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*Consulting Engineers Serving the Marine Community*

# Weight and Stability Management for Research Vessels

Presentation for: 2004 RVOC Meeting

October 2004

**Presented by: Dirk H. Kristensen**

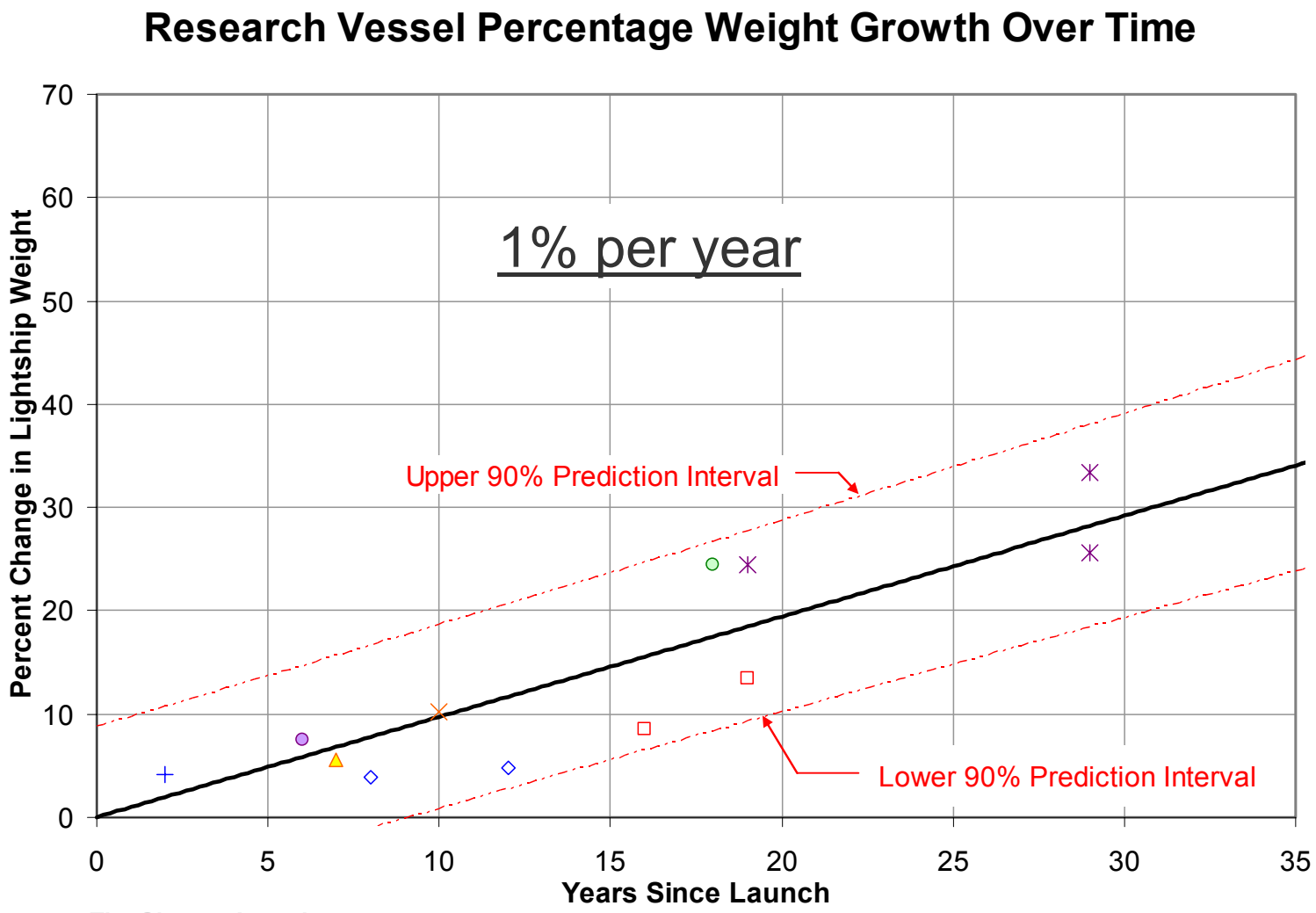
# Presentation Will Cover:

