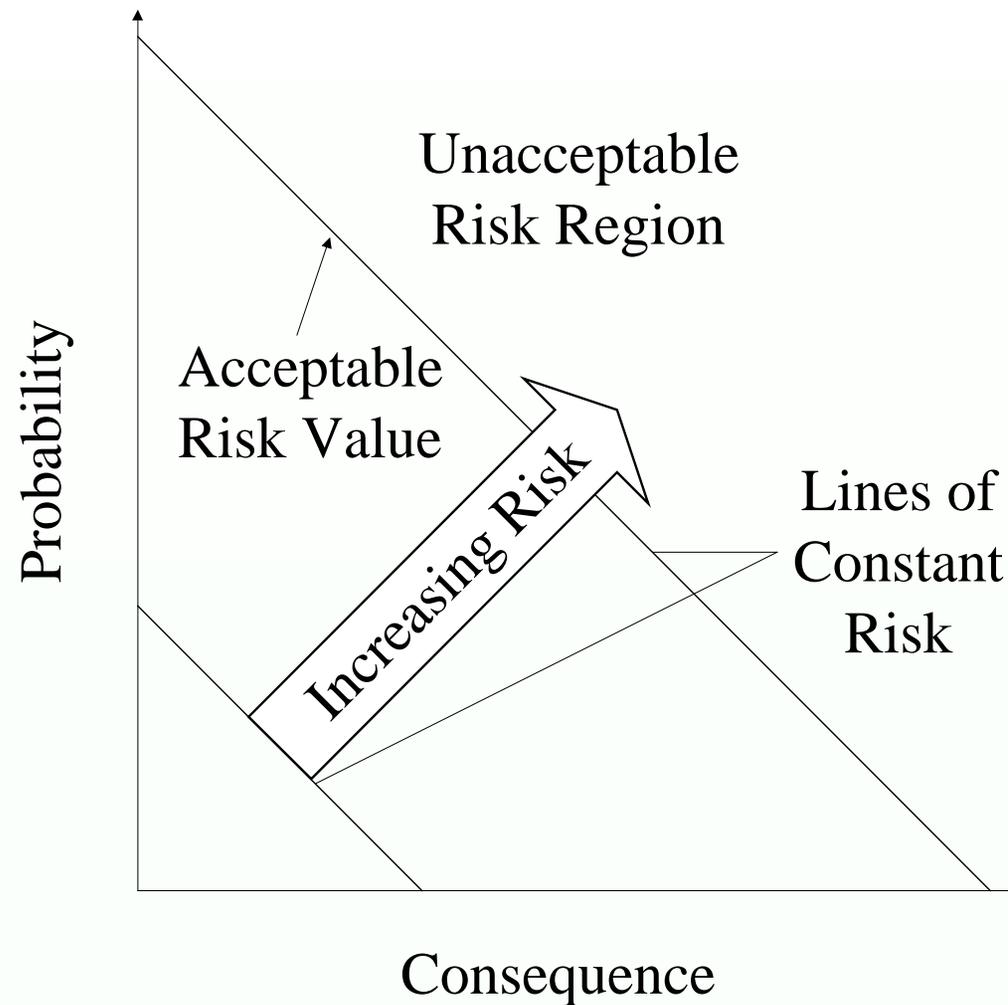
SUMMARY/ CONCLUSIONS



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- **Overview of G-M Organization**
 - **Criteria for Novel Design Acceptance - Safety Equivalency**
 - **Risk Analysis**
 - **Alternative Fuel Regulations**
 - **Existing Applications of CNG Systems**
 - **Acceptance of Novel Concepts on a Case by Case Basis for a Specific Vessel and Operating Zone**



RISK DIAGRAM





RISK ACCEPTANCE CRITERIA IN EXISTING MARINE REGULATIONS



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- IMO High Speed Craft Code & NVIC 5-93 Passenger Submersible Guidance
 - “If end effect is hazardous or catastrophic, a backup system and corrective operating procedure are required.”
 - Single failure must not result in a catastrophic event , unless the likelihood is extremely remote.”

 - Part 62 “Vital System Automation”
 - Failsafe design - to levels of least critical consequence.