- Importance of Weight and Stability Management
- Problem Scope
- Consequences
- Recommendations

# Importance of Pro-Active Weight and Stability Management

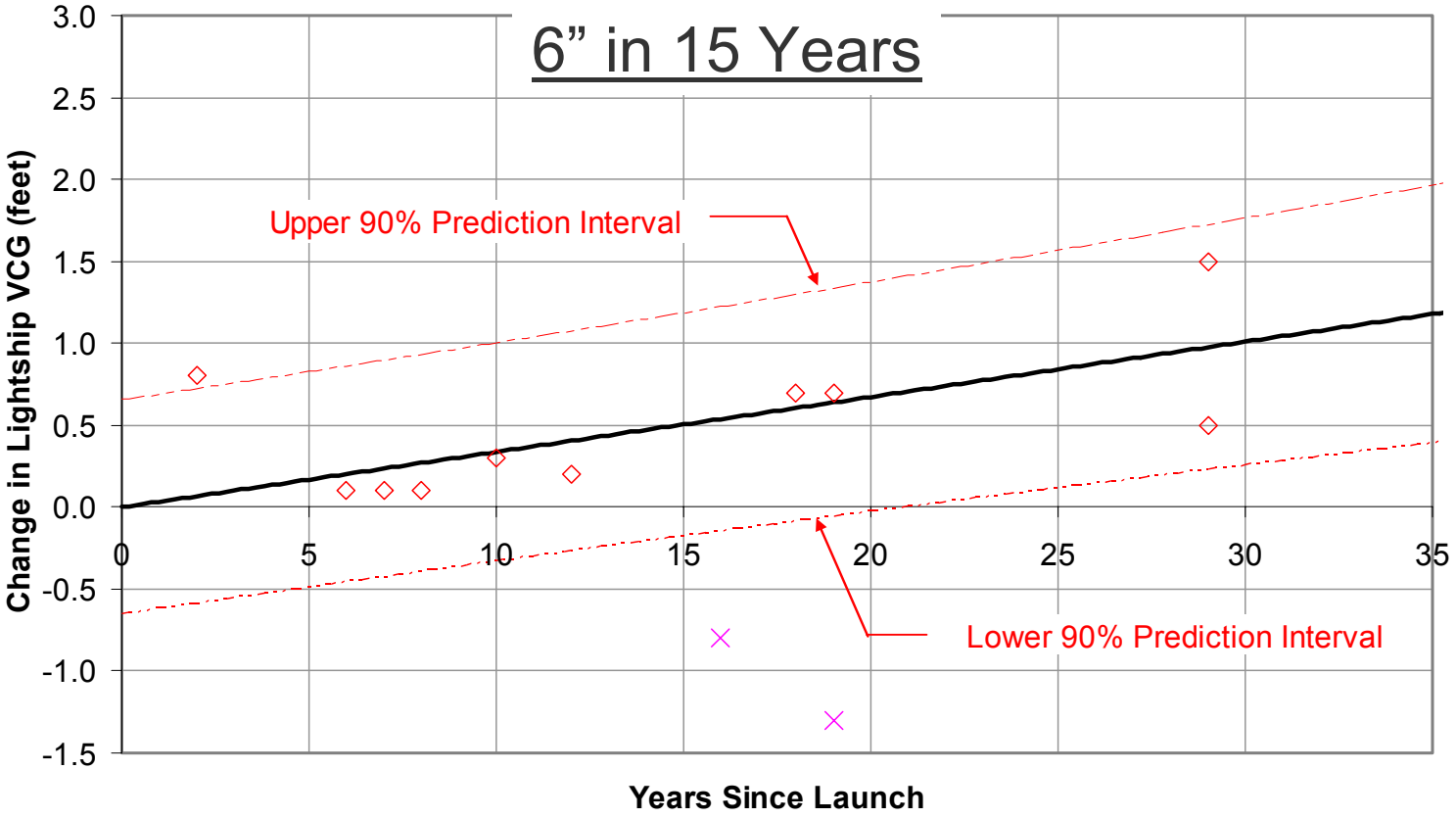
- **Confidence for Vessel Master**
  - Drafts and loading correlate to T/S booklet
- **Knowledge of Vessel Limitations**
  - Science Deadweight Capacity
  - Operational Restrictions
- **Avoid Potential Surprises**
  - Regulatory Approvals
  - Loading Limits

# Problem Scope



# Problem Scope

**Change in Research Vessel Vertical Center of Gravity Over Time**



# Problem Scope

- Average Time Between Surveys or Inclinings is 9 Years
- Shortest Time Between Survey or Inclining is 2 Years
- Longest Time Between Survey or Inclining is 19 Years

# Consequences

- **Impacts to deadweight, range and endurance**
  - Increase in lightship usually means decrease in payload
  - Increase in VCG could mean ballast replaces payload
  - Potential loss of range/endurance
- **Impacts to loading flexibility**
  - Location of payload
  - Crane usage
- **Financial and Schedule Impact**

# Recommendations – Naval Architects

## ➢Naval Architects

- Provide a Cohesive Team to Produce Stability Data
  - ✓ Stability Test Data
  - ✓ Break-down of Lightship Data
  - ✓ Trim and Stability Booklet Data
- Work Closely With Operators
  - ✓ What is included in Lightship
  - ✓ What is The “Permanently Installed” Science Equipment
  - ✓ What Allowances Are Assumed For Crew, Stores, Spares, Etc.

# Recommendations - UNOLS

## ➢Weight Tracking

- Assign Responsibility To An Individual
  - ✓ Track All Weight Additions, Removals, Relocations
- Invoke a System of Weight and Moment Reporting
  - ✓ Quarterly? Per Voyage? Monthly?
- Establish Realistic Weight and Moment Allowances
  - ✓ Service Life Allowances (New Vessels)
  - ✓ Ship's Stores Allowances
  - ✓ Science Stores Allowances

# Recommendations - UNOLS

## ➢Deadweight Surveys and Inclinings

- Frequency
  - ✓ USCG Recommendations
  - ✓ Recommend Minimum 5 Year Intervals
- Roll Test [ $GM = (KB/T)^2$]
  - ✓ Valid if carefully done
  - ✓ Best For Smaller Vessels that can easily be sallied
  - ✓ Recommend Caution In Using

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# Impacts Of NVIC 11-93 Change 3 on Intermediate Size Research Vessels

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# Change 3 Main Differences

- Recent additions to SOLAS regs (after July 18, 1982) must be applied using Convention Tonnage
- STCW is applied using Convention Tonnage
- GMDSS now applicable to most SOLAS vessels

# USCG Tonnage Branch Clarifications

- Primary intent of Change 3 is to implement ISM and ISPS
- Intention of Change 3 is not to have vessels go through a complete refurbishment, e.g., structural fire protection, if not previously subject to these requirements.
- Revisions to existing SOLAS requirements do not change the original implementation date.

# Impacts to Intermediate Vessels

- Dependent on “Built or Substantially Altered” date
- Either tables 5, 6, 7 and 8 in the NVIC will apply to the intermediates engaged on Foreign Voyages
- Vessels Built or Substantially Altered before July 18, 1982 to July 18, 1994 may elect to use Regulatory Tonnage for International Conventions in Effect on July 18, 1982. **Convention Tonnage Must be Used for International Conventions that Became Effective After July 18, 1982 (Such as the ISM Code and ISPS Code).**
- Vessels Built or Substantially Altered on July 19, 1994 must Apply international conventions using convention measurement system tonnages.